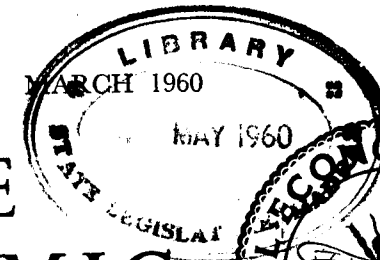
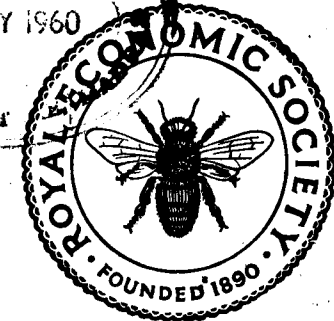


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THE ECONOMIC JOURNAL



THE QUARTERLY JOURNAL OF THE ROYAL ECONOMIC SOCIETY

Edited by SIR ROY HARROD *and* E. A. G. ROBINSON

Assisted by R. C. O. MATTHEWS

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R. C. O. MATTHEWS

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THE ECONOMIC JOURNAL

MARCH 1960

HOW MUCH SCIENCE? ¹

I

It is frequently said that Great Britain is suffering from a shortage of scientists and technologists and of the means for conducting research and development and, since the study of shortages is the main interest of the economist, I propose to examine the reasons usually given for making this statement and to speculate a little about how a community can satisfy itself that it is devoting sufficient of its efforts to scientific and technical matters. As I shall try to explain in a moment, the scale of scientific activities in the country is determined by a very puzzling combination of public and private views, public and private action and, in the last resort, the striking of a right balance will inevitably be a matter of judgment and of intuition. Those who take sides too strongly, therefore, are not likely to give good advice, and I fear that, in recent years, some of those who have taken a vigorous part in the campaign for "selling science to the Establishment" have been prone, with the best intentions in the world, to muddle up good arguments with bad and, paradoxically enough, to push the claims of science against the humane studies by making questionable use of history, economics, statistics and even perhaps educational theory.

I begin with some matters mainly of definition. It has become fashionable to speak of "science and technology" in the singular as if what was true of one was inevitably true of the other. But the generalisations that can be made about the two in common are few. In purpose, method and appropriate scale of operation they can best be discussed separately and, although they may frequently have to be discussed as one, that is nearly always evidence of the limitations of our knowledge about them. The practice of bundling the two together has had some very odd results in recent years: for example, when the Russians, by a highly competent piece of engineering, put the first sputnik into orbit, this was used as a proof that more money should be spent on science in Great Britain.

A second truism. If we train in the Universities more people in the sciences or in technology, then there will be fewer of the ablest segment of the community trained in the other disciplines. This would be untrue only

¹ President's address delivered to Section F (Economics) on September 4, 1959, at the York Meeting of the British Association.

No. 277. VOL. LXX.



if the Universities were at present failing in their task of selection, which I do not believe to be the case. If we decide to have more scientists we must pay the price for it. It is an evasion to suggest that we can have more scientists, more technologists, more historians, more doctors, more economists and so on all at the same time. For the question of quality immediately comes in. The proportions of University graduates who fail even now is high (and incidentally it is higher in science and technology than in other subjects). To scrape the bottom of the barrel more vigorously, to set out to produce what is sometimes described as a "scientific proletariat" would further increase the proportion of failures; unless, of course, University standards are lowered. The right terms, therefore, in which to discuss this whole question is whether the community will gain by having more scientists or more technologists trained at the expense of non-scientists. Some eminent scientists have declared themselves in very forthright fashion on this subject.¹ Whether they were right or wrong they were certainly, to my mind, discussing the right question.

The most important matter of definition, however, relates to the meaning of the word "shortage." For the economist, a shortage exists when at the prevailing price the demand is greater than the supply. There is a shortage of scientists when, at existing salaries, Schools, Universities, Government Laboratories, Research Associations and Industrial Firms cannot get as many of these people as they would be prepared to engage. In these circumstances it is to be expected that salaries of scientists would rise because of the competition for them. What would be needed and what would follow sooner or later in anything like a free market would be a boost in supply. I propose hereafter to use the word "shortage" in this sense: it is a condition of the market.

There is, however, a second, much hazier, meaning given to the word in present-day discussion. There is said to be a shortage when those individuals and institutions which actually exercise the demand for scientists—those same schools, Universities, public laboratories, industrial firms mentioned above—are not demanding enough of them, are making mistakes in not rating sufficiently highly the contribution that such workers can make to the profits of individual businesses or to the national welfare, are not sufficiently "science-conscious." In this sense it is not merely the supply

¹ The late Lord Cherwell, speaking in the House of Lords on November 21, 1956:

"Humanistic studies are agreeable, and were very valuable in their day. But they do not really help the country to survive today . . . The fact remains that the people of this country must be fed and clothed . . . the contribution of a man like Whittle was even more helpful to the people of this country than the efforts of any of the Regius Professors of History in our own Universities."

Also Sir Alexander Todd:

"To suggest that more than a modest number of those now studying, say, history or literature in our Universities were being trained to the best advantage was not only nonsense but at the present time, dangerous nonsense" (*The Times*, January 3, 1957).

but also the demand for scientists which is inadequate. For this situation I propose to use the term "unmet need."

As I say, this "unmet need" is a vague and perplexing concept (although I am not prepared to argue that it is entirely without meaning). It implies that those people and institutions responsible for exercising the demand for scientists do not really know their job as well as some other group of people who have no responsibility for action or for risk-taking but claim to be able to draw upon some source of higher wisdom. For instance, if a statesman or an economist declares that industry would gain greatly from the employment of more scientists, how does he know? Why should he know better than the industrialist? If he is confident of his conclusions why should he not go into industry himself and make the large profits which the existing industrialists are neglecting to make? A second reason why "unmet need" is so slippery an idea is that it is bound up with the distinction between private gain and social gain. It is possible to argue that even if the employment of more scientists by one particular firm will not increase the profits of that firm, yet it will increase the national income. But social gains and social costs are the most difficult things to measure even in a rough and ready fashion.

II

Let us try now, as an exercise, to answer the questions: what evidence is there of (a) a market shortage, and (b) an unmet need for scientists in Great Britain? By scientists I mean (following the classification of the Ministry of Labour) persons trained to University levels in biology, chemistry (other than pharmacy), geology, mathematics, physics and general science.

Let us take market supply and demand first. The number of scientists being turned out by British Universities is on the increase. In 1956-57 the number of degrees and diplomas obtained in pure science was more than twice as great as in 1938-39 and 11% greater than in 1949-50. Between 1955 and 1958 the number of full-time students entering University Institutions for the first time in order to pursue courses in pure science increased by 25%. The output of science graduates is, therefore, certain to move upwards in the next three years. And still further increases are being planned for later years. In the three years 1956-59 the total output of scientists from British Universities was in the neighbourhood of 18,000. This was the supply. What was the demand? Fortunately we have a rough idea of that, because in 1956 the Ministry of Labour undertook an inquiry¹ in order to determine the number of scientists already employed in industry, government and education and the number of additional scientists that, in the view of those who employed scientists, would be required in the following three years. The conclusions reached was that by 1959 the net additional demand for scientists would be about 9,500. Even after making

¹ *Scientific and Engineering Man Power in Great Britain*, Office of the Lord President of the Council and the Ministry of Labour and National Service, 1956.

any reasonable allowance for death, retirement and emigration, it seems fairly certain that in these three years scientists were being produced by the Universities at a rate commensurate with the increase in demand as estimated by those who can be supposed to be in the best position to judge.¹

Have there in recent years been increases in the salaries of scientists disproportionate to the changes in the salaries in other professions, which might have been expected if there had been a shortage? The evidence is very scrappy. In the PEP Report, *Salaries of Graduates in Industry*, 1957, where a study was made of the salaries paid to a random sample of some 4,000 graduates of 1950, the general conclusion was that there was little difference between the earnings of graduates in arts, science and technology. The Report goes on to point out that the pattern of earnings was "not well calculated to encourage men to read science and technology rather than history or languages or some other non-technical subject." By 1959 the median salary of all corporate members of the Royal Institute of Chemistry had reached about £1,700, a 45% increase in the six years 1953-59.² By 1956 the median salary of Fellows of the Institute of Physics reached about £1,950, which represented an increase of 35% in the five years 1951-56.³ In comparison, the average annual salary in manufacturing industry increased by 55% between 1950 and 1958 and the average annual wage by 72%. We must await more figures before reaching a final conclusion. My impression is that the earnings of scientists are still not outstanding in the professional hierarchy; on the other hand, the rapid rate of increase in very recent years may presage big changes.

Even if there is no market shortage is there nevertheless an unsatisfied social need for more scientists? At least four different reasons are given why the community should have more science and more scientists. First, it is said that, quite independently of what kind of career young people may subsequently wish to follow, they should be taught more science in schools and Universities as a part of a good general education. We ought to try to raise the level of scientific literacy. Secondly, it is suggested that more scientific resources should be made available for the purpose of extending man's knowledge of the nature of the physical universe, even if no material advantage could be expected. "The picture we form in our minds of nature will be the more beautiful for being brightly lit." Thirdly, it is claimed that more science is needed in order to strengthen our national defences. And finally, it is stated that more science is a necessity for improving economic standards.

It immediately becomes obvious that the chance of determining "needs"

¹ A new study along the same lines, *Scientific Engineering Man Power in Great Britain 1959*, Advisory Council on Scientific Policy, Committee on Scientific Manpower, came to hand too late to be examined in this article.

² Royal Institute of Chemistry. Remuneration Survey. 1959.

³ Bulletin of the Institute of Physics, January 1957.

of this kind by methods which would possess a commanding logic or find general acceptance seems to be extremely remote. There are great differences of opinion, even between experts, as to the proper place of science in our general scheme of education. How does a community make up its mind what it wishes to spend on the acquiring of pure scientific knowledge which may or may not have usefulness in the narrow sense? It is customary to suggest that the extent to which science should be subsidised for the purpose of national defence is a matter which can be left to military experts. In fact, that is not the case; military needs have no limit and there must be some point at which, as military expenditure increases, the economy as a whole is so weakened that this expenditure becomes self-defeating. Presumably the decisions under the fourth head can be more exactly determined, or at least they can be left to business-men, each deciding on the merits of his own particular case whether increased expenditure on science seems worth while. But even there it is not easy to discern any very clear pattern of business behaviour.

Difficult as it may be to reach a convincing decision about needs on any one of these four grounds, when they are looked at together the complexities multiply quickly. The different needs may be in conflict. In the short period, if the community wants more teachers of science it must content itself with less scientists for work in industrial laboratories. Or, in the longer period, if the community decides that it attaches value to extended knowledge of the cosmos, it may be necessary to sacrifice material standards of living for that purpose. More radio telescopes mean fewer private television sets.

Must we, then, resign ourselves to the idea that the decisions made can never be rational; that action will always have to be taken on but a fragment of all the evidence needed for logical behaviour; and that, having taken decisions, it will never be possible to know whether they were correct or not? Or, on the contrary, can we be confident that, although there can be no precise determination of how much science there should be ideally, yet at the moment there is certainly too little; that although we do not know how far we should go, we can feel confident that we are moving in the right direction? It always seems to me to be an additional enigma of this subject that, despite all its mysteries, outstanding writers and institutions manage, by somewhat mystical processes, to reach confident conclusions that one line of action is palpably preferable to another.¹

In the next section of this paper I examine the broad tests which, at

¹ Thus the British Advisory Council on Scientific Policy, 1956-57, p. 4, says in one breath:

"It is not possible to lay down any proportion of the total national effort on research and development which should *a priori* be devoted to the civil sector"

and in the next:

"But in our view, the resources devoted to civil research and development have been and still are far too small for a country whose competitive position in world trade is dependent upon the economic development of new products and new processes and where the achievement of a rising standard of living must depend mainly on our success in increasing the productivity of the labour force."

various times and places, have been applied in order to determine whether sufficient emphasis is being placed on science. Before doing that, however, it is worth while pointing out that some well-informed observers have suggested that Great Britain is not suffering from an unmet need for more scientists.¹ That view gains support from comparisons between the United States and Great Britain.

In the Appendix, I compare in detail the annual output and the existing stock of scientists in Great Britain and the United States. The conclusions to be drawn (and this is indicative of the grave difficulties of making these comparisons even in the most favourable circumstances) depend crucially upon the view that is taken of the relative standing of science degrees in the two countries. If the first science degree is taken as equivalent in Britain and the United States, then America possesses, and is annually producing, about twice as many scientists in relation to population as Britain. If, on the other hand, the first science degree in Britain is regarded as equivalent to the second science degree taken in the United States, then the advantage would lie heavily with Great Britain. I suggest that, surrounded with all these doubts, a reasonable compromise conclusion is that the two countries are roughly in the same position.

I repeat that I have in this section been dealing with scientists alone. It would be useful if one could prepare a similar analysis for technologists, which roughly means engineers of all kinds. The existing information is not adequate to support conclusions. For the moment it is intriguing to note that in 1955-56 the median earnings of professional engineers was slightly below £1,200.²

III

What tests have been applied to determine whether the resources devoted to science and to technology are adequate? The extensive literature on the subject reveals four ways in which writers have sought to establish their case:

1. International comparisons: thus it is frequently asserted that Great Britain is lagging behind other countries, notably the United States and Russia.
2. Industrial comparisons: if one industry is devoting less effort to

¹ Thus the late Viscount Waverley, speaking in the House of Lords on November 21, 1956:

"So far as pure science is concerned, statistics appear to show that we are in no way behind Russia, the United States of America or any other country. It is in regard to technology or applied science that we are woefully behind."

And Lord Simon of Wythenshawe in the House of Lords on November 21, 1956:

"I want to make it as clear as I can that the crux of the position today is not scientists it is engineers. A Nobel prize winner in physics has recently written: 'The Science departments of our Universities are better and more vigorous than they have ever been in the history of this country . . . What is wrong in this country is that there are far too few engineers to develop our scientists' ideas as fast and as well as is done in some other countries.'"

² *Engineer*, October 1959.

science and technology than others, it is presumed that this is evidence of failure on the part of that industry.

3. The establishment of positive correlations between industrial output and the number of scientists and engineers employed in industry. The presumption, then, is that an increase in the number of scientists and engineers will increase industrial production.

4. The measurement of the net return, for specific inventions or for particular industries or countries, of investment on research and development.

International Comparisons

Although there are honourable exceptions, recent international comparisons of the scale of scientific effort must rank among the most reckless of all statistical exercises ever made. (Indeed, they suggest that what we are most short of are competent and responsible statisticians.) The common argument is that Great Britain is falling behind the United States and the United States is falling behind Russia. But why should it be assumed that Russia is doing the right thing and the other two countries the wrong? From the experience of the last quarter of a century it surely cannot be denied that Russia is capable of inflicting upon herself massive misdirections of her resources. Why not in this case?

What is meant by the statement that one country is falling behind another? What is the right basis for comparison? For example, I have already suggested that, if some allowances are made for differences in educational standards, the number of scientists being turned out annually by American Universities per thousand of the total population may not be very much higher than in Great Britain. But these statistics of graduates can be looked at in other ways. For example, in 1956, 25% of those who graduated with the bachelor's degree in Great Britain graduated with science degrees; whilst in the United States only 4% of those who took the first degree took a science degree. The reason for this is a simple one: the annual output of University graduates in the United States in non-scientific subjects, in proportion to the population, far outstrips that in Great Britain. Is Great Britain, then, in a more or less favourable position than the United States?

Or again, it seems to be roughly true that the money expenditure in Great Britain on industrial research and development as a proportion of national income is about as high as in the United States. Does this mean that the British position is satisfactory? Some may argue so. But others may argue that the British proportion is relatively high only because the national income is low, and the national income is low only because insufficient funds in total are devoted to research and development. The suggestion would be that if Great Britain spent more on research and development then its national income would increase at least *pari passu*, and the proportion between expenditure on research and development and the

national income would still remain the same. If there is anything in this line of reasoning, then the present situation in Britain could be regarded as highly unsatisfactory. In any case, is it safe to regard the *costs* of research and development as a proper measure of fruitful results? How much truth is there, for instance, in the statement often heard that research in America is carried out on a much more lavish and perhaps even wasteful scale than in Great Britain?

I will not elaborate on the other statistical snags in these measurements. What is a scientist or an engineer? To what extent is a man who "come up the hard way" necessarily inferior to a formally trained man? These difficulties are great enough when comparing two countries, such as the United States and Britain, which are similar in many respects. But when we bring into the comparisons Russia, where social institutions are so different, where independent observers are not allowed to move freely (and where, of course, a good Marxist, by definition, would not be above the use of statistics for the purpose of misleading the decadent bourgeois), then the foundations for conclusions become even more rickety.

But taking the figures most commonly employed, there are some formidable obstacles in extracting real meaning from them. For example, it is said that Russia and the United States have about the same number of qualified engineers. It is also said that the total industrial output in Russia is, at most, about half that of the United States. It follows arithmetically that industrial output, per qualified engineer, is twice as great in the United States as in Russia. Does this mean that Russia makes a prodigal use of qualified engineers or that its engineers are inefficient? Or is it that there is some inherent weakness in the Russian industrial system which makes it essential to employ many more qualified engineers per unit of output than in other Western countries?

The Correlation between Industrial Output and the Number of Scientists and Technologists

The only attempt known to me to establish a link between the number of scientists and engineers in employment and the growth of the economy, and, in this way, to predict the future need for scientists and technologists, is that of the Committee on Scientific Manpower.¹ Its argument is worthy of close scrutiny. There are three stages in it which can be set down in the words of the Committee's Report:

1. There is a definable relationship between the rate of increase of industrial production on the one hand, and the number of trained scientists and engineers employed by industry on the other.²

2. It is more reasonable to base our projections of the likely need

¹ *Scientific and Engineering Manpower in Great Britain*, Office of the Lord President of the Council and the Ministry of Labour and National Service, 1956.

² The evidence given in support of this statement is very sketchy. In the United States, where a run of figures of industrial production and the number of engineers exists from 1890, there is a consistent relationship. Thus in the decade 1930-40 industrial output increased 0.15% for each 1% increase in the number of engineers; in the decade 1940-50 industrial output increased 1.2% for each 1% increase in the number of engineers.

for scientific manpower on the assumption that demand within each industry will, on the average, increase in direct proportion to increases in industrial output than on some even more arbitrarily chosen relationship.

3. It would be appropriate to work on the basis of an average increase of industrial production at the rate of 4% per annum.

If, therefore, the number of scientists and technologists is linked to industrial production in this way and if industrial production is to increase at the rate of 4% per annum, then a basis exists for determining the need for the number of scientists and technologists in the future.

This approach is perplexing for more than one reason. Which is supposed to be cause and which effect in this correlation? Is it being suggested that the number of scientists and technologists is the crucial determining factor in economic growth, so that if we do not have a 4% increase in the number of scientists and technologists we cannot possibly enjoy a 4% increase in industrial production? Actually the annual percentage increase in industrial production between 1955 and 1958 was not 4%; production did not increase at all in this period. But the number of scientists and technologists certainly increased. Does this mean that too many scientists and technologists were produced in the period? If not, what becomes of the assumption that there is a definable relationship? If so, and if the crucial mistake made was in the assumption of a 4% increase in industrial production per annum, what is the point of trying to predict the future annual requirements of scientists and technologists by basing it upon another prediction, that of the probable increase in industrial production, which is no easier to make than a straight prediction out of the blue of the number of scientists and technologists required?

An even more puzzling point is that this Committee, along with other authorities, accepts by implication one assumption for which there appears to be little evidence and which is highly pessimistic in character. The assumption is that, since the number of scientists and technologists moves in step with industrial production, output per head of scientists and technologists will never improve, that whatever economies are made in the future they will not be in that particular type of labour. If this were true it would be a striking fact that scientists and technologists could economise in everything but themselves. I do not see why this assumption is made. And I suggest it is pessimistic because, if we accept the idea of a 4% annual increase in industrial production, a short calculation shows that the number of scientists and engineers in Great Britain will have to increase from about 120,000 in 1955 to 5,171,000 in A.D. 2050. That is a lot of scientists and technologists.

Inter-industry Comparisons

Some authorities¹ seek to establish a case for more extensive industrial research and development by pointing out that some industries spend less

¹ See in particular J. K. Galbraith, *The Affluent Society*, p. 99, and the *British Annual Report of the Advisory Council on Scientific Policy*, 1956-57, p. 5.

than others on research and development and by assuming that all industries would gain by raising themselves to the standards of the highest. Now different industries vary greatly in almost every imaginable sense: in capital investment per head; in the raw materials consumed per unit of output; in the types of labour employed; in the methods of financing new expansion; in the extent to which they buy finished or semi-finished parts from other industries; and so on. Nobody doubts that these variations represent the proper responses of different industries to the different circumstances which face them. Why, then, should it be assumed that it is a golden rule, an inflexible uniformity, that, in proportion to size, every industry should spend the same proportion on research and development or devote the same proportion of its labour force to these ends?

The Measurement of the Net Gain Arising from Research and Development

In much recent writing the practice has been common of quoting the costs of research and development as a measure of the returns to them, a practice all the more illegitimate because it is in the case of research and development that costs and returns are most uncertain and most likely to fluctuate from time to time and case to case. There have, however, been one or two recent commendable efforts to strike the balance between costs and returns. Thus Z. Griliches, in the *Journal of Political Economy*, October 1958, "Research Costs and Social Returns: Hybrid Corn and Related Innovations," has carried out a fascinating study of the history of the introduction of hybrid corn in the United States and, after trying to determine, on the one hand, the whole of the costs of the research and development which led to it and, on the other, the net increase in the value of the corn crop as a consequence of this innovation, has reached the conclusion that the social rate of return on the research and development of hybrid corn was not less than 700%. There is a fertile field for other similar studies, but the inherent difficulties of generalising from such cases must always be borne in mind. In any specific case the costs may be so widespread, both in space and time, that it is virtually impossible to identify and total all of them; correspondingly the net advantages of an innovation may spread out in so many directions as to defy measurement. More important, one cannot judge of the general effect of research and development by adding up the successes; there are many more failures than successes.

Nevertheless, as it seems to me, we have here the right kind of question to ask. If nothing had been spent directly on technical progress in the past two decades how much poorer would we be than we actually are? We can, of course, never give a precise answer because it is not possible to isolate from many other forces the specific influence of technical innovation. But orders of magnitude, bearing a rough similarity to the conditions that exist in some Western countries, can be indicated. Let it be assumed that net national output per head is increasing at 2% per annum and that the national ex-

penditure on scientific research and development is of the order of 2% of this output. The causes of the increase in output are various: the use of more capital equipment; improved organisation of existing resources; increased efficiency of labour quite apart from any increase in the use of equipment and, finally, technical innovation. If one-fifth of the annual increase in national output could be attributed to innovation, then the rate of return on the expenditure on research and development would be 20%; if one-tenth of the increase in output could be attributed to this factor, then the return on expenditure would be 10%; if one-twentieth, then the return would be 5%. We cannot make a choice with any great confidence between these different possible answers. But, before we too readily accept the higher, optimistic figures, some sobering facts should be kept in mind.

One is that although there has been an enormous increase in the United States in the sums expended on industrial research and development since 1930, when the modern industrial research laboratories began to make their appearance, there does not seem to be any strong evidence that this has made steeper the general upward trend in output per head.¹ And the second is that if we compare the experiences of the different industrial countries in the period since 1945, or in any part of that period, there does not seem to be any very obvious correlation between the rate of industrial expansion and the resources devoted to scientific and technological effort. In relation to their size, the United States and Great Britain have probably spent most on research and development; but they have not been the leaders in the rate of economic growth. Conversely, Germany and Japan and some other European countries have shown the biggest increases in industrial production per head, although, from any information available, they have not distinguished themselves in scientific and technical expenditures.

IV

My principal conclusion is that we should go on searching for better criteria for determining how much the community should devote to science and to technology. I have no doubt that when everything that can be done has been done in devising objective tests for guiding public policy, much room will still be left for intuition, for judgment, for common sense. I would be the first to admit that the process of shuffling resources about until something like the correct balance is struck is not, in itself, a scientific procedure and certainly not one in which scientists should be allowed the last word.

¹ Thus M. Abramovitz: "It is not clear that there has been any significant trend in the rates of growth of total output and of output per head." ("Resources and Output Trends in the United States since 1870," *National Bureau of Economic Research Occasional Paper No. 52*); and J. W. Kendrick, after suggesting that there was a significant acceleration of productivity advance from the end of the First World War as compared with the prior two decades, goes on "there does not appear to have been either further acceleration, or retardation, in the primary trend rate of increase in total factor productivity since 1919." ("Productivity Trends in Capital and Labor," *National Bureau of Economic Research Occasional Paper No. 53*.)

If, however, there have to be guesses, the more informed they can be the better. To my mind we derive no help from such statements as that "modern science and technology is the greatest force for good or ill in the world today" or that "scientists and technologists have a special responsibility, since it is their genius and their skill which alone can bring the material basis of happiness within the reach of all." These are surely myopic misinterpretations of our world in which religious, political and social (and not scientific) ideas are the great moulding forces.

For those whose task it is to put science and technology on the proper map and in its proper place, the following points are perhaps worth considering:

1. Whilst no one would wish to deny that technology and science (in that order) have contributed much to the raising of standards of living in the last two centuries, there is a disposition in these days to exaggerate the contribution they have made and to underestimate that made by new social organisations and institutions. New ways of collecting capital for investment; new systems of controlling currency and banking; new market organisations for bringing goods and services to the right places at the right times; new conceptions of the virtues of free trading; new legal codes and systems of arbitration enabling trade to be carried on more securely and more speedily; in their totality these social discoveries may have contributed just as much as the technical inventions and scientific discoveries of the period.

2. Much loose talk about "the second industrial revolution" is leading us to overstress the potential material benefits of recent scientific discoveries. Atomic energy, to take the most spectacular case of all, must still rank as a very heavy debit item in this scale. For, as a result of it, fearful peoples everywhere are sacrificing their standards of living for the purpose of creating modern weapons of war or systems of defence against them. As for the peace-time uses of atomic energy, all we have are promises, which in recent months have become increasingly tentative, that, at some unidentified future moment, electricity will thus be generated at a cost as low as the present cost of producing electricity by burning oil or coal under boilers.

3. It is by no means clear that for those countries with urgent short-period economic problems, such as intractable balance-of-payment difficulties or levels of poverty which are politically explosive, more science and technology should have the highest priority. It is usually said that for increasing the British export trade the first need is for more vigorous and better-trained salesmen. It is rarely if ever said that British products are failing to sell abroad because of the lack of qualities which they might have possessed if our science had been more advanced or our technology more progressive. In the other field I doubt whether the first need of the undeveloped parts of the world is for more science and technology; indeed, they cannot utilise fully the existing stock of knowledge. On the contrary, what they need above all are more men of the administrative and managerial type and the pervasive spread of specialised skills of all kinds which Western countries take

for granted.¹ India, in particular, seems to me an area where administrative acumen and not more science is the top priority; certainly in that country in recent years the shortage of economists who understood properly the limitations and pitfalls of central economic planning has exposed the economic system to violent stresses that it could well have done without.

4. When something is in short supply the most useful immediate step that can be taken is to economise to the utmost in the use of it. It is, therefore, of extreme importance that the scientists and technologists we already have should be employed to the best effect. I wonder whether that has been true in the recent past in Great Britain.

5. Striking the right balance as to the number of scientists and technologists calls, as I have said, for both public and for private decisions. Errors, carrying with them serious possible consequences, may arise if both types of decision are not made with an eye on the market. Governments may make provision to encourage more young people to train as scientists, but, in the last analysis, it will be business-men who will have to employ most of them. There are reasons for supposing that, as a result of a shortage, the demand for scientists may snowball in a way which will make likely a surplus in the future. If, for example, there is a sudden increase in the demand for scientists in industry, then, since the total supply cannot increase instantaneously, the first direct consequence would probably be that scientists teaching in schools and Universities would be drawn into industry by the higher salaries offered there. So that just at the time when more science teachers were required to augment the annual supply, fewer would be available. The boom would be intensified. And if efforts are made to meet the shortage quickly, then the annual output of new scientists might easily be raised to the point which was too large to meet normal requirements when the backlog had been satisfied.

Allow me to illustrate what I mean by "keeping an eye on the market." First, it is a good working rule to suppose that a business-man knows his business better than anybody else. It is to be feared that the vigorous propaganda from outside for more science and scientists in industry, especially when firms can set costs against taxation at high rates, has sometimes led to industrial research laboratories being established which have had little purpose or value. Second, if the demand for scientists does increase, it is desirable that the salaries of scientists should be allowed to rise: for this at once tends to damp down demand and to increase supply. In this connection I cannot help but feel that the general policy in British Universities of striving

¹ Lord Heyworth, in his annual speech in April 1959, spoke of these problems of the backward countries:

"There is no pattern of upbringing, no system of education, to develop the outlook and specialised skills which we must look for in countries like this. We cannot do a very great deal to improve matters because the development of patterns of society and ways of thought is part of a nation's historical development which no single firm could massively influence."

to maintain income equality among the various faculties is short sighted and indeed self-frustrating. If the Universities accept the contention that there is a shortage of scientists and that there is a case for swinging the balance somewhat in favour of science in the Universities, then it is inconsistent to prevent the salaries of scientists from rising in relation to other University salaries. The principle of equality, of trying to pursue a given policy in defiance of the market, is also self-defeating, for it means that the Universities, for a given salary, will get lower-quality people in the faculties short of teachers than in other faculties. Third, if Government Departments and businesses really consider themselves short of scientists they should be prepared to narrow the margin between scientists' salaries and the higher salaries usually given to administrators (often scientists turned administrators); conversely, if they deem it wise not to narrow this margin, they should accept the logic that it is administrators who are in short supply and not scientists.

6. The recent boosting of science has taken the form of arguments which might easily be fatal in the long run to the autonomy of science. The doctrine has been widely spread that, even where scientific investigation is not directed towards some specified, materially useful end, yet it can be confidently assumed that it will more often than not have such a result. If the public, acting through its Government, succumbs to such appeal and puts down its money for what has been offered as a sound investment, it will not unnaturally look forward to a return. It will expect scientists to devote themselves largely to those investigations most likely to lead to material gains and to accept public guidance and control. In "seeking to sell science to the Establishment" scientists may also sell themselves to the Establishment. In fact, the overwhelming mass of scientific thought and observation in the Western world was never designed to bring, has not brought, and is highly unlikely ever to bring the slightest improvement in material standards of living. This, of course, is not a confession of failure. It is simply one way of asserting that the ultimate purpose of science is not to cater for the lower claims of material progress, where indeed its yield is uncertain, fluctuating and sometimes even negative, but to satisfy the higher needs of knowledge for its own sake, where its returns can hardly ever fail to be positive.

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APPENDIX

1. *The Stock and the Annual Production of Scientists in the United States and Great Britain*
The comparison of the existing numbers and the annual output of scientists in the United States and Great Britain is a hazardous undertaking for many reasons, but for two above all others:

(i) In Great Britain the only figures of existing stock relate to "Qualified" scientists. This includes University graduates together with the corporate

and graduate members of certain professional institutions and the associates of certain educational institutions. But, generally speaking, the level is that of the University graduate. In the various surveys in the United States it appears that a somewhat lower standard than this has been normally adopted. Thus in the U.S. Census of Population, Occupational Tables, it appears that, in the past, a considerable proportion of "Chemists" have not had four years of College (*The Demand and Supply of Scientific Personnel*, D. M. Blank and G. J. Stigler, p. 11). In more recent surveys by the National Science Foundation a Scientist is defined as one "engaged in scientific work . . . at a level which requires a knowledge of . . . physical, natural or mathematical sciences equivalent at least to that acquired through completion of a 4-year professional college course." This clearly would make it possible to include those who were self-educated or had come up "the hard way."

(ii) In both countries there are, of course, statistics of the annual number of graduates in the important science groups. But is the first degree, the B.Sc. in Great Britain and the B.S. in the United States, of the same standard in the two countries? It seems impossible to be dogmatic about this. The level of achievement demanded for the first degree varies more widely between one educational institution and another in the United States than in Great Britain. Some observers have gone so far as to assert that the B.Sc. in Britain should be compared with the M.Sc. in the United States (e.g., *Universities and Industry*, Productivity Report: Anglo-American Council on Productivity, pp. 11, 12). Without going so far as that, it seems reasonable to suggest that the British first degree is of a higher standard than that in the United States.

2. *Annual Output of Graduates in 1956*

The figures for the two countries are shown in the tables below.

GREAT BRITAIN

First Degrees Awarded in Pure Science Faculties, 1955-56

Honours					
Chemistry	.	.	.	.	1,027
Physics	.	.	.	.	624
Mathematics	.	.	.	.	465
Total Degrees *	.	.	.	.	4,920

* Including Pass Degrees

Source: University Grants Committee.

UNITED STATES

Earned Degrees Conferred at First and Second Level, 1956

Field	Bachelors' and First Professional Degrees	Second Level Degrees
Chemistry	6,178	1,164
Physics	2,335	742
Mathematical Subjects	4,660	898
Total *	28,898	5,312

* I.e., Biological Sciences, Mathematical Subjects, Physical Sciences.
Source: Statistical Abstract of the United States, 1958.

The conclusions which will be drawn from these tables will depend greatly upon one's judgment of the comparative standards of the first degrees. If the standards were the same then, taking together Chemistry, Physics and Mathematics as the most clear-cut group, the United States, with a population three and a half times greater than that of Great Britain, would show an output of graduates six and a half times greater. If the British bachelor's degree corresponded to the U.S. master's degree, then the United States would show an output of graduates only about one-third greater than the British. If the truth lay somewhere midway between these two assumptions, it would suggest that, after allowing for the different size of population, the output of science graduates was about the same in the two countries.

3. *The Existing Stock of Scientists*

Ideally, it would be desirable to compare in the two countries the total number of scientists employed in all tasks, the number employed in industry and, within the number employed in industry, the number employed in research and development where the scientist is engaged upon the tasks for which he has been scientifically trained. The nearest approach to this ideal is provided in the tables below.

GREAT BRITAIN

Qualified Scientists Employed by All Authorities and in Industry, 1956

Qualified Scientists	All Authorities *	Industry
Chemists	20,692	13,195
Physicists	10,484	4,132
Mathematicians	11,482	1,387
Total	51,228	19,468

* Central Government; Local Authorities; Education and Industry.
Source: *Scientific and Engineering Manpower in Great Britain, 1956.*

UNITED STATES

Scientists Employed by All Authorities; in Industry and on Research and Development in Industry, 1954

	All Authorities	Industry	Research and Development in Industry
Chemists	—	60,000	26,800
Physicists	—	7,500	4,800
Mathematicians	—	6,400	2,500
Total	290,000 (?)	145,000	52,000

Source: *Science and Engineering in American Industry: 1953-54 Survey*, National Science Foundation.

Here again we reach the conclusion that with three and a half times the population the United States appears to have six times the number of scientists possessed by Great Britain. That margin would be reduced in proportion as the standard of "scientist" were lower in the United States.

PROGRESS IN BRITISH MANUFACTURING INDUSTRIES IN THE PERIOD 1948-54¹

A. INTRODUCTION

THIS paper presents the preliminary results of a piece of research, the aim of which is to measure changes in the productivity of manufacturing industry in the United Kingdom, taking account of changes in the amount of both capital and labour used. The selection of the particular period, 1948-54, once it had been decided to investigate contemporary conditions, was determined by the availability of statistics. The decision to examine manufacturing industry was taken on the grounds that, in that sector, meaningful measures of changes in output in real terms are available.

An effort is made only to measure changes in efficiency, or "progress." No attempt is made to assess how far the actual level of efficiency falls below some theoretical standard which might be regarded in some way as "best known practice." Such discrepancies probably vary considerably between industries, offering scope for different rates of progress, quite apart from the development of new techniques. Considerations of this nature are obviously of importance in interpreting the measures of progress.

At this stage, manufacturing is divided into the fourteen industrial orders, for each of which the progress is calculated. Not only is there the purely descriptive advantage in measuring progress industry by industry, but also this approach is essential for the purpose of analysis of the causes of progress, though for this latter purpose a finer classification would probably be of greater value. It is hoped at a later time to measure progress for about forty manufacturing industries, and at that stage to analyse the results more completely. The immediate objectives of this exercise are, first, to develop a measure of economic progress which can be applied industry by industry, and secondly, to apply that measure to a small group of industries.

A useful conceptual starting-point is to consider measures of change in labour productivities. In recent years these have had considerable vogue, though they have obvious serious limitations. In working with them one is permanently aware of the problem of the extent to which any labour productivity increases are attributable to changes in the quantity of capital employed, which in this context is regarded as the use by industry of physical resources. Data on changes in capital/output ratios would obviously throw light on the significance of changes in labour productivities, but in the

¹ The authors wish to thank Mr. M. Farrell for useful suggestions and the statisticians of several government departments for their help in providing essential data. They are also much indebted to Miss M. Vidaković, who was employed at the Department of Applied Economics for two years as one of the two research workers engaged on the project.

absence of further information the two factor/output ratios would be difficult to handle.¹ Yet an obvious requirement of any measure of progress is that some allowance must be made for capital as well as for labour.

Of course, this procedure of allowing for more than one factor could theoretically be carried further. Yet land, for example, is thought to be fairly insignificant in manufacturing industry, and entrepreneurship is impossible to measure satisfactorily. In the analysis which follows, the quantity of these inputs is implicitly assumed to move proportionately to the quantity of capital, and changes in the *quality* of entrepreneurship (if any) are one of the factors which are reflected in our measure of progress. This treatment should be borne in mind when the progress figures are examined.

Conceptually, then, the measure of progress presented in this paper is one which shows changes in "output per unit of (all) inputs," instead of relating output only to one input, *e.g.*, labour. It is perhaps of some interest to record, however, that our first ideas were to measure the rate of "real" return to additional capital invested in each of the various industries. This we sought to do by subtracting from the increase in output produced between two years an allowance for extra labour employed, and then relating the residual change to the additional capital employed. This approach of allowing progress in each industry to be reflected in the rate of real return on extra capital employed had many attractions, apart from its apparent avoidance of awkward statistical problems; thus it seemed to correspond with the fact that capital takes the residual share of a firm's output, and also with the idea that progress stems mainly from the introduction of new capital into industry. But the results soon showed what should perhaps have been obvious *a priori*, namely, that an industry's output may increase by amounts which are quite disproportionate to the amount of extra capital introduced, because the increases may have little or no logical connection with it, being due—for example—to improved methods adopted in firms which have introduced no new capital.²

For this essentially empirical research little attention has been given to the more theoretical problems which arise in measuring capital. The relevant capital concept in this work has been taken to be the "quantity" of real resources, buildings, plant, machinery, vehicles and stocks employed by an industry. Basically, as will be seen, these assets have been measured on the principle of constant-price replacement cost, net of depreciation.

¹ Account has to be taken of the fact that the relative importance of capital and labour varies between industries.

² We found it helpful to quote to one another Adam Smith's classic example of the boy who reduced the amount of labour required to work a "fire engine" by means of a piece of string. Had we adopted the above approach, the calculation would have shown the real return to the capital introduced (the string) as many thousands per cent per annum: in this case it is clearly wrong to attribute the gain either to the capital or to the remaining labour, and such improvements in methods which involve only minor changes in labour or capital may be important.

B. METHOD

(1) *The Ratio Method*

In deriving a measure of changes in economic efficiency one is concerned with obtaining measures of physical change for each of the variables being considered, which with the aid of economic weights are combined to derive net output¹ per unit of "combined" factors. This method defers to the requirement discussed above that factors are not related to net output in turn, since the initial step in the procedure consists of combining the two factors labour and capital, the combined input then being related to net output. The change in efficiency can then be gauged by tracing these measures of net output per combined factor input over time, and the efficiency change is defined as the ratio of the rates of change of net output and of combined inputs. It can be conveniently set out in an index form:

$$\text{Productivity Index} = \frac{\text{Net Output Index}}{\text{Combined Input Index}} = \frac{\frac{O_2}{O_1}}{\frac{I_2}{I_1}}$$

In fact, our concern is primarily with the additional efficiency, and in consequence,

$$\text{Progress during the period} = \frac{\frac{O_2}{O_1}}{\frac{I_2}{I_1}} - 1$$

For conceptual purposes the most important characteristic of progress in this ratio form is that concern need be directed only at the weights attached to two of the three variables being considered, labour and capital. No relationship between the input prices and the net output price need be specified.

Measuring the combined input index means obtaining the weighted average of the labour and capital indices, a procedure which gives rise to two quite separate weighting problems. The first problem is, irrespective of time, what are the appropriate weights for these factors? The second is, from which point of time during this period are weights to be taken?

(2) *The Weights Used*

The usual method of obtaining a quantity index—valuing the units under consideration at their respective prices in a base period—is adopted, units of labour being valued at a wage rate and capital at a unit return. Thus the labour index is weighted by the base-year wage bill and the capital index by something which for the moment may be thought of as base-year profits (including rent and interest).²

¹ As will be seen, output is used net of raw material, services purchased from outside the industry and depreciation.

² Its exact nature is discussed below.

The main results presented in this paper are obtained with the use of the customary base year (*i.e.*, 1948) prices. The results of some calculations using 1954 prices are also given and present a picture very similar to that obtained with base year prices.¹

Symbolically:

	Base Year (1)	End Year (2)
Number of man hours	L_1	L_2
Wage rate	w_1	
Quantity of capital	C_1	C_2
Return to a unit of capital	r_1	
Volume of net output	O_1	O_2
Net output price	P_1	

The combined factor input index is:

$$I = \frac{w_1 L_2 + r_1 C_2}{w_1 L_1 + r_1 C_1}$$

$$\text{Progress} = \frac{P_1 O_2}{P_1 O_1} - 1$$

The suitability of the base-year return to capital in each industry to serve as its "price" for weighting purposes requires rather close examination, though a full treatment would take us outside the limits of this article. The return to capital depends on the level of profits and the amount of capital employed. Of these two, profits are a residual return, the level of which fluctuates with changes in the amount of contractual payments and variations in demand and output price. In consequence, particularly owing to short-term price/demand changes, profits are subject to fairly wide variations; in contrast, over a short period the amount of capital employed is fairly constant. Thus short-run increases in demand tend to be reflected in higher utilisation of capital, possibly higher output prices and a high return to capital; temporary falls in demand lead to lower utilisation, lower output prices and a low, perhaps negative, return to capital.

As a consequence, the observed return to capital tends to be a volatile figure, being unstable between industries and over time, and may on occasions take a negative value. There is therefore much reluctance in accepting a pattern of returns to capital observed at any one moment of time as even approximating the likely contribution of capital to output. Even if such a set of returns were available, they might well have to be rejected for our purpose.

¹ The actual calculation of progress using 1954 prices raises a statistical difficulty. In the same way that the relative prices of output, labour and capital assets vary over the period, similarly since the output of any one industry is made up of the production of more than one item, there will be relative variations in the prices of these. Unfortunately 1954 weighted production indicators are not available for this period, and the calculation on the basis of 1954 can be carried out only if the 1948 weighted production indicators, calculated by the C.S.O., are regarded as single quantity relatives for each industry. It is with this assumption that progress on 1954 prices is calculated.

A possible escape from this dilemma is to postulate on an *a priori* basis a capital charge to be applied to all industries. After some thought and taking into consideration the magnitude of earnings gross of tax open to new financial capital, it was decided that a reasonable charge, excluding any depreciation element, and imposed on written-down capital at replacement cost (including stocks and work-in-progress), should not be below 10% or greater than 20% per annum. In fact, for most of the calculations undertaken, a charge of 15% on capital was made¹; calculations using the estimates of real capital stock which are available indicate that the return in 1948 was of about this size.²

Our inclination is to regard the charge of 15% per annum for capital as being if anything on the high side; we sought to err in this direction rather than the other in order not to understate the effect of introducing capital into measures of progress. The effect on the figures of choosing some other rate is, of course, significant, but not as great as one might fear. Thus for All Manufacturing progress in the six-year period 1948-54 comes out as follows:

Assumed charge for capital, % per annum.	Estimate of "progress" in six years, %.
10	16.1
15	13.2
20	10.5

Using this 15% charge for capital ($= r'$), progress is now given by:

$$\text{Progress} = \frac{P_1 O_2}{\frac{w_1 L_2 + r' C_2}{w_1 L_1 + r' C_1}} - 1$$

(3) *The Absolute Change Approach*

Measures of the stock of capital employed by individual industries, even in the fairly straightforward sense in which it is required for our purpose, are still very much in the pioneer stage,³ and in consequence it was thought

¹ This uniform 15% charge is ultimately levied on new capital being employed by an industry. One can regard it as the social, or opportunity cost to be met by each industry for the use of new capital. It is interesting to consider whether a uniform wage should similarly be charged per man capital. It is interesting to consider whether a uniform wage should similarly be charged per man capital. It is interesting to consider whether a uniform wage should similarly be charged per man capital. On the whole, it in each industry, instead of adopting the base-year wage as the weighting price. On the whole, it seemed to us that inter-industry variations in wages should be retained as reflecting in some degree differences in skill, but the arguments are nicely balanced. Proportionately the differences are much smaller than those in the return on capital.

² For details of this calculation, see Technical Appendix.

³ F. N. P. Redfern, "Net Investment in Fixed Assets in the United Kingdom 1938-1953," *Journal of the Royal Statistical Society, Series A*, Vol. 118, Part II, 1955, pp. 141-92.

Redfern's data, derived on the perpetual-inventory method, include figures of gross and net capital stock for Manufacturing and Distribution. No figures are given, however, for our individual industries.

T. Barna, "The Replacement Cost of Fixed Assets in British Manufacturing Industry in 1955," *Journal of the Royal Statistical Society, Series A*, Vol. 120, Part I, 1957, pp. 1-47.

Barna's capital data are based on insurance values. Whilst gross capital figures are presented for each industry separately, Barna has no information on net capital stock, and our concern is primarily with this.

inadvisable to have such preliminary figures as a base for one of the three main variables being considered.¹ In contrast, gross capital formation figures are available on a much firmer basis, particularly for the period since 1948. This prompted an attempt to derive a formula which enables the variables to be expressed in the form of an absolute change (thereby dispensing with the need for base-year total figures) and yet provides an approximation to progress as yielded by the ratio approach.

If it is assumed, first, that the actual labour and capital returns exhaust net output in the base year, and secondly, that the actual capital return (r_1) as opposed to 15% (r') is being used, then:

$$w_1L_1 + r_1C_1 = p_1O_1$$

With this, the ratio formula given above simplifies to

$$\text{Productivity Index} = \frac{p_1O_2}{w_1L_2 + r_1C_2}$$

With:

ΔO = Extra output (compared with 1948) produced in 1954

ΔL = Extra labour (compared with 1948) employed in 1954

ΔC = Extra capital (compared with 1948) employed in 1954

Then:

$$\begin{aligned} w_1L_2 &= w_1L_1 + w_1\Delta L \\ r_1C_2 &= r_1C_1 + r_1\Delta C \end{aligned}$$

So that:

$$\text{Productivity Index} = \frac{p_1O_2}{p_1O_1 + w_1\Delta L + r_1\Delta C}$$

In effect, this expression is comparing net output in the end year (p_1O_2) with base-year net output (p_1O_1), together with an allowance for the additional factors employed ($w_1\Delta L + r_1\Delta C$).

Furthermore,

Since

$$p_1O_2 = p_1O_1 + p_1\Delta O$$

$$\text{Progress} = \frac{p_1\Delta O - (w_1\Delta L + r_1\Delta C)}{p_1O_1 + w_1\Delta L + r_1\Delta C}$$

The logic of this formula is really quite straightforward. If the quantity of factors used had been the same in the two years we would measure progress simply by dividing the increase in output by the output in the base year. Where, as is usually the case, more factors were used in the later year, we must obviously subtract an allowance for this from the extra output; we must also add an allowance for extra factors to the base-year output

¹ These stock of capital figures are, however, used to estimate figures of somewhat less importance.

before relating the adjusted increase to it, since the extra productivity applied to them too. Thus we may think of "progress" as

$$\frac{\text{Increase in output, less Allowance for extra factors}}{\text{Output which would have been attained with unchanged productivity}}$$

The principal characteristic of this formulation of progress is that it requires us to introduce a relationship between the output price and the prices of the factors, instead of merely an "internal" relationship between the latter (for weighting purposes).

(4) *The Required Modification to the Absolute Change Formulation*

With the adoption of a uniform 15% (r') as the rate to be applied to capital we have the difficulty that in general the rewards of the factors will not add up to the value of the product: in symbols,

$$w_1L_1 + r'C_1 \neq p_1O_1$$

As a consequence of the reasoning in Section (2) we can regard this discrepancy as arising from the presence on the output side of the equation of the *observed* net output price, rather than the net output price appropriate to the postulated return to capital of 15%. Since the absolute-change formula depends for its exact applicability on the identity of the above equation, in using 15% as the weight for capital the corresponding net output price should be substituted for the observed price. This (p'_1) is given by:

$$w_1L_1 + r'C_1 = p'_1O_1$$

Alternatively:

$$p'_1 = p_1(1 + h)$$

and

$$w_1L_1 + r'C_1 = (1 + h)p_1O_1$$

Progress is now given by:

$$\begin{aligned} \text{Progress} &= \frac{(1 + h)p_1O_2}{w_1L_2 + r'C_2} - 1 \\ &= \frac{p_1\Delta O - (w_1\Delta L + r'\Delta C) + hp_1\Delta O}{p_1O_1 + w_1\Delta L + r'\Delta C + hp_1O_1} \end{aligned}$$

At this point it is evident that the problem introduced by the absence of capital stock statistics cannot be completely avoided, since the base-year stock of capital is required to calculate the net output price discrepancy h .

$$h = \frac{w_1L_1 + r'C_1}{p_1O_1} - 1$$

If no data at all on capital stock are available, h cannot be found, and an approximation only to progress is given by the formula:

$$\text{Progress} = \frac{p_1\Delta O - (w_1\Delta L + r'\Delta C)}{p_1O_1 + w_1\Delta L + r'\Delta C}$$

Inspection of the two formulæ suggests that the approximations are likely to be fairly good, even where h is as large as is at all probable, since its introduction moves both numerator and denominator in the same direction. The effect of a given h will be proportionately greatest where an industry has expanded considerably, but progress is small, so that nearly all the increase in output is absorbed by the allowance for additional factors; where there is no allowance to be made for additional factors, no problem arises.

The main sets of results presented here are derived from this formula as approximations to progress. This means that they are derived without any use of the uncertain figures for the stock of capital existing in 1948.

(5) *Estimates of Progress with Adjusted Net Output Price*

It is possible, however, using the figures of capital stock presented by Barna and Redfern to arrive at some estimates of the net stock of capital employed in each industry. The method of obtaining these estimates, which are of very poor reliability, is set out in some detail in the Technical Appendix. Despite their unreliability, it is thought that they can be used to yield for each industry an estimate of h , in effect the appropriate net output price by which the approximate progress results may be adjusted. One should appreciate that, in view of the poor reliability of the capital stock statistics, the consequent estimates of progress with this adjustment are not necessarily superior to the results yielded by the approximate progress calculation. It is probably better to regard differences between the two measures as an indication of the magnitude of error attached to the particular approximate progress figure, which is attributable to the use of the actual net output price rather than that corresponding to a 15% return to capital.

Since the capital charge applied is little different from the estimated return to capital in 1948, the value of h obtained for All Manufacturing is, of course, small, and the resulting adjustment to progress is negligible. Individual industries have fairly high values for h , but, though the disparity between progress and adjusted progress is consequently more marked in particular industries, in no industry is the adjustment very great. Taking all the industries, the average differences (neglecting sign) between the two sets of results is only 0.2% per annum.

C. TIME LAGS AND STATISTICAL POINTS

Selection of the period 1948-54, for the main calculations, was determined by the availability of the statistics. Sufficiently detailed capital formation figures or production indices were not available prior to 1948, and the year of the latest full census of production, 1954, determined the choice of the end year.

The application of the progress measure to such a short period as six years has some disadvantages, in particular the effect of new capital may not be fully felt. In this research it has been provisionally assumed that on average we can treat capital expenditure in all industries as fully effective from the beginning of the calendar year succeeding that in which it was made, but as having no effect within that year. This assumption must be justified mainly on the grounds of convenience for use with annual figures; broadly speaking, it implies an average time lag of about six months between expenditure and fully effective operation. Over a long period, these effects may be neglected, but applying the progress measure to as short a period as six years, in so far as the above time lag is inadequate, might give unwarranted results in those industries where the rate of capital expenditure was much higher at the end of the period than at the start. Such industries may be charged for capital before the effect of that capital on output is fully felt, giving too low a figure for progress. In the absence of capital-formation figures prior to 1948 it is only possible at this stage to point out the deficiency, which must be remembered when examining the results. Variations in the time lag may be tried in later work.

Though working with a longer period would reduce the importance of this time-lag problem, it would at the same time introduce the peculiar difficulties encountered when measuring production movements over long periods. Even as it is, the figures of the change in real output which have been used are, in relation to their importance, probably the weakest link in the calculations.¹

The sources of the basic data, and, where required, the methods of estimation employed, are contained in the Technical Appendix. The following points may however be usefully noted here:

- (a) The variables are all measured at 1948 prices.
- (b) The output used is output net of the cost of raw materials, the cost of services obtained from outside the industry and an allowance for depreciation.
- (c) The labour change represents the change in man hours worked and covers salaried employees and workers on own account.
- (d) Capital is measured less an estimate of depreciation.

D. METHOD OF PRESENTING RESULTS

The basic data about net output, depreciation, labour and capital formation, on which all our calculations rest, are given in a table in the Technical Appendix. Those figures contain much which is of great interest in other

¹ Apart from all other difficulties, the index of production can only imperfectly reflect changes in the quality of an industry's product.

connections,¹ but the information needed to make estimates of progress has been extracted from them and presented in Table I. The terms used have been described broadly above and fuller particulars are given in the Appendix.

Table I first provides for each industry a figure for the increase between 1948 and 1954 in true net output (*i.e.*, after deducting depreciation as well as all purchases from outside the industry), with all measurements done at 1948 prices; in our notation, this is ΔO . The next two columns give the increase in the wage-bill, measured at 1948 wage-rates ($w\Delta L$) and the "charge" for extra capital introduced ($0.15\Delta C$).

By subtracting these two allowances for additional factors one then gets in column (4) the increase in output in the six years due to progress. This is expressed in column (5) as a percentage of what output would have been in the absence of progress (*i.e.*, $O_1 + w\Delta L + 0.15\Delta C$), and column (6) converts this into an annual compound rate of progress. In a sense this column contains the main result of our labours.

Columns (7)-(9) are all in a sense checks on the reliability and usefulness of the figures for progress given in column (6). Thus column (7) gives figures which have been adjusted for the discrepancy between the actual net output price and the one which would correspond to a return of 15% on capital: as indicated above, the adjustments are mostly rather small, and negligible for manufacturing as a whole. Column (8) shows the results obtained by using 1954 prices instead of 1948 prices, and here too the differences are rather surprisingly small. Column (9) shows the effect of averaging two years both at the beginning and the end—a precaution which we took initially to reduce the influence of possible abnormalities in a particular year; as the period is thereby changed, slightly, one cannot expect to get identical results, but the change for all manufacturing is only from 2.1% to 1.9%, and over the fourteen industries the average difference (neglecting sign) is only 0.3%.

Columns (10) and (11) of Table I give figures for progress for two sub-periods, 1948-51 and 1951-54. The significance of these is considered in the next section.

Table II gives for each industry index numbers of output, labour and capital in 1954, taking 1948 as 100. From these, index numbers of labour productivity, capital productivity and capital per man-hour are deduced.

¹ A few examples may serve as an indication of the subjects on which they throw light. Thus for manufacturing as a whole in the six years 1948-54 we find that:

(a) Depreciation (reckoned at replacement cost) was equal to nearly half the value of gross fixed capital formation, and so almost equal to net fixed capital formation.

(b) Investment in additions to stocks and work-in-progress (which to our shame we started by ignoring) represented 40% of total net capital formation—in engineering the proportion was as high as 60%.

(c) Depreciation, even at replacement cost, was rather less than 5% of net output, both at the beginning and the end of the period.

TABLE I
Progress
(£ million at 1948 prices or percentages)

S.I.C. Orders	Changes (1948-54).			Progress (1948-54).			Supplementary progress calculations (annual compound rates).				
	In net output less depreciation, ΔO . (1)	In wage bill at 1948 wage-rates, $w\Delta L$. (2)	15% of change in net fixed capital and stocks, $r'\Delta C$. (3)	Extra output "due to" progress, and $\Delta O - w\Delta L - r'\Delta C$. (4)	Per-centage progress over the period. (5)	Progress annual com-pound rate. (6)	Adjusted progress,* at 1954† prices. 1948-54. (7)	Progress, 1948/49-54/55. (8)	Progress, 1948-51. (9)	Progress, 1951-54. (10)	
III. Bricks, Glass, etc.	£m. 30.7	£m. 8.2	£m. 13.5	£m. 9.1	% 5.7	% 0.9	% 0.7	% 0.9	% 0.8	% 1.5	% 0.5
IV. Chemicals	144.3	23.1	56.4	64.8	22.2	3.4	3.7	3.8	3.1	4.6	2.8
V. Metals	61.1	4.9	39.2	17.0	5.3	0.9	1.0	1.0	1.0	1.0	0.7
VI. Engineering	310.7	96.1	63.9	150.6	16.3	2.5	2.7	2.6	2.6	5.4	0.3
VII. Vehicles	210.3	84.5	37.9	87.9	17.7	2.8	3.5	2.9	2.6	4.3	1.9
VIII. Metal Goods N.E.S.	21.6	3.8	1.0	6.7	3.0	0.5	0.3	0.5	0.9	2.8	1.7
IX. Precision Instruments, etc.	11.3	4.6	3.0	3.7	6.7	1.1	1.4	1.4	0.5	0.3	1.9
X. Textiles	61.5	17.0	13.9	30.6	7.5	1.2	1.3	1.1	0.6	3.0	0.6
XI. Leather	-1.8	-1.3	0.9	-1.4	-3.8	-0.7	-0.6	-0.7	-0.9	-1.1	-0.2
XII. Clothing	28.4	6.2	3.7	18.5	8.7	1.4	1.4	1.2	1.2	1.2	1.5
XIII. Food, Drink and Tobacco.	76.4	24.6	42.7	9.1	1.7	0.3	0.2	0.0	-0.1	-1.3	1.9
XIV. Wood and Cork	55.1	3.2	6.6	45.3	34.4	5.0	5.0	4.9	4.5	6.3	3.9
XV. Paper and Printing	126.8	32.3	12.5	81.9	30.9	4.6	4.7	4.8	4.3	7.9	1.8
XVI. Other Manufacturing	44.0	7.7	6.6	29.7	23.7	3.6	3.4	3.3	4.0	4.5	3.0
III-XVI. All Manufacturing	1,180.3	314.8	311.9	553.6	13.2	2.1	2.1	2.0	1.9	3.3	1.1

* Adjusted to allow for the discrepancy net output price (see text, p. 26).

† See text p. 20, footnote.

TABLE II

Changes in Real Terms

(Index numbers for 1954 with 1948 = 100)

S.I.C. Orders.	Net output	Labour.	Net fixed capital and stocks.	Labour productivity.	Capital productivity.	Capital/labour ratio.
	(1)	(2)	(3)	(4)	(5)	(6)
III. Bricks, Glass, etc. . .	122.3	108.4	151.1	112.9	80.9	139.4
IV. Chemicals	167.7	117.9	155.7	142.2	107.7	132.0
V. Metals	122.0	102.4	141.7	119.2	86.1	138.4
VI. Engineering	140.8	116.7	129.1	120.7	109.0	110.7
VII. Vehicles	156.2	126.4	128.8	123.6	121.3	101.9
VIII. Metal Goods, N.E.S. . .	110.2	102.6	128.9	107.4	85.5	125.6
IX. Precision Instruments, etc.	123.3	111.0	120.8	111.1	102.1	108.8
X. Textiles	116.2	106.9	108.1	108.8	107.5	101.1
XI. Leather	95.1	94.5	112.9	100.6	84.3	119.4
XII. Clothing	114.0	103.8	111.1	109.8	102.6	107.0
XIII. Food, Drink and Tobacco . .	116.6	110.5	129.2	105.5	90.2	116.9
XIV. Wood and Cork	145.3	103.4	132.9	140.5	109.3	128.6
XV. Paper and Printing	157.5	121.1	116.1	130.1	135.7	95.8
XVI. Other Manufacturing	139.7	110.6	123.0	126.3	113.6	111.2
III-XVI. All Manufacturing . . .	133.2	112.6	128.0	118.3	104.0	113.8

E. REVIEW OF THE RESULTS

In inspecting the results, as with the methodology, examination of labour productivity provides a useful starting-point. Table II shows an increase of 18% for All Manufacturing over the six-year period. Though labour productivity has fallen in none of the fourteen industries, the range of experience is wide: thus the industry having the largest increase is Chemicals, where labour productivity increases by 42%, whilst at the other end of the scale Leather barely shows any increase. In all, three industries—Chemicals, Wood and Cork, and Paper and Printing—have a labour productivity increase of more than 30%, whilst in five industries—Leather, Food, Drink and Tobacco, Metal Goods N.E.S., Textiles and Clothing—labour productivity increases by less than 10% over the period.

In almost every Order—the exception is Paper and Printing—capital employed has increased by a greater percentage than labour, a fact readily seen from the indices of capital per man-hour. Therefore with our definition, “progress” is bound to appear as lower than the recorded increase in labour productivity.¹ An alternative way of expressing this fact is to say that part of the recorded increase in labour productivity is attributable to the increase in capital intensity, and in moving from the former measure to progress we have made an allowance for the latter.

¹ In the exceptional industry, Paper and Printing, though capital intensity fell by about 4% over the period, progress is in fact only fractionally greater than the labour-productivity increase. In view of this, the generalisation that progress in all Orders is not greater than labour productivity is reasonable.

One of the objectives which inspired this research was to get an indication of the quantitative importance of this allowance. By the time that one had allowed for the extra capital per man, would the rise in productivity (*i.e.*, output per head) disappear, or be barely changed? The answer seems to be that the effect is of some importance, but not overwhelming: thus after allowing for the extra capital input, the productivity increase for All Manufacturing falls from 18.3 to 13.2%.¹ Similarly, in nine out of the fourteen industries—Engineering, Metal Goods N.E.S., Precision Instruments, etc., Textiles, Leather, Clothing, Food, Drink and Tobacco, Paper and Printing and Other Manufacturing—the allowance made for extra capital reduces the percentage gain in productivity by less than 5 over the period. In Chemicals and Metals, on the other hand, the consequent reduction in productivity is as high as 20% and 14% respectively.

A further point is of interest in connection with the above. Despite the fact that introducing a charge for capital reduces the labour productivity figures by these varying amounts, nevertheless labour productivity is quite a good indicator of relative degrees of progress; in our results the rank correlation between these two is as high as +0.91. When due consideration is given to the importance of labour in production, this particular conclusion may hold little surprise, but it is useful to have some information of the actual extent to which patterns of progress and labour-productivity changes diverge.

Interesting conclusions also emerge from the capital-productivity figures (Table II, column (5)). The fact that the figure for All Manufacturing shows little change over the six-year period may seem reassuring to those who tend to assume constancy in the capital-output ratio (the reciprocal of capital productivity); in economic terms this constancy implies that “progress” at about 2% per annum was sufficient to prevent a fall in the average output per unit of capital, despite the fact that each unit of capital had the co-operation of less labour.

The figures for individual industries show clearly, however, that this constancy observed above for All Manufacturing depends heavily on the word “average,” and is in no sense a technical necessity: only half the industries show a change in capital productivity in the six years of less than 10%, and the figures range from a fall of 20% in the case of Bricks, Glass, etc., to a rise of 36% in Paper and Printing. There are only five industries, however, in which progress was insufficient to prevent output per unit of capital from falling, despite the reduced number of co-operating workers.

If we turn to the figures for progress itself (Table I, column (6)), the first

¹ This and many of the other conclusions presented here are paralleled by findings for the U.S.A. over a much longer period. See J. W. Kendrick, *Productivity Trends; Capital and Labour*, National Bureau of Economic Research, Occasional Paper 53, 1956. S. Fabricant, *Basic Facts on Productivity Change*, National Bureau of Economic Research, Occasional Paper 63, 1958.

impression may well be that a figure of 2% per annum for All Manufacturing is too good to be true—remembering that this is after subtracting from the increase in output over the period an allowance for the increase in man-hours worked and for extra capital introduced (at 15% per annum, net of depreciation). This impression is indeed borne out by the analysis into two sub-periods (1948–51 and 1951–54) given in columns (10) and (11): the first, in which recovery from war-time disorganisation was still raising productivity significantly, shows “progress” at 3.3% per annum; the second, and this is probably a better guide to what can be expected as a long-term trend, shows only 1.1%.

Experience between industries in rates of progress has been very varied. Progress during 1948–54 ranges from 5.0% per annum in Wood and Cork down to –0.7% in Leather. Within this range, two rather clearly distinguished groups are displayed. Out of the fourteen industries six have progress of more than 2½% per annum; these are in descending order Wood and Cork, Paper and Printing, Other Manufacturing, Chemicals, Vehicles and Engineering. The remaining industries have less than 1½% progress, and of these, seven are bunched within the relatively narrow limits 0.3–1.4%.

In fact, however, this industry pattern appears to be consistent only in a broad sense over the whole six years.¹ As an extreme example of the shifts which take place between the two sub-periods, Food, Drink and Tobacco, which has the lowest recorded progress in the first period, is ranked 5th in the second, and Engineering ranked 2nd in the first period is only 12th in the second. In the period 1948–51 there is a fairly large gap, from 4.3 to 3.0%, between the high- and the low-progress industries, and it is the above six industries which constitute the former group. In the period 1951–54 there is no such convenient demarcation between high- and low-progress industries, though the only disturbance to the “top six” is the replacement of Engineering by Food, Drink and Tobacco.

Possibly of greater significance than the extent to which the pattern of progress persists through the period is the fact that there was a much greater range of results found in the period 1948–51. In this period the results varied from about 8% per annum in Paper and Printing, down to –1.3% in Food, Drink and Tobacco, whilst in the period 1951–54 all fourteen industries have progress figures between 3.7 and –1.7%.

The reduced dispersion is probably due to the fact that the transition from war-time to peace-time conditions provided more scope for abnormal increases in some industries than others. For instance, industries such as Paper and Printing, which had been restrained during and immediately after the War, could redevelop rapidly as their raw materials were freed from control.

¹ The rank correlation between the pattern of progress in the period 1948–51 and that in 1951–54 is only +0.39.

In addition to noting that such peculiarities at the beginning of the period under review probably played an important causal role in determining the varying industry rates of progress, the only other causal factor which emerges on a cursory examination of the fourteen industries is the association between high (or low) output changes and high (or low) progress. Such an association is not unexpected,¹ but, on the other hand, it is not easy to interpret clearly. One can, of course, generalise and say that progress appears to be associated with “expansion”—provided that this term is restricted to mean increased output and not the employment of more factors, since any association of progress with capital or labour increases is much less evident. What is not yet clear from the results is whether the high output increase causes the high progress or, indeed, whether it is the latter which induces the former. It is possible to provide reasons for both sequences. Output expansion will facilitate the employment of latest techniques and more reorganisation of industry. Progress, stemming from, for example, the application of some new invention, can, by lowering costs and thereby prices, lead to a higher level of production.²

This observed association between output changes and progress is very significant in another light. In only one industry, leather, is progress over this period negative.³ This is the only industry in which output falls, and one is tempted to conclude that a “contraction” is likely to be accompanied by a fall in efficiency in some “real” sense.⁴ Whilst such a conclusion could not be justified on the basis of this one industry, in fact preliminary results for Manufacturing Industry much more finely divided—where several cases of negative progress are recorded—tend to support this finding.

A more complete appraisal of causal possibilities is, however, best left until progress is analysed for Manufacturing Industry subdivided by more than the fourteen S.I.C. Orders.

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¹ This sort of association is a well-known economic phenomenon. See, for example, Kendrick, *op. cit.*; Fabricant, *op. cit.*

² These matters are analysed at some length, with the aid of other statistical data, in a forthcoming monograph in the Department's series: *Productivity and Technical Change*, by W. E. G. Salter.

³ An examination of the results for the sub-periods shows that negative progress is recorded in five instances, in Leather and in Food, Drink and Tobacco in 1948–51 and in Metal Goods N.E.S., Textiles and Leather in 1951–54. The only four instances in which net output fell are included in this group—a fact which lends support to the observation which follows.

⁴ There is the possibility that the recorded negative progress might be attributable to purely statistical factors, for example, inaccuracies in the data. Analysis of Manufacturing Industry with a finer classification suggests, however, that in most instances this is not the case, but rather that the recorded fall in economic efficiency is a real one—at least so long as one sets the change for additional capital as high as 15% per annum.

TECHNICAL APPENDIX

Measurement of Output

The change in output was measured by the difference in value added, at constant 1948 prices, between the base and the final year. The output figures are required net of all raw materials used, of depreciation, of equipment and of the value of services provided by other industries. In fact, the 1948 net output figure actually used for all Manufacturing is that given in the National Income Blue Book,¹ and from this total, net output figures are derived for each industry on the basis of the weights given to them in the Index of Production.² (The divergence between the sum of those weights, which are derived from the Census of Production, and the Blue Book figure computed from factor incomes is small, and may be attributed to some double counting in the former.) Value added for later years at 1948 prices was computed by multiplying each base-year net output by the production index for that Order. From these net output figures by industries the deduction of an estimate of depreciation is made.

*Wage and Salary Bills**Method*

Wage and salary bills for each year at 1948 wages were obtained by multiplying the 1948 wage and salary bills by indices of change in man-hours worked. The calculations were made separately for males and females, and also for constituent trades within the S.I.C. Orders to allow for more detailed analysis later.

1948 Wage and Salary Bills

These were derived from the 1948 Census of Production, adjusted to cover small firms, Northern Ireland and some omitted trades; they correspond to the figures in Table 14 of the 1957 Blue Book. Two further adjustments were made to render the figures more representative of labour costs to the industry. Employers' contributions to National Insurance, pension schemes, etc., were allowed for by adding a uniform 4%, equal to the proportion found in the Blue Book for all manufacturing. The salary element in the remuneration of working proprietors was allowed for by adding a variable amount based on figures in the Inland Revenue Reports. This added another 4% to the total Manufacturing wage and salary bill, the highest percentage (14%) being in clothing. To divide base-year wage and salary bills between males and females, numbers of workers of each sex were weighted by the average weekly earning for October 1948 given in the *Ministry of Labour Gazette*, and the wage and salary bills were split accordingly.

Man-hours

Census figures for average employment in the year, covering working proprietors, were used wherever possible, with any necessary adjustments for coverage of small firms and Northern Ireland.

Hours worked were taken from the Ministry of Labour six-monthly survey. For males, average hours worked by adult males were used, and for females those worked by women. Testing showed that elaborating the method to take account of juveniles would have a negligible effect. For years after 1948, hours worked

¹ At all possible points the statistics used have been keyed to the relevant, 1957 Blue Book figures.

² All references to the index of production relate to the one with 1948 as a base.

in April and October were averaged. For 1948 this was impossible because the Standard Industrial Classification was introduced between the two surveys. The October figures were therefore used, and further examination of the figures suggests that no perceptible error is introduced by neglecting April.

Gross Capital Formation

The Blue Book was used as the basic source. Investment in the three main assets, buildings, plant and vehicles, was treated separately in order to deflate each one by the specific price index provided by the C.S.O. Capital formation under the heading Government Research and Development was left out of consideration because the corresponding assets are not employed in the current production of manufactures. Other government-financed capital expenditure in Manufacturing is included.

Depreciation

The starting-point for our estimates is the series of figures for depreciation prepared by the C.S.O. for (a) buildings, (b) plant and (c) vehicles in the field of "Manufacturing and Distribution, etc." The figures were first split between "Manufacturing" and "Distribution, etc." and the total for "Manufacturing" then split between the fourteen Orders. The method used is to split the figures according to estimates, for individual industries, of gross capital stock. The preparation of these capital estimates, which are based on Redfern's capital-stock figures,¹ the source of the C.S.O. depreciation estimates, must first be described.

Allocation of "Redfern" Capital Stock between "Manufacturing" and "Distribution, etc."

Redfern gives figures of gross capital in 1948 for the whole of Manufacturing and Distribution,² for industrial buildings, commercial buildings, plant and vehicles. After considering the distribution of capital formation in each of these assets between the two sectors, together with the Inland Revenue depreciation allowances for "Manufacturing" and "Distribution," we decided to assume that Manufacturing had three-quarters of the plant, one-quarter of the vehicles and less than one-half of the buildings.

Allocation of "Redfern" Capital Stock in 1948 between Orders

To carry out the allocation we had recourse to a paper in which Barna³ presented estimates derived from insurance values of the stock of capital by individual Orders, for the year 1955. These figures, given separately for plant and buildings,⁴ relate to gross capital at replacement cost and are therefore similar in concept to Redfern's. They were adapted to give an estimate for 1948 at 1948 prices by first deflating them to 1948 prices, and then subtracting the gross capital

¹ *Op. cit.*

² "Distribution, etc." comprises mining other than coal, building and contracting, broadcasting and other services, as well as wholesale and retail distribution and road goods transport. Agricultural vehicles are also included.

³ *Op. cit.*

⁴ The following method was applied separately to: (a) plant, and (b) buildings. Barna did not give any figures for vehicles, and the method of allocating Redfern's figures for these between Orders is set out above.

formation for 1948-54 (less an estimate of scrappings). The total of the resultant figures exceeds the Redfern total, probably on account of the assumption by Redfern of shorter than actual asset lives, but this Redfern total was allocated between the Orders in proportion to the former.¹

From the gross capital stock obtained in this manner for each industry at the beginning of 1948, capital-stock figures were calculated for each year to 1954 by the addition of gross capital formation and the deduction of an estimate for scrappings.

The Estimates of Depreciation

With the aid of all these figures for gross capital stock we are now in a position to split the depreciation figures, mentioned at the start of this section, in each year, for plant and buildings. The allocation was done on the basis of the proportion of gross capital stock in each industry at the beginning of the year.² Depreciation of vehicles was allocated between Orders on the basis of capital formation in the period.

Stocks and Work-in-Progress

The figures of the physical changes in stocks are derived as the difference between the estimated values, at 1948 prices, of stocks held at the beginning and at the end of the period. Raw materials and fuel are (throughout) treated separately from work-in-progress and finished products.

Stocks at the end of each year at current prices can be obtained from the Blue Book (Table 58, Blue Book 1957) for the following groups of industries:

- Chemicals: Covering Order IV.
- Metals: Covering Orders V, VI, VII, VIII, IX.
- Textiles: Covering Orders X, XI, XII.
- Food: Covering Order XIII.
- Other: Covering Orders III, XIV, XV, XVI.

With the help of C.S.O., some provisional estimates were made of the value of the physical changes in stocks, at current and mid-1948 prices, for these groups. To obtain stocks at constant 1948 prices at the beginning of 1948 and the beginning of 1951, we use:

- (a) stocks at the beginning of 1948 from the Blue Book;
- (b) the addition to physical stocks;
- (c) has to be converted to mid-1948 prices by an estimate of the price change over the first half of 1948; this is made from the price change implied in the stock changes at current and at constant prices, and the Board of Trade Index of Wholesale Prices.

The stocks at the beginning of 1951 are the sum of (a) and (b). The real changes in 1951, 1952 and 1953 are added to give the stocks at the beginning of 1954.

¹ We also experimented with other methods of allocation which seemed more logical, but various tests suggested that the above simple procedure was as satisfactory as any.

² A test calculation was made using an extreme assumption to see how far the final progress figure would be thrown out by any errors in allocating depreciation. Depreciation was allocated in proportion to gross capital formation since 1948, and progress computed with this. This was compared with progress computed by using depreciation allocated by Barna's stock amended by gross capital formation in the period 1948-54. Only one or two industries showed substantial difference, while the ranking of industries was practically unchanged.

The stocks at these three dates were allocated between Orders by Census of Production current value data. These were converted to mid-1948 prices by implied price indices from the values at current and at constant prices of the physical stock changes in the major groups. It has to be assumed that price changes within the major industry groups are uniform.

Capital and the Net Output—Price Discrepancy

The depreciation figures used are basically those provided by Redfern, and the appropriate capital figure to which the apportioning calculations should be keyed is consequently Redfern's. However, in estimating the net output-price discrepancy, the capital figure required is preferably one which estimates capital directly. (Given the capital figure for each industry the method of deriving *h* is set out in the text.) Similarly a direct measurement of capital is more appropriate for deriving changes in capital productivity. It was therefore decided to use the Barna capital estimates for these purposes.

The calculation of "Barna" gross capital figures for 1948 has been described above. The major problem was then to derive from these Barna figures, estimates of *net* capital stock. The problem was approached, first, by deriving an estimate of net stock for All Manufacturing, and secondly, apportioning this total between the constituent Orders.

The Barna Net Stock of Capital for Manufacturing

To obtain this, the only available indicator is the relationship which Redfern obtained, for Manufacturing and Distribution, between net and gross capital for 1948. The temptation to apply this relationship¹ as it stands, to derive a net figure from Barna's gross capital, was avoided, since it is considered that the main reason for the difference between Redfern and Barna's capital figures is the underestimated asset lives of the former, and the use of asset lives other than Redfern's would yield a different net capital to gross capital relationship.

It was therefore decided to construct a simplified set of capital formation figures, but one which approximates that found by Redfern,² and apply to this series, first, the asset lives used by Redfern, and secondly, some rather longer lives.³ The proportion of net to gross capital was then calculated for both sets of lives for both assets. The results are:

	<i>Net Capital</i> Gross Capital.	Plant and machinery.	Buildings.
(a) Redfern Lives		0.503	0.568
(b) Longer Lives		0.553	0.631
(a)		0.909	0.899
(b)			

It was ultimately decided to assume, as an approximation, that for both assets the proportion of net to gross capital on a Redfern basis would be 0.9 of the

¹ Redfern finds that for both plant and machinery and industrial buildings, net capital is just greater than half gross capital in 1948.

² In particular, the low capital formation of the 1930s slump years and of the war period were taken into consideration. These features are important, since irregular growth of capital stock has a strong influence on the proportion of written-down capital to gross capital.

³ Redfern assumes a life of fifty years for industrial buildings and an implied average life of about thirty years for plant and machinery. The longer lives assumed here were, respectively, seventy-five and forty-five years.

equivalent Barna proportion. For both assets a Barna net stock figure for manufacturing was obtained from the gross figure together with the Redfern proportion of net to gross capital, and in conjunction with the above factor.

For vehicles, which constitute only a small percentage of capital, Redfern's net capital figure was used, and to these three assets, the figure for stocks and work in progress¹ was added.

The Barna Net Stock of Capital by Orders

The method adopted for deriving individual capital figures involved making provisional estimates for each industry and asset,² of the proportion of net to gross capital in 1948, and applying these to the gross capital figures for that industry. The net stock figures obtained in this way were then used to apportion the figure obtained for All Manufacturing in the previous section.

To obtain by industry and asset these provisional proportions of net to gross capital it was assumed that over the half-century prior to 1948 the annual rate of capital growth is approximated by the average annual output change of this period.³ It was further assumed that this change took place at a constant annual rate within the period. Using this estimate of the rate of capital growth, together with the assumed (longer) lives of assets, one derives algebraically the proportion of net to gross capital for each industry.

The vehicles net capital figure is distributed between Orders according to post-war capital formation and the figure for stocks and work in progress is available by Orders from the above section.

The Return to Capital

The net stock of capital, comprising plant and machinery, buildings, vehicles and stocks and work-in-progress for 1948, is also employed, together with true net output less the wage and salary bill, to yield an estimate of the return to capital in manufacturing industry.

	£ million.
True Net Output	= 3,558
Wages and Salaries	= 2,504
Net Capital	= 7,414
The Return to Capital	= 14.2%

The Net Capital Stock Indices

Table II contains, by Orders, indices of net capital. These were obtained by adding to the 1948 net capital figures the figures for net fixed capital formation and increase in stocks during the period 1948-53 (inclusive). As with all the statistics involving the use of the estimates of capital stock, they are of poor reliability.

¹ See section "Stocks and Work-in-Progress."

² The method outlined here was applied to buildings and plant machinery separately. For vehicles, and stocks and work-in-progress, see below.

³ These were obtained from:

K. S. Lomax, "New Index Numbers of Industrial Production 1900-1938," *London and Cambridge Economic Bulletin*, New Series No. 26, June 1958, pp. v-vi.

B. C. Brown, "Industrial Production in 1935 and 1948," *London and Cambridge Economic Bulletin*, New Series No. 12, December 1954, pp. v-vii.

Basic Data
(£m. at 1948 prices)

S.I.C. Orders	Output.		Labour.		Capital formation.			
	Net output (including depreciation).	Depreciation (at replacement cost).	Wage bill at 1948 wages.		Gross fixed capital formation, 1948-53.	Depreciation (at replacement cost), 1948-53.	Changes in Stocks and Work-in-progress, 1948-53.	Net fixed capital formation and stock change, 1948-53.
	1948.	1954.	1948.	1954.				
III. Bricks, Glass, etc.	142.1	176.0	97.5	105.6	103.5	35.6	21.9	89.8
IV. Chemicals	231.8	387.8	128.8	151.9	455.2	136.9	57.5	375.8
V. Metals	294.8	362.6	205.5	210.4	299.7	122.3	83.9	261.3
VI. Engineering	793.7	1,112.1	576.9	673.0	379.0	206.7	253.8	426.1
VII. Vehicles	391.1	607.4	320.2	404.7	255.4	111.0	108.2	252.6
VIII. Metal Goods N.E.S.	217.5	241.7	145.0	148.8	96.5	42.5	19.5	73.5
IX. Precision Instruments, etc.	50.6	62.5	41.6	46.1	25.5	14.2	8.6	19.9
X. Textiles	411.2	476.3	247.1	264.1	255.9	203.5	40.5	92.9
XI. Leather	38.2	36.7	24.1	22.7	12.3	5.2	-1.0	6.1
XII. Clothing	208.0	237.5	161.4	167.6	45.8	32.2	11.3	25.0
XIII. Food, Drink and Tobacco.	482.7	568.0	235.2	259.9	312.4	150.1	122.4	284.6
XIV. Wood and Cork	125.0	181.6	95.0	98.2	44.0	23.3	23.5	44.2
XV. Paper and Printing	234.7	364.0	152.8	185.1	140.6	93.0	36.0	83.5
XVI. Other Manufacturing	115.4	160.8	72.8	80.5	59.5	30.0	14.7	44.2
III-XVI. All Manufacturing	3,736.8	4,978.8	2,503.9	2,818.6	2,485.2	1,206.4	800.8	2,079.6

THE STRUCTURE OF MACRO-ECONOMIC MODELS

I. INTRODUCTION

VARIOUS types of macro-dynamic economic models have been proposed during the past twenty-five years, notably by Kalecki (1935), Harrod (1939), Samuelson (1939), Kaldor (1940), Domar (1946), Hicks (1950), Goodwin (1951, 1955), Phillips (1954, 1957), Smithies (1957) and Duesenberry (1958). The main influence is Keynesian, and a general feature is that the economic relations are so simplified that econometric testing or estimation seems a very remote possibility. The object here is to classify the models from the economic angle (perhaps of some interest in itself), to examine their economic and lag structure and to begin the preparation of the ground so that, in the end, we may hope to pass the models to the statistician for testing and estimation of parameters.¹

The models are constructed in two stages: the economic selection of the relations included and the technical specification of the lags in the relations. A good deal of attention has been paid to the first stage, much less to the second. We are familiar enough with the economic relations—with the form they take and with the parameters they include. We have much less idea about the appropriate form to assume for lags, about the lag parameters to insert. This is a kind of no-man's land. Economists in their model-building seem content, for the most part, to leave lag specification to the statistician—if the models ever get to the testing or estimation stage.² On the other hand, the statistician is likely (perhaps rightly) to refer the question back to the economist. What is a fairly typical view is that expressed by Smithies (1957):

"I have arbitrarily assumed that the lag period in these relations [for full-capacity output] is the same as in the investment function. In a model that arrived at numerical results the two lag periods would each have to be estimated. The assumption of a single lag period, however, does not affect the validity of the model as a basis for qualitative discussion" (p. 21, footnote).

The contentions here are to the contrary—that the specification of lags is not just a matter of fixing the length of delay (*e.g.*, nine months as opposed to six months) and that the forms of the lags do affect the models, even for qualitative discussion.

¹ Nothing is said here about the more opportunist "econometric models" of the types associated with the names of Tinbergen, Klein and Goldberger.

² This is not altogether fair, since some economists (*e.g.*, Goodwin) are well aware of the problem. Moreover, Phillips' approach is such that he is much concerned with the issue. He does not construct economic models as such; he uses them to throw light on problems of economic stabilisation.

When both stages are complete the model may still be highly simplified, but it will be precise on exactly what parameters (economic and lag) are included. It will generally yield a deterministic solution (time-paths of the variables) which will depend in a known way on the values of the parameters. It should then be possible to look ahead towards the econometric testing of the model and the estimation of its parameters. The model would need to be amplified—by inclusion of further endogenous and exogenous influences, by specification of appropriate stochastic elements—but the way should be less obscure.

The treatment here is first to simplify the economic structure to the barest minimum in order to see clearly the influence of lags; and then to add to the economic content of the models. Even so, only typical and simplified models are considered, of kinds easily represented by schematic diagrams. For example, depreciation and obsolescence are complications which are assumed away; only net investment is considered. Another simplification is that no distinction is drawn between discrete and continuous formulations of the models. The discrete case is taken here, mainly because it is more familiar to the economist, if not to the mathematician. In fact, the difference between the two formulations is not great; the difference and differential equations which arise are handled in very similar ways and, apart from details, the solutions are the same.¹

II. MULTIPLIER MODELS

The simplest macro-dynamic model has only one economic relation: the multiplier. It serves as a basis for most models of greater sophistication, and it has been examined particularly by Phillips (1954, 1957) in relation to problems of economic stabilisation. The variables are in real terms, flows in period t : Y_t = output = income; Z_t = demand; C_t = consumption demand; A = autonomous investment (constant and given).

The schematic diagram² of Fig. 1 shows the relations of the model. There is only one economic parameter, the marginal propensity to consume c . Without lags:

$$Y_t = Z_t = C_t + A \quad \text{where} \quad C_t = cY_t \quad (0 < c < 1)$$

giving the static solution: $Y_t = \frac{A}{1-c}$ all t

This is the multiplier $\left(\frac{1}{1-c} > 1\right)$ and the simplest instance of a "feed-back."

¹ It must not be taken for granted that discrete models are more "realistic" given data in statistical (discrete) form. The "period" of the discrete model has nothing to do with the timing of the statistics, as given in monthly, quarterly or annual series. Any model, whether in discrete or continuous form, produces time-paths of the variables which need to be "chopped up" into the accidental time intervals of the statistics.

² The diagrams follow suggestions made by Tustin (1953) rather than the more professional engineering form adopted by Phillips (1954, 1957). See Allen (1956), Chapter 9.

There are two lags to introduce. One is the supply lag L_1 : supply Y_t lagging on demand Z_t . The other is the consumption lag L_2 : consumption demand C_t lagging on income Y_t . The most general expression of the model is:

$$\left. \begin{array}{l} \text{Supply: } Y_t = (Z_t)_{L_1} = \text{lagged dependence on } Z_t \\ \text{Demand: } Z_t = c(Y_t)_{L_2} + A = \text{lagged dependence on } Y_t \end{array} \right\} \quad (1)$$

The simplest possible case is when there is only one lag in the form of a

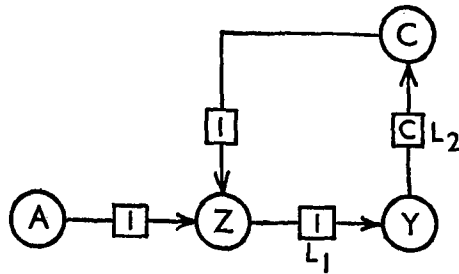


FIG. 1

one-period delay, e.g., $L_1 = 1$, $L_2 = E^{-1}$, where E is the shift operator ($EY_t = Y_{t+1}$, $E^{-1}Y_t = Y_{t-1}$).

Then: $Y_t = Z_t = C_t + A$ where $C_t = cEY_t = cY_{t-1}$

Here, as later, write $y_t = Y_t - \bar{Y}$ for deviations from the static level $\bar{Y} = \frac{A}{1-c}$ which is consistent with the model.

So: $y_t = cy_{t-1}$ with solution $y_t = y_0 c^t$

i.e., the simple dynamic multiplier with Y_t steadily damped ($0 < c < 1$) to $\bar{Y}$.

No lag parameters have yet been introduced. Consider cases where the two lags are of the same form, each involving one parameter. There is a variety of one-parameter forms to choose from, e.g., the fixed-period delay: $Y_t = Z_{t-\theta}$ ($\theta > 0$). Two more general possibilities (shown for the supply lag) with a parameter μ ($0 < \mu \leq 1$) are:

Two-period moving average (distributed lag):

$$Y_t = (1 - \mu)Z_t + \mu Z_{t-1} = (1 - \mu + \mu E^{-1})Z_t$$

$$\begin{aligned} \text{Geometric lag: } Y_t &= \mu \{Z_{t-1} + (1 - \mu)Z_{t-2} + (1 - \mu)^2 Z_{t-3} + \dots\} \\ &= \mu E^{-1} \{1 + (1 - \mu)E^{-1} + (1 - \mu)^2 E^{-2} + \dots\} Z_t \end{aligned}$$

The simplest case of a one-period delay is got by setting $\mu = 1$ in either of these forms. The geometric lag, with Y_t dependent on *all* past values of Z_t , may look strange in this company. But the weighting coefficients, i.e., $\mu, \mu(1 - \mu), \mu(1 - \mu)^2, \dots$ adding to unity, have the particularly simple

form of a decreasing geometric series and only one parameter is needed to specify them. Moreover, it can be expressed in the difference operator $\Delta = E - 1$ (where $\Delta Y_t = Y_{t+1} - Y_t$) to give:

$$Y_t = \frac{\mu}{\Delta + \mu} Z_t \quad \text{or} \quad \Delta Y_t = \mu(Z_t - Y_t)$$

with the interpretation that the increase in Y_t is always a fixed proportion of the current deficit ($Z_t - Y_t$) due to the lag.¹

In the model (1) write $y_t = Y_t - \bar{Y}$ and $z_t = Z_t - \bar{Z}$ for deviations from the static level $\bar{Y} = \bar{Z} = \frac{A}{1-c}$. As one case, take L_1 as a two-period moving average lag with parameter μ and L_2 as a similar lag with parameter v :

$$y_t = (1 - \mu)z_t + \mu z_{t-1} \quad \text{and} \quad z_t = (1 - v)cy_t + vcy_{t-1}$$

The reduced or recursive form is:

$$\left. \begin{aligned} y_t &= \frac{1}{C} \{v(1 - \mu)cy_{t-1} + \mu z_{t-1}\} \\ z_t &= \frac{1}{C} \{vcy_{t-1} + \mu(1 - v)cz_{t-1}\} \end{aligned} \right\} \quad (2a)$$

where $C = 1 - (1 - \mu)(1 - v)c$. As a second case, take L_1 and L_2 as geometric lags with parameters μ and v respectively:

$$y_t = \frac{\mu}{\Delta + \mu} z_t \quad \text{and} \quad z_t = \frac{v}{\Delta + v} cy_t$$

which give the reduced or recursive form:

$$\left. \begin{aligned} y_t &= (1 - \mu)y_{t-1} + \mu z_{t-1} \\ z_t &= vcy_{t-1} + (1 - v)z_{t-1} \end{aligned} \right\} \quad (2b)$$

The equations of the model, either (2a) or (2b), are a pair of linear difference equations in y_t and z_t . The solution (see Technical Note B) is that y_t and z_t satisfy the same autoregressive relation, a second-order difference equation. In general, the time-paths of the variables can be steady or oscillatory, damped or anti-damped, according to the values of the parameters; but with the present parameters (c, μ and v , all positive fractions) the typical solution has Y_t as the sum of two real terms. The dominant term is again steadily damped to $\bar{Y}$ and the other term is a more heavily damped alternation:

$$Y_t = B_1 \lambda_1^t + B_2 (-\lambda_2)^t \quad (0 < \lambda_2 < \lambda_1 < 1)$$

¹ See Technical Note C. The geometric lag was suggested by Koyck (1954) for such economic relations as consumption or investment; see also Klein (1958). It may seem odd that the geometric lag taken here begins with Z_{t-1} (i.e., after a one-period delay) instead of with Z_t . But, in the latter case:

$$Y_t = \mu \{Z_t + (1 - \mu)Z_{t-1} + (1 - \mu)^2 Z_{t-2} + \dots\} \text{ giving } Y_t = \frac{\mu}{\Delta + \mu} Z_{t+1}$$

This is not quite so simply interpreted, but the difference in practice is largely incidental.

where B_1 and B_2 are given by initial conditions. The time-path of Z_t is similar and (in the limit as t increases) Z_t is a multiple of Y_t , the multiple here being nearly unity.

In general, the lags involve several parameters, *e.g.*, a moving average (distributed lag) of three or more periods, or a multiple geometric lag comprising two or more geometric lags applied in succession. To illustrate, with double geometric lags, (1) becomes:

$$y_t = \frac{\mu_1 \mu_2}{(\Delta + \mu_1)(\Delta + \mu_2)} z_t \quad \text{and} \quad z_t = \frac{v_1 v_2}{(\Delta + v_1)(\Delta + v_2)} c y_t$$

which gives the reduced or recursive form:

$$\begin{cases} y_t = (2 - \mu_1 - \mu_2)y_{t-1} - (1 + \mu_1 \mu_2 - \mu_1 - \mu_2)y_{t-2} + \mu_1 \mu_2 z_{t-2} \\ z_t = v_1 v_2 c y_{t-2} + (2 - v_1 - v_2)z_{t-1} - (1 + v_1 v_2 - v_1 - v_2)z_{t-2} \end{cases} \quad (3)$$

In solving (3), as compared with (2b), the common relation satisfied by y_t and z_t is a difference equation of the fourth order. The range of possibilities for the time-paths is greatly increased.

It is clear, as Phillips (1957) has shown in his continuous formulation, that the more complicated the lags, the higher the order of the difference equation satisfied by the variables and the greater the range of possibilities for their time-paths. In particular, oscillatory and explosive time-paths become more likely. Notice, also, that there is no necessary link between the number of parameters (economic and lag) and the number of coefficients, which might be subject to statistical estimation, in the difference equations (1). In (2b) there are four coefficients in three parameters; in (3) there are six coefficients in five parameters. There happens to be a deficiency of parameters in this model. The point clearly needs to be watched.

III. ACCELERATOR MODELS

More sophisticated models based on the multiplier can be generally classified into two types. The first type is the accelerator model, characterised by an investment relation which depends on the rate of change of output and in which the capital stock does not appear explicitly (as an endogenous variable). The second type is the capital-output model, in which investment is made to depend, directly or indirectly, on the level of output and on the capital stock. Simplified but typical versions of the two models are here considered in turn.

Accelerator models have a long history, both as generating growth, as with Harrod (1939) and Domar (1946), and as giving rise to oscillations, as with Samuelson (1939) and Hicks (1950). The variables are as before, together with:

I_t = investment demand

and there are two economic parameters, the marginal propensity to consume

c , and the power of the accelerator v . The relations of the model are shown in the schematic diagram of Fig. 2. Without lags:

$$Y_t = Z_t = C_t + I_t + A \quad \text{where} \quad C_t = cY_t \quad (0 < c < 1) \\ \text{and} \quad I_t = v(1 - E^{-1})Y_t = v(Y_t - Y_{t-1}) \quad (v > 0)$$

Write $\rho = \frac{1-c}{v}$ (typically $0 < \rho < 1$) and $y_t = Y_t - \bar{Y}$ as before ($\bar{Y} = \frac{A}{1-c}$):

$$y_t = \frac{1}{1-\rho} y_t \quad \text{with solution} \quad y_t = y_0 \left(\frac{1}{1-\rho} \right)^t$$

This is the typical Harrod-Domar growth model, the rate of growth being given by $\left(\frac{1}{1-\rho} \right)$.

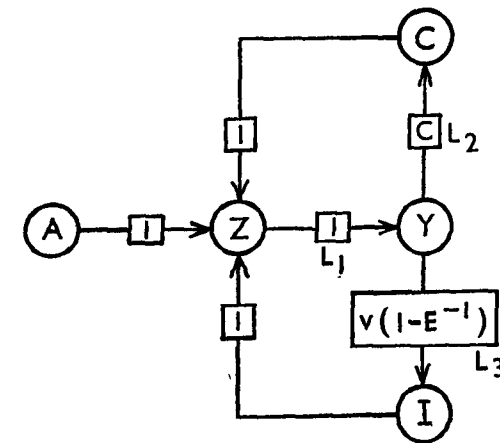


FIG. 2

There are three lags to be inserted: the supply lag L_1 , the consumption lag L_2 and the investment lag L_3 . The general model is:

$$\left. \begin{aligned} \text{Supply: } Y_t &= (Z_t)_{L_1} = \text{lagged dependence on } Z_t \\ \text{Demand: } Z_t &= c(Y_t)_{L_2} + v(1 - E^{-1})(Y_t)_{L_3} + A \\ &= \text{lagged dependence on } Y_t \end{aligned} \right\} \quad (4)$$

The parameters comprise two economic parameters (c and v) and as many lag parameters as are considered necessary in specifying the three lags. There is no way of keeping (4) down to a pair of linear difference equations like (2a) or (2b), except by taking no lag in the accelerator ($L_3 = 1$). This is generally to be avoided; investment should be dependent, at least, on the output increase of the previous period. The difference between the multiplier and accelerator models (1) and (4) is that the demand relation of the accelerator model has one more economic parameter and (for lags of the same kind) it is a difference equation of the next higher order. The time-paths of the variables, other things being equal, are more complicated.

Some simple cases make this general conclusion more specific. The starting-point is the steady growth of the model without lags. Take no lag in supply ($L_1 = 1$) and a single-period delay in consumption ($L_2 = E^{-1}$). The lag in the accelerator (L_3) is to be specified in terms of suitable lag parameters.

(i) Take $L_3 = E^{-1}$, i.e., a single-period delay in investment (a specific lag, without a parameter). This is the elementary case of Hicks (1950). The model is:

$$Y_t = Z_t = C_t + I_t + A \quad \text{where} \quad C_t = cE^{-1}Y_t = cY_{t-1} \\ \text{and} \quad I_t = v(1 - E^{-1})E^{-1}Y_t = v(Y_{t-1} - Y_{t-2})$$

The result is an autoregressive relation for y_t , the second-order difference equation:

$$y_t - (v + c)y_{t-1} + vy_{t-2} = 0 \quad (5)$$

The time-path of y_t from (5) can be steady or oscillatory, damped or anti-damped, according to the values of the two parameters c and v . Typically, in this Hicksian case, the value of v is large enough for the time-path to be oscillatory and mildly explosive.

Generalise, as Hicks does, by taking L_3 as a moving average (distributed lag) of a small number of periods and starting after a single-period delay.¹ The case of two periods has $L_3 = (1 - \mu)E^{-1} + \mu E^{-2}$ with one parameter ($0 < \mu \leq 1$). Then:

$$I_t = v(1 - E^{-1})\{(1 - \mu)E^{-1} + \mu E^{-2}\}Y_t \\ \text{i.e.,} \quad I_t = v(1 - \mu)(Y_{t-1} - Y_{t-2}) + v\mu(Y_{t-2} - Y_{t-3})$$

which Hicks writes $I_t = v_1(Y_{t-1} - Y_{t-2}) + v_2(Y_{t-2} - Y_{t-3})$ with $v_1 + v_2 = v$. The result is a third-order difference equation:

$$y_t + a_1y_{t-1} + a_2y_{t-2} + a_3y_{t-3} = 0 \quad (6)$$

where the three coefficients are given in terms of the three parameters (c , v and μ) of the model. The time-path of Y_t is now typically an oscillation combined with a steady or alternating component. As the length of the moving average (distributed lag) is increased, the difference equation (6) takes in more terms to match the larger number of parameters, and the time-path of Y_t is a more complicated blend of oscillatory, alternating and steady components.

The result is quite neat in this simple case. The basic model, without lags, has a steady growth given by the two economic parameters c and v .

¹ The general moving average lag is $\mu_0 + \mu_1 E^{-1} + \mu_2 E^{-2} + \dots + \mu_r E^{-r}$ with $\sum_{i=0}^r \mu_i = 1$. The case analysed here has $\mu_0 = 0$ and $r = 2$, a single-period delay followed by an average over two subsequent periods. The general Hicksian case is:

$$I_t = v_0(Y_t - Y_{t-1}) + v_1(Y_{t-1} - Y_{t-2}) + v_2(Y_{t-2} - Y_{t-3}) + \dots (\sum v_i = v)$$

with $v_0 = 0$ to omit the first term.

With lags of delayed moving average type, the order of the difference equation for Y_t always equals the number of parameters—and the oscillatory and non-oscillatory components of the time-path of Y_t increase in variety as the length of the lag is made greater.

(ii) The same kind of autoregressive relation for Y_t can be obtained for accelerator lags of other forms. A simple case is that of a geometric lag, not examined by Hicks. Take:

$$L_3 = \frac{\mu}{\Delta + \mu} \quad \text{with one parameter } (0 < \mu \leq 1) \quad \text{and} \quad \Delta = E - 1$$

$$\text{So:} \quad Y_t = Z_t = C_t + I_t + A \quad \text{where} \quad C_t = cE^{-1}Y_t = cY_{t-1} \\ \text{and} \quad I_t = v(1 - E^{-1}) \frac{\mu}{E - (1 - \mu)} Y_t$$

which is found to give the autoregressive relation:

$$y_t - (v' + c')y_{t-1} + v'y_{t-2} = 0$$

where $c' = (1 - \mu) + \mu c$ and $v' = (1 - \mu)c + \mu v$

This is the same as (5) and the solution is the same—except that the coefficients are different and involve three parameters instead of two. Usually $0 < c < 1$ and $c < v$, so that $c < c' < 1$ and $c < v' < v$; c' is a weighted average of c and 1, and v' of c and v , the weights being $(1 - \mu)$ and μ . The effect of the geometric lag is to increase the marginal propensity to consume and to reduce the power of the accelerator. This may well be enough to turn the mildly explosive oscillation of Hicks into a mildly damped one.

The generalisation now is to take a multiple geometric lag with several parameters. For example, when L_3 is a double geometric lag with parameters μ_1 and μ_2 , the difference equation for y_t is of third-order form (6) with three coefficients given by four parameters (c , v , μ_1 and μ_2). The result is much the same as in (i), except that there is a surplus of parameters.

The case of no supply lag, of which two versions have been analysed, is characterised by the fact that the pair of lagged relations (4) reduces to a single autoregressive relation for Y_t , such as (5) or (6). It may be possible, by being partly specific in the lags, to keep the number of parameters down to the number of the coefficients in this relation. More generally, however, there are more parameters than coefficients. This need not be a difficulty in econometric testing and estimation. For, with no lag in supply, C_t and I_t are both realised as actual consumption and investment, i.e., they are separately observable.

The situation is complicated by the presence of a supply lag. There are two lagged relations (4), but, though output Y_t is observable, the other variable, demand Z_t , is not. Further, since total demand is not currently realised ($Y_t \neq Z_t$), this is also true of one or other (or both) of consumption

and investment demand. In particular, I_t is not necessarily associated with actual investment, with the growth of capital stock or with any observable series. An aggregate model of this type, in which there is a supply lag, is not immediately decomposable into sub-aggregates.

These complications arise in attempts to introduce "realistic" lags in supply and in other relations of the model. They are quite apart from other complications, again in the interests of "realism," when non-linear forms are taken for the accelerator, as by Goodwin (1951).

IV. CAPITAL-OUTPUT MODELS

Smithies (1957) and Duesenberry (1958) have recently made much use of models of this type, but they go back to earlier work, *e.g.*, by Kalecki

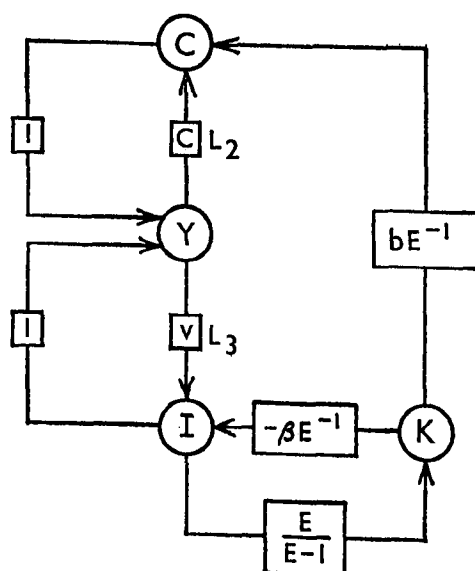


FIG. 3

(1935) and Kaldor (1940). Goodwin (1955) has a model of this general type, but more explicitly related to the accelerator and with a non-linear relation. There are further models, *e.g.*, Phillips (1957), in which capital stock is confined to inventories.

First, assume no lag on the supply side and take the simplified model of Duesenberry, shorn of its depreciation element, as the type. To the flow variables already used, a stock variable is added:

K_t = capital stock at end of period t

The schematic diagram of Fig. 3 shows the relations of the model. There are four parameters: c and v for the influence of output (income), b and β

for that of capital stock (at the end of the previous period) on consumption and investment. Without lags:

$$Y_t = C_t + I_t \quad \text{where} \quad C_t = cY_t + bE^{-1}K_t = cY_t + bK_{t-1} \quad (0 < c < 1, b > 0)$$

$$\text{and} \quad I_t = vY_t - \beta E^{-1}K_t = vY_t - \beta K_{t-1} \quad (v > 0, \beta > 0)$$

together with a technical relation (identity) on capital growth:

$$K_t - K_{t-1} = I_t \quad \text{or} \quad K_t = \frac{E}{E-1} I_t$$

The effect of capital stock is taken as positive on consumption, through profits and dividends, but as negative on investment, through the marginal efficiency of capital. Write $\rho = 1 - \beta + kv$ where $k = (b - \beta)/(1 - v - c)$ and the relations give:

$$Y_t = kK_{t-1} \quad \text{and} \quad K_t = \rho K_{t-1}$$

$$Y_t = kK_0 \rho^{t-1} \quad \text{and} \quad K_t = K_0 \rho^t$$

with solution:

where K_0 is the original capital stock. This is again a typical growth model, capital stock growing at a rate given by ρ and the capital-output ratio being constant. This ratio can be expressed: $Y_t/K_{t-1} = k$, *i.e.*, output is a fixed multiple of capital stock at the end of the previous period. The ratio is not a technical one; it arises from the actual time-paths of capital and output generated by the model (Technical Note A).

It is reasonable to take no lag in the effect of capital stock (K_t) on consumption and investment in the subsequent period. There are then two lags to insert, in the output effects on consumption (L_2) and on investment (L_3). The general model is:

$$\left. \begin{aligned} \text{Supply/Demand: } Y_t &= c(Y_t)_{L_2} + v(Y_t)_{L_3} + (b - \beta)K_{t-1} \\ &= \text{lagged dependence on } Y_t \text{ and } K_{t-1} \\ \text{Technical: } K_t &= I_t + K_{t-1} = v(Y_t)_{L_3} + (1 - \beta)K_{t-1} \\ &= \text{lagged dependence on } Y_t \text{ and } K_{t-1} \end{aligned} \right\} \quad (7)$$

There are four economic parameters and whatever lag parameters are used for L_2 and L_3 .

The simplest case has $L_2 = L_3 = E^{-1}$, one-period delays in consumption and investment. This is Duesenberry's simplified model and effectively that of Smithies.¹ Then (7) are:

$$\left. \begin{aligned} Y_t &= (v + c)Y_{t-1} + (b - \beta)K_{t-1} \\ K_t &= vY_{t-1} + (1 - \beta)K_{t-1} \end{aligned} \right\} \quad (8)$$

¹ The model of Smithies (1957) uses full-capacity output Y_f as a variable instead of capital stock K . A translation from Smithies to Duesenberry, or conversely, can be made by means of a technical relation: $Y_f = \sigma K$, where σ is Domar's coefficient (see Technical Note A). In Smithies' technical relation: $Y_f = \sigma K$, where σ is Domar's coefficient (see Technical Note A). In Smithies' State 1 the relations are (8) with different parameters and Y_f instead of K ; the solution is as indicated here. In addition, he has a State 2, which is characterised by relations of type (8) with a constant term (in past peak income $\bar{Y}$) added to each. A corresponding particular integral, again a constant in terms of $\bar{Y}$, is then to be added to the solution (see Technical Note B).

This is a pair of linear first-order difference equations in two variables, in reduced or recursive form, and with four coefficients given in terms of four parameters. The model is neat and convenient (*e.g.*, for estimation purposes)—as a result of the fact that the lags are specified as one-period delays. The solution (Technical Note B) is that both the variables, Y_t and K_t , satisfy the same autoregressive relation:

$$Y_t - (v + c + 1 - \beta)Y_{t-1} + \{(v + c)(1 - \beta) - v(b - \beta)\}Y_{t-2} = 0. \quad (9)$$

and that the closely related time-paths of Y_t and K_t may be steady or oscillatory, damped or anti-damped, according to the values of the parameters. Typically, in the Duesenberry model, the variations are steady growths, and the time-paths can be written:

$$\begin{aligned} Y_t &= B_1\lambda_1^t + B_2\lambda_2^t \\ K_t &= k_1B_1\lambda_1^t + k_2B_2\lambda_2^t \quad (\lambda_1 > \lambda_2 > 1) \end{aligned}$$

where λ_1 , λ_2 , k_1 and k_2 are constants fixed by the parameters of (8) and where B_1 and B_2 are given by initial conditions. There are two steady-growth situations:

$$\begin{aligned} Y_t &= Y_0\lambda_1^t \quad \text{and} \quad K_t = k_1Y_t \quad (\text{when } B_2 = 0) \\ Y_t &= Y_0\lambda_2^t \quad \text{and} \quad K_t = k_2Y_t \quad (\text{when } B_1 = 0) \end{aligned}$$

The general solution is a combination of these two situations. The capital-output ratio K_t/Y_t is constant in each situation and, generally, the ratio tends to k_1 in the limit as time goes on. The constancy of the capital-output ratio is again not a technical matter. Nor is it accidental. It is a consequence of the structure of the model as expressed in the linear first-order equations (8)—a built-in feature of any model (such as Duesenberry's or Smithies') which has such relations.¹

The consequences of introducing other and more complicated lags in the system (7) are similar to those already described. For example, if no more is done than to insert the geometric lag $L_3 = \frac{\mu}{\Delta + \mu}$ in the investment

¹ Duesenberry claims that the elementary accelerator model of Hicks is a special case of his model with relations (8), putting $b = 0$ and $\beta = 1$. The autoregressive relation of Duesenberry, (9) above, does indeed become:

$$Y_t - (v + c)Y_{t-1} + vY_{t-2} = 0$$

which is Hicks' relation, (5) above. But there is a little more to it than this. Hicks' model has no supply lag, so that I_t is actual investment, giving:

$$K_t - K_{t-1} = I_t = v(Y_{t-1} - Y_{t-2})$$

for change in capital stock. Hicks' model need go no farther; nothing is said explicitly about the level of capital stock, or about the capital-output ratio. It is not necessary that $K_t = vY_{t-1}$ as required by Duesenberry's (8) with $\beta = 1$. However, it is possible to add an extra assumption to Hicks' model—that actual capital stock is always equal to desired capital stock, given technically by: $K = vY_{t-1}$. Then:

$$K_t = vY_{t-1} \quad \text{and} \quad K_t - K_{t-1} = v(Y_{t-1} - Y_{t-2})$$

are both valid and the link with the accelerator is complete.

relation, then (7) no longer give the simple equations (8). They become of second order:

$$\begin{aligned} Y_t &= a_{11}Y_{t-1} + a_{12}Y_{t-2} + a_{13}K_{t-1} + a_{14}K_{t-2} \\ K_t &= a_{21}Y_{t-1} + a_{23}K_{t-1} + a_{24}K_{t-2} \end{aligned}$$

The seven coefficients are here given in terms of five parameters (c , v , b , β , μ). The autoregressive relation (9) becomes a third-order difference equation in Y_t , from which growth and oscillatory components of the time-path of Y_t are to be expected. Duesenberry introduces fluctuations into his simple growth model (8) by taking the parameters as shifting over time. This may well be appropriate, but he can also get some of the complications

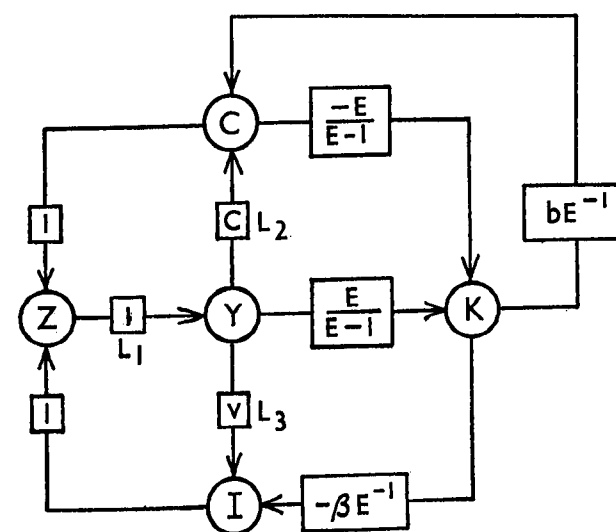


FIG. 4

he wants (and some he does not) by the simple and "realistic" device of replacing his one-period delays by more suitable lags. The number of parameters will be larger and not necessarily equal to the number of coefficients in the relations of the system. The solution of the model—the time-paths of Y_t and K_t , their growth and oscillatory features—will vary with the types of lags included.

Now assume that there is a supply lag. The schematic diagram of the relations of the model needs to be adjusted as in Fig. 4. The variables Y_t and Z_t are shown separately, and the technical relation on capital growth is changed to match. The relation $K_t - K_{t-1} = I_t$ is valid only if I_t is actual investment as well as investment demand—correct in the absence of a supply lag but not necessarily so when output lags behind demand. What relation to substitute depends on an additional assumption. It is taken here that consumption demand is realised, that investment absorbs all surplus or

short-fall in output, *e.g.*, in the form of unintended inventories.¹ Since actual investment is then $(Y_t - C_t)$, the technical relation is:

$$K_t - K_{t-1} = Y_t - C_t \neq I_t \text{ or } K_t = \frac{E}{E-1} (Y_t - C_t)$$

This is shown in Fig. 4. Inserting three lags, including the supply lag L_1 , we find that the model is characterised by three relations in three variables Y_t , Z_t and K_t :

$$\left. \begin{aligned} \text{Supply: } Y_t &= (Z_t)_{L_1} = \text{lagged dependence on } Z_t \\ \text{Demand: } Z_t &= c(Y_t)_{L_2} + v(Y_t)_{L_3} + (b - \beta)K_{t-1} \\ &= \text{lagged dependence on } Y_t \text{ and } K_{t-1} \\ \text{Technical: } K_t &= Y_t - C_t + K_{t-1} = (1 - c)(Y_t)_{L_2} + (1 - b)K_{t-1} \\ &= \text{lagged dependence on } Y_t \text{ and } K_{t-1} \end{aligned} \right\} \quad (10)$$

The time-paths of the variables can vary greatly according to the lag forms taken. The number of parameters can be large; the four used here are to be supplemented by other economic parameters and by the parameters of the lags. Against this, though Y_t and K_t are observable, Z_t and its components (C_t and I_t) are not. Consequently, (10) needs to be reduced to two lagged relations in Y_t and K_t for econometric purposes—and to a single autoregressive relation in Y_t or K_t for a deterministic solution. These may be difference equations of quite high order.

These are serious complications, hardly explored as yet. They are aggravated if non-linear relations are used, *e.g.*, for investment. Yet it seems that no model simpler than that of Fig. 4 can serve as a basic system for econometric testing and estimation.

V. CONCLUSION

A macro-dynamic model of the type considered involves two or more lagged and interdependent relations in two or more variables. A deterministic solution is obtained by reducing the system to an autoregressive relation in a selected variable. Other reductions of the system may be needed for econometric purposes. The parameters of the model may be numerous and not necessarily identified in terms of the coefficients of the relations. But the time-paths of the variables depend on the values of the parameters, and they are affected by any temporal shifts in the parameters. Some studies are now becoming available,² but much remains to be done, not only on the formulation of economic relations but particularly on realistic specification of lags. It is still too much to ask the statistician to test or estimate parameters in such economic models.

¹ This is the usual assumption, but it is not always made explicit. It is the assumption made by Phillips (1957) in his inventory model, a good example of a capital-output model with a lag on the supply side.

² See Eisner (1959) and Klein (1958).

The following are among the questions which need to be put. First, what form of lag is realistic? Is it a moving average (distributed lag) of several periods? Noting that the order of the difference equations of the model grows alarmingly as the lags are lengthened, how few periods can be taken? This has a bearing on recent work in which a distinction is drawn, in consumption or investment relations, between permanent and temporary increases in output or income (considered over many periods). Or, can some simple approximation (*e.g.*, a geometric lag) be used and, if so, with how few parameters?

Second, with the form of the economic and lag relations decided, how many parameters are there in all for estimation? It is only too easy to increase the number of economic parameters in a model. Even in Duesenberry's simplified model there is one more parameter (for depreciation) than shown in (8) above; Smithies has an even larger number in his version. The general expectation is that there will be a surplus of parameters. The question is whether some of them, and the lag parameters in particular, can be allotted specified values, found by experimentation or by other means.

Finally, there is no reason whatever to expect that realism can be achieved by taking lags as simple delays (whether of a single or a variable period) rather than in distributed form. The treatment of general lags is in any case not difficult, as indicated in Technical Note C. They are handled just as well in discrete as in continuous form, and they can be specified empirically as well as analytically.

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TECHNICAL NOTES

A. CAPITAL-OUTPUT RATIOS

The ratio of capital stock K to output Y follows from the time-paths of the two variables. It is not technically determined; it is a consequence of the structure of the particular model considered. If the ratio is constant over time, then it is because the model has been assumed to have a particular structure. The ratio, however, may be confused with one or other of two *technical* ratios which are sometimes assumed to be given and/or constant.

- (a) *Desired Capital/Output Ratio*: $v = \frac{\bar{K}}{Y}$ (v = acceleration coefficient)

In discrete analysis, the technical relation (v constant) is $\bar{K}_t = vY_t$ without lag, i.e., desired capital stock at the end of period t is proportional to output in the period. If a lag is introduced, it can only be $\bar{K}$ lagged on Y : $\bar{K}_t = vY_{t-1}$. To interpret a constant v as the power of the accelerator, it is necessary to say something about actual as well as desired capital stock. Assume that actual capital stock is always the same as that desired. Then $K_t = \bar{K}_t = vY_t$ gives:

$$I_t = K_t - K_{t-1} = v(Y_t - Y_{t-1})$$

which is the accelerator relation.

- (b) *Full-capacity Output-Capital Ratio*: $\sigma = \frac{Y_f}{K}$ (σ = Domar's coefficient)

In discrete analysis, the technical relation (σ constant) is $Y_{ft} = \sigma K_t$ without lag, i.e., full-capacity output in period t is proportional to capital stock at the end of the period. If a lag is introduced, as indeed would be usual, it can only be Y_f lagged on K : $Y_{ft} = \sigma K_{t-1}$. Here, σ is not the reciprocal of the acceleration coefficient; it expresses only the technical fact that full-capacity output is fixed by the capital stock. The confusion arises since (σ constant, one-period lag):

$$I_t = K_t - K_{t-1} = \frac{1}{\sigma} (Y_{ft+1} - Y_{ft})$$

This is not an accelerator relation—the lag is in the opposite direction. It is simply the same technical relation in difference form:

$$Y_{ft+1} - Y_{ft} = \sigma I_t$$

i.e., the change in full-capacity output is proportional to the (prior) investment.

B. SYSTEMS OF LINEAR DIFFERENCE EQUATIONS

The problem is sufficiently illustrated by considering a pair of first-order difference equations in two variables Y_t and Z_t . In homogeneous form:

$$\begin{cases} \alpha_{11}Y_t + \alpha_{12}Z_t + \beta_{11}Y_{t-1} + \beta_{12}Z_{t-1} = 0 \\ \alpha_{21}Y_t + \alpha_{22}Z_t + \beta_{21}Y_{t-1} + \beta_{22}Z_{t-1} = 0 \end{cases} \quad (i)$$

Provided that the matrix of α 's is not singular, the equations can be solved for Y_t and Z_t to give the reduced or recursive form:

$$\begin{cases} Y_t = a_{11}Y_{t-1} + a_{12}Z_{t-1} \\ Z_t = a_{21}Y_{t-1} + a_{22}Z_{t-1} \end{cases} \quad (ii)$$

where the a 's are given in terms of the α 's and β 's. It is better to consider the reduced form (ii) with four parameters, rather than the form (i) originally specified.

The variables in the simple system (i) or (ii) are very closely related. The relation can be expressed in one or other of two equivalent ways:

- (a) *The Variables Satisfy the Same Autoregressive Relation*

Multiply the equations (ii) by a_{22} and a_{12} respectively and subtract:

$$a_{12}Z_t = a_{22}Y_t - AY_{t-1} \quad \text{where} \quad A = \begin{vmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{vmatrix}$$

Then

$$a_{12}Z_{t-1} = a_{22}Y_{t-1} - AY_{t-2}$$

can be substituted into the first equation of (ii) to give:

$$Y_t - (a_{11} + a_{22})Y_{t-1} + AY_{t-2} = 0 \quad (iii)$$

On eliminating Z_t , the system (ii) is reduced to the autoregressive relation (iii) in Y_t . Similarly, on eliminating Y_t , it reduces to exactly the same relation in Z_t .

- (b) *The Variables Have a Particular (Constant) Relationship*

The deterministic solution of the system (ii) is given by the difference equation (iii). More directly, try:

$$Y_t = \lambda^t \quad \text{and} \quad Z_t = k\lambda^t$$

in (ii) and find appropriate constants λ and k . Substitution in (ii) gives:

$$k = \frac{\lambda - a_{11}}{a_{12}} = \frac{a_{21}}{\lambda - a_{22}}$$

λ is given by the quadratic:

$$\lambda^2 - (a_{11} + a_{22})\lambda + A = 0$$

or

$$\begin{vmatrix} a_{11} - \lambda & a_{12} \\ a_{21} & a_{22} - \lambda \end{vmatrix} = 0$$

Hence, there are two values of λ , the characteristic roots (λ_1 and λ_2) of A . The corresponding values of k are:

$$k_1 = \frac{\lambda_1 - a_{11}}{a_{12}} \quad \text{and} \quad k_2 = \frac{\lambda_2 - a_{11}}{a_{12}}$$

The values of the λ 's and the k 's are thus provided by the structure of the model, the coefficients in (ii). If λ_1 and λ_2 are real ($\lambda_1 > \lambda_2$), the solution of (ii) is:

$$\left. \begin{aligned} Y_t &= B_1 \lambda_1^t + B_2 \lambda_2^t \\ Z_t &= k_1 B_1 \lambda_1^t + k_2 B_2 \lambda_2^t \end{aligned} \right\} \quad \text{. . . . (iv)}$$

where B_1 and B_2 are given by initial conditions. In the limit as t increases, the first term in each of these expressions is dominant. The ratio of Z_t to Y_t tends to be a constant k_1 , depending only on the structure of the system (and not on initial conditions).

If the λ 's are conjugate complex, the time-paths (iv) are oscillatory:

$$Y_t = B \rho^t \cos(\theta t - \epsilon) \quad \text{and} \quad Z_t = \kappa B \rho^t \cos(\theta t - \epsilon')$$

where ρ , θ and κ are structural constants given by the coefficients in (ii) and where B , ϵ and ϵ' depend also on initial conditions. The time-paths of the variables have the same frequency and damping but with amplitude and phasing dependent on initial conditions. But the amplitude of the oscillation in Z_t is a constant multiple of that in Y_t , the constant being given by the structure of the system.

If the system is not homogeneous, a term in t being added to each equation in (i) or (ii), then the solution is (iv) with the addition of a particular integral. For example, add constant terms $r\bar{Y}$ and $s\bar{Z}$ in (ii) so that the solution (iv) has constants $R\bar{Y}$ and $S\bar{Z}$ added to the two equations respectively, where R and S are constants given by r , s and the a 's.

This treatment of difference equations is analogous to the corresponding (and better-known) analysis for differential equations. The equations in reduced form:

$$\frac{dY}{dt} = a_{11}Y + a_{12}Z \quad \text{and} \quad \frac{dZ}{dt} = a_{21}Y + a_{22}Z$$

show that Y and Z satisfy the same autoregressive relation:

$$\frac{d^2Y}{dt^2} - (a_{11} + a_{22}) \frac{dY}{dt} + AY = 0$$

$$\text{and} \quad Y = B_1 e^{\lambda_1 t} + B_2 e^{\lambda_2 t} \quad \text{and} \quad Z = k_1 B_1 e^{\lambda_1 t} + k_2 B_2 e^{\lambda_2 t}$$

The interpretation of the constants here is exactly the same as that given above for difference equations.

C. GENERAL TREATMENT OF LAGS

The variables ($Y, Z, K, \dots$) of a macro-dynamic model are inter-related and the responses are lagged. Suppose that Y has a lagged dependence on Z . In the continuous case the Laplace Transform is a powerful tool for handling the general lag:

$$Y(t) = \int_0^\infty w(\tau) Z(t - \tau) d\tau \quad \text{where} \quad \int_0^\infty w(t) dt = 1 \quad \text{. . . . (i)}$$

The weighting function $w(t)$ of the lag must be specified either empirically or analytically in terms of lag parameters. Write the one-sided Laplace Transform of $w(t)$:

$$W(p) = \int_0^\infty e^{-pt} w(t) dt$$

Then the lagged relation (i) reduces to the differential equation:

$$Y = W(D)Z \quad \left(\text{Operator } D = \frac{d}{dt} \right) \quad \text{. . . . (ii)}$$

Usually, by the way in which Laplace Transforms appear, the function $W(p)$ is the ratio of polynomials in p , and (ii) is linear with constant coefficients.

In the discrete case, the general form of the lagged relation is:

$$Y_t = \sum_{r=0}^\infty w_r Z_{t-r} \quad \text{where} \quad \sum_{r=0}^\infty w_r = 1 \quad \text{. . . . (iii)}$$

The weighting coefficients w_r ($r = 0, 1, 2, \dots$) must be specified empirically or analytically. If $w_r = 0$ for $r \geq R$, then (iii) is the sum of a finite number R of terms and the lagged relation is of moving average (distributed) form. More generally (iii) has an infinite series of weighting coefficients. An appropriate transform, analogous to the Laplace Transform of the continuous case, can then be used. It is provided by the Generating Function of w_r :

$$W(s) = \sum_{r=0}^\infty w_r s^r$$

The lagged relation (iii) then reduces to the difference equation:

$$Y_t = W(E^{-1})Z_t \quad (\text{Shift Operator } EY_t = Y_{t+1}) \quad \text{. . . . (iv)}$$

If $W(s)$ is a ratio of polynomials in s , then (iv) is linear with constant coefficients.

The reduction of the lagged relation to a differential or difference equation is not difficult when the weighting function, or the set of weighting coefficients, is given empirically. If there is a finite set of w_r , then (iii) is already a difference equation. For an empirical function $w(t)$, or an infinite set of w_r , numerical methods provide $W(p)$ or $W(s)$ for use in (ii) or (iv). The following simple cases illustrate the procedure when $w(t)$ or w_r is given analytically.

Exponential Lags

The single exponential lag is defined by the relation:

$$Y(t) = \int_0^\infty \mu e^{-\mu\tau} Z(t - \tau) d\tau \quad (\mu > 0)$$

So:

$$w(t) = \mu e^{-\mu t} \quad \text{and} \quad W(p) = \frac{\mu}{p + \mu}$$

and

$$Y = \frac{\mu}{D + \mu} Z \quad \text{or} \quad \frac{dY}{dt} = \mu(Z - Y) \quad \text{. . . . (v)}$$

This differential equation can be checked directly from the integral for Y . The single exponential lag has one parameter μ ; it is expressed by the first-order differential equation (v). Generalise by taking several such lags in succession:

$$Y = \frac{\mu_1 \mu_2 \mu_3 \dots}{(D + \mu_1)(D + \mu_2)(D + \mu_3) \dots} Z$$

This multiple exponential lag has several parameters and a differential equation of higher order than the first. Phillips (1957) shows that the response of Y to Z can be quite "realistic" when only a few terms (three or four) are taken.

Geometric Lags

The single geometric lag is defined:

$$Y_t = \sum_{r=1}^{\infty} \mu(1-\mu)^{r-1} Z_{t-r} \quad (0 < \mu \leq 1)$$

So: $w_r = \mu(1-\mu)^{r-1}$ for $r \geq 1$ and with $w_0 = 0$

and $W(s) = \mu s \sum_{r=1}^{\infty} \{(1-\mu)s\}^{r-1} = \frac{\mu s}{1 - (1-\mu)s}$

i.e.,
$$W(s) = \frac{\mu}{\left(\frac{1}{s} - 1 + \mu\right)}$$

The difference equation is: $Y_t = \frac{\mu}{(E-1) + \mu} Z_t$

i.e.,
$$Y_t = \frac{\mu}{\Delta + \mu} Z_t \quad \text{or} \quad \Delta Y_t = \mu(Z_t - Y_t) \quad \text{(vi)}$$

in terms of the operator $\Delta = E - 1$ ($\Delta Y_t = Y_{t+1} - Y_t$). The difference equation (vi) can be checked by writing the infinite series of the lag:

$$\begin{aligned} Y_t &= \mu\{Z_{t-1} + (1-\mu)Z_{t-2} + (1-\mu)^2Z_{t-3} + \dots\} \\ Y_{t+1} &= \mu\{Z_t + (1-\mu)Z_{t-1} + (1-\mu)^2Z_{t-2} + \dots\} \end{aligned}$$

and then subtracting to get ΔY_t . The single geometric lag, with one parameter μ and a first-order difference equation (vi), is obviously analogous to the exponential lag (v). It can be generalised by taking several such lags in succession:

$$Y_t = \frac{\mu_1 \mu_2 \mu_3 \dots}{(\Delta + \mu_1)(\Delta + \mu_2)(\Delta + \mu_3) \dots} Z_t$$

This multiple geometric lag has several parameters and a difference equation of order higher than the first.

GROWTH MODELS, CAPITAL AND STABILITY

I. INTRODUCTION

THE purpose of this paper is in part expository, in part critical. By constructing a simple model, we hope to facilitate the comparison of certain theories of economic growth which have recently been presented; by building the model around the concepts of a "natural rate of growth" and a "warranted rate of growth," we make it possible to inquire whether these theories have succeeded in refuting Sir Roy Harrod's view, first stated twenty years ago, that a growing economy is inherently unstable.¹ Before attributing significance to conclusions drawn from a model of the type here presented, however, we must first try to justify our disregard of Mrs. Robinson's insistence on the insuperable difficulty of measuring capital. We then consider in turn the neo-classical models (Solow, Swan, Tobin), finding ourselves fully in agreement with the recent paper by Professor Eisner in this JOURNAL; the "Keynesian" model of Mr. Kaldor; and finally the work of Professor Fellner. After concluding that Harrod's problem has not been satisfactorily disposed of, we suggest briefly other uses to which our model might be put.

II. THE PRODUCTION FUNCTION

Underlying all the models under consideration is an aggregate production function which may be written, in its most general form, as $Q = F(K, L, t)$, expressing the dependence of total output on the amounts of capital and labour employed. The introduction of t (time) with $\frac{\partial Q}{\partial t} > 0$ implies that as time passes output will increase even if the amounts of capital and labour do not. This increase results from "technical progress," in the sense of technological advances which improve the quality of capital goods, of advances in education and training which improve the quality of the labour force, and of increasing division of labour as the market expands.² This function is often specialised to $Q = A(t) f(K, L)$, with the increase in output due to technical progress proportional to actual output, so that $\frac{A'(t)}{A(t)}$ is constant.

The factor $f(K, L)$ in the specialised form of the function is assumed to have the properties of constant returns to scale and diminishing returns to factor proportions. It follows that (assuming for the moment no technical progress) as the ratio of capital to labour increases the marginal product of

¹ R. F. Harrod, "An Essay in Dynamic Theory," *ECONOMIC JOURNAL*, March 1939, pp. 14-33.

² A. A. Young, "Increasing Returns and Economic Progress," *ECONOMIC JOURNAL*, December 1928, pp. 527-42.

capital falls and that of labour rises. A common assumption in the models considered is that these opposing changes exactly offset each other, so that the ratio of the amounts of the two factors times the ratio of their marginal products is constant: the elasticity of substitution is unity.

A form of the production function which satisfies the foregoing conditions is:

$$Q = e^{at} K^b L^{1-b} \quad . \quad . \quad . \quad . \quad . \quad (1)$$

$$(a \geq 0, 1 > b > 0)$$

This function plays a central role in Professor Swan's model¹ and an important part in that of Professor Solow.²

It follows from (1) that if we write G_X for $\frac{1}{X} \frac{dX}{dt}$, the rate of growth of X , ($X = Q, K, L$), then:

$$G_Q = a + bG_K + (1 - b)G_L \quad . \quad . \quad . \quad . \quad (2)$$

From (2) it follows that:

$$G_{\frac{Q}{L}} = a + bG_{\frac{K}{L}}$$

which is the continuous form of Mr. Kaldor's "technical progress function."³ Kaldor criticises neo-classical models for the unwarranted assumption of unit-elasticity of substitution (see below, p. 67), but it must be pointed out that this is not a crucial feature of his model, and that he draws from it no conclusions about distributive shares, as do the neo-classical writers.

As long as b remains constant, the technical progress embodied in (1) is neutral in the Hicksian sense,⁴ since the factor e^{at} increases the marginal products of capital and labour in the same proportion. If we may assume that the price of capital goods in terms of consumption goods (and therefore of goods in general) is constant, the constancy of b also implies neutral technical progress in Sir Roy Harrod's sense: "I define a neutral advance as one which, at a constant rate of interest, does not disturb the value of the capital coefficient."⁵ The next section will be concerned with the measurement of capital; here we shall simply assume, as we may without loss of generality, that the price of a unit of capital is unity. If we assume that entrepreneurs attempt to equate the sum of the discounted future yields of capital goods to their prices, and that these yields are expected to be constant and permanent

¹ T. W. Swan, "Economic Growth and Capital Accumulation," *Economic Record*, November 1956, pp. 334-61, especially pp. 334-8.

² R. M. Solow, "A Contribution to the Theory of Economic Growth," *Quarterly Journal of Economics*, February 1956, pp. 65-94, especially pp. 76-7, 85-6.

³ N. Kaldor, "A Model of Economic Growth," *ECONOMIC JOURNAL*, December 1957, pp. 591-624, especially p. 604.

⁴ J. R. Hicks, *The Theory of Wages* (London, 1932), pp. 121-2.

⁵ R. F. Harrod, *Towards a Dynamic Economics* (London, 1948), p. 23.

(leaving questions of depreciation and obsolescence for the next section), then in equilibrium, with a rate of interest r :

$$1 = \int_0^\infty \frac{\partial Q}{\partial K} e^{-rt} dt = \frac{1}{r} \frac{\partial Q}{\partial K} = \frac{1}{r} \frac{bQ}{K}$$

Hence the equilibrium capital-output ratio (Harrod's C_r) is:

$$C_r = \frac{K}{Q} = \frac{b}{r} \quad . \quad . \quad . \quad . \quad . \quad (3)$$

As long as b and r are constant, technical progress will not disturb the value of the capital coefficient.

III. CAPITAL AND OUTPUT

The form of equation (1) suggests that capital is to be measured in physical units, by analogy with man-hours of labour (or acres of land). The mechanics of all the theories under consideration, save that of Mr. Kaldor, require that a unit of capital shall have a constant price in terms of consumption goods, since they assume a constant or inflexible ratio of savings to income. For as Mrs. Robinson points out,¹ if the price of capital goods varies, the sacrifice of a given amount of consumption goods through saving will yield varying amounts of physical capital, so that the assumption of a constant savings ratio will imply that equation (1) ceases to hold.

In Mr. Kaldor's model the savings ratio is assumed to be flexible, but he does propose some such assumption as that capital goods are measured by the number of tons of steel embodied in them, and that the price of a ton of steel in terms of goods in general is constant.² Though this may, as he says, not be essential for his model, it will be argued below (p. 67) that he is safer in making some such assumption.

For all our theories except Mr. Kaldor's there is a further difficulty. If the price of capital goods in terms of consumption goods can vary, a constant rate of interest, with neutral technical progress in either the Hicks or the Harrod sense, no longer requires a constant capital-output ratio. The relationship between the rate of interest and the marginal product of capital, as analysed, for example, at the end of the preceding section, ceases to hold, and doubt is cast on the marginal productivity theory of factor rewards.³

Professor Swan⁴ makes the "scarecrow" assumption that capital goods and consumption goods are produced by the same factors used in the same

¹ Joan Robinson, "Economic Growth and Capital Accumulation—A Comment," *Economic Record*, April 1957, pp. 103-8, especially p. 104.

² Kaldor, *op. cit.*, p. 599.

³ Joan Robinson, "The Production Function and the Theory of Capital," *Review of Economic Studies*, Vol. XXI (2), 1953-4, pp. 81-106; N. Kaldor, "Alternative Theories of Distribution," *Review of Economic Studies*, Vol. XXIII (2), 1955-56, pp. 83-100, especially p. 91.

⁴ Swan, *op. cit.*, p. 344.

proportions, so that their relative marginal costs, and therefore in perfect competition their relative prices, are constant. Mrs. Robinson argues¹ that as the overall capital-labour ratio increases, the rate of wages rises and the rate of profit falls, so that there are two conflicting influences on the price of capital goods, the net effect of which may be in either direction. She holds, however, that the effect must be to raise the price of capital goods if the rate of profit falls far enough.² But this does not meet Swan's point that it is the *relative* prices of capital goods and consumption goods that are at issue, and that:³

"When wages rise and interest falls, whether the value of a 'standard axe' goes up or down in terms of product may be expected to turn (broadly speaking) on a comparison of the relative importance of the two factors for the axe on the one hand, and for the product on the other. In general, there is no presumption either way."

In the absence of such a presumption, Swan feels justified in attaching significance to the results of a model based on his "scarecrow" assumption.

But this argument is far from disposing of Mrs. Robinson's objections. Can a unit of "physical capital" be defined? In a paper based largely on the work of Professor Leontief, Professor Solow⁴ states the conditions in which the construction of an index of physical capital is possible, namely that any two pieces of capital equipment which yield equal outputs when each co-operates with one quantity of labour shall also yield equal outputs when each co-operates with any other quantity of labour. In her reply⁵ Mrs. Robinson expresses less concern about the physical diversity of capital goods than about the problems of (a) their durability, (b) the effect of technical progress, both of which are neglected in Solow's analysis.

(a) The productivity of capital goods consists of a stream of future outputs, whose equivalent in terms of current output depends on the rate at which they are discounted. Thus two pieces of capital equipment yielding equal "outputs" at one rate of discount (and thus representing the same "quantity" of capital) may yield different "outputs" at another rate of discount. It is therefore impossible to express an old machine as the equivalent of so many new machines unless we know the rate of interest. Again the marginal productivity theory is in danger.

(b) If new equipment is more productive than old because of technical progress, then according to Solow's analysis it simply represents a greater quantity of capital. It becomes meaningless to speak of technical progress

¹ Joan Robinson, "Economic Growth and Capital Accumulation—A Comment," p. 107.

² *Ibid.* *The Accumulation of Capital* (London, 1956), p. 406.

³ Swan, *op. cit.*, p. 360.

⁴ R. M. Solow, "The Production Function and the Theory of Capital," *Review of Economic Studies*, Vol. XXIII (2), 1955-56, pp. 101-8.

⁵ Joan Robinson, "The Production Function and the Theory of Capital—A Reply," *Review of Economic Studies*, Vol. XXIII (3), 1955-56, p. 247.

as raising the productivity of a given quantity of capital. In his interesting attempt to measure the actual rate of technical progress¹ he is, of course, forced to abandon his definition of a unit of capital by reference to its productivity.

As to (a), Swan's "scarecrow" assumption is that capital goods last for ever with unimpaired efficiency.² We would propose a compromise between this and the assumption of Professors Champernowne and Kahn,³ which is that machines operate at constant efficiency for T years and then fall to pieces. We assume with Swan that capital goods last for ever (unless their scrap value comes to exceed their value in production) but that their efficiency declines exponentially, so that a piece of equipment of age t is the equivalent in production of e^{-ut} pieces of new equipment; this ratio is, of course, independent of the rate of interest.

As to (b), Swan assumes⁴ that technical progress does not alter the physical form of capital goods, but only the methods whereby they are combined with labour in production. We are reluctant to dismiss the problem of obsolescence so readily. But in what sense can we speak of a "given quantity" of capital when technical progress alters the form of capital goods? Our only recourse is to some such assumption as Kaldor's mentioned above (p. 59), so that the price of capital goods in terms of consumption goods is constant, and equation (1) continues to hold for capital so measured. Owing to technical progress, represented by e^{at} , a piece of capital equipment which cost as much as a unit of consumption goods when it was produced t years ago would be the equivalent in production (if no physical deterioration had taken place) of e^{-at} pieces of new equipment, where a piece of new equipment currently costs as much as a unit of consumption goods.

The joint effect of these two assumptions is that, through physical deterioration and obsolescence, a piece of equipment which was a unit of capital when it was new t periods ago is now the equivalent of only $e^{-(u+a)t}$ units. Such a formula may perhaps find some justification in the practice, very common in the United Kingdom though less so in the United States, of charging depreciation by the "percentage of diminishing balance" method.

The argument of this section, however, requires us to reconsider the variable Q in equation (1), which is normally taken to represent net output. In our case, the difference between gross and net output is a constant fraction of the stock of capital. It follows that in general the functions relating gross and net output to the amounts of capital and labour employed cannot both

¹ R. M. Solow, "Technical Change and the Aggregate Production Function," *Review of Economics and Statistics*, August 1957, pp. 312-20.

² Swan, *op. cit.*, p. 344.

³ D. G. Champernowne and R. F. Kahn, "The Value of Invested Capital," *Review of Economic Studies*, Vol. XXI (2), 1953-54, pp. 107-11; reprinted as an Appendix to Joan Robinson's *The Accumulation of Capital*, pp. 429-35.

⁴ Swan, *op. cit.*, p. 344.

be subject to constant returns to scale.¹ It seems more reasonable to assume this property to be enjoyed by the gross output function; accordingly, Q will henceforth stand for gross output. The argument at the end of the preceding section must be modified as follows:

$$1 = \int_0^{\infty} \frac{\partial Q}{\partial K} e^{-(r+u+a)t} dt = \frac{1}{r+u+a} \frac{bQ}{K}$$

$$C_r = \frac{K}{Q} = \frac{b}{r+u+a} \quad \dots \quad (3')$$

IV. THE NATURAL RATE OF GROWTH

The "natural rate of growth," G_n , plays an important part in Sir Roy Harrod's analysis; it is "the rate of advance which the increase of population and technological improvement allow" and "represents the line of output at which producers of all kinds will be satisfied that they are making a correct balance between work and leisure; it excludes the possibility of 'involuntary' unemployment."² It follows from (2) that the rate of growth of output is not completely determined when the rate of technical progress, the rate of growth of the labour supply and the condition of full employment are given. G_Q depends also on the rate of growth of capital, and both Professor Swan³ and Mr. Kaldor⁴ speak of a variety of natural rates of growth even when a , b and G_L are given. Harrod has stated⁵ that his G_n does not depend on the rate of growth of capital; on the contrary, it requires a certain rate of growth of capital. This can only be a rate equal to the rate of growth of output. For if this were not so, a situation in which the warranted rate of growth, which requires a constant capital-output ratio so that $G_Q = G_K$, is equal to the natural rate would be not only unstable but impossible. We conclude that, from (2):

$$G_n = a + bG_n + (1-b)G_L = \frac{a}{1-b} + G_L \quad \dots \quad (4)$$

This is the equilibrium rate of growth of both output and capital in Swan's and Kaldor's models.⁶ In the next two sections we consider their arguments in turn.

¹ Constant returns to scale in one function imply constant returns to scale in the other if, and only if, the ratio of capital to output is constant. This is in fact an equilibrium condition in our models, but must not be assumed at this stage.

² Harrod, *op. cit.*, p. 87.

³ Swan, *op. cit.*, p. 342.

⁴ Kaldor, "A Model of Economic Growth," p. 612.

⁵ In a letter to the author.

⁶ And would be so also, were it not for an algebraic slip, in Professor Solow's model; cf. "A Contribution to the Theory of Economic Growth," pp. 85-6.

V. THE NEO-CLASSICAL MODEL

In the neo-classical models of Professors Solow and Swan, the required capital-output ratio is determined as described at the end of Sections (II) and (III) above (equations (3) and (3')), and the ratio of savings to output, s , is assumed constant. Hence:

$$G_w = \frac{s}{C_r} = \frac{s(r+u+a)}{b} \quad \dots \quad (5)$$

G_w is Harrod's "warranted rate of growth"; " G_w is the entrepreneurial equilibrium; it is the line of advance, which, if achieved, will satisfy profit takers that they have done the right thing."¹ If $G_w < G_Q$, then:

$$C_r > \frac{s}{G_Q} = \frac{dK}{Q} \div \frac{dQ}{Q} = \frac{dK}{dQ}$$

so that the required capital-output ratio exceeds the actual incremental capital-output ratio. Provided that the existing capital-output ratio K/Q does not exceed C_r , this will stimulate investment; at the existing market rate of interest planned investment (to use Professor Fellner's terminology) will exceed actual saving. On the neo-classical view, this will drive up the market rate of interest. If $G_w > G_Q$ the actual incremental capital-output ratio will exceed C_r . Provided that the existing capital-output ratio K/Q is not less than C_r , investment will be discouraged and the market rate of interest will fall.

Professor Swan assumes that if $G_w < G_n$, there is full employment so that $G_w < G_n = G_Q$. The market rate of interest therefore rises and, since in the neo-classical models r in (5) is equated with the market rate of interest, G_w also rises. If $G_w > G_n$, G_w must exceed G_Q (which cannot for long exceed G_n), and the market rate of interest will fall, as will G_w .

The attainment of equilibrium with $G_Q = G_w = G_n$, and its stability when attained, depend on the possibility of changing r , and the responsiveness of C_r to changes in r . We follow Harrod in doubting the efficacy of the market rate of interest in this context.² In the first place, the market rate of interest may itself have an irreducible minimum. Secondly, the r which appears in equation (5) is the rate at which entrepreneurs discount future yields, an "internal rate of return" whose connection with the market rate of interest is extremely tenuous. Finally, we note that Solow claimed as a weakness of Harrod's model the "crucial" assumption of fixed technical coefficients. Professor Eisner points out³ that this is misleading; the true issue between Harrod and Solow turns on the effectiveness of the rate of

¹ Harrod, *op. cit.*, p. 87.

² *Ibid.*, Lecture Five.

³ Robert Eisner, "On Growth Models and the Neo-classical Resurgence," *ECONOMIC JOURNAL*, December 1958, pp. 707-21, especially pp. 713-14.

interest, and there is in Solow's model the "crucial" assumption that the marginal product of capital is always positive. If this crucial assumption (which is implicit in our own equation (1)) is not made, the "internal rate of return" may fall to zero without bringing about equilibrium. Moreover, to regard the entrepreneur as so easily encouraged or discouraged by changes in the market rate of interest is to belittle unduly his role in the economic process, as Mr. Kaldor would no doubt agree.¹

A further source of stability may be sought in monetary factors. (The following analysis owes much to Professors Tobin² and Eisner.³) Let us assume that the desire to save can be satisfied either by accumulating claims to physical capital or by adding to the real value of the stock of "money"; "money" here includes, roughly speaking, currency plus government debt, but not commercial bank deposits.⁴ We continue to assume that real saving is a constant fraction of real income (we could add increases in the real value of the stock of "money" to real income as a determinant of saving without affecting the argument essentially). Writing M for the nominal quantity of "money" and p for the price level, we have:

$$\frac{dK}{dt} + \frac{d}{dt}\left(\frac{M}{p}\right) = sQ$$

The savings implicit in the expression for G_w (equation (5) above) are those which it is desired to hold in the form of claims to physical capital. Thus

$$\frac{1}{Q} \frac{dK}{dt} = s - \frac{1}{Q} \frac{d}{dt}\left(\frac{M}{p}\right)$$

and (5) becomes:

$$G_w = \frac{r+u+a}{b} \left[s - \frac{1}{Q} \frac{d}{dt}\left(\frac{M}{p}\right) \right] \quad (5')$$

If the equality of G_w and G_n is sought through changes in p alone, with M held constant, then $\frac{d}{dt}\left(\frac{M}{p}\right) = -\frac{M}{p} G_p$, and (5') becomes

$$G_w = \frac{r+u+a}{b} \left(s + \frac{M}{pQ} G_p \right)$$

It appears that falling prices ($G_p < 0$) will reduce G_w by reducing the effective savings ratio. But the expectation of falling prices will cause the expected real rate of interest to stand above the money rate.⁵ Just as our

¹ N. Kaldor, "The Relation of Economic Growth and Cyclical Fluctuations," *Economic Journal*, March 1954, pp. 53-71, especially pp. 69-71.

² James Tobin, "A Dynamic Aggregative Model," *Journal of Political Economy*, April 1955, pp. 103-15.

³ Eisner, *op. cit.*

⁴ Cf. Tobin, *op. cit.*, p. 105, and the references there cited.

⁵ W. Fellner, *Trends and Cycles in Economic Activity* (New York, 1956), pp. 171-3; Eisner, *op. cit.*, p. 720; Solow, "A Contribution to the Theory of Economic Growth," p. 80.

discussion of Solow's model was not meant to deny that there is always some real rate of interest (which might have to be negative), derived from the market rate and the rate of change of the price level,¹ that would be low enough to encourage investment sufficiently, so it cannot be denied that there is always some real rate of interest high enough to discourage it. Thus falling prices will reduce the effective savings ratio, but may well also reduce C_r , so that the net effect on G_w is not certain. (Of course, this solution may in any case require a degree of money-wage flexibility which is institutionally unattainable.)

If the price level is held constant and M is increased C_r will be unaffected. Harrod himself proposes a scheme whereby price stability and full employment could be simultaneously maintained by buffer stocks and budget deficits.² But this is a far cry from the self-regulating classical mechanism.

VI. A "KEYNESIAN" MODEL

In Mr. Kaldor's view it is the ratio of savings to income, rather than the required capital-output ratio, that bears the burden of adjustment. Investment is the independent and saving the dependent variable; it is in this way that he justifies the use of the term "Keynesian,"³ although here it is the distribution of income rather than its level that changes in order to bring about the equality of saving and planned investment. The mechanism is as follows:⁴

Given full employment—

"a rise in investment, and thus in total demand, will raise prices and profit margins, and thus reduce real consumption, whilst a fall in investment, and thus in total demand, causes a fall in prices (relatively to the wage level) and thereby generates a corresponding rise in real consumption. Assuming flexible prices (or rather flexible profit margins) the system is thus stable at full employment.

"The model operates only if the two savings propensities differ and the marginal propensity to save from profits exceeds that from wages, i.e. if:

$$s_p \neq s_w \quad \text{and} \quad s_p > s_w$$

"The latter is the stability condition. For if $s_p < s_w$, a fall in prices would cause a fall in demand and thus generate a further fall in prices, and equally, a rise in prices would be cumulative."

¹ Let r be the real rate of interest, r_m the money rate of interest (both compounded continuously), and G_p the proportional change in the price level, $\frac{1}{p} \frac{dp}{dt}$. Then as Professor Solow shows: $r = r_m - G_p$.

² Harrod, *op. cit.*, pp. 134 ff.

³ N. Kaldor, "Alternative Theories of Distribution," pp. 94-5; "A Model of Economic Growth," pp. 594-5.

⁴ "Alternative Theories of Distribution," p. 95.

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He also assumes¹ "an investment function which makes investment in any period partly a function of the change in output in the previous period and partly of the change in the rate of profit on capital in that period."

This implies, for example, $K = cQ + f \frac{P}{K}$, where P is total profit.² The way in which profit is introduced into this function is, as Kaldor admits, to some extent arbitrary; and this particular function is somewhat awkward to handle. In an exposition of the mechanics of his model, and for our present critical purpose, little is lost if we simplify by assuming the level of output to be the sole determinant of the required stock of capital, so that $C_r = \frac{K}{Q} = \bar{c}$.³

Hence in Kaldor's model (we write W for total wages):

$$s = s_p \frac{P}{Q} + s_w \frac{W}{Q} = s_p \frac{P}{Q} + s_w \left(1 - \frac{P}{Q}\right) = (s_p - s_w) \frac{P}{Q} + s_w \quad (6)$$

$$G_w = \frac{s}{\bar{c}} = \frac{(s_p - s_w) \frac{P}{Q} + s_w}{\bar{c}} \quad \dots \quad (7)$$

If $G_w < G_n$ and there is full employment the capital stock is deficient and investment is encouraged. The resulting increase in $\frac{I}{Q}$ increases $\frac{P}{Q}$, and by (6) and (7) s and G_w are raised. If $G_w > G_n$, investment is discouraged, and $\frac{P}{Q}$, s and G_w are lowered.

Kaldor concedes that his model will not bring about the equality of G_w and G_n needed for equilibrium if the shares of wages and profits are inflexible.⁴ He speaks of a lower limit to $\frac{P}{Q}$ as being set by an "acceptable" rate of profit on turnover, below which entrepreneurs will not lower prices. He speaks only of the subsistence level of wages as setting a lower limit to $\frac{W}{Q}$. Such an assumption is incomplete nowadays; an attempt to lower real wages below a level substantially in excess of biological subsistence will lead to resistance (*cf.* the "inflation barrier" of Mrs. Robinson⁵ and Professor Champernowne⁶). What evidence is there that the flexibility of distributive shares can be relied upon with any more confidence than the market rate of

¹ "A Model of Economic Growth," p. 601.

² *Op. cit.*, p. 604, equation (2).

³ Kaldor shows that, in his model, the economy will reach a stable equilibrium with the growth rate of capital equal to that of output, and adds: "The indirect effects through changes in the rate of profit on capital will reinforce this process" (*op. cit.*, p. 610).

⁴ *Op. cit.*, pp. 607-9.

⁵ Joan Robinson, *The Accumulation of Capital*, p. 48.

⁶ D. G. Champernowne, "Capital Accumulation and the Maintenance of Full Employment," *Economic Journal*, June 1958, pp. 211-44, especially p. 224.

interest to bring about equilibrium? And if it is agreed that a significant degree of inflexibility exists, we still need to know why distributive shares are limited to a certain range of values: we still need a theory of distribution.

Mrs. Robinson's own view is that Harrod's instability will be avoided by changes both in s (through the Kaldor mechanism) and in C_r (through appropriate changes in the relative prices of capital goods and consumption goods).¹ There would appear to be no reason, in view of Swan's argument quoted above (p. 60), to expect the prices of capital goods to move in the required direction rather than the opposite. In Kaldor's model (depending on how we choose to measure capital goods when their prices change) this might alter s or C_r in a way which would prevent the attainment of equilibrium; it is for this reason that we suggested above (p. 59) that he was safer with his "steel" assumption than without it.

Kaldor is concerned to "explain" certain observed historical constancies in the United States and the United Kingdom, in particular those of the capital-output ratio, the share of profits in income and the rate of profit. He says:²

"Existing theories are unable to account for such constancies except in terms of particular hypotheses (unsupported by any independent evidence), such as the unity-elasticity of substitution between Capital and Labour, or more recently, constancy of the degree of monopoly or the 'neutrality' of technical progress. One of the merits of the present model is that it shows that the constancy in the capital/output ratio, in the share of profit and in the rate of profit can be shown to be the consequence of endogenous forces operating in the system."

We submit that the constancy of these ratios depends on the constancy of the parameters of his equations, as well as on the mechanism of his model. By what "independent evidence" is the stationariness of his savings function, his investment function and his "technical progress" function supported? In this respect the observed historical constancies can by no means be held to be more satisfactorily accounted for by Kaldor's model than by the neo-classical model. The Joan Robinson-Kaldor savings function (6), however, is an innovation which could well be introduced into the neo-classical model, though of course as long as distributive shares are assumed to remain unchanged, (6) implies that the ratio of savings to income remains constant.

VII. THE ROLE OF TECHNICAL PROGRESS

Both the neo-classical and the "Keynesian" models examined have been found to be internally consistent, to yield the same stable equilibrium rate of growth and the constancy of certain ratios which have been observed to

¹ Joan Robinson, *op. cit.*, pp. 404-6.

² Kaldor, *op. cit.*, pp. 592-3.

be constant. With great respect to Mr. Kaldor, we are still inclined to regard the marginal productivity theory as the best theory of distribution we have. We are not unduly disturbed by the assumptions we found it necessary to make in order to justify it (Section III above), and indeed we have suggested (p. 67 above) that Mr. Kaldor's own model might not work unless he made similar assumptions. In default of evidence that distributive shares are as responsive to his mechanism as he claims, we are reluctant to abandon the "principle of substitution" as it relates to capital and labour, and shall continue to assume that the shares of profits and wages in output are b and $(1-b)$ respectively. Incorporating the savings function (6) in (5), we have:

$$G_w = \frac{s(r+u+a)}{b} = (r+u+a) \left[s_p + s_w \left(\frac{1}{b} - 1 \right) \right] \quad (8)$$

Given a , b , s_p , s_w and u , the value of r necessary for equilibrium can be obtained by setting $G_w = G_n$. We shall assume, in the spirit of Sir Roy Harrod's Lecture Five, that r remains constant (though not necessarily at the equilibrium level). We are assuming, in effect, that the net "internal rate of return" remains unchanged during periods of temporary or chronic disequilibrium. Equation (8), together with the assumption that r is constant, expresses our view that Harrod's problem has not been disposed of by the theories so far discussed.

How else might the equality of G_w and G_n be brought about? We shall consider, since this has received most attention, only the case where $G_w > G_n$, but what we shall say will apply, *mutatis mutandis*, to the reverse case. A reduction in s_p or s_w will reduce G_w and so lead towards equilibrium. The possibility that the effective savings ratio might be reduced through the operation of monetary factors was discussed at the end of Section V above. A reduction in u , increasing the "half-life" of equipment, will reduce G_w by increasing C_r , for since yields will fall off less rapidly, equipment of smaller current yield, and therefore a higher capital-output ratio, will be acceptable.

The "technical progress" parameters a and b are perhaps the most interesting and powerful possible source of relief from secular stagnation. Assuming G_L to be constant, we have, from (4) and (8):

$$\frac{\partial}{\partial a} (G_w - G_n) = s_p + s_w \left(\frac{1}{b} - 1 \right) - \frac{1}{1-b} \quad (9)$$

An increase in a will clearly increase G_n . It will also increase G_w , since with more rapid obsolescence higher current yields will be required, necessitating a smaller capital-output ratio C_r . But if we take $\frac{1}{2}$ or $\frac{1}{4}$ as alternative plausible values for b , (9) becomes $s_p + 2s_w - \frac{2}{3}$ or $s_p + 3s_w - \frac{4}{3}$ respectively, which will almost certainly be negative, since s_w may be taken to be small. Hence a greater overall rate of technical progress will very probably reduce the excess of G_w over G_n .

If b increases, technical progress will raise the marginal product of capital in a greater proportion than the marginal product of labour, and will become "labour-saving" or "capital-using." From (4) and (8):

$$\frac{\partial}{\partial b} (G_w - G_n) = -(r+a+u) \frac{s_w}{b^2} - \frac{a}{(1-b)^2} \quad (10)$$

An increase in b will increase G_n ; it will also reduce G_w by increasing C_r in greater proportion than s . (An increase in b increases s because, in our model, it increases the share of profits in output.) Labour-saving innovations can therefore avert secular stagnation.

The foregoing analysis is consistent with that of Professor Fellner.¹ Harrod's disagreement with Fellner² concerns what happens if the effect of an increase in b is to raise G_n above G_w , and if the marginal productivity of labour is affected in such a way as to cause the supply of labour to exceed the demand at the existing real wage-rate. Clearly there must be either unemployment or a reduction in real wages brought about, probably, by inflation. Fellner stresses the former alternative, Harrod the latter.

Professor Eisner rules out the "employment of capital-using innovations like a *Deus ex machina* to set the plot straight."³ The term is apt. For if technical progress is to be regarded as a stabilising force it must be shown that there is reason to believe that innovations of the required intensity and bias will appear when they are needed. Professor Hicks's argument that⁴ "a change in the relative prices of factors is itself a spur to invention . . . directed to economizing the use of a factor which has become relatively expensive" is answered by Fellner when he says:⁵

"There exists no good reason for believing that a purely competitive buyer will notice *direct indications* of the labour scarcity, which in the interest of the growth process should induce him to seek improvements that shift up primarily the marginal productivity of the existing *capital stock*. The purely competitive firm can hire any amount of additional labour at the going wage rate . . . [it] will initially believe that its profits will increase in the same proportion with the 'wrong' as with the 'right' kind of improvement."

Fellner believes that nonetheless such a mechanism exists, but his argument is very compressed, and his claim that entrepreneurs would spontaneously interpret their collective experience in such a way that they would be led to introduce the "right" kind of improvement⁶ carries little conviction as

¹ Fellner, *op. cit.*, pp. 209 ff.

² R. F. Harrod, "Professor Fellner on Growth and Unemployment," *Kyklos*, Fasc. 1, 1957, pp. 1-17, especially pp. 5 ff.

³ Eisner, *op. cit.*, p. 720.

⁴ Hicks, *The Theory of Wages*, p. 124.

⁵ Fellner, *op. cit.*, pp. 220-1.

⁶ *Loc. cit.*

it stands. In any case, the situation in which labour-saving inventions would be needed is one in which $G_w > G_n$, so that unless the induced improvement mechanism worked very rapidly the economy would be depressed, and the labour scarcity which would exist if there were full employment would not be apparent. It would be of great interest if Professor Fellner would elaborate upon his "mechanism of induced improvements," since this is a major possible source of stability which has not yet been systematically explored.

A point which emerges from our analysis is that an excess of G_w over G_n can very probably be eliminated by a sufficient increase in a , the overall rate of technical progress, without any need for a change in b (see equation (9) above and the subsequent discussion). Changes in a , however, as distinct from b , could scarcely be explained on economic grounds alone; it is only within a broader model, perhaps of the type outlined by Professor Rostow¹ and stressing the role of the entrepreneur as did Mr. Kaldor in 1954,² that a could be made to change automatically.³

VIII. A DIAGRAMMATIC SUMMARY

It may be useful, by way of summary, to present a geometric comparison of the main "solutions" to Sir Roy Harrod's problem that have been discussed in this paper. For this purpose, we make use of the very ingenious diagram devised by Professor Swan.⁴ In this diagram the rates of growth of output, capital and labour are measured vertically, and on the horizontal axis is measured $\frac{Q}{K}$, the ratio of output to capital.

Let s be the ratio of investment, $\frac{dK}{dt}$, to output, Q . Then $\frac{dK}{dt} = sQ$ and

$$G_K = \frac{1}{K} \frac{dK}{dt} = s \frac{Q}{K}$$

From our equation (2) above, (p. 58):

$$\begin{aligned} G_Q &= a + bG_K + (1-b)G_L \\ &= a + (1-b)G_L + bs \frac{Q}{K} \end{aligned}$$

The functions relating G_K and G_Q to $\frac{Q}{K}$ are represented by solid straight

¹ W. W. Rostow, *The Process of Economic Growth* (New York, 1952).

² N. Kaldor, "The Relation of Economic Growth and Cyclical Fluctuations."

³ Professor Champernowne (*op. cit.*, p. 216) defines the rate of technical progress in such a way that it would correspond, in our model, to $\frac{a}{1-b}$. If G_L were zero, $\frac{a}{1-b}$ would be the equilibrium rate of growth in our model, but we prefer to regard this as the result of capital accumulation as well as of technical progress, as does Professor Swan (*op. cit.*, p. 337).

⁴ *Op. cit.*, p. 336.

lines in the diagram. The line representing G_Q has a positive intercept, $a + (1-b)G_L$, on the vertical axis, and since $b < 1$, its slope is less than that of the G_K line. The natural rate of growth, at which $G_Q = G_K$ (see Section IV above) is represented by the horizontal straight line G_n passing

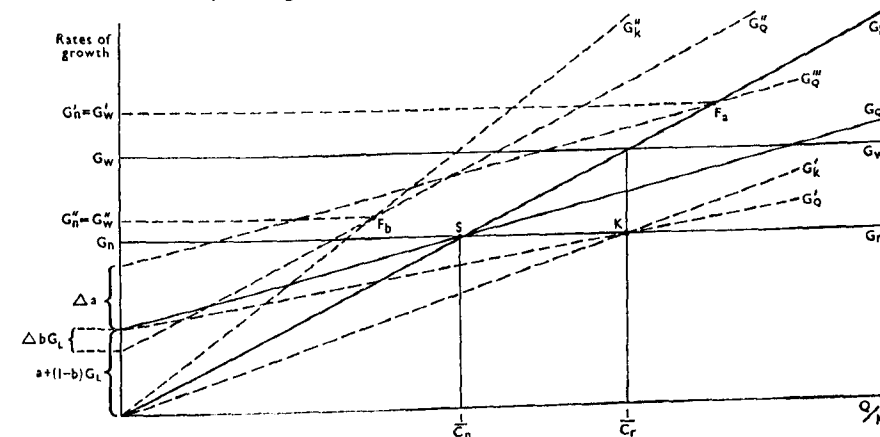


FIG. 1

through the intersection of the G_Q and G_K lines. Let us call C_n the capital-output ratio associated with G_n ; the corresponding ratio of output to capital is labelled $\frac{1}{C_n}$ in the diagram.

Harrod's problem is that the required capital-output ratio C_r may differ from C_n . The case illustrated in the diagram is that in which C_r is less than C_n , so that $\frac{1}{C_r} > \frac{1}{C_n}$. The warranted rate of growth $G_w = \frac{s}{C_r}$ is then the height of the G_K line when $\frac{Q}{K}$ has the value $\frac{1}{C_r}$.¹ G_w is represented by a horizontal line in the diagram. Since $C_r < C_n$, it follows that $G_w > G_n$.

On the neo-classical view (see Section V above) it is C_r that adjusts itself by increasing to C_n , so that $\frac{1}{C_r}$ falls to $\frac{1}{C_n}$ and G_w falls to G_n . Equilibrium is at the point S , and is stable, for if G_Q exceeds G_K , $\frac{Q}{K}$ rises, and if G_K exceeds G_Q , $\frac{Q}{K}$ falls, so that in either case the system returns to S .

According to our interpretation of the neo-Keynesian model (see Section VI above), equilibrium comes about through a reduction in s . The G_Q and G_K lines become flatter, eventually becoming G'_Q and G'_K , and intersecting at K . Again G_w falls to G_n . As Professor Swan points out,² and as is apparent from our own equation (4) (p. 62 above), the equilibrium or natural

¹ This is because the G_K line passes through the origin with slope s , and $s \times \frac{1}{C_r} = \frac{s}{C_r}$.

² *Op. cit.*, pp. 337-8.

rate of growth, at which the G_Q and G_K lines intersect, will not be affected by a change in s alone; G_n depends only on the values of a , b and G_L .

As to the argument based on Professor Fellner's work (see Section VII above), the effect of an increase in a (the overall rate of technical progress) by Δa is to raise the vertical intercept of the G_Q line, while leaving its slope and that of the G_K line unchanged. The intersection of the new G_Q line, labelled G_Q'' , with the G_K line will give a new and higher value of G_n . The increase in a will also reduce C_r (see p. 69 above), thus increasing $\frac{1}{C_r}$ and G_w . Whether there is an equilibrium position depends on the strength of the increase in a and on the values of b , s_p and s_w (the propensities to save out of profits and wages). If equilibrium is reached it will be at a point like F_a , where the new G_Q'' line intersects the G_K line, at a rate of growth $G_n' = G_w'$ higher than either G_n or G_w .

An increase in b (labour-saving innovations) by Δb will lower the vertical intercept of the G_Q line by $\Delta b G_L$. It will also increase both the slope of the G_Q line (bs) and that of the G_K line (s), since a larger share of profits in income is assumed to increase s . It is clear from equation (4) above (p. 62), however, that an increase in b alone must increase G_n , so that the new lines G_Q'' and G_K'' must intersect above the line G_n . C_r will be increased (see p. 69 above) and $\frac{1}{C_r}$ and G_w will be reduced. If the increase in b is strong enough there will be an equilibrium point F_b , at a rate of growth G_n'' and G_w'' between G_w and G_n .¹

IX. TREND AND CYCLE

The model summarised by equations (4) and (8) is offered as a useful framework within which to study economic growth and its stability. It seems likely that over the past 150 years the parameters have been, on balance, such as to maintain equilibrium. In default of a convincing account of a mechanism which has maintained this equilibrium, however, we are inclined to re-emphasise the independence of G_w from G_n , and to question the stability of the system.

Is our model able to interpret other phenomena, apart from the "historical constancies" discussed at the end of Section VI above? Mr. Kaldor's "two stages of capitalism"² are not very well established statistically; it appears that real wages did rise in the first half of the nineteenth century, if somewhat less rapidly than later.³ The difference could as well be explained, however, by an increase in b in our model (labour-saving innovations) in the early period as by Kaldor's mechanism.

¹ It can also be verified algebraically that the new capital-output ratio must, as in the diagram, be greater than either C_r or C_n .

² N. Kaldor, "A Model of Economic Growth," pp. 618-21.

³ W. W. Rostow, *British Economy of the Nineteenth Century* (Oxford, 1948), Chapter 1.

What of the Kondratieff? Sir Roy Harrod has recently suggested¹ that the upswing and downswing of the Kondratieff can be explained in terms of an excess of G_n over G_w and of G_w over G_n respectively. It seems to be agreed, however,² that output increases more rapidly in the downswing of a Kondratieff than in the upswing. This would require that in the upswing of a Kondratieff G_n should fall while G_w fell still further, and that in the downswing G_n should rise while G_w rose still further. Now in our model the only parameters affecting both G_n and G_w are a and b ; by equation (9), a change in a alters G_n in the same direction as G_w , but probably to a greater extent, and by equation (10) a change in b alters G_n and G_w in opposite directions. Thus our model cannot, as it stands, explain the Kondratieff in a way consistent with observation. One way of modifying the model would be to take into account the fact that, because investment does not in general yield results immediately, the investment of one period is not in general identical with the increase in K which appears in the production function (1) for that period.

The need for such modification does not, we submit, lessen the usefulness of our model for the purpose of considering long-run stability. A promising approach to the Kondratieff might be to show the consequences of fluctuations in b about some "normal" level b_0 ; but it would be the normal level b_0 itself, in conjunction with the other parameters of the system, that would determine its long-run stability or instability.

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¹ Harrod, "Professor Fellner on Growth and Unemployment," p. 3.

² Rostow, *loc. cit.*; J. A. Schumpeter, *Business Cycles* (New York, 1939), p. 504.

NOTES ON SOME CONTROVERSIES IN THE THEORY OF INTERNATIONAL TRADE

It is proposed in this paper to review four disputed problems in the theory of international trade.

(1) The first problem concerns the impact of an autonomous shift in international demand on the net barter terms of trade and the volume of trade. Graham disputed the solution that Marshall offered to this problem in *Money, Credit and Commerce*. The contradiction between their rival solutions stems from alternative meanings attached to the "increase" in demand; this is seen to emerge readily from an extension of recent developments of demand theory.

(2) The second problem concerns Edgeworth's proposition that a reduction in the cost of production of exportables in a country may lead to her impoverishment. Nicholson disputed this proposition on the ground, among others, that the model used to demonstrate the result was very restrictive. It is shown that this possibility, and the conditions under which it will obtain, can be established for less restrictive models.

(3) The third problem relates to Marshall's measure of the "net benefit" from foreign trade and Viner's objection to it. These rival measures are here evaluated with the aid of an extension of modern welfare economics to the theory of international trade.

(4) The fourth problem relates to Marshall's theorem that, where international demands are sufficiently inelastic for international equilibrium to be unstable, there exists at least one position of stable equilibrium on each side of the unstable equilibrium point.

I. MARSHALL vs. GRAHAM ON CHANGES IN INTERNATIONAL DEMAND, TERMS OF TRADE AND VOLUME OF TRADE

In Chapter VIII of *Money, Credit and Commerce* Marshall discusses the problem of how far the terms of trade and the volume of trade would be changed if "trade between two countries E and G having been in equilibrium, there is a considerable increase in E's demand for G's goods, unaccompanied by any corresponding increase of demand on the part of G."¹ His solution, lucidly set out in Appendix J, is that the extent of the deterioration in E's terms of trade will vary directly with E's elasticity of demand for imports and inversely with G's elasticity of demand for imports; and the magnitude of the increase in the volume of trade will vary directly with both these elasticities.²

¹ Marshall, *Money, Credit and Commerce* (Macmillan, 1923), p. 177.

² *Ibid.*, p. 178.

Graham, on the other hand, has argued that deterioration in E's terms of trade will vary inversely with both these elasticities while the extent of the increase in the volume of trade will vary inversely with E's elasticity and directly with G's elasticity.¹

A. Graham's Solution

In the following analysis we shall use the two-country (E and G), two-commodity (E-goods and G-goods) "real" model which both Marshall and Graham were using.

Starting from a position of balanced trade, assume that E's demand for G's goods has increased in the sense that, at each level of the terms of trade, the quantity of imports demanded by E from G has increased in a given proportion; this increase can be represented by an increase in the quantity of imports demanded by E at the initial terms of trade. What will be the resultant impact on the international commodity terms of trade?

Assuming that the terms of trade have been readjusted so as to restore equilibrium in trade, we can analyse the change in the quantity of G-goods imported into E into two components:

(i) The postulated increase in the quantity of G's goods demanded at the initial terms of trade: it may be denoted by $\overline{dM}$, where M refers to E's initial quantity of imports of G's goods.

(ii) The decrease in the quantity of G's goods demanded as the terms of trade move in favour of G-goods to restore equilibrium: this is measured by $M \cdot \alpha \cdot dp$, where $\alpha = -\frac{p}{M} \cdot \frac{dM}{dp}$ is the elasticity of E's demand for imports, and p is the terms of trade, measured as the price of G-goods divided by the price of E-goods and assumed by choice of units to be unity initially.

The total change in the quantity of G-goods imported into E may thus be measured by:

$$(1) \quad \overline{dM} - M \cdot \alpha \cdot dp$$

¹ Graham, "The Theory of International Values," *Quarterly Journal of Economics*, Vol. 46, 1932, pp. 601-2. Viner supports Graham's position in his *Studies in the Theory of International Trade* (Harper & Bros., N.Y., 1937), pp. 543-6. In analysing the Marshall-Graham controversy Viner discards the use of offer curves in favour of diagrams with E-bales on the X-axis and the terms of trade (G-bales per E-bale) on the Y-axis, which leads him easily into construing "shift in demand" in the traditional, and as we shall see Graham's, sense of change in the quantity of E-bales demanded by G from E at given terms of trade. It should also be mentioned that alternative solutions of the Marshall-Graham controversy are to be found in Allen, "The Effects on Trade of Shifting Reciprocal Demand Schedules," *American Economic Review*, Vol. 42, 1952, pp. 135-40; and Kemp, "The Relation between Changes in International Demand and the Terms of Trade," *Econometrica*, Vol. 24, 1956, pp. 41-6. As contrasted with these solutions, however, our approach combines simplicity with the explicit demonstration of the significance of stability conditions, further enabling us to attack directly the Edgeworth-Nicholson controversy in Section II; we further link the problem to the general theory of value.

But it can also be measured in terms of the change in the quantity of G-goods supplied by G:

$$(2) \quad M \cdot r_m \cdot dp$$

where $r_m = \frac{p}{M} \cdot \frac{dSm}{dp}$ ($Sm \equiv M$ initially) is the elasticity of G's supply of G-goods to E. In equilibrium, (1) = (2). Solving for dp , therefore, we get:

$$(3) \quad dp = \frac{\overline{dM}}{M(r_m + \alpha)}$$

However, both Marshall and Graham couch their argument, as we have seen, in terms of G's elasticity of demand for E's goods instead of in terms of G's elasticity of supply of her goods to E as we have done. We must, therefore, recast formula (3) accordingly. Let us define G's elasticity of demand for imports of E's goods as $\eta_x = \frac{p}{X} \cdot \frac{dX}{dp}$, where X is the initial quantity of E-goods imported by G. Then, by a well-known proposition, $\eta_x - r_m = 1$. Formula (3) thus becomes:

$$(4) \quad dp = \frac{\overline{dM}}{M(\eta_x + \alpha - 1)}$$

Concerning the change in the terms of trade, therefore, we have emerged with Graham's solution: if we confine ourselves to stable situations ($\eta_x + \alpha - 1 > 0$) the extent to which the terms of trade will become unfavourable to E varies inversely with the elasticities of both G and E. It may also be noticed that, provided the stability condition is fulfilled, this conclusion holds even when G's elasticity is less than unity.¹

The change in the volume of trade is also in conformity with Graham's findings, and can be obtained readily as:

$$(5) \quad M \cdot r_m \cdot dp = \frac{(\eta_x - 1)\overline{dM}}{(\eta_x + \alpha - 1)}.$$

For elastic G-demand ($\eta_x > 1$), therefore, the increase in the volume of trade will be greater, the smaller is E's elasticity of demand for imports and the larger is G's elasticity, provided the stability condition is satisfied.

B. Marshall's Solution

It seems surprising that Marshall should, however, have reached a different result. But the puzzle is readily solved when we find that Marshall is construing the increase in E's demand for G's goods to mean that "the number OM' of her bales, which she will [now] give for PM (or $P'M'$) of

¹ Marshall explicitly confined his discussion to the case of elastic demands, although Graham did not. It is best, therefore, to regard the controversy as confined to the case of elastic demands. Cf. Viner, *op. cit.*, pp. 543-6.

G bales, is greater than OM " and that "there will be an advantage in speaking of OE [E's offer curve] as moved to the right by an increase in E's demand."¹ Marshall clearly means by a "given" increase in E's demand for G's goods an equi-proportional increase in the quantity of exports E will offer for each quantity of imports received from G; this is the same thing as an equi-proportional increase in the price E will offer for each given quantity of imports.

This being so, the reason for the contradiction in the solutions offered by Marshall and Graham emerges readily. It will be remembered that $\overline{dM}$, which occurs in the earlier formulæ, represented the *given* increase in the demand for G's goods, and hence was a datum. Under Marshall's assumption, however, it varies in turn with the elasticity of E's demand for imports. If $\overline{dX}$ is the postulated increase in the quantity of exports of E-goods that E will offer for the initial quantity of G-goods imported from G, $\Delta p = \frac{\overline{dX}}{M}$ is the increase in the price E will pay per unit. The increase in the quantity of G-goods E will demand at the initial price is approximately:

$$(6) \quad \overline{dM} = -\frac{M}{p} \cdot \alpha \cdot (-\Delta p) = \alpha \cdot \overline{dX}$$

Substituting (6) into (4), we get:

$$(7) \quad dp = \frac{\overline{dX}}{M\left(\frac{\eta_x - 1}{\alpha} + 1\right)}$$

Marshall's solution follows quite readily now. For stable situations and elastic G-demand ($\eta_x > 1$), the extent to which the terms of trade will become unfavourable to E will vary inversely with G's elasticity and directly with E's elasticity. However, when G-demand is inelastic ($\eta_x < 1$)—a case which Marshall excluded by assumption²—and the stability condition holds, Marshall's conclusion is inadmissible and the Graham conclusion holds even under the Marshall-type change in international demand.

The change in the volume of trade again is in conformity with Marshall's conclusions and can be obtained readily as:

$$(8) \quad M \cdot r_m \cdot dp = \frac{\overline{dX}}{\left(\frac{1}{\alpha} + \frac{1}{\eta_x - 1}\right)}$$

For stable situations and elastic G-demand the increase in the volume of trade will be greater, the greater are both G's and E's elasticities of demand for imports.

¹ Marshall, *op. cit.*, p. 342, Marshall's italics.

² See footnote 1, p. 76.

We thus see that, where stability obtains and G-demand is elastic, the Graham conclusions hold when the change in international demand is defined in terms of a change in the quantity demanded at given terms of trade; whereas the Marshall conclusions hold when the change in international demand is defined in terms of a change in the price at which the given quantity is demanded.

C. Generalisation of the Problem

Our discussion points directly to a more general proposition in the theory of value, of which the Marshall-Graham controversy is an illustration. This is that the answer to the problem of how the elasticity of demand (supply) affects the extent to which a shift in demand (supply) alters the price and quantity exchanged depends on the precise way in which the shift is defined. There are two possible definitions of such a shift:

- (a) a change in the quantity demanded (supplied) at a given price; and
- (b) a change in the price at which a given quantity is demanded (supplied).¹

According to which definition is chosen, the influence of the elasticity of the shifted curve on the effect of the shift will be different, as follows, if stability is assumed:

- (i) An increase in demand will produce a greater increase in quantity exchanged, and a greater increase in price—
 - (1) on definition (a), the *less* elastic is the demand;
 - (2) on definition (b), the *more* elastic is the demand;
 and conversely.
- (ii) An increase in supply will produce a greater increase in quantity exchanged, and a greater reduction in price—
 - (1) on definition (a), the *less* elastic is the supply;
 - (2) on definition (b), the *more* elastic is the supply;
 and conversely.

D. Concluding Observations

Both ways of construing a change in demand—change in quantity demanded at a given price, and change in price at which a given quantity is demanded—may be useful in the analysis of international trade problems. Broadly speaking, Graham's approach is likely to be more convenient when the problem is to examine the effects of some change on the volume and terms of international trade, when the conditions of international competition are

¹ Definition (a) is the Graham-type; definition (b) is the Marshall-type. The former corresponds to Hicks' *p*-theory; the latter to Hicks' *q*-theory (Hicks, *A Revision of Demand Theory* (O.U.P., 1956)).

assumed constant, since the direction of change of international equilibrium can be predicted from the effect of the change on quantity demanded at the initial price. Examples are the transfer problem and the effect of economic expansion on international trade equilibrium.¹ Marshall's approach, on the other hand, is likely to be more convenient when the problem concerns the effects of a change in a country's commercial policy on its internal equilibrium prices and quantities, since the direction of change of this equilibrium can be predicted from the effect of the tariff on the quantity of imports demanded at the initial internal price, and of the corresponding reduction of the external price on the quantity of imports the foreigner would supply. Marshall himself used this technique for the analysis of tariffs and subsidies; a more recent example of its successful application is Metzler's classic analysis of the case in which a tariff shifts production towards exports.²

II. EDGEWORTH *vs.* NICHOLSON ON THE EFFECT OF AN IMPROVEMENT IN PRODUCTION ON FOREIGN TRADE AND WELFARE

Edgeworth, in the first of his three celebrated articles on "The Theory of International Values" in this JOURNAL, argued that where there has occurred "a diminution . . . in the cost of production of an exported article," an extension of Mill's analysis indicates that "the improvement may prove detrimental to the exporting country." While claiming that his proposition is "sufficiently supported by common sense," Edgeworth demonstrated it in the context of a model of complete specialisation in production of exportables and in consumption of importables, arguing that the foreign elasticity of demand for the country's exportables should be less than unity for such impoverishment to occur in the context of his model.³

Nicholson, in his *Principles*, raised objection to Edgeworth's proposition on the ground that "If, however, we introduce money, this case is seen to work out differently" ⁴ and that Edgeworth's model was highly restrictive.

Edgeworth returned briefly to the subject in this JOURNAL to argue that the introduction of money would not affect the proposition; and, further, that, although his proposition had been demonstrated with respect to his restrictive model, it was clearly not confined to it and should be demonstrable in the context of models of incomplete specialisation.⁵

¹ H. G. Johnson, *International Trade and Economic Growth* (Allen & Unwin Ltd., 1958), Chapters III and VII. Also J. Bhagwati, "International Trade and Economic Expansion," *American Economic Review*, Vol. 48, December 1958, pp. 941-53.

² Marshall, *op. cit.*, pp. 344-6. Metzler, "Tariffs, the Terms of Trade and the Distribution of National Income," *Journal of Political Economy*, Vol. 57, February 1949, pp. 1-29.

³ Edgeworth, "The Theory of International Values," *ECONOMIC JOURNAL*, Vol. 4, 1894. The argument set out in the text is from pp. 40-1.

⁴ Nicholson, *The Principles of Political Economy*, Vol. II (London, 1897), p. 311.

⁵ Edgeworth, "On a Point in the Theory of International Trade," *ECONOMIC JOURNAL*, Vol. 9, 1899, pp. 125-8.

In his *Theory of International Trade* Bastable entered the controversy to argue in favour of Edgeworth, seeking to demonstrate Edgeworth's result, in terms of a model of incomplete specialisation in consumption along familiar classical lines, by showing how the country with the postulated improvement may, as a result of inelastic foreign demand, find herself with less of both exportables and importables than prior to the improvement. Bastable then proceeded to state the proposition that: "It is only where the benefit from improvement is smaller than the advantage of interchange that loss could result from it."¹

A. Edgeworth Model: Complete Specialisation in Production and in Consumption

Edgeworth postulates that the country with the improvement in technique produces only exportables and consumes only importables. This remarkable model makes for the simplest, if not the most persuasive, demonstration of Edgeworth's proposition.

Thus, using the notation introduced in Section I, assume E to be the country with the postulated improvement. Then, the Edgeworth model amounts to arguing: (1) the Marshall-type increment in supply of exports: $\bar{dX}$; (2) that α is unity; and (3) that E's welfare varies directly with the quantity of her imports.

From formula (8) it follows then that E will be impoverished by the improvement if

$$(9) \quad \frac{\bar{dX}(\eta_x - 1)}{\eta_x} < 0$$

which yields us the Edgeworth condition that $0 < \eta_x < 1$ for the country to be damnified by the improvement.

B. Model of Complete Specialisation only in Production

Where, however, consumption of both exportables and importables obtains, different and more complex analysis becomes necessary to establish Edgeworth's proposition.

What we must now discover is the condition under which, in this model, the gain directly accruing from the improvement is outweighed by the loss from the resultant deterioration in the terms of trade.² This can be done readily. Let K be defined as country E's productive capacity, which is always fully employed and is measured in terms of the output of exportables that E would produce at the initial terms of trade. Then $\bar{dK}$ is the increase

¹ Bastable, *The Theory of International Trade* (Macmillan, 1903), 4th edition (revised), pp. 185 and 186-7. Bastable also correctly dismisses Nicholson's contention that the introduction of money would affect the validity of the result.

² This argument is to be found in a rudimentary stage in Edgeworth's 1899 *ECONOMIC JOURNAL* note, *op. cit.*, as also in his earlier 1894 article, *op. cit.* (p. 41): "The case of an improvement in the process of manufacture of an article which is both exported and consumed at home . . . is a compound between the certain gain to the native consumer and the possible loss to the home country in the way of foreign trade."

in real income directly resulting from the postulated improvement. To measure the loss from the deterioration in the terms of trade, we must first discover the change in the terms of trade resulting from the improvement; this is found simply by substituting for $\bar{dM}$ in formula (4) the expression $m \cdot \bar{dK}$, in which m is the marginal propensity to consume importables. The loss of real income due to this change in the terms of trade is approximately the increase in the cost of the initial volume of imports:

$$(10) \quad M \cdot dp = \frac{m \cdot \bar{dK}}{(\eta_x + \alpha - 1)}$$

It follows, then, that E will be impoverished by the improvement if

$$\bar{dK} < \frac{m \cdot \bar{dK}}{(\eta_x + \alpha - 1)}$$

i.e., if

$$(11) \quad (\eta_x + \alpha - 1) < m$$

This condition can be fulfilled without violating the stability condition; hence Nicholson's second objection, concerning the restrictiveness of the model used by Edgeworth, is refuted.

Since α can be decomposed into $m + \epsilon$, where ϵ is an expenditure-compensated elasticity of demand, the condition for impoverishment can be rewritten as

$$(12) \quad \eta_x < 1 - \epsilon$$

This formula shows, as might be expected, that for impoverishment to ensue both the foreign demand for exports and the domestic (expenditure-compensated) demand for imports must be inelastic.

C. Model of Incomplete Specialisation in both Production and Consumption

The analysis resulting in formula (11) can be easily extended to the case where the country is producing and consuming both exportables and importables. All that is required to do is (i) to rewrite m in equation (11) as $c - h$, the difference between the marginal propensity to consume the importable good (c) and the proportion of the increase in productive capacity that would take the form of production of importables if the terms of trade remained at the initial level (h); and (ii) to recognise that the elasticities of international demand η_x and α now depend on the elasticities of transformation of exportable goods into importables in domestic production, as well as on the elasticities of final demand.¹

While the possibility of increasing domestic production of importables in

¹ The actual reworking of the formula along these lines may be found in J. Bhagwati, "Im-miserizing Growth: A Geometrical Note," *Review of Economic Studies*, Vol. 25, June 1958, pp. 201-5; and in H. G. Johnson, *op. cit.*, p. 76.

response to an increase in their price introduces a factor tending to raise elasticities of international demand and so increase the restrictiveness of the conditions required for the Edgeworth case, the possibility that the improvement may lead to a decrease in domestic production of importables works in the opposite direction. Since h can be negative, m can exceed unity and impoverishment can occur even if international demands are elastic.

The theoretical analysis of the effects on production of an improvement in technique in an industry, for the standard two-good two-factor constant-returns model of international trade, may be summarised as follows.¹ Assuming initially unchanged factor prices and no change in factor employment in the other industry, technical progress in an industry has two effects: except when it is "neutral," it releases a quantity of one of the factors from the industry; and it reduces the unit cost of production. At unchanged factor prices the quantity of the factor which is released must be absorbed by an expansion of the industry which uses it relatively intensively, accompanied by a contraction of the other industry (which contraction releases the amount of the other factor required to co-operate with the released factor in the combination optimal at the given factor prices). At unchanged commodity prices the reduction of cost in the industry where the improvement has occurred must be offset by a shift of resources into that industry out of the other, which will raise the price of the factor used relatively intensively in that industry and cheapen the factor used relatively intensively in the other industry, so restoring the initial comparative cost ratio.²

It follows that if progress in an industry is (a) neutral, so that only the second adjustment is called for; (b) saving of the factor used relatively intensively in the industry, so that both adjustments work in the same direction; or (c) not sufficiently saving of the factor used relatively unintensively in the industry for the first adjustment to outweigh the second; then production in the other industry will fall. Conversely, if progress is (d) sufficiently saving of the factor used relatively unintensively in the industry for the first adjustment to outweigh the second, output in the other industry will rise, and in the extreme case output of the industry in which progress occurs will actually decrease.

Thus an improvement in the export industry which is neutral, or saving of the factor used intensively in that industry, will increase demand for imports by both increasing consumption and reducing domestic production of the importable good; and impoverishment may result from such an im-

¹ See H. G. Johnson, *op. cit.*, for the analysis of neutral progress and a brief indication (p. 78, n. 20) of the required line of argument on cases of biased progress; and Findlay and Grubert, "Factor Intensities, Technological Progress and the Terms of Trade," *Oxford Economic Papers*, Vol. 11, February 1959, pp. 111-21, for the analysis of the effects of biased progress.

² Since the factor used relatively unintensively in the progressing industry falls in price, more than the whole of the benefit of progress goes to the other factor. If the marginal propensities to consume of owners of the two factors differ, this redistribution effect may reduce consumption of one of the goods. This possibility, which could make c negative, is ignored in what follows.

provement, even if international demands are elastic.¹ But improvements in the export industry which save the factor used relatively unintensively there do not necessarily give rise to the possibility of impoverishment. On the contrary, improvements sufficiently strongly saving of the factor used relatively unintensively in the export industry may, by increasing domestic production of imports, actually reduce the country's demand for imports. In this case the country will enjoy a double gain—in total output, and through improved terms of trade—instead of a gain in output offset in whole or part by a terms of trade loss.

Edgeworth was therefore incorrect in implying that any improvement which reduced costs in the export industry might prove detrimental to the exporting country. On the other hand, modern analysis points to a possibility not mentioned by Edgeworth, that an improvement in the import-competing industry, if it is sufficiently saving of the factor used relatively intensively in the export industry, will increase the country's demand for imports and so create the possibility of a net loss of welfare from the improvement. Again, this possibility arises even if international demands are elastic.

D. Concluding Observations

We have shown that it is possible, contrary to Nicholson's assertion, to demonstrate the possibility of impoverishment of a country from domestic improvement in the context of models less restrictive than Edgeworth's. Moreover, in the general case of incomplete specialisation we have shown that this possibility does not require inelasticity of international demands.

Also, whereas Edgeworth, Nicholson and Bastable confined their discussion (necessarily in view of their models) to improvement in the production of exportables, our analysis of the case of incomplete specialisation in production demonstrates, on the one hand, that not all improvements in the export industry will create the possibility of impoverishment, but, on the other hand, that impoverishment is possible even if the improvement occurs in the domestic production of the importable good, and thus further generalises the scope of Edgeworth's proposition.

Further, since the maximum loss that the country may suffer from adverse terms of trade cannot be greater than her gains from trade, the Bastable proposition follows that the necessary condition for Edgeworth's possibility to arise is that the direct gain from growth is less than the initial gains from trade. Our analysis again proceeds farther and establishes conditions for such impoverishment which are both sufficient and less restrictive.

Finally, it may be noted that Edgeworth correctly argued that where the country is thus damnified by the improvement, it follows "by parity of reasoning" that it "may be benefited by a restriction of its exports."²

¹ This proposition, and the following ones, assume the fulfilment of the stability condition and the absence of inferior goods.

² Edgeworth, *ECONOMIC JOURNAL* (Vol. 4, 1894), p. 40.

Whatever the model used, it is clear that where impoverishment results from domestic improvement in production, the country can restrict its trade to advantage.

III. MARSHALL *vs.* VINER ON MEASUREMENT OF THE "NET BENEFIT" FROM TRADE

A. Marshall's Measure

In *Money, Credit and Commerce* Marshall measured the "net benefit" derived by a country from its international trade as the sum of the excesses of the unit prices at which the country would have purchased successive quantities of imports, over the equilibrium "rate of interchange" established in international trade.¹ In other words, he applied his concept of consumer's surplus to the problem, measuring the gain by the area between the demand curve and the price-line; though the application of the concept to the country's offer curve required considerable geometrical ingenuity, and the prices involved, as well as the surpluses, were expressed in terms of representative bales of export goods rather than money.²

Since the representative bales embody unit products of labour and capital, Marshall was able to measure the aggregate gain from trade to the world as a whole in terms of unit products of labour and capital, as the sum of the surpluses of the trading countries, measured in bales of their export goods. In addition, he stated the following proposition concerning a country's (G's) net benefit from trade: "the surplus is the greater, the more urgent is G's demand for a small amount of E's goods and the more of them she can receive without any great movement of the rate of interchange in her favour"³—i.e., the higher the price G will pay for sub-equilibrium quantities, and the more elastic her demand in the sub-equilibrium quantity range.

B. Viner's Criticism and Amendment

Viner's criticism of Marshall's measure, set out in his *Studies in the Theory of International Trade*,⁴ runs along lines which are by now familiar. He points out that Marshall's measure assumes that the offer curve is unaffected by whether or not the importing country pays the equilibrium price or the maximum price it is willing to pay for intra-marginal increments in its imports, which in turn implies constancy of the marginal utility of exportables. On the contrary, he argues, the marginal utility of exportables is greater, and therefore the price the country will pay for a marginal increment of imports less, the more that has been paid for the previous volume

of imports; so that Marshall's measure exaggerates the amount of the surplus the country receives in trade. Because of this exaggeration, Viner claims, Marshall's measure may lead to improbable or meaningless magnitudes of the surplus.

In place of Marshall's measure Viner suggests going behind the offer curve to the country's utility function: deriving from it the offer curve as it would be if the country paid the maximum price it was willing to pay for each successive unit, and measuring the country's benefit from trade as the sum of the excesses (or deficiencies) of the prices shown on this curve for successive quantities of imports over the equilibrium price established in international trade. The offer curve so derived is, of course, the equivalent of the marginal valuation curve in welfare theory; and the measure it leads to is the true Marshallian consumer's surplus (the excess of what the consumer would be willing to pay for the equilibrium volume of imports over what he actually pays) as contrasted with the defective, exaggerated measure of it obtained by integrating the area under the demand curve. Thus Viner's measure is a theoretically sound version of Marshall's consumer's surplus concept, in the context of international exchange.

C. Alternative Measures of the Gains from Trade

Both Marshall and Viner employ the analytical tool of the offer curve—the aggregative version of the demand curve—and both are concerned with measurement according to the concept of benefit from exchange associated with the demand curve: consumer's surplus. Other concepts of benefit from exchange have since been developed, requiring the use of indifference curves for their exposition. The purpose of this section is to apply these concepts to the problem of the benefits derived from international exchange and to develop alternative measures of the gains from trade.

Three alternative approaches to the problem of measuring the gains from trade are available: Marshallian surplus, compensating variation and equivalent variation. The first assumes that the advantage of trade consists in the opportunity to exchange the equilibrium quantity of exports for the equilibrium quantity of imports, and measures the gain from trade by the amount of one good that could be extracted from the country without making it worse off than it would be in the absence of trade. The second and third both assume that the advantage of trade consists in the ability to exchange exports for imports at the equilibrium price ratio; but whereas the second measures the gain from trade by the amount of one good that could be extracted from the country (while leaving it free to trade at the equilibrium price ratio) without making it worse off than it would be in the absence of trade, the third measures the gain by the amount of one good that would have to be donated to the country to make it as well off without trade as it would be when free to trade at the equilibrium price.

¹ Marshall, *op. cit.*, Appendix J, Section 3, pp. 338–40.

² *Ibid.*, p. 339.

³ *Ibid.*, pp. 339–40.

⁴ Viner, *op. cit.*, pp. 570–5.

Each measure can be made in terms of either of the two goods, exportables and importables. Since, in the world market, the country is a net producer of the former in order to be a net consumer of the latter, measures in terms of exportable goods (the cost of consumption of importables) may be regarded as measures of the country's gain in its capacity as a consumer, while

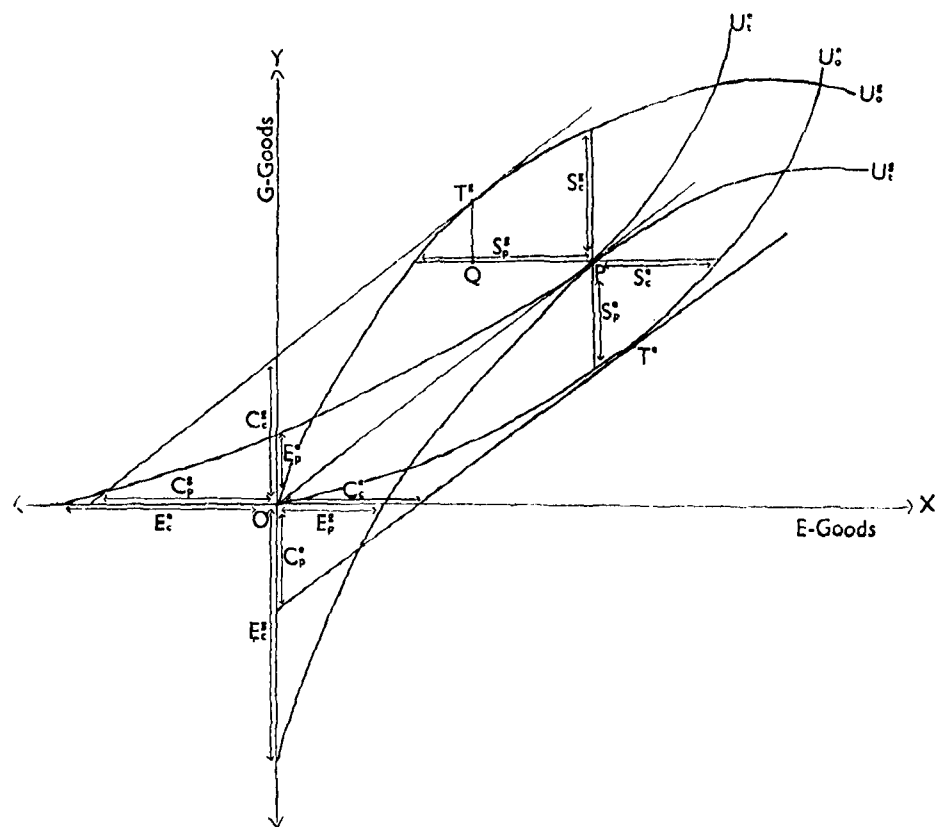


FIG. 1

measures in terms of importable goods (the reward for production of exportables) may be regarded as measures of its gain in its capacity as a producer. Consequently, the alternative measurements in terms of the exportable and importable goods may (at the risk of some confusion in the Marshallian terminology) be described as the consumer and producer measurements respectively. Thus there are six possible measures of the gains derived by a country from international trade—Marshallian consumer's and producer's surplus, consumer's and producer's compensating variation, and consumer's and producer's equivalent variation—and twelve in all for the (two-country) world as a whole.

The six measures for each country are illustrated in Fig. 1. Country E's exports are measured along OX , country G's along OY ; P is the free-trade

equilibrium point at which the two countries' offer curves intersect, the slope of OP representing the equilibrium terms of trade. U^E_g and U^G_g represent the no-trade indifference curves, and U^E_e and U^G_e the free-trade equilibrium indifference curves of the two countries.¹ T^E and T^G are the points on the no-trade indifference curves with slopes equal to the equilibrium terms of trade. The three measures of the gains from trade are denoted by S , C and E respectively; the country whose gain is being measured is denoted by the superscript g or e , and the producer's and consumer's measures by the subscripts p and c respectively.

In the "normal" case represented in the diagram, with indifference curves strongly convex and neither good inferior, the Marshallian surplus must be less than the compensating variation; the consumer's equivalent variation must be greater than the consumer's compensating variation; and the producer's equivalent variation must be less than the producer's surplus. In other words, in this case the consumer-measures stand in the relationship $S_c < C_e < E_c$; and the producer-measures in the relationship $E_p < S_p < C_p$.²

All three types of measures are internationally additive, in the sense that the total gain of the world as a whole can be said to be equal to a certain quantity of one or the other country's export good. But this is a very limited statement, since the measure of total gain is valid only on the assumption that the total quantity is divided between the two countries in a unique proportion corresponding to the distribution of income at the trade equilibrium point.

D. Concluding Observations

The foregoing analysis of alternative measures of the gains from trade suggests some comments on the treatment of the problem by Marshall and Viner, and also leads to a more satisfactory measure of the gains from trade.

(1) All three types of the measures of benefit discussed here employ the no-trade indifference curve as a basis of comparison. It follows that Marshall's proposition concerning the conditions under which the benefit is likely to be large, which runs in terms of the characteristics of the offer curve, must

¹ These are to be construed as the trade-indifference curves introduced by Meade, *A Geometry of International Trade* (G. Allen & Unwin, 1952). It is interesting to note that, as Viner records, *op. cit.*, p. 576, Edgeworth, in his "On the Application of Mathematics to Political Economy," *Journal of the Royal Statistical Society*, Vol. 52, 1889, pp. 555-60, had already introduced, for measuring the net benefit from trade, a "no-gain from trade" curve, which he called a "collective utility curve," and had measured the gain from trade (for Germany) by a method exactly identical to our own. Whereas, however, Edgeworth's indifference curve was based purely on exchange analysis, the trade-indifference curve of Meade allows us to admit production into the model.

² Universal non-inferiority means that the slope with reference to the import-good axis of any point on the U_g curve is steeper than that on the U_e curve for the same quantity of exports, and less steep than that on the U_e curve for the same quantity of imports. Hence the distance between the two curves in the export direction increases, and in the import direction decreases, as the point on U_g moves towards the origin.

now be reformulated in terms of the properties of the no-trade indifference curve. The revised proposition, about the size of the Marshallian consumer's surplus, must involve the marginal rate of substitution between the goods in the absence of trade, and the shape of the indifference curve between the origin and the point corresponding to the equilibrium volume of imports: the consumer's surplus derived from trade will be larger, the greater the difference between the slope of the free-trade terms of trade line (OP) and the slope of the tangent to the no-trade indifference curve at the point of origin, and the higher the elasticity of substitution between the goods (along the no-trade indifference curve). Marshall's own proposition, in terms of the offer curve, is thus clearly incorrect except when the trade-indifference curves are homothetic.

(2) Viner's criticism of Marshall's measure, that "Marshall's method . . . is capable of producing such improbable results as a surplus, measured in G-bales, many times greater than the total amount of G-bales actually exported, and—if the OG curve is inelastic—may produce such meaningless results as a surplus, measured in G-bales, greater than the total amount of G-bales which G can produce"¹ is both equally applicable to his amended version of Marshall's measure and totally irrelevant. As is easily seen from contemplation of S_e^g in Fig. 1, it is perfectly easily conceivable that the gain from trade on Viner's measure (or the other two consumer-measures, though *not* the producer-measures) might exceed the total quantity of goods exported by the country. Nor is the possibility that the gain might exceed the total amount of exportables the country could *produce* ruled out by Viner's measure. This possibility does require that the no-trade indifference curve can be drawn for regions involving exports above the country's productive capacity, implying that the country can value negative consumption of exportables combined with positive consumption of importables; but the fulfilment of this requirement is itself implied by the usual practice of drawing the offer curve through the origin, which assumes that at some finite high price of importables the country becomes a net exporter of such goods. If this possibility is ruled out by assumption, however, the defective Marshallian measure, which exaggerates the true surplus, could still produce the requisite result, so that Viner's argument is justified to that extent.

(3) All three of the measures of gain discussed in the previous section are open to a logical objection. If the quantity of the relevant good which measures the gain were actually extracted from the country the equilibrium volume and terms of trade would be different from their initial equilibrium values: if the gain were extracted in exportable goods the volume would be smaller and the terms of trade more favourable than initially, and the converse if the gain were extracted in importable goods. The measures are, therefore, in a sense logically inconsistent.

¹ Viner, *op. cit.*, p. 572.

In order to avoid such inconsistency, the gain must be measured by the quantities of the two goods which, if extracted, would leave the international trade equilibrium unchanged. The simplest such measure, illustrated for country G, is T^gQ of G-goods and QP of E-goods, which quantities might be extracted by an income tax, the proceeds of which are spent in buying these amounts of the goods. But T^g is only one point on the no-trade indifference curve, that at which the marginal rate of substitution between the goods is equal to the terms of trade; any of the other points could be reached, in principle at least,¹ by a combination of excise taxes and subsidies (remembering that an income tax is, in this model, equivalent to an excise tax at the same rate on both goods). Thus the gain can be thought of as a transformation curve between the two goods, formed by the no-trade indifference curve referred to the origin P ; for simplicity, the curve could be confined to the range bounded by the two Marshallian surpluses, within which the quantity of neither good is negative. By extension of this notion, the value of the opportunity to trade can be regarded as a family of such transformation curves, one for each point on the foreign-offer curve; or as a single curve formed by points on the foreign-offer curve and the points on the no-trade indifference curve at which the marginal rate of substitution between the goods is equal to the terms of trade.

IV. MARSHALL'S THEOREM CONCERNING THE STABILITY OF INTERNATIONAL EQUILIBRIUM

Our fourth problem is whether, if international demands are so inelastic in the neighbourhood of an equilibrium point as to make that equilibrium unstable, this necessarily implies the existence of at least two points of stable equilibrium, one at a higher and one at a lower exchange ratio than the (unstable) equilibrium ratio. This problem is rather different from the preceding three, in that no well-recognised controversy over it is embedded in the literature of international trade, though clearly opposed views on it have been stated by different writers.

The proposition that instability of equilibrium implies an odd number of equilibrium prices, alternatively stable and unstable, was stated by Marshall as follows:²

"9. On the extreme hypothesis that each of two imaginary countries, in exclusive trade with one another, had an urgent demand for a small quantity of the other's goods, but could find no good use for any large quantity of them, then there might be several positions, alternatively stable and unstable, of equilibrium between them.

"If OE and OG both belong to this Exceptional Demand class, they

¹ For instance, by negative purchases of goods.

² Marshall, *op. cit.*, Appendix J, Section 9, p. 352.

may cut one another three (or any other odd number of) times, not counting O . The first of these reached from O in either direction, will be stable, the second unstable, the third stable and so on. . . ."

As is clear from the quotation, Marshall regarded inelasticity of international demand (and therefore instability of equilibrium) as of no conceivable practical relevance. Experience in the 1930s changed opinion on this score, and the conditions required for instability were re-explored in connection with the theory of devaluation and floating exchange rates. But the classic treatments of this subject did not investigate the question of the existence of stable equilibria at all thoroughly, and in *obiter dicta* implied agreement with the Marshallian position. Joan Robinson, in "The Foreign Exchanges,"¹ asserts the existence of a stable lower equilibrium rate of exchange on the grounds that "a sufficiently violent rise in the price of imports must ultimately choke demand, and even if exports fail to react, in the flurry of the moment, the value of imports must somewhere begin to fall off." Abba Lerner, in *The Economics of Control*,² while arguing generally in terms of constant elasticities which may be too low for stability, implies agreement with the Marshallian proposition in the following passage:

"One country after another is forced off the gold standard, finds its currency appreciating without this affording much relief, and is able to find a stable position only after a long fall in the value of its currency and the introduction of special restrictions on trade have so altered the situation that the elasticities are no longer so low."

On the other hand, Lloyd Metzler, in "The Theory of International Trade,"³ does not mention the Marshallian proposition, but writes as if elasticities of international demand were the same at all levels of price, though increasing with the passage of time. The only explicit attack on the Marshallian proposition known to us is contained in Paul Samuelson's "Disparity in Postwar Exchange Rates,"⁴ where it is remarked, *à propos* a restatement of the classical position in Joan Robinson's "The Pure Theory of International Trade":⁵

"At the critical point in her argument she assumes as obvious what is not universally necessarily true. She says, 'at some point the goods become so expensive relative to world money incomes that demand

¹ J. Robinson, *Essays in the Theory of Employment* (Oxford: Blackwell, 1947), Part III, p. 201.

² A. P. Lerner, *The Economics of Control* (New York: Macmillan, 1944), Chapter 28, p. 380.

³ *A Survey of Contemporary Economics*, H. S. Ellis ed. (Blakiston, 1948), Chapter 6.

⁴ *Foreign Economic Policy for the United States*, Seymour Harris ed. (Harvard U.P., 1948), Chapter 22, p. 409, n. 14. In addition, Samuelson makes the theoretically far more important point that, if demand can be financed from an accumulated stock of assets as well as from income, there is no reason why devaluation of any degree should restrict demand to what can be paid for from current income. But we shall restrict our argument to the offer-curve analysis.

⁵ *Review of Economic Studies*, Vol. 14, 1946-47, pp. 100-2.

turns elastic . . . and there is some level . . . at which exports fall to zero.' I grant that it is customary to draw demand curves so that at high prices they do touch the price axis and become elastic. Probably this is realistic. But it is not universally necessary as a matter of logic. It is easy to specify indifference curves such that demand is *always* inelastic."

More recently, the Marshallian proposition has been revived as part of the argument for the adoption of flexible exchange rates.¹

The Marshallian proposition may be illustrated by reference to Figs. 2 (a) and 2 (b). In Fig. 2 (a), which is based on Fig. 20 of Appendix J to

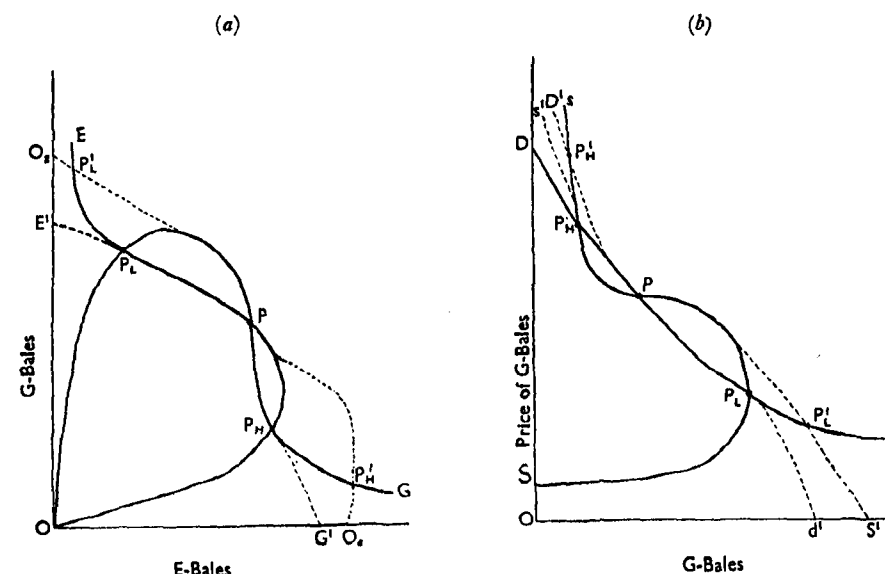


FIG. 2

Money, Credit and Commerce, OE and OG are the reciprocal demand curves of E and G ; in Fig. 2 (b) these are translated into the more familiar concepts of demand and supply for imports as functions of the price of imports, Dd being E 's demand for imports and Ss G 's supply curve. P is a point of unstable equilibrium and there are stable equilibria at P_H and P_L , representing respectively a higher and a lower price of E 's imports than the price at P .

It is at once apparent from the diagrams that the Marshallian proposition is a consequence of the way in which the curves are drawn. Each reciprocal demand curve has two characteristics:

- (i) it passes through the origin, implying that there exists a finite

¹ Milton Friedman, "The Case for Flexible Exchange Rates," *Essays in Positive Economics* (University of Chicago Press, 1953), Chapter 6, p. 160, n. 4.

high price of imports which will choke off demand for them; *i.e.*, the demand for imports is terminable;¹

(ii) it does not join the import-good axis as the price of imports falls, implying that the quantity of imports demanded increases indefinitely as their price falls; *i.e.*, the demand for imports is insatiable.

It is these characteristics which ensure that the reciprocal demand curves (demand and supply curves) intersect at least once above and below the (unstable) equilibrium price. But neither of these characteristics is a necessary logical consequence of demand theory:² on the contrary, both are empirical assumptions. Moreover, both characteristics appear inconsistent with Marshall's own assumption that each country has "an urgent demand for a small quantity of the other's goods, but could find no good use for any large quantity of them."

If neither assumption holds good for either country, the demand for imports being interminable but satiable in each country, the unstable equilibrium may be the only equilibrium possible at a finite exchange ratio; this possibility is illustrated by the curves O_eE' and O_oG' in Fig. 2 (a), and $D'd'$ and $S's'$ in Fig. 2 (b). If one country's demand for imports is satiable but not interminable, while the other country's demand for imports is interminable, there may be only one stable equilibrium possible at a finite exchange ratio, this ratio entailing a higher price for the first country's imports than the unstable equilibrium price ratio. This case is illustrated by the combination of OE' with O_oG or O_oG' and of OG' with O_eE or O_eE' in Fig. 2 (a), to which correspond the combinations of Dd' with $S's$ or $S's'$ and Ss' with $D'd$ or $D'd'$ in Fig. 2 (b). If one country's demand for imports is interminable but not satiable, while the other country's demand for imports is both satiable and interminable, there may again be only one stable equilibrium possible at a finite exchange ratio, this ratio entailing a lower price for the first country's imports than the unstable equilibrium price ratio. This case is illustrated by the combination of O_eE with O_oG' and of O_oG with O_eE' in Fig. 2 (a), to which correspond the combinations of $D'd$ with $S's'$ and $S's$ with $D'd'$ in Fig. 2 (b). But if the demand for imports is both insatiable and terminable in one country, or satiable but terminable or insatiable but interminable in both, there will be a stable equilibrium at both a higher and a lower exchange ratio than the unstable equilibrium price ratio. These cases are illustrated in Fig. 2 (a) respectively by the combinations involving OE or OG , the combination of OE' and OG' , and the combination of O_eE and O_oG ; to these correspond combinations involving Dd

¹ Each country's reciprocal demand curve must cut its export axis somewhere, as the country cannot spend more than its total national income on imports; but intersection at any other point than the origin implies that an infinitely high price is required to end demand.

² Consider, on the one hand, a bread-and-water economy or one relying on imports of a raw material not producible at home; on the other hand, the case of inferior goods.

or Ss , the combination of Dd' and Ss' , and the combination of $D'd$ and $S's$ in Fig. 2 (b).¹

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¹ Our analysis thus demonstrates the fallacy of the assertion made by Milton Friedman (*op. cit.*) and more recently alleged to be proved by Egon Sohmen ("Demand Elasticities and the Foreign Exchange Market," *Journal of Political Economy*, Vol. 65, October 1957, pp. 431-6) that an unstable foreign-exchange market equilibrium is necessarily enclosed by stable equilibrium points. Sohmen argues: "It is crucial for our purposes, however, that a stable equilibrium point exists below as well as above the critical unstable range. This outcome is always guaranteed, provided only that for both import demand curves the quantity demanded becomes zero at a finite price (at the upper end of the demand schedule). It is theoretically possible that a demand curve approaches the price axis asymptotically without ever reaching it. But even then its elasticity cannot forever remain below unity by more than an infinitely small amount with limited budgets, since expenditures on this commodity would otherwise have to increase without limit as its price is increased. In international trade, the limited supply of resources takes the place of the budget constraint for the single consumer" (p. 434). The first three sentences are, of course, correct; but Sohmen apparently believes, quite erroneously, that the fourth and fifth sentences add enough to the argument to dismiss the qualification expressed in the third—for he provides no further proof of his assertion.

In fact, these sentences illustrate the extent to which *non sequitur* and *ignoratio elenchi* can be accepted as valid argument if the conclusion purportedly reached is of sufficient propaganda value. In the first place, Sohmen forgets that what determines the effect of an exchange-rate change on the trade balance (on his assumption) is a weighted sum of the elasticities of demand for imports in the two countries; and that as the price of imports in one country rises towards infinity the price of imports in the other falls towards zero. While the budget constraint implies that the demand elasticity in the country where import prices are rising must approach infinitely close to unity, it does nothing to prevent the demand elasticity in the country where import prices are falling from approaching infinitely close to zero as imports approximate to a free good. The budget constraint therefore provides no argument in support of the contention that devaluation must improve the trade balance at sufficiently high import prices: the contrary possibility is illustrated in Fig. 2, for an increasing price of E-bales, by the offer-curve segments PE' and PO_o . Secondly, even were this contention established, it would not prove the existence of a stable equilibrium position. Further exchange depreciation may always reduce the amount of an adverse trade balance, without ever actually eliminating it, as is illustrated in Fig. 2, for an increasing price of G-bales, by the offer-curve segments PG' and PO_o . To travel hopefully is not necessarily to arrive.

Contrary to Sohmen's assertion that "the main argument of this note does not require any position on empirical questions" (p. 432), the question of the existence of stable equilibria cannot be solved by theoretical argument; it can only be deduced from empirical assumptions about the nature of demand for imports in the real world. Of the two simplest assumptions that will guarantee the result—that at some high price of imports, substitution in consumption and/or production will eliminate demand for imports, and that no finite quantity of imports could satiate the demand for them—the former is probably the more plausible. Both assumptions, however, raise the question of the time required for the adjustment of production and consumption patterns to a change in relative prices, the failure to investigate which may be the most important source of disagreement between economists about the efficacy of exchange-rate adjustments.

THE SHORT-TERM EFFECT OF THE LOWERING OF IMPORT DUTIES IN GERMANY

THERE has been, and will be, much discussion on the impact of the lowering of import duties. These discussions are in general always in the abstract. For until now it has not been possible to gain any insight into the influence and significance which import duties have in the practice of modern economic life, for the simple reason that integrated tariff reductions on an appreciable scale have never yet occurred.

A dread of the economic consequences of substantial (or even small) tariff reductions is apparently an important counsellor to the governments of many countries.

For some years past, however, an interesting experiment has been conducted in Germany, consisting in the application of drastic tariff reductions, notably in the industrial sector. Germany thus affords the only noteworthy practical instance in which the effect of tariff reduction on economic life can be studied. It is therefore of primary use to have some notion of the development of the tariff incidence in that country.

It appears that within a short period import duties were more than halved. Notably in the years 1956 and 1957 the great blow was struck under the name of "konjunkturpolitische Zollsenkungen." In 1956 the duties on industrial products which ranged from 1 to 16% were lowered by 20% and those ranging from 17 to 25% by 25%, while all others were reduced to 21%.

As the duties on finished industrial products largely came within the category of 17-25% or exceeded this, the reduction for this group of products at the first round amounted to more than 25%.

In 1957 a second round of reductions took place with an all-round lowering of 25% per tariff item.

Considering that the world is not accustomed to much in the way of tariff reductions, and given the short period in which they were effected, the German lowering of import duties is nothing short of impressive.

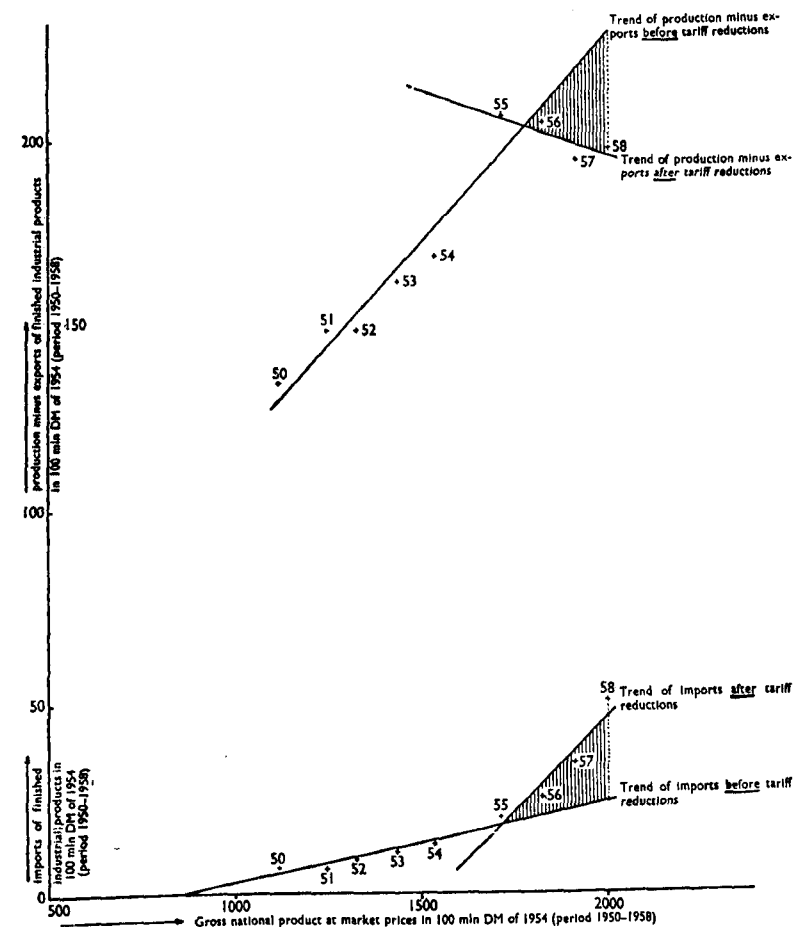
Of course, it can never be conclusively demonstrated how, in the concrete, the German tariff reductions have affected the German economy, but it can be discovered whether particular economic relations, which were statistically perceptible before the tariff reduction, have changed since it took place.

The following is an attempt to do so. It will be found that there is some difference between the changes that have occurred in the sector of industrial end-products and those which have taken place in that of semi-manufactured goods. These two sectors will therefore be treated separately.

With regard to industrial end-products the relations between the following quantities are traced below for a series of years:

(a) the development of national income (as an important determinant of the demand for imported industrial end-products) and the imports of industrial end-products subject to tariff reductions, both before and after the tariff reductions;

(b) the development of national income and the production of



GRAPH 1.—End products. The relation of national income (horizontal) to imports of finished industrial products (vertical; see lower graph) and to production minus exports of finished industrial products (see upper graph).

industrial end-products subject to tariff reductions, both before and after the tariff reductions.

The advantage of this approach is that it eliminates those movements which are conditioned by the normal process of economic "growth," so that the "net" effects of the reduction can be ascertained with greater accuracy.

In the accompanying graph (No. 1) the interrelation between the various

quantities can be read off. Horizontally the national income for a number of years has been plotted, vertically the imports of industrial end-products in the same years (bottom lines) and the production intended for home use (top lines). The graph brings some interesting facts to light.

It appears that in the period before the tariff reductions (1950-55) there was a reasonably constant relation between income and imports. An appreciable deviation occurred in the period from 1956 onwards, following the great tariff reductions. It was due to a sudden "extra" rise in imports. In the graph the shaded parts represent the difference between the pre-reduction and post-reduction trends.

The extra rise in imports (*i.e.*, in deviation from the trend), which occurred *after* the tariff cuts, can be calculated by a simple method. As set out in the note below, it is for the year 1957 estimated at DM. 1,200 million of 1954, and for 1958 at DM. 2,500 million of 1954.¹

This "extra import" could be explained in three ways.

(a) It might be that the internal price-level in Germany rose more rapidly after 1953 than did the price-level on the world market, which would have stimulated imports (and slowed down exports). This circumstance would account for the relative increase in imports which has been recorded. A closer investigation, however, reveals that there has been no such divergence in price trends. The German price-level came limping somewhat behind the rise in world-market prices rather than running ahead of it.

(b) A second hypothesis is that accidental factors were at play in the period under consideration. According to this there would have been a sudden increase in the demand for some important import products as a result, say, of a change of taste or need. The coincidence of the increasing demand for these goods with the period of tariff reductions would thus be a mere matter of chance. This explanation, too, is unsatisfactory, inasmuch as a detailed analysis shows that the phenomenon is in evidence as to all essential import products that were subjected to tariff reductions.

(c) There remains the residual explanation that the tariff reductions do indeed account for the shifts evidenced by the graph. In view of the trends of the graphs and the times of the various reductions this would be the most plausible explanation.

This explanation will be reinforced when we compare in the final paragraph of this paper the remarkably different behaviour of the

imports of finished products (subject to substantial tariff reductions) and the imports of semi-finished products (subject to much smaller tariff reductions).

THE EXTENT AND ECONOMIC CONSEQUENCES OF THE LOWERING OF THE TARIFF

Just as interesting as the development of the import trade in industrial end-products in the pre-reduction and post-reduction periods is the course of the production of industrial end-products destined for the home market. This can also be read off from the graph (No. 1)¹ (see the top lines), when it will be noticed that the trend of the production line after the tariff reduction runs opposite to the trend of the import line of the same category of industrial products.

Here, too, it can be calculated by a simple method how far the production deviates from the "normal" trend. Calculating this deviation arising after the tariff cuts we find, for 1957 and 1958, values of DM. 2,500 and 3,200 million.²

The relation between the increased imports and the decreased production is obvious. The amount we found for the "extra" imports turns out to be even less than the amount we stated above for the extent of the relative fall in production; for the values we found for the "extra" imports of industrial end-products were DM. 1,200 million and 2,500 million.

When considering these figures we must, of course, bear constantly in mind that owing to the inevitable crudity and/or inaccuracy of the statistical material they are but approximations with no pretence to accuracy. Moreover, the very nature of the problem imposes a limit on the number of statistical observations. Yet even with a wide margin of error the figures found are such that the natural conclusion is that the expansion of imports following the lowering of import duties has been largely, if not wholly or almost wholly, at the expense of the national production. The larger imports could therefore be better accounted for by attributing them to the displacement of home production than by putting them down to increased consumption of industrial end-products due to the fall in prices. In other words, assuming that the figures given above are representative for the actual situation, the German tariff reductions seem to have had a great substitution effect and no effect, or but a slight one, on consumption.

It may in general be contended that the German tariff reduction resulted

¹ Generally speaking, one ought to be careful in handling this kind of graph, because it has to be borne in mind that the production of industrial end-products is a factor in the determination of the national income. The present graph was nevertheless considered to be justified, because the output of end-products subject to tariff reductions made up only 20% of the national income.

² The regression equation for the production of industrial end-products before tariff reduction is $y = 0.111x + 66$ (y being production and x national income). The amounts here given represent the deviations, as in the case of the "extra" rise in imports, of the actual value of industrial production from the "theoretical" values found for 1957 and 1958 on the basis of the regression equation.

¹ Assuming y = imports of finished industrial products and x = national income, the regression line for imports (in the pre-reduction period) answers to the formula: $y = .022x - 19.6$.

For the national incomes (x) in 1957 and 1958 (x 1957 = DM. 192 milliard and x 1958 = DM. 201 milliard) we find as corresponding "theoretical" import values (y) the amounts of DM. 2,200 million and DM. 2,500 so that the "extra" import amounted to about DM. 1,200 million and DM. 2,500 million respectively in the years 1957 and 1958.

in a fall in import prices of finished industrial products by 10–12½%.¹ The “extra” rise in imports was, at least in the short period under review, by 100%,² which would imply an import price elasticity of about 8–10. Through this high coefficient the home production could evidently acquire a downward course—in an absolute sense, which appears so clearly from Graph 1.

To one more aspect attention should, however, be drawn in this connection. The production figures stated take no account of the volume and the development of the export trade. If we look at the course of the total production of industrial end-products we see quite a different picture from that presented by the graph presented above.

The rise in the total output of industrial end-products took the following course:

Increase of the Total Production Volume of Industrial End-products (Including Exports) on Each Preceding Year

1951.	1952.	1953.	1954.	1955.	1956.	1957.	1958.
+24.6%	+7.1%	+13.4%	+12.0%	+20%	+7%	+5%	+3.7%

In other words, it is particularly the expanding export possibilities of Germany which have provided a substantial compensation for the adverse effects which the increasing imports have had on the home production. On balance, then, notwithstanding the tariff reductions the production could, thanks to the available export opportunities, pursue an upward trend.

THE EFFECT OF THE TARIFF REDUCTIONS ON GERMAN WELFARE

In the foregoing analysis of the economic consequences of the tariff reductions we have tried as much as possible to eliminate the results of normal economic growth. With this knowledge in mind it is possible to form by way of an experiment roughly a “schematic” and “static” picture of the impact of the German tariff reduction on German welfare. Such a schematic representation is provided by Graph 2.

$PQ:QR$ represents the ratio between home production and imports before the tariff reduction; $ST:TU$ represents that ratio after the reduction. RU represents the rate of the tariff (the total tariff being RL ; $RU = \frac{1}{3}RL$). Since the statistical analysis given in the preceding paragraphs did not indicate an important impact of the tariff reductions on domestic consumption, the demand curve V has been drawn as a vertical curve, indicating an elasticity nil or almost nil.

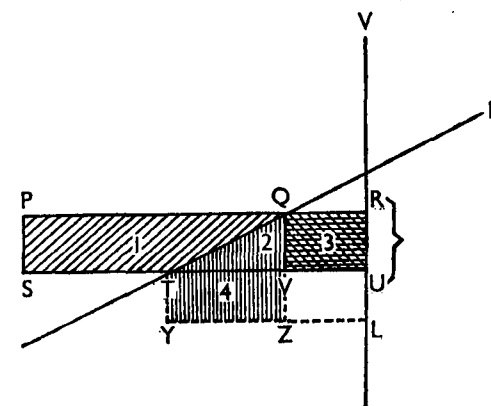
K is then the total-cost curve for the German economy.

¹ As far as can be ascertained, the tariff reduction has had no effect on the terms of trade. Indeed, this is hardly likely, seeing that the German market, as compared to the world market for finished industrial goods (United States, United Kingdom, Japan and others), is still of a modest size and monopolies that control the world market are scarce. Moreover, such an effect on terms of trade would only go to raise the elasticity coefficient.

² These 100% have been found by computing, for the year 1958, the difference between the “theoretical” and the actual imports (see also Graph 1; the “theoretical” imports in that year amounted to DM. 2,500 million, the actual imports to DM. 5,000 million).

A fall (RU) in the price-level owing to the lowering of import duties results in a loss ($PSTQ$) of producers surplus. Consumers, on the other hand, obtain a general gain in income from the fall in prices, a gain which may be equated to the extent of the price fall and which is represented by the rectangle $PRUS$.

The government suffers a loss of revenue due to the reduction of import duties equal to $QRUV$. On the other hand, however, it gains additional revenues of import taxes equal to $TYZV$ owing to the expansion of imports.



GRAPH 2.—Representing the effects of the German tariff reduction on the German economy (for explanation see text).

Eventually, then, the tariff reduction causes the following profits and losses to the German economy:

- (a) Loss of producers surplus $-PSTQ$ (1)
- (b) Loss of revenue due to reduction of import duties $-QVUR$ (3)
- (c) Increase of revenue due to the expansion of trade $+TYZV$ (4)
- (d) Gain to consumers (through fall of price-level) $+PSUR$ (1 + 2 + 3)

Total net profit to the German economy $TQV + TYZV$ (2 + 4)

Since $QV = VZ$, the area of $TQV + TYZV$ can be written as $1:5$ $TV \times QV$.

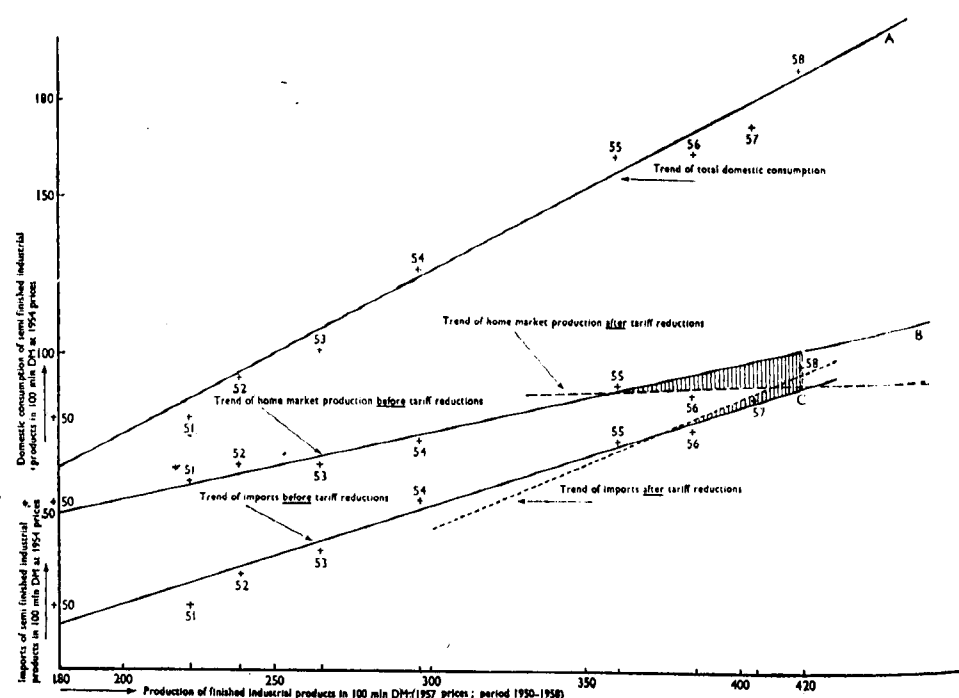
We know the extent of the “extra” rise in imports (TV). In terms of DM. of 1954 it amounts to DM. 2,500 million. The price fall (RU) being about 10%, the ultimate gain in prosperity amounts to $1\frac{1}{2} \times \frac{10}{100} \times$ DM. 2,500 million = DM. 375 million of 1954.

The rise in the national income resulting from the tariff reduction thus amounts to about DM. 375 million. This, compared with the national income in 1958 at roughly DM. 200,000 million (likewise in 1954 prices),

constitutes only 0.18% of that income. Even if we allow a very large margin of error which is necessary taking into consideration the extremely tentative character of our calculations, of 100% or more, this amount is so small that one is justified in concluding that for a country of the size of Germany import duties have no important impact on welfare, their significance being often grossly exaggerated, by text-books as well as by policy-makers.

THE REDUCTION OF IMPORT DUTIES IN THE SEMI-MANUFACTURES SECTOR

A similar graph as was given for the industrial end-products sector has been drawn up for the semi-finished manufactures sector (Graph 3). For



GRAPH 3.—Trends of consumption (A), home market production (B) and imports (C) of semi-finished manufactures.

this purpose, however, it seemed logical to assume that there is a certain relationship between the production of finished products and the total consumption of semi-manufactures.

In Graph 3 this relation has been indicated by the topmost straight line (A), which gives the trend between the production of finished products and the consumption of semi-manufactures in the period 1950-58.

The graph shows that there is indeed, as was to be expected, a high degree of correlation between the total output of industrial end-products

and the consumption of semi-manufactures (domestic production minus exports plus imports). This relation has not been affected by the tariff reduction.

It is interesting to know if a shift in the composition of the consumption of semi-manufactures has taken place after the cut in import duties in that more imported semi-manufactures (which are cheaper now) and fewer domestic semi-manufactures are bought.

As appears from the deviation of the line of domestic production after 1955 from the trend line in the graph, the domestic production of semi-manufactures declined relatively somewhat after the tariff reduction (see lines indicated by B). On the other hand, imports in this sector have shown a slight rise since 1955 (see lines indicated by C).

From these graphs and the pertinent figures on which they are based it might be inferred that, if the reduction of import duties on semi-manufactures has had any economic effect, it must have been considerably less than it had in the industrial end-products sector.

Since absolute reduction of import duties on semi-manufactures was lower than the reduction on finished products, this is not surprising in itself. Moreover, the effect of the fall in prices of semi-manufactures is normally very limited, since it is the demand for finished products which ultimately determines the demand for semi-finished products. Since we saw that apparently the consumption of finished industrial products was not substantially affected by the decline of import prices, the behaviour of the trendline indicating the consumption of semi-finished manufactures is not surprising.

Finally, the circumstance that the reaction of the import and production of semi-manufactures to the tariff reductions cannot be clearly traced, and is therefore probably limited, might also point to a small elasticity in the supply of semi-manufactures on the German home market.

THE TEXTILE INDUSTRY—A CASE STUDY

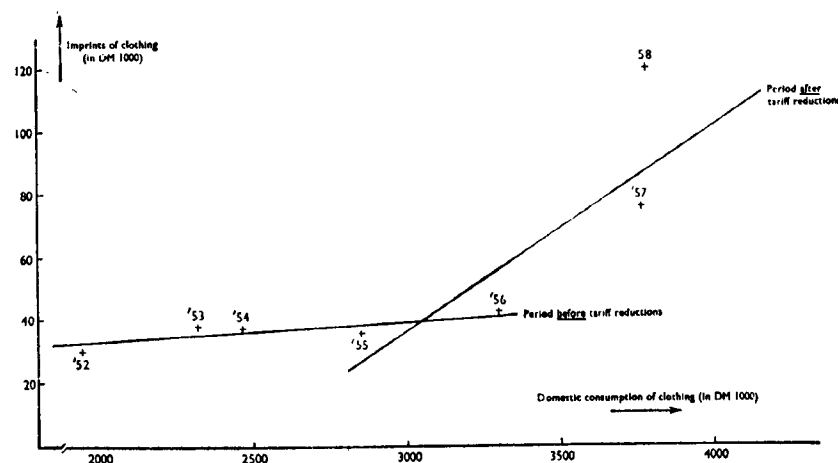
For the textile industry, as in every country in the world, a politically and psychologically important sector, separate graphs have been included. They are in agreement with the picture presented by total industry, and confirm the general conclusions already drawn.

Graph 4 indicates the relation between the domestic consumption and imports of clothing in the period before the tariff reductions. This relation appears to be reasonably stable. After 1955, however, there is a strong deviation, because imports suddenly come to claim an ever larger share of the total consumption.

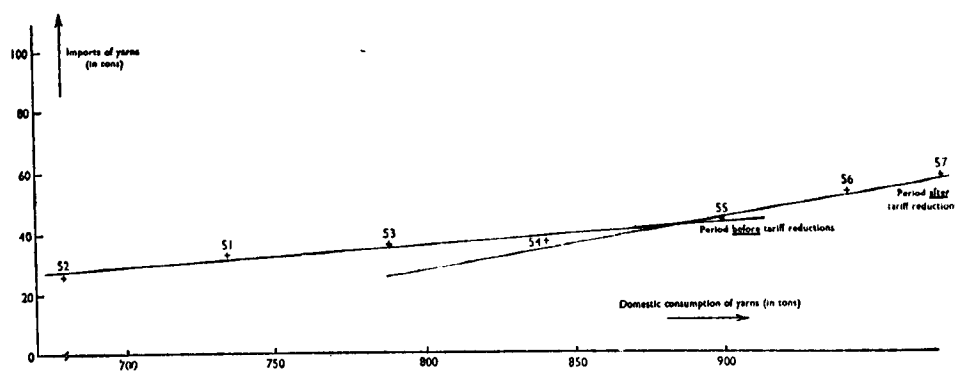
As to semi-manufactures (yarns), it appears from Graph 5—and we saw this also in general in the total sector of semi-manufactures—that the deviation from the "normal" development of the relation between imports and

5L
Xm 56, M90
11.60.70

domestic production after the tariff reductions is much less than it is in the case of the finished textile products.



GRAPH 4.—Correlation between imports and domestic consumption of clothing (ladies and gentlemen's outer and underwear) in DM. 1,000.



GRAPH 5.—Correlation between imports and domestic consumption of yarns, quantities in tons.

SUMMARY

(1) From the foregoing investigation it appears that it is reasonably possible to ascertain the effect (in so far as noticeable over a short period) of the German tariff reduction on the German economy. Notably the cut in import duties on industrial end-products appears to have had a highly stimulating effect on imports. The import elasticity has even been estimated at 8 or 10.

(2) From the figures it appears that the increase in imports as a result of the tariff reduction has probably been at the cost of the development of the domestic production (a large substitution effect) rather than the consequence of greater consumption.

(3) In reviewing the German tariff reduction it should be noted that it came about in the course of two years and amounted to more than 50% of the tariff applied. In spite of the forced character of this reduction the output of industrial end-products hardly showed a ripple, because the normal rate of growth, and particularly the greater export opportunities, offered sufficient compensation for the effects of the tariff reduction.

(4) It is certain, therefore, that, if this strong tariff impulse could already be coped with so smoothly, this will be even easier with a tariff reduction which, as has been envisaged, for instance, in the free-trade-area plans, (a) is spread over a longer period; or (b) is applied to a smaller number of countries.

(5) That in terms of welfare the part played by the tariff in the whole of the modern economic structure of a large industrial country is negligible is shown by the tentative calculation that was made of the effect of the German tariff reduction on the prosperity of the German economy. The short-term increase in the national income as a result of the cut in import duties was minimal.

(6) The cut in the import duties on semi-manufactures appears not to have caused any distinct large shifts. In all probability the economic effect has been small, in any case much smaller than it has been in the case of finished products. This may be accounted for, *inter alia*, by the lower duties in this sector.

(7) A case study of the development in such a politically and psychologically important sector as the textile industry confirmed—at least for this industry—the above findings made with respect to all industry.

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APPENDIX CONCERNING THE FIGURES USED

I. Sources

The figures are taken from the following publications:

1. Imports/Exports

Der Aussenhandel der Bundesrepublik Deutschland (1950–58) (Statistisches Bundesamt, Wiesbaden).

(a) *Teil 1: Zusammenfassende Uebersichten.*

(b) *Teil 2: Waren nach Herstellungsländern und Verbrauchsländern.*

2. Production

(a) *Die industrielle Produktion der Bundesrepublik* (1950–58) Deutschland, Reihe III.

(b) *Statistisches Jahrbuch der Bundesrepublik Deutschland* (1957 and 1958).

(c) *Wirtschaft und Statistik* (June 1958).

(d) *OEEC—Statistical Bulletin*. Definitions and methods concerning indices of industrial production (3rd edition, 1957).

(e) *OEEC—General Statistics* (July 1958).

3. Tariffs

Deutscher Gebrauchszolltarif; furthermore, *Austauschblätter* concerning changes in tariffs.

II. Construction of the Indices

1. The figures only apply to industrial products, since tariff reductions on agricultural products were small or zero.

2. With regard to semi-finished products and final products the figures were obtained by adding the following posts taken from:

(a) Production Statistics:

Semi-finished industrial products = "Produktionsgüter"

Finished industrial products = "Verbrauchsgüter + Investitionsgüter"

(b) Imports/Exports Statistics

Semi-finished industrial products = "Halbwaren + Vorerzeugnisse"

Finished industrial products = "Enderzeugnisse"

III. How the Graphs Have Been Constructed

Graphs 1 and 3

1. Production of semi-finished products and final products were calculated on the basis of the figures taken from I 2(c) with the aid of the weights of both groups in 1954 (sources I 2(d) and I 2(b)).

2. The figures for imports and exports composed as mentioned under II 2(a) were taken from *Aussenhandelsstatistik* (I 1(a)).

3. Domestic consumption was found by the formula:

$$\text{Production} + \text{Imports} - \text{Exports}.$$

The figures concerning national income were taken from: I 2(e)

4. All data were expressed in 1954 prices.

Graph 4

In this graph figures are given for a part of the important textiles sector. For this purpose the sector of clothing (*Bekleidung*) was chosen.

1. The figures on production are based on the items: 6411, 6412, 6421 and 6423 from German production statistics I 2(a).

2. The figures on imports and exports are based on the items 6101, 6102, 1603 and 6104, taken from *Aussenhandelsstatistik* (I 1(b)).

Graph 5

Yarns were chosen as an important example of semi-finished products in the textiles sector.

1. Data on production are based on the items 6331–6337 (I 2(a)).

2. Data on imports and exports are based on the items 50–57 taken from *Aussenhandelsstatistik* as mentioned under the head "zusammenfassende Übersichten A—IIB—1—6" (I 1(a)).

THE SOCIAL CHOICE BETWEEN HOME AND OVERSEAS INVESTMENT¹

How much of its accruing saving should a country invest at home and how much, if anything, abroad? The question presumes that the relevant criteria for a country as a whole are not the same as those for individual investors—for if they were, the result of individual choices between home investment and capital export would coincide with the socially optimal investment distribution, and no separate question about national advantage could be asked. On the other hand, differences in the two sets of criteria, the social and the individual, raise issues of public policy including, in private-enterprise economies, government control (subsidy, tax or rationing) of private capital exports, and in State capitalist systems, some rationally based settlement of the competing political claims of domestic development and foreign lending or aid.

The present paper is concerned with a purely formal framework for analysing these issues. The first section examines prevalent arguments about the possible conflict between the individual and the social optimum, the second develops a formal theory of the social optimum allocation, while the third seeks to compare the result of private choices with this optimum.

It will be assumed throughout that private investors aim at maximising profit, while society would seek to maximise national income regardless of its distribution (on the ground that if it has taxing or rationing powers to bring about a certain investment combination, it also has powers to alter, if it wishes to, the domestic income distribution which would result from that combination). Society will be taken to be "selfish," *i.e.*, unconcerned about foreign real income except inasmuch as it has repercussions on its own income. It will also be assumed that the degree of domestic factor utilisation is the same regardless of the investment pattern (specifically, that employment is kept "full" whether domestic saving is taken out in the form of domestic capital formation or of a current-account balance-of-payments surplus).

I

The vulgar type of statement of the conflict between social and private optima in home and overseas investment asserts that while home investment augments the national income by an amount given by the capital-output ratio (some of the increase accruing to home profits and the rest to home wages), overseas investment raises it only by an amount given by the rate of profit abroad (the whole increase accruing to home profits). The equation

¹ For helpful comments on this article, and particularly for eliminating a *non sequitur* from Section III, I am indebted to Mr. J. Black. Any remaining errors are, of course, my own.

at the margin of the domestic and the foreign rate of profit involves a loss of national income equal to the share of wages in the extra domestic output which could have been secured by home investment, but was forgone in favour of income from capital exports. More concisely, home investment raises domestic, overseas investment raises foreign real wages.

The fallacy of this argument springs from the double confusion of an average with a marginal and of a statistical-historical with a *ceteris paribus* capital-output ratio. The marginal capital-output ratio, in the *ceteris paribus* sense of knowledge and other factor endowments (labour, land) remaining constant, is of course nothing but the reciprocal of the marginal physical productivity of capital. The corresponding capital-to-national-income ratio is the reciprocal of the marginal value-productivity of capital.

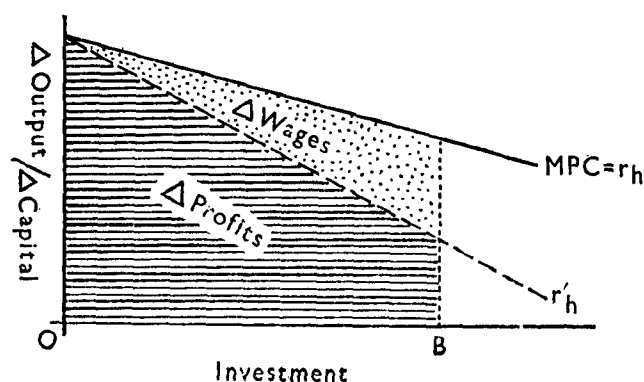


FIG. 1

The intellectually more respectable case against capital exports is based on this latter concept.

If factor rewards are equal to marginal value-products, the home and foreign rates of profit will be equal to the marginal value-productivities of capital at home and abroad respectively. Let these be denoted by r_h and r_f . Assuming that production functions are normal so that, with other factors held constant, the marginal value-productivity of capital falls as its stock is increased, r_h will decrease upon home and r_f upon foreign investment. The *prima facie* equilibrium combination of the two investment flows will be that which keeps r_h and r_f equal.

In Fig. 1 the y axis measures the marginal value-productivity of capital MPC in the home country, and the x axis the addition to its existing capital stock, *i.e.*, investment. An investment of OB increases national income by the area under the $MPC = r_h$ curve, of which the shaded area below the corresponding marginal curve r'_h accrues to profits and the dotted area above it to wages. Thus, for home investors taken together, the relevant reward is r'_h the marginal rate of profit. Similarly for the foreign profit rate r_f there is a corresponding marginal rate r'_f showing the addition to the total income

of investors abroad, while the difference between r_f and r'_f goes to foreign wages.

Part of total profit income abroad, however, accrues to the capital-exporting residents of the home country. If as yet they own none of the capital stock of the foreign country, they receive the profit rate r_f on their new overseas investment. If they already own all the existing capital overseas, they (taken together) merely receive r'_f . If they own some non-negligible share c of the overseas capital stock, their collective reward will accrue at some rate r_{fc} , where $r_f \geq r_{fc} \geq r'_f$.

There are hence two possible equilibrium solutions depending on whether investors in the home country behave in a perfectly competitive or in a monopolistic manner.

(a) In the former case each investor is looking at the profit rate he can earn on his own new investment and ignores the effect on his compatriots' old investments. He will merely compare r_h and r_f , and thus in equilibrium $r_h = r_f$. But since the home country as a whole is receiving r_h from home and r_{fc} from foreign investment, and since $r_{fc} < r_f$ when c is non-negligible, $r_{fc} < r_h$; while for the social optimum $r_{fc} = r_h$ is required. In other words, provided c is not zero, in the perfectly competitive case the equilibrium solution implies too much foreign and too little domestic investment.

(b) In the monopolistic case investors realise the effect of their investment choices on the yields of their already existing capital, and therefore equate r_{fc} and r'_h . The social optimum requires $r_{fc} = r_h$ as before, and since $r'_h < r_h$, the private equilibrium will again imply too much foreign and too little domestic investment.

In case (a) the private and social optima will diverge provided c , the proportion of capital in the foreign country owned by residents of the home country, is not negligibly small. In case (b), on the other hand, there will be a divergence even if $c = 0$ to start with, and *a fortiori* if $c > 0$. In both cases interference with private choices, by altering the allocation of a given volume of investment in favour of home investment, will result in a greater increment of national income than could be obtained from the private equilibrium allocation.

This, *in abstracto*, is the intellectual basis of the case against free capital exports. However, in the next section the requirement $r_h = r_{fc}$ will be shown to be a false criterion of the social optimum, and an alternative one will be deduced.

II

Implicit in the above argument is the condition that increases in the capital stock abroad must leave the marginal value-productivity of capital at home unaffected. However, this could strictly be so only in the special case of the closed economy. A closed economy, in turn, does not (and cannot) export capital, so that the question of conflict does not arise. If, on

the other hand, the home economy is an open one, the domestic value-productivity of capital will depend in some manner on the capital endowment of the rest of the world.¹ More precisely, the overseas capital stock will itself be a parameter of the function relating the domestic marginal value-productivity of capital to its domestic stock.

One way of augmenting the overseas capital stock is for the home country to export capital. A classic example of the effect on domestic marginal value-productivity is the case of the home country developing, by capital exports, foreign sources of raw materials. The benefit then clearly manifests itself in the home country's terms of trade. But comparative advantage works in more roundabout and subtle ways, too, which may connect mainly manufacturing, and not patently and obviously complementary, countries. The terms-of-trade effect may be disguised, taking the vaguer form of external economies. Long descriptive tracts could be written on this aspect alone; but perhaps it may suffice to remind ourselves at this juncture that "the division of labour [the scope for gains from trade] depends on the extent of the market."

At the same time no rigid one-way dependence should be assumed. While increased wealth abroad should, *ceteris paribus*, more often than not raise marginal value-productivity at home,² it may in certain circumstances

¹ The above functional dependence also suggests that the marginal value-productivity of capital abroad will in turn move with the capital endowment of the home country; but this will be ignored in the main text for the following reasons:

If the home capital stock grew without the foreign capital growing, the long-run terms of trade would change (normally worsen for the home country). The effect on the marginal value-productivities of capital in two areas of causing capital to be invested in one area rather than another (in our example, at home rather than abroad) can, in principle, be expressed as a change in the terms of trade compared to the terms of trade which would have obtained without the geographical reallocation of investment. Reducing foreign and increasing home investment by a given amount will imply a given percentage change in the long-run terms of trade between the home country and the rest of the world; and for small ranges, within which supply and demand functions can be treated as iso-elastic, increasing foreign and reducing home investment by the same given amount will imply the same percentage change of opposite sign in the terms of trade. Now if trade between the home country and the rest of the world absorbs a greater share of the national product of the former than of the latter—or, what comes to the same thing, if the home country is small—the effect will be relatively larger on the home country than on the rest of the world. This, admittedly, implies treating the rest of the world as a homogeneous entity, i.e., one country. However, even if the effect of home investment on the rest of the world is of more than second-order importance compared to the effect of foreign investment on the home country, allowance can be made for it. Anticipating matters a little and turning to Fig. 2, successively higher foreign profit rate (r_f and r_f) curves can be drawn for successively greater volumes of home investment, and the relevant intersections with the home capital productivity curves correspondingly lifted. However, not much would be gained by introducing this refinement in the main analysis. Therefore it is conducted as if there were only one effect, namely, that of the foreign capital stock on home productivity, and no effect of the home capital stock on foreign productivity.

² In treating this as the more "likely" or important case, the present article may appear to challenge the notion that the more similar are factor endowments in two countries, the lesser are the potential gains from trade between them. If we express the latter in terms of the value-productivity of capital in the capital-exporting country A, the MPC curve in Fig. 2 ought therefore to be shifting downwards with increases in the capital stock in B, rather than upwards as it is doing—the presumption being that A is the capital intensive country, and its capital exports are making

have adverse terms-of-trade effects or result in external diseconomies; perhaps more improbably, beneficial and adverse effects may exactly balance, by accident satisfying the closed-economy condition underlying the argument summarised in Section I that the domestic marginal value-productivity of capital is independent of the foreign capital stock. Circumstances may well be allowed to alter cases, but not a formal apparatus designed to cover them all. The apparatus of this section is presented in terms of a positive and perceptible beneficial effect of a growing overseas capital endowment on domestic capital productivity. However, as will be observed, it can, *mutatis mutandis*, be turned to the analysis of other types of case also.

The diagram (Fig. 2), is drawn on the assumption that there is OQ of investible resources (annual saving from a full-employment income) to be allocated between home and overseas investment in such a way as to maximise the resulting domestic "growth" (increment in the home country's national income). MPC_o is the domestic marginal value-productivity of capital given the overseas capital stock. If, however, the latter were increased by an amount QE_x , the former would shift upward to MPC_x . This, of course, means that by devoting capital QE_x to foreign rather than domestic investment, the home country could cause the marginal value-productivity of the capital OE_x (remaining for home investment) to rise from MPC_o to MPC_x ,¹ and so on for successively larger capital exports until, with the export of all available capital QO , the home marginal productivity reaches OZ . For want of specific information to the contrary, the MPC curves are assumed to be linear and to shift vertically without change of slope upon an increase in the foreign capital stock, their height being some linear function of it.

With the whole available capital allocated to home investment, the increment of national income would (as in Section I) be the area under MPC_o from O to Q . With capital exports of QO , some very high value-productivity Z would be reached, but no capital would be left over for home investment to take advantage of it. Neglecting, for the moment, profit

B capital-intensive, too. However, no such challenge is intended. For it is, of course, known that the gains from trade need only fall as factor ratios become more similar if the production functions in A and B are similar. But even if this were the case (which is improbable wherever natural resources are important and dissimilar), and the gains from trade were becoming smaller as factor ratios in the two countries moved nearer to each other, this would still leave out of account the income effect of increasing the factor endowment of B at any given factor ratio. Putting it crudely, while the change in B's factor ratio may shift B's production pattern from exports to import-substitutes, the increase in its total factor endowment will increase its total production and its total domestic absorption of both exportables and imports. There is thus still room for A to gain if B's production of exportables increases more than its domestic demand for them, and if its demand for imports increases more than its production of import-substitutes. The weight of historical evidence seems overwhelmingly to be on the side of this being the likelier outcome.

¹ Readers will have noted a remote analogy with the optimum-tariff argument, with restriction of home investment (and expansion of overseas investment) standing for the export tax or import duty. The principal difference is that while the optimum-tariff argument relies on movements along supply and demand curves, the theory of capital exports developed here derives a somewhat similar effect from movements of supply and demand curves.

investors), the home country does not as yet own more than a negligible fraction of the overseas capital stock. However, in Section II it was shown that the social optimum is satisfied not by $r_h = r_{fc}$ as the prevalent arguments seem to hold, but by $mMPC = r_{fc}$. Will private choice tend to diverge from this equality, and if so, in which direction?

For any point along the x axis (*i.e.*, for any volume of capital exports), r_i is higher than $mMPC$ so long as ZA runs above $mMPC$, *i.e.*, so long as more development overseas could lift the marginal value-productivity of home capital. ZA is the locus of successively lower marginal productivities consistent with successively smaller capital exports; hence it is also the locus of the various possible home profit rates r_h earned by the domestic investor.

Perfectly competitive private investment choice will seek to equate r_i to r_f . The particular r_h (out of the multitude of various possible ones) capable of becoming equal to r_f is that found at the intersection of ZA and r_f . Clearly, $ZA = r_f$ need not coincide with $mMPC = r_{fc}$. There may therefore be a conflict between social and private choice. However, it is difficult to detect any obvious tendency to divergence one way or the other: for while $ZA > mMPC$ suggests that private capital exports will be too small, $r_f > r_{fc}$ suggests that they will be too large. Any divergence either way between the competitive private (QE_p) and the social (QE_l) optimum can result only from a net balance of these two offsetting biases.

If, on the other hand, the choice between home and foreign investment were made by a monopolist who owned all the already existing home and foreign investments, his aim would be to equate the marginal addition to his home and to his foreign profits. The latter is shown by the area under the r_{fc} curve, and thus coincides with the socially relevant criterion. The former, however, diverges from what is relevant for society. For society the return from home investment is the area under $mMPC$; but this area includes *both* the profits of new investment *and* the amount by which the new investment reduces profits on old investments and increases real wages.

For the monopolist (though not for society, which includes wage-earners) the transfer of this amount from profits to wages is a loss which he deducts from the total area under $mMPC$ to arrive at the net addition to his total home profits. This addition is represented by the ZA' curve in Fig. 2, the area under which is, at every abscissa, equal to the rectangle under the particular MPC curve consistent with the proportion between home and foreign investment shown by the abscissa in question. The difference between $mMPC$ and ZA' is that the former shows the change of the whole area under a shifting MPC curve, while the latter shows the change of the area of the rectangle under the same shifting MPC curve. Since MPC slopes downward, the area of a rectangle under it is everywhere smaller than the whole area under it; therefore ZA' must everywhere lie below $mMPC$. This, in turn, means that ZA' must intersect with r_{fc} further to the left (at E_m) than $mMPC$ (at E_l), so that a perfect monopolist would, to

maximise profit, invest less at home and more abroad than is required to maximise total national income.

Fortunately, this is a too fanciful case to warrant concern; for while it could be true, particularly in the case of direct overseas investment, which is often the preserve of a few larger firms, that capital is being exported from a country by a monopolist or quasi-monopolist, it is most unlikely that the home country's capital stock should also be largely owned by the same monopolist.

Save this last contingency, one can draw a relatively complacent conclusion in favour of letting private investment decisions take their course. A conflict between private and social investment optima is entirely possible; what appears impossible is to *establish the presumption of a general bias* for private overseas investment to be either too large or too small. Nor can therefore a general recommendation be made for public policy in this regard. If there is a case for stimulation or obstruction of overseas investment it can only be established by a quantitative study of the specific instance on hand—a study which, even if feasible, is bound to be exceedingly complicated and full of sources of potential error.

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PRODUCTION FUNCTIONS AND LAND—A NEW APPROACH

WHEN JEVONS and others established the general principle that the price a factor of production is equal to its marginal yield it was tempting to generalise the result in a single formula applicable to all factors. Just as an adjustment of the price of a consumable product to its marginal utility could be regarded as maximising utility, so the adjustment of the price of a factor of production to its marginal productivity could be regarded as maximising production.

Jevons described his theory of economics as "purely mathematical in character." "Believing," he wrote, "that the quantities with which we deal must be subject to continuous variation, I do not hesitate to use the appropriate branch of mathematical science, involving though it does the useless consideration of infinitely small quantities. The theory consists in applying the differential calculus to the familiar notions of wealth, utility, value, demand, supply, capital, interest, labour."

The use of the calculus is an aid to clear thinking in economics. Yet the assumption of continuity is one to be made with caution.

A differential coefficient is a limit: $\frac{dy}{dx}$ is the limit which the ratio of an increment of y to an increment of x approaches when the increments are made indefinitely small. But nothing in human motives ever does become indefinitely small.

In a static treatment of economics, however, a function is composed of a series of hypotheses, and the interval between one hypothesis and another is not subject to the same limitations as human motives. When we plot a demand curve or an indifference curve for an individual consumer we want to show how his consumption of a commodity would react to various possible alternative assumptions. Actually the price is p , and he buys x units of time; had the price at the present time been q , he would have bought y . The schedule is a set of hypotheses about his present disposition. When we were considering the effect of a change of price we should limit ourselves to a change of such magnitude as to affect the consumer's behaviour, and we should take account of the impact of a change on his outlook. But static theory is concerned not with changes but with hypothetically different static conditions, and allows an indefinitely small difference between one hypothesis and the next. The schedule therefore can properly be represented by a continuous function or curve.

A demand function adds up the demands of all the consumers. It may be conceived as composed of a number of terms, each term covering a group of consumers whose motives are sufficiently similar to one another to form

a significant average. A price which is reckoned high in one group is thought moderate in another and trifling in a third. And the relation of the commodity to other consumable things may be different in different groups. Each group contributes a trend or governing tendency, and the function is the resultant of all the trends, any fortuitous and irrelevant disturbances being assumed to be averaged out within each group. When we depart from the static treatment, and investigate a change of conditions, we find that at a subsequent date the function itself will have changed. We have a new set of hypotheses, which may or may not closely resemble the old. And we cannot assume a continuous transition from the old set to the new. The hypotheses relate to human motives, in which there are apt to be discontinuous changes of mind.

A production function purports to express the output of a producing unit or group of units as a mathematical function of the factors employed. Since it relates output to costs, the product and the factors must alike be priced. With given prices under perfect competition, the producer aims at maximising the excess of the value of output over costs.

If the respective amounts of the three fundamental factors, labour, capital and land, used in an output, P , are a , b and c , and their prices are p , q and r , the cost of production is $pa + qb + rc$.

If P is a continuous function of a , b and c , the conditions of $P - pa - qb - rc$ being a maximum are

$$\frac{\partial P}{\partial a} - p = 0, \quad \frac{\partial P}{\partial b} - q = 0, \quad \frac{\partial P}{\partial c} - r = 0^1$$

Economists who concentrate on the mathematical calculations have been prone to accept this result rather uncritically. In particular, they have been ready to assume that the condition relating to land can be interpreted in the same way as those relating to labour and capital.

The terms pa and qb , representing labour and capital in the formula for costs, are composed of a units of labour and b units of capital (valued at their cost in the market). But land has no cost. To the producer who buys or leases land the rental value is, of course, part of his costs. As Marshall said, "land is but a particular form of capital from the point of view of the individual manufacturer or cultivator." The landowner exacts a rent equal to the saving of cost, but to him there is no cost.

Different pieces of capital equipment, like different pieces of land, have widely different cost-saving efficacy. But plant and tools of high cost-saving efficacy do not command a correspondingly high price, because they can be supplied in response to demand at prices corresponding to the cost of producing them. The supply of land of any specified cost-saving efficacy is limited. The owner who makes his land available is participating like the capitalist in the process of production, but at no cost to himself. If

¹ See Edgeworth, *Papers*, Vol. I, p. 20.

a piece of capital equipment is sub-marginal, in that its cost-saving efficacy is below zero, it is not demanded, and is not produced: the cost of producing it is saved. If a piece of land is submarginal it is not used, but no cost is saved.

The producer who is calculating how much capital to employ with a given amount of labour and land will see the limit at the point at which the cost-saving efficacy of any additional plant ceases to cover the cost of the plant. That is why the price and the cost-saving efficacy of any factor tend to be equal. But the cost of land is zero, so that the landowner offers land of any cost-saving efficacy, however low, to producers for what it will fetch; only marginal and sub-marginal land are unused and fetch nothing.

Any land of which the rent asked by the owner is appreciably below its rental value would be sought after by producers who could make an extra profit by using it. So under static conditions the rent charged by a landowner is deemed to be equal to the rental value.

The symmetry of the production function $P = pa + qb + rc$ is misleading; the prices, p and q , of labour and capital are equal to the marginal yields of labour and capital, but r , the price of land, is not "marginal" at all. The price of each piece of land is its *total* cost-saving efficacy. The price of a marginal piece of land is zero.

A producer who is already using labour, capital and land in suitable proportions, and who wants to employ some additional labour and capital has the choice of working his existing land more intensively or acquiring additional land. Additional land may be marginal land, hitherto yielding no rent, or it may be supra-marginal land diverted from some other use. For supra-marginal land he must pay rent, so that it will be no more profitable to him than marginal land.

Producers all producing one commodity, who constitute an industry, are in the same position as the single producer. Additional land brought into use by the industry is either marginal land or rent-yielding land diverted from other uses. For all industries taken together, composing the entire production of the community, additional land brought into use can only be land previously marginal and sub-marginal. It comes into use because the increase in cost consequent on the more intensive use of the land already occupied gives it a competitive advantage which brings it into the rent-earning class.¹

The intensive marginal yield of land and the extensive marginal yield are both zero: the latter because marginal land yields no rent; the former because the intensive exploitation of a piece of land is pushed to the limit beyond which any further expenditure on labour and capital will not be covered by the additional output obtained.

¹ There may, of course, be other changes which bring land into the rent-earning class, but there is no need to enter into these.

In the formula for cost, $pa + qb + rc$, the prices p and q are equated to the marginal yields of labour and capital. If r , being the marginal yield of land, is zero, the symmetry is destroyed.

When the formula is applied to a particular industry the cost, it is true, does include an item for land, the rent paid by the producers to the landowners. But this item is no parallel of the items for labour and capital. The expression of these latter as products of quantity and price presupposes units of quantity. The quantity of a factor composed, like capital, of heterogeneous units is measured in terms of money at actual or hypothetical prices. In the case of capital the various items find their common basis of measurement in their market prices, which correspond under static conditions to their costs of production (along with the rate of interest), but for land this common basis is lacking.

All the same, it may be said, a piece of land has a price, and all that is needed to give significance to the item rc in the expression for cost is a unit of land. Why not area? Land is priced at so much the acre or so much the square foot.

But area has not the same kind of economic significance as cost of production. It is not dealt with in the market as a separate entity and cannot have a market price actual or hypothetical. Where land is to be used as the source of primary products derived from the stuff of the land itself (the soil, or mineral deposits) area may be thought of as in some degree an indicator of the quantity of stuff to be obtained. But it can only be a very vague indicator of the quantity, and mere quantity cannot be priced apart from the essential considerations of ease or difficulty of working, and of location and access. At the time, after the First World War, when Germany's capacity to pay reparations was under discussion, an enthusiast argued that Germany had coal reserves amounting to hundreds of thousands of millions of tons which, valued at 10s. a ton at the pit's mouth, would amount to more than £50,000 million.

And what quantitative measure can there be of sites which are not used for the production of crops or minerals, but are valued for their situation for houses or for industrial or commercial business or for transport facilities? Each plot of land is unique in its characteristics; plots have not the interchangeability which makes items of plant and capital equipment legitimately measurable in terms of price.

The price of a piece of land under static conditions is its rental value, its total cost-saving efficacy. Then, it may be asked, is not a unit of cost-saving efficacy just the unit of quantity that we are looking for? Unfortunately that will not do. We can equate the price of labour or capital to its marginal cost-saving efficacy, because the total cost-saving efficacy of the quantity of labour or capital employed is not identical with its quantity. If we define the quantity of land as its total cost-saving efficacy the concept of its marginal efficacy becomes nugatory.

But even if we could find a suitable unit which would make land quantitatively measurable we still should not be able to put land on the same footing as capital and labour. The producer would not make the calculations which, in the cases of capital and labour, lead up to the equality of price and marginal yield. For when he procures an additional piece of land he has to pay a rent which just cancels its differential advantages. If we imagine him reckoning how much land to use with a given force of labour and capital, and adding on successive hypothetical increments of land, the price of an increment of land is irrelevant. Whether the land is high-priced or low-priced does not matter to him. He pays the landlord the value of the cost-saving efficacy of the land, and for the land, apart from that characteristic, he pays what he would have to pay for marginal land, that is, nothing.

When he is reckoning the effect of successive increments of capital he arranges them in order of cost-saving efficacy. Some items are literally indispensable; some less essential still have an enormous cost-saving efficacy relative to their price; others are of gradually descending efficacy, down to the marginal items, which only just save the equivalent of their own cost. We may suppose his hypothetical capital outlay to increase continuously, and the total cost-saving efficacy of a specified capital outlay to be expressed as a function of the latter. The function exhibits a trend, in virtue of which there is a significant differential coefficient in respect of the capital outlay, by which the marginal cost-saving efficacy can be defined.

Successive increments of land do not exhibit any such trend. Their prices are purely fortuitous; the price of any increment bears no relation to that of the increment before or to that of the increment after. The net cost-saving efficacy of all is reduced to zero by the rents paid. There is no trend, and there can be no differential coefficient.

In the cost expression, $pa + qb + rc$, the last term must drop out. The curtailed expression $pa + qb$ is the cost of factors other than land. The excess of the output, P , of an industry over this cost is the total rent, R , paid to landowners (or a constructive rent, where the producer is himself the landowner.) The total rent, R , cannot be analysed significantly into a quantity, c , of land and a price, r , and we cannot get from it a differential coefficient or a marginal yield.

The true cost of the output is $pa + qb$, the third term, R , representing so much of the cost as is spared through the efficacy of the land.

Does this amendment give us a rehabilitated production function? There are, I think, still certain objections to it.

When we identify the marginal efficacy of labour and capital with the partial differential coefficients $\frac{\partial P}{\partial a}$ and $\frac{\partial P}{\partial b}$ we are assuming that a and b are independent variables.

Production consists of a series of processes in each of which labour and

capital may both be employed. If the proportion of capital to labour is altered, that usually means that in one of these processes some mechanical device which saves labour has been introduced (or abandoned). A variation in the proportions in which factors are employed therefore means that one factor is substituted for another, so that the factors are not independent. If a and b are not independent variables they cannot form partial differential coefficients, $\frac{\partial P}{\partial a}$ and $\frac{\partial P}{\partial b}$.

We may restate the producer's aim as the production of a specified output at a minimum cost. The cost depends on the relative amounts of the factors employed and their prices. The partial differential coefficients presuppose that any variation in a factor can be directly related to a consequent variation in output, independently of the other factors. But that is not so, for variations in factors affect output through their effect on total cost, that is to say, on one another.

Suppose that the total labour-saving efficacy of capital employed to the amount of b is f . Then the efficacy of the labour employed to the amount of a , plus capital, b , expressed in units of labour, is $a + f$. If the producer's aim is to minimise the cost of a specified output the total efficacy will be a constant, e , corresponding to this output. Since a is equal to $e - f$, the cost is $p(e - f) + qb$.

If f is a continuous function of b the condition that the cost be a minimum is $p \frac{df}{db} = q$. That is, the marginal efficacy of capital must be equal to the price of capital relative to the price of labour.

This calculation applies to an entire industry no less than to a single producer. And it applies equally to the total production of a community, for, as the formula relates one factor to another, and does not depend on the end product for which they are employed, the difficulty of aggregating heterogeneous products does not arise.¹

In applying it to the total production we can no longer treat the prices of labour and capital as given. Prices have to be adapted to the marginal-efficacy formula. If at any moment they are inconsistent with it, there will be a disparity between the demand for a factor and its supply. Changes of price will result, and each new price structure will call for a new adjustment of marginal efficacies. A static theory assumes that perfect adjustment will be attained. To make prices as well as quantities variable in the formula would make the mathematics more complicated without any compensating advantage.

In the expression $p(e - f) + qb$ the total efficacy, e , is the amount of labour which would be required to produce the specified output on the extreme hypothesis that the capital employed, b , is zero. As is often the

¹ The pricing of a factor, such as labour or capital, does raise the problem of aggregating heterogeneous quantities. But that pricing is presupposed in any form of production function.

case in economic functions, the extreme hypothesis can be ignored. Whatever e or f may be, the difference $e - f$ is a definite quantity, the amount of labour employed, and the differential coefficient, $\frac{df}{db}$, does not depend on the absolute magnitude of f .

We might have made f the total efficacy of labour, a , instead of that of capital. We should then have had an expression for costs, $q(e - f) + pa$, in which e would have meant the amount of capital required to produce the specified output without the aid of labour—a hypothesis not merely extreme but absurd, for if there is no labour nothing is done.

The formula embraces only two factors. Having discarded land, it treats all labour and all capital each as one factor. But it can be extended to a multiplicity of factors. We may distinguish long-term capital, for instance, from working capital, each having its appropriate rate of interest. And management, instead of being merged in labour, can be treated as a separate cost-saving service, earning remuneration equivalent to its marginal efficacy.

Suppose that, in addition to labour, there are three factors, b_1 , b_2 and b_3 , that their respective prices are q_1 , q_2 and q_3 , and that their total cost-saving efficacies are f_1 , f_2 and f_3 . The cost-saving efficacy of any factor will be a function of that factor alone, to the exclusion of the others. But cost saved by a factor will not be limited to costs of labour, but may include costs of other factors.

$$\begin{aligned}\text{Total efficacy} &= a + f_1 + f_2 + f_3 = e \\ \text{Cost} &= pa + q_1b_1 + q_2b_2 + q_3b_3 \\ &= pe - (pf_1 - q_1b_1) - (pf_2 - q_2b_2) - (pf_3 - q_3b_3)\end{aligned}$$

The conditions of cost being a minimum are:

$$\begin{aligned}p\frac{df_1}{db_1} - q_1 + \left(p\frac{df_2}{db_2} - q_2\right)\frac{db_2}{db_1} + \left(p\frac{df_3}{db_3} - q_3\right)\frac{db_3}{db_1} &= 0 \\ \left(p\frac{df_1}{db_1} - q_1\right)\frac{db_1}{db_2} + p\frac{df_2}{db_2} - q_2 + \left(p\frac{df_3}{db_3} - q_3\right)\frac{db_3}{db_2} &= 0 \\ \left(p\frac{df_1}{db_1} - q_1\right)\frac{db_1}{db_3} + \left(p\frac{df_2}{db_2} - q_2\right)\frac{db_2}{db_3} + p\frac{df_3}{db_3} - q_3 &= 0\end{aligned}$$

These are satisfied by making:

$$p\frac{df_1}{db_1} = q_1 \quad p\frac{df_2}{db_2} = q_2 \quad p\frac{df_3}{db_3} = q_3$$

So the formula which equates the marginal efficacy of a factor to its price applies to the case of a multiplicity of factors.

The formula applies only to factors of production which can be substituted for one another. A special skill which is indispensable for the

production of a particular commodity, and is used for no other purpose, is sometimes classed as a separate factor of production. In the case of a single producer or all the producers of a particular industry, the formula gives the conditions of minimum cost with given prices of factors. If the price of a special skill is assumed to be given, there is no problem of minimum cost, for the cost is the given price. The formula gives the cost of the material to which the special skill is to be applied, and the cost of applying it is simply the assumed price of the skill.

When the formula is extended to the aggregate production of the community the prices of the special skills come into the process of adjustment, which leads up to the equilibrium position. The price of a special skill is reflected in the price of the article in the production of which the special skill is employed, and equilibrium requires a price structure in which the demand for the article is just sufficient to allow full employment to the special skill.

The relative prices of the fundamental factors of production, labour, capital and management (we are leaving land on one side for the moment) are determined by their marginal cost-saving efficacies. The prices of end products come into the calculations only because the price level of factors has to be so adjusted to the price level of end products as to maintain normal profit margins and full employment.

The possessors of a special skill, on the other hand, in deciding what rate of remuneration to demand, have to take into account the effect on the sales of the end products. In this respect their position approximates to that of an *enterprise*, which takes the responsibility for supplying an end product, and relies on selling it to make a profit.

And there are other objections to treating a special skill as a separate factor. No clear boundary line can be drawn between special skills and the aptitudes which are merged in the main body of labour. Skills which are employed in several distinct end products, but cannot be used for any other purpose, are subject to the same considerations as those which specialise in one product. But where they extend to many end products, they become indistinguishable from the kind of skill which is used in all industries. Indeed, we can hardly suppose that there are particular skills which are used literally in all industries. Skills can be learnt, and the recruit to industry who hopes to qualify as skilled can choose which trade to learn. And even in middle life a worker can change from one occupation to another, at the cost of wasting a part of his acquired aptitudes.

Management is in a sense only a branch of labour. Like other kinds of labour, it commands a price corresponding to its marginal efficacy. And individuals with the requisite qualifications, natural or acquired, for management are recruited from the main body of labour. They range from high-paid executives down to foremen and others employed on direct supervision and discipline. Nevertheless, it is useful, certainly in some

connections, to treat management as a factor. It is specifically directed to the function of cost-saving, and takes its place quite naturally in our formula, though it differs from other factors in that its cost-saving efficacy can be regarded as directly increasing output.

The formula $p \frac{df}{db} = q$ presupposes that the successive values of the efficacy f corresponding to the values of b can be suitably represented by a continuous function. Where b represents management, that is a legitimate assumption. We may suppose expenditure on management to be so nicely calculated that every additional shilling (whether in numbers employed, in rates of remuneration or in incidental expenses) will bring its yield in increased output or decreased cost. As in the demand function, we are dealing with hypotheses of human behaviour.

But where b represents capital, the successive values, being dictated by technological consideration, will be, in general, essentially discontinuous. The value of f corresponding to a value of b is composed of all those technical devices which have an efficacy above the margin determined by q in relation to other prices. They are not related together in any other way. The marginal efficacy is a mathematical fiction, designed to correspond with the gap between the efficacy of a device just on the margin and the next largest efficacy or the next smallest. Neither gap has any significance, and they may differ to an indefinite extent in size.

When we apply the formula to a large number of producers, composing an entire industry, there is some semblance of continuity. The producers are not to be supposed all to adopt a labour-saving device simultaneously. Marginal or nearly marginal devices will be adopted only by some of the producers, so that b , the total capital employed in the industry, can be supposed to vary by very small hypothetical steps. But it is still true that the differential coefficient, $\frac{df}{db}$, has no economic significance. The simple fact that producers will adopt those pieces of plant which will save costs not less than the costs of interest, depreciation and maintenance which they involve is easy to understand without resort to a mathematical hypothesis.

Expression of an economic quantity as a mathematical function is not in general useful unless there is an underlying trend which will give reality to its differential coefficients of first, second and higher orders. Our production function $p(e - f) + qb$ is not committed by its form to be a continuous function. If $p(e - f) + qb$ is to be the minimum cost, then $pf - qb$ must be greater than any alternative $pf' - qb'$. That is, $\frac{f - f'}{b - b'}$ must be greater than $\frac{q}{p}$.

If we can devise a continuous function, f , which corresponds sufficiently closely to successive increments of capital employed, placed in order of

efficacy, the expression $\frac{f - f'}{b - b'}$ approaches the limit $\frac{df}{db}$. But this only restates through a mathematical analogy a principle which we can quite well understand without any mathematics.

How are we to deal with land? The rental value of a piece of land, being its total cost-saving efficacy, reckoned in terms of costs of other factors, is in no sense a marginal quantity. The rent derived from a piece of land is, on the assumptions of static conditions, the highest cost-saving efficacy that can be realised from it in any employment. When, as is usual, an industry employs some land which could earn rent, but at lower rates, in other industries, it is increasing the costs of these latter by withholding it from them. When there is a piece of land which has the same rental value for two different industries it may be called marginal in a special sense. But the rental value may be high or low.

Land, as we have seen, is not measurable in terms of any quantitative unit of economic significance. How, then, can we say that its price is high or low? The rental value counts as high when the land's cost-saving efficacy is a high proportion of the value of the output derived from it.

It is a mistake to say that the rental value of land is exclusively due to its natural endowments. It often depends vitally on the degree and character of man-made developments of neighbouring land, especially on the distribution of population, and on the transport and communications giving access to markets and materials.

Moreover, fixed capital in the form of improvements and structures sunk in the land becomes inseparable from it, so that the value attributable to it is merged in the land value. Likewise any causes of loss of value, such as soil erosion or depletion of minerals. Land on which there has been capital outlay in the past is valued in the market as if this capital outlay were a natural endowment. The price of the land does not include a recoupment of the outlay itself, but reflects the cost-saving efficacy of the capital under current conditions. A site cumbered with obsolete and worn-out structures may still command a rent in excess of its bare land value. Only when this excess disappears is it worth while to demolish the structures and to appropriate the site to some new venture.

Static theory makes the producer pay the landowner the full cost-saving efficacy of the land he uses. Is not this a paradox? How can he make anything out of the land for himself?

Land, like the other factors, is an indispensable means of production. Its cost-saving efficacy determines its price, because it relates the land to the other factors, the prices of which go to make up costs. But the price does not pretend to measure the productive virtue of the factor. Marginal land commands no price, but it is available for use, and when used makes its contribution to the productive process. It commands no price, not because of any technical failing, but because it has to face the competition

of other land more favourably endowed. The basic productive services of marginal land may be compared to those of a free water supply, or of light and air. Rent is paid for advantages additional to the basic services.

A formula relating only to costs disregards profit. Profit is the remuneration of enterprise, that is to say, of the decision to produce. The producer engages in his enterprise with a view to the sale of his product. He believes that there is a demand to be satisfied. A condition of success is that he must keep down costs. If he incurs higher costs than his competitors, his margin of profit will be diminished or perhaps extinguished. If he reduces his costs below theirs, his margin of profit will be so much the greater, and he may be able to extend his sales at the expense of theirs.

But the keeping down of costs is only ancillary to his essential function, that of deciding what is to be produced. What is produced is destined to be sold, and it is the selling which yields profit, and rewards the producer. The landowner, the capitalist and the worker are all engaged by the producer to contribute to the productive process. But the landowner's function approximates to that of the producer himself. The capitalist holds his resources in the form of money for disposal in the investment market; the worker sells his services at a price determined by the labour market. But the landowner bears the responsibility of deciding to what use his particular piece of land is to be put. He may accept the offer of the first comer, who will use the land in a way yielding but a fraction of its potential efficacy, but, if he does, he is not acting according to static theory. Static theory assumes him to select the use in which the potential efficacy of the land is fully realised. That selection is essentially different from the sale of services in the labour market or the placing of capital in the investment market; it shares with enterprise the decision what things are to be produced.

The production function excludes enterprise from the factors of production, and the profits of enterprise from the prices of factors. That may be defended on the ground that enterprise is not a cost; its decisions are not a time-taking function, such as can be paid for by a salary. And landowning is similar in this respect to enterprise. The landowner is remunerated for decisions.

My formula for the function of production is a formula for costs, which legitimately excludes land as well as enterprise. Land, however, is universally classed as a factor of production. And it would seem that enterprise should also be so classed.

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REVIEWS

Business Enterprise: its Growth and Organisation. By R. S. EDWARDS and H. TOWNSEND. (London: Macmillan, 1958. Pp. xvii + 706. 60s.)

FOR over ten years the authors of this book have held a seminar on problems of industrial administration at the London School of Economics, at which industrialists and others present papers on the organisation and problems of their particular enterprises. It was the existence of this collection of case material which prompted the writing of the book. Although nine of the seminar papers are given in full in appendices (and extremely interesting they are), while others provide many illustrations, the book is much more than a collection of seminar papers and discussions. The authors have drawn on a wide range of knowledge and experience to give a large-scale survey of the structure and problems of industry, with a central theme of exploration of the factors which influence business enterprise and thereby economic growth and development.

The book is divided into four Parts. The first, entitled "Variety of Industry," deals with such matters as the birth and growth of firms, the different forms of organisation, the relevance of science and the "patchwork of specialisation." Part Two is devoted to the integration of industrial activities; a discussion of economies of scale and the merits of large organisations leads to a three-fold classification of methods of integration—by administration, through the market and by co-operation in various forms. The third Part, "The Government and Industry," is the longest, and deals with various topics: the organisation and finance of industrial research (a matter in which Professor Edwards' previous work is deservedly well-known), the establishment of common services, controls over production, industrial location and (in four chapters) the nationalised industries. Part Four is a short discussion of the future of British industry, with emphasis on the factors influencing the rate of innovation.

The general conclusions can best be summarised in their own words:

"First, the patterns of industrial organisation are bewilderingly complex and it would be a matter for concern if they were not. Secondly, no assumptions should be made or action taken that would imply a bias in favour of either large or small scale. Thirdly, the State should, in general, avoid action and prevent action that would bring about rigidities in the industrial structure. The most important requirement of industrial organisation is that it should provide for variety and change" (p. 573).

It is impossible in a short review to do justice to the wealth of material on which they draw to establish and illuminate these (and other less far-reaching) generalisations. Different readers will no doubt find different parts of

the book the most stimulating and informative. I would pick out the first Part as of particular interest, though it is matched by some of the individual chapters (such as that on economies of scale), while the group of chapters on nationalised industries would be hard to beat as a succinct statement of the issues. Other parts, such as accounts of governmental controls and collective organisations, are less interesting, though allowance must be made for the nature of the material as well as for a reviewer's greater familiarity with certain of the matters covered.

As the authors point out in the preface, in this field empirical studies have lagged behind theory; and, while they are clear that theory is not much use without a basis of empirical verification, make only modest claims for their own achievement: the instances which they provide "need adding to many times over before we shall have more than a cursory knowledge of the working of industry and trade. We need to find out much more about the actual operations of firms and industries before very confident conclusions are drawn about any of the big issues." Although it can be agreed that much more empirical work needs to be done, I think that the implication of the authors' emphasis on the variety of industry, that generalisation is extremely hazardous, perhaps even impossible, can be somewhat exaggerated; I at least should be surprised if many of their conclusions and judgments were to be seriously upset by the accumulation of further evidence.

They are equally cautious in warning the reader that he must allow for their own predilections, especially in Part Three: "We have tried to show in the text where description and analysis end and advocacy begins, but it would be disingenuous to pretend that even the description and analysis can be completely freed from convictions." It would indeed be idle so to pretend, even though some writers make the attempt; from the *Wealth of Nations* onwards, all great works on economics have sprung from some system of consistent ideas, and their value is by no means lessened thereby. It is often too easily forgotten that an accusation that an analysis has been inspired by particular convictions about what is true and important is completely irrelevant to its validity and to the value of the evidence which it presents. The fact that this book is to some extent a tract for the times does not reduce the significance either of its analysis or its value as a standard work of reference. The authors state that they hope that the book "will prove useful not only to those who study industrial economics for professional and academic examinations but also to practising businessmen." It will certainly have an important place in University reading lists, for the best up-to-date account of such matters as economies of scale in the firm, the problems of the nationalised industries or government policy on location of industry, while many business-men would undoubtedly gain from its perusal, if only to learn that they have been talking prose without knowing it. It is, however, more than a text-book; it is also an original work which must have an important influence on the approach to many aspects of economic organisa-

tion and growth. It is to be hoped that Professor Edwards' translation to the administration of one of the nationalised industries will not preclude a further instalment of the authors' analysis of the nature and operations of enterprise.

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Income and Economic Welfare. By S. G. STURMEY. (London: Longmans, 1959. Pp. x + 208. 21s.)

LEST the title of this book mislead any economist to suppose that this is a book about welfare economics, it will be said at the start that it is an elementary textbook about economic institutions. The excuse for using the word welfare in the title is, apparently, the author's opinion that "economic welfare" ("... only a part of total welfare" or "happiness") is commensurate with real income, about which there is systematic discussion in these pages. But about welfare economics, as understood in the profession, there is nothing other than an occasional use of the word optimum, or equilibrium, and allusions in several places (pp. 5, 167, 202) to the effect that a maximum position is reached when the additional gains to welfare no longer exceed the additional losses. And though this may beguile the eager beginner into the belief that he is being presented with a principle of universal application since—like the formula "the greatest happiness of the greatest number"—it carries with it the echo of revelation, no light is shed on the problems of welfare economics by continual affirmation that, whatever economic welfare is, it reaches a maximum at an upper turning point.

While, in general, it is expected that the enthusiasm of the reviewer fall short of that of the publisher, the discrepancy of opinion in this instance extends as much to the author's intentions as to his achievements. We are told on the dust cover that "The first two sections of the book cover the meaning of economic welfare and its relation to the total welfare of the community, the connection between income and economic welfare, the theory of income determination and the causes of both unemployment and inflation." If the connection between income and economic welfare is disclosed by such statements as, first, that the more real income a person has the more economic welfare he enjoys and, second, that a unit increase in income will cause a greater increase in economic welfare if it accrues to a person with a low income than if it accrues to a person with a high income, then, indeed, the author can be held to have established the connection. As for providing a theory of income determination, apart from a paragraph on page 42, too condensed to be of much use to the beginner, it is just not to be found. There is a single reference to the multiplier on page 55,

where it is described as "a reasonably stable relationship between the eventual increase in income which will flow from any primary increase and that primary increase," but no more. And while there are some definitions and some informal discussion of inflation and unemployment, to claim that the book covers "the causes of both unemployment and inflation" is surely stretching publisher's licence beyond the elastic limit.

In so elementary and placid a treatment of the subject there is virtually nothing to take issue with, and it remains only to indicate the subject matter of the book. The first three chapters amount to a rather diluted version of Hicks' *Social Framework*. The first chapter equates economic welfare with real income, elaborates the definition of income in terms of a flow of goods and services, distinguishes between real and money income, and classifies sources of income. The second chapter discusses the size, age-structure and trend of the population, while the third chapter on production and expenditure makes use of data from the blue book to illustrate the necessary relations between national income, national production, and national expenditure. Chapter 4 discusses such factors as the level of employment, inflation, productivity, and investment, which influence changes in money and real income. Chapter 5 is devoted to the nature and measurement of unemployment. Chapter 6 begins by discussing the forms in which income is received and passes on to a brief history of trade unions and some remarks on the existing negotiating machinery in the determination of wages. The role and functions of trade unions are briefly surveyed in Chapter 7. The effect on the distribution of real income of the continuous rise in the price-level since 1939 is discussed and illustrated with blue book figures in Chapter 8. Chapter 9, on the development of the modern welfare state, undertakes some impressive comparisons between the bad old days before the turn of the century and the ubiquitous beneficence of the modern government agency. Chapter 10 on housing turns out to be a convincing indictment of rent controls. The book ends with Chapter 11 on the effect of taxes on the redistribution of income, and the extent of growth and changes in the composition of output over time.

On the whole, then, if one is willing to impute only a modest ambition in the author there is little to quarrel with in the treatment of the topics he has decided to cover. Here and there, however, there are traces of carelessness. On page 157, for instance, we meet with the statement, "To raise the present pension to a level at which no retired people would be in need would . . . have inflationary consequences." This is obviously a *non sequitur*. Regardless of how need is defined, unless we are told how government expenditure on pensions is to be financed we can make no predictions about its monetary effects. Again, to be told, at the beginning of Chapter 3, that national income is identical with national expenditure, apparently on the grounds that income generates expenditure, is not likely to convey to the reader the nature of identities. The conscientious but

innocent student is almost sure to find himself stuck a few pages later. He will read (on page 45) that the value added by each enterprise is the difference between the value of sales and the cost of materials and services, excluding wages, bought from other sectors of the economy, and—"alternatively" according to Mr. Sturmey—as wages and salaries paid by an enterprise plus profit (or minus loss). The first definition, which might be better framed as the value of all sales less all "outside" purchases (whether materials or services), however, amounts to wages, salaries, profits, and depreciation. The second—unless "profits" is to be interpreted as gross revenue—does *not* include depreciation and, in fact, in a closed economy, amounts to net national income. When, therefore, the reader is told that the sum of values added (and "payments for services") is the gross domestic product, he may guess that the author intended to say that it was *equal in value* to the gross domestic product. If he has already read *The Social Framework*, or Edey and Peacock's *National Income and Social Accounting*, he may even guess that it is the first definition of value added which applies in this connection. But it is more likely he will read it several times and then give up. In particular as, at the bottom of the page, pretty much the same confusion occurs. The sum of the factor incomes is said to be equal to gross domestic product (which it is not, on the generally accepted definitions), and that gross domestic product is equal to national income "before making allowance for capital consumption." The harassed reader is finally assured that gross domestic product *is* the same as national income and capital consumption "because they are exactly the same thing looked at in slightly different ways." And that, apparently, clinches it.

As affording some background material for sixth formers or first year students this book, which is for the most part clearly written, will have its uses as a source book to be glanced through prior to seeking more systematic analysis and more specialised data.

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La Répartition du Revenu National. By JEAN MARCHAL and JACQUES LECAILLON. Part I: Les Participants: Vol. I, Les Salariés; Vol. II, Les Entrepreneurs, Agriculteurs, Prêteurs, Bénéficiaires de Transferts. (Paris: Librairie de Médicis, 1958. Vol. I: pp. 667; Fr. 36; Vol. II: pp. 388; Fr. 24.)

PROFESSOR JEAN MARCHAL of Paris and Professor Jacques Lecaillon of Lille have published a first instalment of their monumental study of the distribution of national income. As is explained in their general introduction, the authors aim to present a new theory of the distribution of national income. They believe that neither the classical, nor the neo-classical, nor the marxist

theory is able to explain the actual facts of the distribution of national income. They advance the view that a general theory of the distribution of national income cannot be conceived, since the latter is heavily influenced by institutional, political and sociological factors. The two authors deliberately confine themselves to the elaboration of a theory of the distribution of national income in developed countries. That means that the distribution of national income in underdeveloped countries and in countries behind the Iron Curtain is not to be explained by the theories the authors will present in the second part of their study. I am myself convinced that the prevailing body of economic theory has to be enlarged or at the least modified in order to explain economic tendencies in underdeveloped countries. I have started work along these lines during the last four years. The work of Professors Marchal and Lecaillon is similarly concerned to secure a closer reconciliation of economic theory with reality. They started some thirty years earlier.

The first Part of the work gives only a few hints of the theory to be presented in the second Part. These hints may be confirmed by reading some of the articles published by Professor Marchal in the *Revue Economique*, in the *American Economic Review* and in the *Economia Internazionale* during the years 1950–54. He has there argued that the distribution of national income is influenced by the struggle between the various social classes and between individuals therein.

In this first Part the authors make a valuable analysis of data concerning the distribution of income in France, in the United States and in the United Kingdom. They then proceed to their analysis in order to define the groups that participate in the distribution of national income in these three countries on the basis of the latest data. The institutional, political and sociological factors which influence the distribution of national income are considered in detail.

The authors stress the consequences of the diminished importance of the entrepreneur now and compared with the nineteenth century; of the appearance of organised pressure groups; of the oligopolistic markets of to-day; of the Government's and of the central bank's intervention in the money and in the capital markets. They conclude after a careful analysis that they have all contributed to an increased possibility of excess of purchasing power compared with the goods available.

The first volume includes, following a general introduction and a preliminary chapter, five other chapters dealing with the incomes of salary and wage earners. The authors believe that national income is best regarded as distributed between five groups: salary and wage earners, industrial and commercial firms, farmers, lenders of capital (both real and monetary) and the beneficiaries of transfer payments who offer nothing immediately. Among their more interesting conclusions are: that, while the percentage of female workers increases, those who get senior posts remains small; that wage and salary earners seldom own property; that the income of farmers

is lower than that of industrial workers and others outside the agricultural sector; that the increase in numbers of those employed in the tertiary sector is balanced by the increase of productivity in the secondary sector; that salary and wage earners constitute the majority of the active population.

The authors further insist on the disappearance of the former differences between those working in agriculture and in industry. They explain it by the tendency of the former to adapt themselves to the conditions prevailing in industry. They draw attention also to the growing importance of incomes accruing to salary and wage earners not in respect of their productivity but of the number of their dependants, particularly in the case of the lower-paid workers; to the special position and interests of higher employees, whom they call "*cadres*," in both the private and nationalised sectors; to the greater percentage of skilled workers and foremen in big firms; to the tendency to assess people on the basis of real income. They reach the conclusion that the wage and salary earners for the purpose of the study of the distribution of the national income should be defined as those employees paid on a monthly basis; and in addition the higher-placed employees who, owing to their higher education and to their participation in the decision-making, are, however, in a special position. The French term "*cadres*" has no real equivalent in English. These comments and groupings seem to be wholly justified, not only by the admirable treatment of the authors but also in the light of my own general experience. It remains to be seen how, in the second part of the work, the theoretical analysis will be developed to handle these concepts.

In the second volume, divided into four sections, the remaining income earners—all others, that is, than salary and wage earners—are dealt with. The authors stress the fact that entrepreneurs constitute a minority but, despite public control and nationalisation, enjoy valuable monopolistic advantages. These are absent in the case of those who lend real or nominal capital. To the latter the authors assimilate the owners of rented houses. The house-owners are chiefly concerned to preserve their capital and only to a less extent with the rent. The authors make in this connection an excellent analysis of the considerations which induce investments and loans under abnormal monetary conditions. Capitalists rely very seldom on their incomes. The ability and desire to protect their incomes is not the basis of their satisfactions. They also handle successfully the problems posed by the attempts of farmers to transfer to the nation the consequences of the instability of the markets of their products. Transfer payments are also justified on the basis of the desire to secure a certain minimum to everybody. Thus the authors identify seven further groups of participants in the national income: commercial and industrial entrepreneurs; private and nationalised undertakings; the latter's managers; those working on their own account; farmers; lenders; the beneficiaries of transfer payments.

As I said earlier, we must wait for the full theoretical analysis before we

can properly appraise this work. I may, however, already draw attention to the excellence of the preliminary analysis contained in these volumes and express my own agreement with the authors' view that it is not possible to have a general theory of distribution. Economic theory becomes thus more complex but nearer to reality. Let me add that the first volumes here reviewed remind the reader of what the historic school ought to have performed if it was to achieve its objective of presenting a body of theory based on reality.

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Toward a Geography of Price: A Study in Geo-econometrics. By WILLIAM WARNTZ. (Philadelphia: University of Pennsylvania Press (London: Oxford University Press), 1959. Pp. 117. 40s.)

THE main aim of this study is, in its own words, "to develop the theory of space potential and demonstrate its usefulness as a type of methodology in economic geography." "Space potential" is here opposed to what is termed "time potential," with which the book also deals. Two main kinds of space potential systems are studied, namely: population potential and supply potential. The word "potential" in all this is being used in a sense analogous to that encountered in electrical contexts. Thus any concentration of population is thought of as exerting at all points, near and far, an influence which varies directly with the size of the population and inversely with the distance from it. This influence (called population potential by John Q. Stewart, Professor of Astronomical Physics at Princeton University, who originated the concept) is expressed numerically by means of the simple formula P/d , where P is the size of the population, and d is the distance from it. The total population potential at any point can then be evaluated, in principle, by aggregating these quotients as calculated for all population centres, near and far, according to their respective distance from it.

Dr. Warntz has made estimates along these lines for the central point of all the states of the United States. He has weighted the population figure used according to the local average income per head. The resulting value he has called Gross Economic Population Potential (1940-49 average). He has presented these values on a map, using a system of contour line joining points of equal potential.

"Supply space potential" for any particular product is calculated on exactly similar lines, except that the annual rate of production at any point is used in place of population figures. Dr. Warntz has estimated, for the United States in 1940-49, supply space potential figures for wheat, potatoes, onions and strawberries respectively. Supply time potentials are also calculated, for the same four products—this constituting an analogous method of allowing for the time pattern, as opposed to the geographical pattern, of production.

Dr. Warntz goes on to formulate an hypothesis that the price (of a particular product, at a particular place and time) varies directly with "gross economic population potential," and inversely with both supply space potential and supply time potential. He then carries out a test of this hypothesis, in the form of four multiple correlation calculations (one for each of the products). In these calculations, price, as the dependent variable, is investigated for multiple correlation with the three "potential" indices. Relationships harmonious with the hypothesis are found to exist, and the levels of significance involved, in the technical statistical sense, are high.

Thus the structure of the book, like its aim, is extremely straightforward, and it is based upon a monumental foundation of arithmetic. The misgivings it arouses are correspondingly straightforward and fundamental.

For example, there is a complete lack of discussion of any theoretical basis for expecting an expression of the form P/d to describe the influence upon price of a population P at a distance d . One cannot be satisfied with having this influence left mysterious, like a kind of gravitational field, when it must arise out of the processes of buying, selling and transporting, which are not mysterious, although they are subtle and complex. On the face of it, an expression of the form, say, $\lambda P - \mu d + \nu$ would seem at least as easy to relate to these elementary processes. There is a special difficulty with Dr. Warntz's formula when $d = 0$, and it looks as though he has solved this in an anomalous manner (putting $d = 1$ instead) which makes the relative importance of local and distant populations depend in a highly arbitrary manner upon the distance unit chosen. One is similarly worried about Dr. Warntz's time discounting formula. It leads to different results from those of time-discounting methods in common use, and these have a theoretical basis.

In view of the nature of these doubts, another one arises as to whether Dr. Warntz's hypothesis is sufficiently stringent for its statistical vindication to have much bearing upon the validity of the basic concepts which he wants to establish as fundamentals of economic thought. After all, one would expect any indices epitomising proximity to markets or to sources of supply to be strongly correlated, in appropriate senses, with prices. Incidentally, it would be interesting to see the geographical pattern, if any, in the algebraic sign of the deviations of "actual" from "expected" prices.

Despite misgivings of this kind, and despite a slight embarrassment caused by Dr. Warntz's terminological abandon, the fact remains that it is refreshing to encounter a good and imaginative idea expounded with enthusiasm. Very much more pioneering work clearly still has to be done in this field. Those inclined to participate in this would probably find Dr. Warntz's book interesting and stimulating.

R. H. TUCK

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Factor Endowments and International Trade. A statement and appraisal of the Heckscher-Ohlin theory. By SUBIMAL MOOKERJEE. (Bombay: Asia Publishing House for the Indian School of International Studies, 1958. Pp. viii + 99. 20s.)

THIS book presents a neat and elegant exposition of the theory that holds international trade to be the result of differences in relative factor endowments. Dr. Mookerjee employs the formidable set of geometrical devices (developed recently by Lancaster, Rybczynski and others) that owe their existence to the debate on international factor prices, started by Samuelson and Lerner. The diagrams have been clarified and arranged logically, additions have been made, and the different parts of the analysis are connected by a sternly concise commentary which, if very Euclidean in places, certainly tackles economic problems. There is a brief but useful bibliography of recent articles.

But Dr. Mookerjee is at least as interested in the "appraisal" of the Heckscher-Ohlin theory as in its exposition; his central chapter is entitled "Verification of the Heckscher-Ohlin Theorem." The author is not, in this chapter, concerned with attempts at empirical verification (or falsification) *à la* Leontief (although on that question he has some conventional but convincing passages in Chapter V), but rather with the internal consistency of the model. His main interest here is in the inherent implausibility of assuming the possibility of an "unequivocal definition of factor intensity": a commodity which is labour-intensive at one set of prices may be capital-intensive at another. In Chapter IV we are shown the now familiar proof that such lack of consistency in factor intensity can remove any stimuli to factor-price equalisation, but elsewhere the author stresses a relatively neglected point—the dependence of the whole Ohlin-type model on the existence of immutable factor intensities. If there are no labour-intensive commodities, labour-abundant countries cannot export them! We are left with a severely truncated theory, which states merely that if countries have differences in relative factor endowment, and these differences are not offset by others, then there is likely to be some profitable trade: "In general, however, no definite *a priori* generalisation concerning the composition of trade is possible" (p. 95); differences in factor proportions need not impart a systematic bias to production.

This is Dr. Mookerjee's most revolutionary point. He is very helpful elsewhere: on technicalities (for example, in Section 3.3, on conditions for complete and partial specialisation); on the generalisation of his analysis to the many-goods, many-factor case (although on this question his discussions in Sections 4.2 and 4.5 seem to confuse the real world with the model, and to make concealed empirical assumptions); and on the Leontief controversy. On only two other issues can one question his treatment. First, he constantly reiterates a distinction between a model based on differences in relative *quantities* of factors and one based on differences in factor *prices*

(before trade); but market demand conditions have to be introduced anyway (as Dr. Mookerjee recognises), and hence the two approaches coincide. Here he would seem to confuse the method of solution with the solution itself—a fault (if so it be) no doubt encouraged by the preoccupation with techniques necessary in writing such a book. Secondly, and more trivially, Fig. 18, the heavy gun against factor-price equalisation, is not as clearly explained as are the others, and in Section 4.1 a slight (and purely verbal) confusion between dynamics and comparative statics clouds the issue.

However, the only possible strong criticism of this book would be that "appraisal" runs a very bad second to "statement." Dr. Mookerjee mentions with approval Dr. R. Robinson's important criticism of the Ohlin doctrine in the *Quarterly Journal of Economics* (May and August 1956); he joins issue (p. 86, footnote) with those who argue that the restrictive (and arbitrary) assumptions of the Ohlin-type model are a virtue; and he is aware of the dual difficulty of using "capital" as a factor of production—the specificity of physical capital and the possibility of trade in capital goods. Of course, a real appraisal would demand an empirical, not a theoretical, work, and Dr. Mookerjee carefully avoids casual empiricism. But there is room at least for the formulation and examination of alternative hypotheses (increasing returns, differences in production conditions, specific resources, dynamic causes and the like). Moreover, many of these problems (on which the author touches in his last chapter) bear on the internal consistency of the Heckscher-Ohlin model itself.

Consider three issues of assorted importance. First, on p. 14 Dr. Mookerjee notes that the assumption of constant returns to scale implies that "the number of firms producing the commodity concerned remains undetermined." At the end of his book he discusses product differentiation as a possible cause of trade *sui generis* (p. 93). But surely constant returns to scale (if they applied in the real world) would lead to product differentiation—hence product homogeneity is an unlikely (though necessary) ornament of the Heckscher-Ohlin model. Secondly, the model is not just part of the theory of markets—it purports to explain the establishment of trading patterns through time. If we recognise (p. 91) the importance of capital movements, what reason is there to believe that adjustment to relative factor abundances will outpace factor movements? And thirdly, should we not be wary (although Dr. Mookerjee does not emphasise this point of Samuelson) of extending the Ohlin-type analysis to trade in manufactures or exotics merely by multiplying the number of factors? And if we do not adopt this course, what other explanation of trade in manufactures does the model offer us?

Despite Dr. Mookerjee's relegation of these important problems to his last few pages, the body of his work will be a valuable addition to the research student's and teacher's library.

M. V. POSNER

Cambridge.

Economic Arithmetic. By R. L. MARRIS. (London: Macmillan, 1958. Pp. xvii + 349. 28s.)

MR. MARRIS defines Economic Arithmetic as a considerably wider subject than economic statistics. He points out that in economics not only is there considerable scope for the tools of statistical method but also there arise problems in the handling and presentation of statistical material. Since we can only describe the economic system quantitatively through statistics, there are many problems of definition, measurement and processing which are not covered in the usual text-books on statistical analysis. Surely, however, economic statistics has this wider connotation for which Mr. Marris feels the need to borrow the term arithmetic. If the author had written about the descriptive side only and had omitted method altogether a new term and title might have been appropriate, but, in fact, he includes sections on regression analysis and time-series and the like. So the title tends somewhat to arouse expectations which are only partly realised.

The book, which is intended primarily for second- and third-year students, is divided into three parts. The first is largely an extensive description of British national income concepts and statistics. National income and capital is, of course, undoubtedly the most important branch of "sources" and one which the student must master. But it is by no means easy. The accounts which appear in many text-books do not help a great deal either. Mr. Marris' chapters dispel some of the fog, but doubts still remain. It is hard to be convinced of the helpfulness of describing money flows in hydraulic terms with the aid of quite complicated diagrams. Why not use some of the actual figures as pegs on which to hang the argument? It is rather remarkable that Mr. Marris succeeds in discussing national income almost without the use of a single statistic. Some of the difficulty, too, almost certainly derives from the attempt, usually, to be comprehensive and realistic. The National Income Blue Book has essentially to be detailed, complex and complete, but the essentials of national income analysis can be explained much more easily through a greatly simplified model.

The second part of *Economic Arithmetic* claims to discuss the intellectual foundations of two important statistical techniques: regression and time-series analysis. Here the words intellectual foundations appear to be something of an exaggeration. There is no consideration of fundamentals and little enlightenment for the student as to what he is really assuming and doing when he follows a guide book in carrying out a particular analysis. Just one minor example of this is seen when Mr. Marris states that "a moving average trend, not being wedded to any particular hypothesis about the nature of the trend . . ." (p. 146). Again, in the chapter on associated movements in variables there appears to be a good deal of confusion between a structural law and a regression line. It seems dangerous to introduce the concept of regression through the idea of "a regular law relating the two

variables" (p. 156). Indeed, the arrangement of this chapter leaves a lot to be desired. Throughout the bulk of it the student is misled to believe that in calculating one regression line he is estimating the underlying law, and then almost at the end (p. 179) he is suddenly confronted with the other regression line. Finally, in the penultimate paragraph a hint is given, but not elaborated, that the whole topic of estimating the parameters of a law in the economic system is much more complicated.

In fact, it does seem that there is no middle course in this business of discussing such topics as regression analysis. Either the techniques are bluntly described with due warnings about snags and difficulties in rather the way elementary mathematics is taught in the lower school or else, if one wishes to go further, the fundamental theory, involving stochastic concepts, statistical inference, and the like, has to be mastered. Looked at from this point of view, the choice of techniques by Mr. Marris leaves him in a difficult situation. Study of association among economic variables raises (or should raise) most formidable problems, of estimation and the like, which are generally solvable but only usually with quite a mathematical battery. Mr. Marris touches on this (p. 180), but why refer to the topic as "the method of simultaneous equations" which has a connotation in algebra with no probabilistic implication or content at all? With time-series analysis it is not even possible to say that the problems are yet solvable. The underlying theory here rests in a most primitive and unpromising state.

The third part of the book, covering almost half the total length, is devoted to index-numbers; first, their general properties, then their application to measurement of changes in family real income and to changes in real national product. The discussion ranges widely, well beyond the confines of pure index-number theory. There is an interesting account of the conceptual problems of measuring real income and real output and full treatment of the associated philosophical difficulties. It seems a little forbidding to introduce welfare considerations right at the outset, but perhaps it is logical so to do. It is in Part III that much of Mr. Marris' original work is to be found, and it is informative to read of Buschguennec's important but neglected theorem linking the Fisher ideal index with indifference-curve theory. The third section of the book in many ways forms the most stimulating reading, but it does seem, in places, to lack rigour. So much depends on the shape of the indifference-curve system about which we know nothing and which is rarely described in precise terms. It grates a little to read (p. 247) "if the indifference curves are well and evenly rounded and of a certain symmetrical pattern . . ." Or, again, (p. 259) ". . . any number which lies somewhere between the values of the Laspeyres and Paasche results . . . will normally come closer to the theoretical 'true' index . . . than will either the Paasche or Laspeyres index taken alone." Why this should be asserted is difficult to see. 72 lies between 70 and 90 but is not nearer to 85 (say) than is 90.

To summarise, the book forms most absorbing reading, is full of ideas and will well repay the, by no means light, task of perusal in detail from cover to cover. Yet whether it quite achieves its object or whether it is quite the finished work which might have been expected seems open to doubt.

Manchester.

K. S. LOMAX

The Control of the Purse. By P. EINZIG. (London: Secker & Warburg, 1959. Pp. 344. 35s.)

AFTER a period of years in which relatively little attention was paid to the processes of Parliamentary financial control, there has recently been an outpouring of ideas from a number of quarters. Professor Beer's *Treasury Control*, Sir Herbert Brittain's *The British Budgetary System* and now Dr. Einzig's book all belong to the same family. The subject, bordering as it does on constitutional, administrative and economic matters, has always potentially had a wide appeal. Now it is in the limelight.

Dr. Einzig is concerned with the broad sweep of history and with one fundamental theme: how Parliament evolved over the centuries a finely tempered system of financial control, how this system reached near perfection in the golden age before 1914 and how much it has deteriorated since then. The result is a lively book with a great deal of material, much of it otherwise inaccessible, attractively presented. The three parts dealing respectively with the early days, the period from 1688 to 1850, and the years since then are of approximately equal length. The historical aspects do therefore predominate and form an essential background to the assessment of the position in modern times. Nevertheless, it is the latter which is likely to be of most interest to most economists.

There can be no denying the supreme importance of effective Parliamentary control over expenditure. It also seems likely that this control is less effective than it was some 50-75 years ago. To give one illustration only, it is now over 35 years since Parliament made any changes in the Estimates laid before it by the Executive. Perhaps this diminution of Parliamentary interest and control has not been as much as Dr. Einzig would have us believe, but it would be hard to deny that there has been some diminution. But having said this, what can be done about it? It is here that Dr. Einzig's treatment is unsatisfactory. He realises that there is a fundamental difficulty that if the responsibilities of modern government are greater and more complex, the exercise of effective control is much harder. But he never really makes it clear whether he thinks that the role of government ought to be much less or whether he thinks that more effective control can be exercised even if the present range of functions is given. He gives the impression of always being too busy grinding his axe to ask himself what exactly he wants to cut down with it.

There are a number of other ways in which the book is open to criticism. The reasoning is far from tight, for example the assertion (p. 331) that without government retrenchment the country is doomed to inflation. One would have thought that reference to methods of control in other countries such as the United States would have been an essential feature of the argument; but there is no mention of them. So although *The Control of the Purse* is an interesting and lively book, it can hardly be said to have been written in a spirit of academic detachment or to face the basic issues utterly fairly and utterly squarely.

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An International Trade in Managerial Skills. By J. S. FFORDE. (Oxford: Blackwell, 1957. Pp. 153. 18s. 6d.)

THE subject matter of this book is of considerable contemporary interest. With the growth and spread of private international investment, on the one hand, and the interest shown by governments of advanced nations in the economic development of those less advanced on the other, the traffic in industrial and commercial knowledge between countries has risen steeply. Sometimes such knowledge has been accompanied by a migration of labour; sometimes by that of capital. The motives behind this flow have been manifold—political, strategic and humanitarian, as well as economic.

What are the main types of knowledge which are capable of being transmitted from one country to another? By what means are they made available? How is the appropriate route chosen? What are the chief social and political problems likely to be encountered in the assimilation of such knowledge into a foreign environment and how best may they be overcome?

These are the sort of questions which Mr. Fforde seeks to answer in his book within the context of the flow of managerial and technical skills from the United Kingdom to some of the underdeveloped countries. In so doing, he outlines four main channels by which such knowledge may be transmitted—the direct recruitment of British labour by the particular country in question; the joint venture between a British and a local company—which may or may not involve a financial commitment on the part of the United Kingdom, and which may be short or long term in character; the product-specialised manufacturing enterprise controlled from the United Kingdom and without the assistance of any local participation; and the trader-industrialist or agency house, a non-manufacturing enterprise whose activities are confined to the provision of services of one kind or another. The problems of initiating and operating such ventures, and their likely success, are analysed in the light of the five main variables determining the choice of route: the actual or desired degree of local control, the length of time of the proposed association, the nature of the products to be

manufactured, the complexity of the production process and the size of the local enterprise.

The finer points of the choice determinants and their implications for the United Kingdom are discussed at some length in the central chapters. Thus for example, we are told that the first route mentioned above is likely to be the most appropriate where foreign capital is unwelcome or where only a limited amount of specialised knowledge is required. For most purposes however, the medium of the joint venture is preferred, since it enables the local partner to benefit extensively from the technical, administrative and commercial services of the United Kingdom firm without surrendering financial control, whereas British dominated enterprises flourish where relationships with the importing country are particularly favourable or where the establishment of a joint partnership is an impracticable proposition. The author has based his findings partly on information obtained from interviews with business-men and answers to written questionnaires and partly on glimpses of practical experience which he was able to obtain and assemble. Mr. Ffordge states that his task has been not so much to give a factual description of his subject as to suggest a logical framework within which the problem of the transmission of managerial skills might be discussed. Only occasionally are suggestions made for the improvement of the route described—and these are very tentative.

The end product, though a scholarly piece of work, is handicapped by a number of deficiencies. Too often the essence of a particular argument is lost or rendered meaningless by flowery writing and cumbersome phraseology. The terminology is sometimes hard to understand—such contrived phrases as “purchase dogma,” “package deal,” “positive localization,” I found particularly difficult to appreciate. Moreover, as this is first and foremost a piece of empirical research, it is a little disappointing to find that many of the cases studies reported are hypothetical in character; as a whole, the book would have been more interesting had there been fewer broad generalisations and more illustrations of particular points. As it is, most of the book is very hard to read, save where the author allows himself the luxury of a piece of descriptive analysis, which he does very well.

J. H. DUNNING

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The Industrial Efficiency of Rural Labour. By C. D. HARBURY, assisted by A. D. SMITH. (Cardiff: University of Wales Press, 1958. Pp. ix + 228. 35s.)

THE aim of this study is to help to provide an answer to the question of whether work-people in rural areas are as efficient in factory trades as work-people in urban areas. The method used was to carry out an inquiry covering 423 workers engaged upon similar processes in 19 firms that operated 25 factories in urban and rural areas and a Development Area.

The first part of the book discusses conceptual and practical problems, and also difficulties encountered in finding industries and firms which satisfied the stringent tests of suitability imposed by the author. The second part reports, in eleven case studies, the results of direct tests of the efficiency of the work-people selected. The third part assesses the indirect effects upon efficiency of labour turnover and absence. The fourth part assembles the conclusions reached.

The task of making strict comparisons between the industrial efficiency of factory workers in urban and rural areas is a difficult one. The measure adopted was the study of records of input and output. Although there are various drawbacks to this—especially that identical conditions of production do not exist in separate factories—it was the best of the methods available. Clearly, it is superior to the rival methods of comparing earnings or direct observation of work-people who, knowing they were being observed, could not be expected to behave normally. The author is acutely aware of the drawbacks of relying upon past records of input and output, discusses them comprehensively and supplies detailed reasons for the methods he used to overcome the drawbacks. Moreover, he does not rely entirely upon this evidence: he takes account also of various other influences which affect labour productivity—notably labour turnover, absence and variations in managerial efficiency.

The findings of the inquiry are first, that as judged by direct comparisons of input and output there are no substantial differences in the industrial efficiency of those who work in the countryside and those who work in towns. Second, when differences were observed, they did not appear to be due to any one outstanding cause.

Because the study was restricted to a small number of work-people; limited to 25 factories and 27 processes—and to processes few of which called for a reasonable degree of skill; and, moreover, concerned predominantly Welsh rural workers and English industrial workers living in three only of the eleven administrative regions of Great Britain; the results cannot support a general conclusion. This verdict accords with that of the author, expressed in earlier chapters, and re-stated in the last chapter. Nevertheless, the inquiry has been worth while, if only because the rigorous and detailed examination made of the capacities of the rural workers surveyed challenges the oft-made assumption that their industrial efficiency does not match that of industrial workers.

Mr. Harbury has produced a very competent study of his subject which should be read by everyone who is interested in, or concerned with, the effective utilisation of the reserves of labour to be found in the British countryside.

JOSEPH SYKES

University of Exeter.

Nationalisation in Britain: The End of a Dogma. By R. KELF-COHEN. (London: Macmillan, 1958. Pp. x + 310. 25s.)

THE main purpose of this book is to explain the reasons which have led Mr. Kelf-Cohen to abandon his former belief in nationalisation and to advocate private ownership of industry. It is primarily an essay in persuasion but since the author's views have changed chiefly as the result of practical experience of nationalisation since the war, the greater part of the book is devoted to a factual survey of recent events and problems.

This survey comprises two series of chapters, one on each of the main industries nationalised since the war (excluding air transport), and one on each of a number of aspects of nationalisation, such as the parts played by Parliament and the government, problems of finance, staff and the protection of consumers. Whatever one may feel about the political arguments these chapters are well written and informative, and complete without being unduly detailed. The book is not particularly concerned with the economic of public enterprise, and where this aspect is considered there are occasional remarks which most theorists are likely to find questionable.

On the political side, a really persuasive argument for the superiority of capitalist organisation in the industries under discussion would have required a thorough investigation of the principles which should govern their economic policies, a task which is beyond the scope of this book. Mr. Kelf-Cohen does, however, establish that many of the claims which have been made for nationalisation were extravagant, and that numerous problems remain, some of them specifically due to public ownership. Unfortunately, he rather spoils his argument by giving the impression at times that he is biased against the policies of nationalised industries, whatever they happen to be. This criticism is difficult to document briefly, but here is an example taken from the discussion of coal: on p. 33 we hear that "each year a wage increase is negotiated, which enables the miners to retain their position as the most highly-paid workers in industry. As coal is seriously short, increases are accepted by consumers with muttering resignation; it has been a perfect example of a seller's market." On p. 182 we are told that coal was sold too cheaply. There is no explicit contradiction, but neither is there an atmosphere of impartial judgment. Again, a more careful distinction should have been drawn between difficulties which are due to the new institutions and those which are independent of them (and therefore irrelevant to the main argument). Such problems as miners' absenteeism, concession coal, decreasing returns in mines and the proportion of small coal are not, of course, laid at the door of nationalisation but they are enumerated during the discussion of it in a way which contributes to the general feeling of gloom and makes the reader feel that nationalisation must be a bad thing. Mr. Kelf-Cohen is also rather hard on the Socialist side of that extraordinary debate on nationalisation which took

place between the wars, for there were striking myths and dogmas on both sides—for example, the belief of some opponents that nationalisation was quite incompatible with economic progress, scientific discovery and personal freedom.

It is, at least potentially, a great merit of the approach adopted by Mr. Kelf-Cohen that his arguments are based on a detailed consideration of particular industries and problems. Much of the debate on this subject has been conducted in ideological terms which are too wide for the purpose and tend to exaggerate differences of opinion. In practice, the area of disagreement can often be greatly reduced by concentrating on the detailed needs of particular industries or on the needs of the economy at a particular time. Thus some industries were nationalised by Conservative governments, while in others the choice (in practical politics) is between public ownership and detailed control, and depends largely on special considerations of administrative efficiency. Again, the form of ownership may be quite subsidiary to substantive issues of policy, and depend largely on the decisions taken on these issues. For example, in the case of the railways the question whether an investment programme which is unlikely to pay its way, and a public subsidy, are justified is more important than the question of ownership. If it is decided to subsidise an industry, the case for public ownership may be strengthened. Of course, the form of organisation does influence policy, and the ideological considerations have some relevance. Nevertheless, it seems to the reviewer that problems concerning particular industries are often easier to settle than general ideological issues, and that the importance of the question of ownership has been over-rated on both sides. Mr. Kelf-Cohen, dealing with one industry and one problem at a time, had the opportunity to distinguish clearly the general from the special questions, the vital from the unimportant, the ideological from the technical and administrative, and thus to narrow down the controversy and reformulate problems in a way that might lead to a greater measure of agreement. Although he has some useful discussions of particular questions, and has produced a book which students of the subject should certainly read, I feel that he has missed the wider opportunity because of his anxiety to convey his political message.

LUCIEN FOLDES

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The Fertilizer Industry. By J. W. MARKHAM. (Nashville, Tennessee: Vanderbilt University Press, 1958. Pp. 238. \$6.00.)

THIS industry study is mainly concerned with the examination of the social costs of market imperfections, due first to restraints on competition and second to imperfect knowledge on the part of the consumer. The several sections of the industry are described, and both the ways in which the Government has attempted to deal with the imperfections and future policy are discussed.

The industry is very suitable for detailed case study, because it has a number of well-marked characteristics which can be measured. Professor Markham's emphasis on the joint importance of both anti-trust policies and policies to reduce imperfect knowledge is new and stimulating. Unfortunately the book does not give a clear impression of the main forces at work at any particular time. Part II deals with the organisation and structure of the integrated fertiliser industries and Part IV deals with primary production and distribution practices in these industries. As each section covers more than thirty years the division causes complications.

In the preface Professor Markham says that the preparation of a detailed industry study is a tedious, painful and often dull process. He gives a great deal of information, but much of the book is difficult to read. The difficulties lie partly in the fact that Professor Markham's methods are such that the reader is neither in a position to judge for himself nor given the confidence to accept without question the conclusions reached. Confidence is important in this type of work because so often detailed facts and figures illustrate or support particular conclusions, but do not prove the importance of general points.

For example

"The weighted average rate [of return] is nearly three times the five to six percent usually considered to be the 'normal' or competitive rate of return, and about four times the average long term interest rate for the same period. Accordingly, for the period 1938-46, it can be reasonably concluded that monopoly profits amounted to from two thirds to three fourths of the total profits earned by producers of fertilizer materials, or to about \$12,000,000 per year."

When Professor Markham turns to the social costs of imperfect knowledge he calculates on the basis of 1949-50 figures that, had farmers used concentrated high analysis fertilisers rather than a large proportion of low analysis fertiliser, they could have reduced the fertiliser bill by 10.5%. Having discussed the Tennessee Valley Authority's experience, he concludes that "manufacturers clearly had little incentive to produce more [concentrated superphosphate] than they did, though farmers had a strong incentive to buy it in much larger quantities." This conclusion supports the view that the imperfect knowledge was the most important market imperfection. Imperfect knowledge is certainly a very strong barrier to effective competition, but Professor Markham overplays his hand. The production of concentrated superphosphate doubled between 1946 and 1950 and doubled again by 1953; in 1954, with the output of concentrated still rising, the output of ordinary superphosphate fell substantially. Further, a mild agricultural revolution was taking place, and the consumption of fertilisers, after remaining almost static in the inter-war period, doubled between 1941 and 1949, and had increased by about a further fifth by 1953. By drawing

apparently static conclusions in an intensely dynamic situation, Professor Markham exaggerates the seriousness of the situation.

Nevertheless, this book provides much information about an interesting industry, and presents a vigorous attack on important problems.

P. LESLEY COOK

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Cambridge.*

Shipbuilding in Britain. By L. JONES. (Cardiff: University of Wales Press, 1957. Pp. 244. 30s.)

This volume had its origin in a thesis submitted for the master's degree, but was subsequently revised and re-written into its present form. It covers an historical account of the industry in the nineteenth century and thereafter concentrates on the period between the two wars, with separate chapters on the factors which affected the demand for new ships, the importance of foreign competition, new ship construction and the efforts at concentration and rationalisation of shipbuilding capacity. Subsequent chapters deal with problems of state aid, labour relations, wage-rates and earnings, and a final chapter endeavours to assess the future prospects of the industry.

Mr. Jones has devoted much industry to the collection of his material, and much of what he has written is useful. But the result is disappointing in two main respects. The planning of the book is unlikely to give the reader a satisfactory grasp of the problems which are discussed, and there is some unnecessary and irksome overlapping of treatment. Thus the reader who hopes to learn the facts about new tonnage will not find them in the chapter on production as he might expect but in the chapter on foreign competition, to which they are incidental. Secondly, it is difficult to understand why the author, who appears to have completed his manuscript in 1955 or 1956, should have limited himself so much to the inter-war period. The industry's problems acquired a new importance at the end of the Second World War and the inter-war period was becoming increasingly irrelevant, except as a matter of history. If considerations of space prevented Mr. Jones from attempting an adequate treatment of these later problems he might easily have sacrificed his opening chapter on the nineteenth century. This opening chapter indeed does not add much to our existing knowledge, and neither limits itself to the nineteenth century nor sets the scene for the discussion of the inter-war problems.

British tonnage is now about the same as in 1914, though world tonnage has more than doubled. New output from British yards has not increased beyond the pre-1914 output despite the great increase in the volume of sea-borne trade. This is one outstanding feature of the contemporary picture

of the British industry. Much of the new tonnage being produced in other countries is intended to sail under the flags of these countries, but there is also the tonnage produced for other flags and the extent to which British yards have maintained their position in these two markets. This is the setting for any study of competitive efficiency, free or otherwise, but it can hardly be said that Mr. Jones faces up to the questions which confront the industry to-day. It is not quite clear whether it was the author's intention to write a work of history or to make a serious contribution to an examination of the industry's problems, and this uncertainty runs through the whole volume. It is perhaps the main source of the disappointment which the reader is likely to experience.

D. T. JACK

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Banks and Politics in America from the Revolution to the Civil War. By BRAY HAMMOND. (Princeton, N.J.: Princeton University Press (London: Oxford University Press), 1957. Pp. xi + 771. 100s.)

It is not too difficult to look leniently upon Nicholas Biddle. Nicholas Biddle was intelligent. As in the case of Alexander Hamilton, one is inclined to slur indulgently over his paternalistic attitude towards the infant American economy. But in spite of prejudice in his favour, a prejudice of which I am as guilty as Mr. Hammond, one is continuously being brought up short by the fact that, unlike Hamilton, Biddle was so blatantly a fool. Perhaps if he had, like Hamilton, had his own way to make so that he had come to the presidency of the Second United States Bank with more experience, things might have been different.

But there is an even more immediate reason for Mr. Hammond's admiration for Nicholas Biddle, an admiration which is grudging and tempered by impatience but nevertheless real enough to make him slide over some of the more dubious episodes in Biddle's career. Mr. Hammond is a central banker himself, and he sees in Nicholas Biddle an early central banker. Thus, Mr. Hammond says of the Bank of the United States:

"The central banking function was conducted by the Bank of the United States in two ways, of which one was self-acting and one was discretionary. Controls were self-acting when the Bank, as it received the notes of state banks in the deposits of government collectors and otherwise, required payment of them by the state banks. Save when the state banks would not or could not meet their obligations, this regulatory function proceeded in routine fashion; and its restraint upon the lending power of the state banks was comprehensive and effectual. It could be readily modified by the Bank's abstaining from the demand for payment and allowing the state banks to run into debt

to it. This was discretionary and qualified the automaticity of the function" (p. 301).

Mr. Hammond goes on to point out that this discretionary power could be used to deal with those general circumstances over which individual banks had no control, "to counter-balance or mitigate the drift of money to and from the economy, from region to region within it, and from bank to bank" (p. 301). He then quotes from Professor Jacob Viner on the ineptitude of the management of the Bank of England from 1800 to 1860 and concludes:

"Be that as it may, the central banking function was apparently as clearly recognized and as successfully performed in the United States by the year 1825 as anywhere in the world—and more clearly and more successfully, I should say, than it was performed there a century later" (p. 324).

Mr. Hammond's predilection for seeing central banking where it is at least questionable whether central banking existed also leads him to write of the Suffolk Bank of New England:

"The Suffolk was in effect the central bank of New England. . . . It was regulating the extension of bank credit, supporting the country banks, on occasion tightening the curb on them, and responsibly advising them what they should do and what not" (p. 554).

The Suffolk Bank had indeed evolved a method for keeping the note issue of the New England country banks in check. But it is doubtful whether the Suffolk's president's warning to a Vermont correspondent that it had lent too much on accommodation paper was different in principle from the action which a contemporary merchant banker would have taken with respect of one of its correspondents.

The most exciting part of Mr. Hammond's work seems to me to be his analysis of the forces behind the destruction of the Second Bank of the United States. He shows that the effective enmity was not that of the old agrarian interest which President Jackson represented and which hated all banks, but of the state banks and a rising money power which resented control over the expansion of bank credit.

Of the remainder of this book—discussion of the Second Bank of the United States occupies less than three hundred of its more than seven hundred pages—Chapter 18, "Free Banking in New York and Michigan, 1835–1865," and Chapter 19, "The West: Monopoly, Prohibition, *Laissez Faire*, and Regulation, 1830–1865" are particularly to be recommended.

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British Investments in Latin America, 1822-1949. By J. F. RIPPY. (Minneapolis, Minnesota: University of Minnesota Press (London: Oxford University Press), 1959. Pp. xii + 249. 40s.)

PROFESSOR RIPPY has attempted to construct a coherent narrative out of seeming chaos by handling his material in three consecutive frames. The first section deals with the subject chronologically and, except for a lively sub-section on Chilean nitrates, is largely a recapitulation of the information set forth in the tables. The second section is a country-by-country survey of the amount and profitability of different categories of investment—investment in government securities, in railroad securities—for various dates; a number of individual companies are also discussed briefly.

The third section is ambitiously entitled "The Crux of the Matter in Global Setting." In Chapter XV the author compares the rates of return of twenty-three very profitable British enterprises operating in Latin America with the rates of return of selected British companies in the Orient and Africa. In Chapter XVI Professor Rippy uses rates of return calculated from material in the Bank of England's *United Kingdom Overseas Investments, 1938 to 1948* to compare the profitability of British investment in Latin America in the two years 1939 and 1948 with that of British investment in various Commonwealth, Empire and foreign countries in the same years, without realising the difficulties involved. Chapter XVII deals briefly with the attitude of various Englishmen to foreign investment, while the final chapter purports to discuss the attitude of Latin Americans to investment by foreigners.

In this last chapter Professor Rippy points out that Latin Americans have, in general, preferred "portfolio to direct investments and, in recent years, loans and credits from foreign governments rather than capital supplied by alien private investors" (p. 214); draws attention to the "persistent trend toward state socialism . . . evident in many Latin-American countries" (p. 215); and concludes that the "prospects for the rapid development of Latin America by a flood of foreign private capital were not bright at the middle of the twentieth century" (p. 216). Nor is the author optimistic about operations under Point Four:

"the 'bold new program,' otherwise known as Point Four, or described as an economic development plan, seemed likely to turn out to be a project to stimulate economic progress in the retarded countries at the expense of the taxpayers of the United States and some other highly developed nations, and as much for the economic benefit of exporters, importers, shippers, and bureaucratic technicians as for the welfare of the recipients abroad" (p. 217).

Anyone who undertakes so wide a subject must necessarily impose strict limitations upon himself, for he cannot hope to cover the field exhaustively. Nevertheless, the title and, more especially, the sub-title of this

book, *A Case Study in the Operations of Private Enterprise in Retarded Regions*, are misleading. Professor Rippy is concerned virtually entirely with the profitability of British investment in Latin America. Profitability is undoubtedly one of the most fascinating aspects of overseas investment. It is therefore unfortunate that Professor Rippy has been content to present only figures for nominal capital and for the return on nominal capital. In working in this field one wants not only figures for nominal capital but also figures for the issue prices of securities and for the prices of securities net of the commissions and/or profits of the issuing agencies. Information on the commissions and profits of issuing agencies is indeed sparse, but in many cases there is no great difficulty in searching out the prices at which securities were issued to the public. In a table giving country-by-country totals the use of nominal capital is probably defensible, *faute de mieux*, but this is surely not the case in tables dealing with individual companies. However, Professor Rippy does, in many cases, draw attention in the text to stock dividends. Professor Rippy also limits his study to the issues of incorporated companies, mainly those listed in the *Stock Exchange Year-Book*. These limitations materially affect the value of this pioneering study.

DOROTHY R. ADLER

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The Commonwealth Economy in Southeast Asia. By T. H. SILCOCK. (Durham, North Carolina: Duke University Press for the Duke University Commonwealth Studies Center (London: Cambridge University Press), 1959. Pp. xviii + 259. 30s.)

THERE are two ways of tackling that much written-up subject, the development of the underdeveloped. The one is the approach from theory, from the consideration of what could or should happen within the confines of a particular model; the other starts from an examination of a particular problem or a particular region and goes on to speculate how far conclusions suggested by that examination can be generalised. Professor Silcock's new volume, based on lectures given at the Duke University Commonwealth Studies Center, is an admirable example of the second approach.

He shows little sympathy with the developmental model-makers or with mechanistic capital-output ratios. His suggested conclusions are based on an open-minded attitude to the problems of adaptation of economic institutions to local political and sociological circumstances, and a willingness to recognise the parts to be played both by private enterprise and by control, stimulus and direct action on the part of governments. He keeps firmly to the essential problem of all sound economics—the most effective use of all available resources; he recognises that enterprise and organising capacity are themselves resources which are sometimes particularly strictly limited;

and he faces frankly the moral problem of an advising economist who finds that the best way of harnessing enterprise itself as well as other resources in a particular social background may be distasteful or repugnant to his political or social convictions. (This can happen either to the *laissez-faire* economist compelled to recognise a need for state action or to the socialist economist compelled to recognise a need for private initiative.)

The first chapter of factual description, qualitative rather than quantitative, is best in the sections dealing with the areas covered by Professor Silcock's personal experience, particularly Malaya, Singapore and Sarawak. The section on Hong Kong is brief and confessedly no more than a sketch. There follows a chapter on relations with the Commonwealth, concerned with broad effects rather than details, and recognising how valuable the Commonwealth connection has been in the past without ignoring the need for wide adjustments in the future as political independence grows. If (with his original American audience in mind) he exposes some common fallacies about imperialism he does it gently and without losing his obvious sympathy with the indigenous peoples.

Professor Silcock goes on to "Assessments and Suggestions" and a final chapter on "The Determinants of Economic Development," each of which contains many sober and penetrating observations and stimulating suggestions. In his comments on the potential local money market in Malaya and Singapore and the existing monetary structure, I think he underestimates the difficulties of building up by any conscious action a short-term market, while he overestimates the benefit Malaya might get from creating a money and capital market of its own if that meant interfering with the area's present easy access to the London market. Disregard of the intimacy of the credit and banking connection with London leads also to an undervaluation of the built-in stabilising influence which the existing currency mechanism provides; Professor Silcock rather assumes here that any good results which are not the effect of conscious decisions are "accidental" rather than being predictable results of the system.

That is, however, one of few points of criticism. Much more interesting are Professor Silcock's reflections on such deeper problems as those of attitudes to economic development, connected with the differing social values of different communities; of the sociology of colonialism; and of the differences in the forms of business organisation appropriate or congenial to different peoples. On attitudes and social values, Professor Silcock takes no simple-minded line; if he concedes that such peoples as the Malays need to show more private initiative he suggests also that the Chinese, who cannot be accused of lacking in enterprise, need to show more public conscience. He particularly remarks, too, that the driving force which started other countries—Britain, Japan, the U.S.S.R. or any other—on the path of economic growth, seems never to have been an undiluted search for personal material benefit.

In the phrase "sociology of colonialism" I include Professor Silcock's very interesting discussion of the economic organisation of the type of territory, such as Malaya, "where a transient group of Europeans build up a culture for themselves which the local population at first wishes to imitate but which is not appropriate to the local setting once the Europeans leave." It is frequently argued that Colonial territories cannot be expected to take over Western political institutions without modification. Professor Silcock shows how this same problem arises with economic institutions, not merely in relation to the introduction of specific western institutions (such as Central Banks, where he seems in danger of falling into the type of trap he warns others against) but also, at a much lower and more detailed level, in the reorganisation of personnel in existing organisations. He points out that the replacement of Europeans by local inhabitants in a business enterprise can rarely be done just by appointing a local man to fill every post previously filled by a European. These posts were designed, and the whole organisation of which they are a part was designed, to be filled by people with the qualities, good and bad, of expatriate Europeans. The organisation will therefore need subtle but extensive reorganisation if it is to be reconstituted of posts designed to be filled by locally domiciled people with different qualities. Professor Silcock suggests specifically that the Chinese in Malaya suffer from so much private initiative that it is impossible for them to take over unchanged the kind of large-scale Western business structure which requires a "professional" attitude of mind in its managerial staff.

This leads on to emphasis on the need to study far more closely than has ever been attempted hitherto the specific forms of business and credit organisation which come naturally to the local—and especially the Chinese—populations of South-East Asia. Professor Silcock does little more here than put up some sign-posts for inquiry, but he looks far enough down the roads they point along to make one hope that he or someone else will follow them much farther. Perhaps one day this fruitful task will be undertaken by a school of Business Administration in the University of Malaya or the University of Hong Kong.

There are many other topics on which it is clear that, given more space, Professor Silcock would have had much more of interest to say; the problems of rapid population growth and the repercussions on capital creation of such growth; the role of education in economic development; the part which might be played by external aid. In the very full reading list of books and articles bearing on the economy of Malaya and Singapore, which occupies the last thirty-three pages of the book, one is conscious of one vital omission—the complete description and analysis of the Malayan economy which Professor Silcock must surely one day give us.

SYDNEY CAINE

London School of Economics.

The Fabric of Society. An introduction to the social sciences. By R. Ross and E. VAN DEN HAAG. (New York: Harcourt, Brace, 1958. Pp. xv + 777. \$10.00.)

FACED with 750 pages in double columns, the reviewer is tempted to categorise this book as yet another compendium on general sociology. But it is something different. Instead of spending space discussing the *subject*—its methods, its scope and its literature—the authors dive into the deep end of the pool at once.

They first take man the social animal. They start with him as an infant, and that leads naturally to psycho-analysis. When the individual psyche has been examined they pass to the institutions, which also mould the psyche, and thus to the groups which have, as it were, lives of their own. Role, status, class, leadership are all discussed, and the authors then examine what is meant by culture, which they divide into two kinds—the official culture of a society, its ideals and its aspirations, and the mass culture formed by multitudinous forces.

Then the authors turn to the way we intellectualise about experience. They analyse science and social science; they explore language, religion and art. From this they turn to a more de-personalised branch of social study, economics, and examine its concepts, such as prices, growth, labour, wages, monopoly and competition, and relate these to the structure of society; and they summarise the alternative system to capitalism which obtains in the U.S.S.R. Finally, they consider politics, which they rightly examine in terms of power. International relations, parties, the contradictory ideals in democratic government and the nature of bureaucracy are all discussed to show how man, the political animal, organises his life.

We call such a work a text-book because it is not tackling any specific problem or making a series of new hypotheses or re-assessing work done by others. But it is a new kind of text-book. It is chatty, discursive and amazingly free from jargon. It provides an introduction to almost everything—an introduction based on the more important books written on the subject in the past thirty years. It is particularly good in frequently illuminating a point by quoting a poem or a character in a novel, or a passage from John Dewey or Schumpeter or Mgr. Knox, so that an arts student feels that social analysis is related to the kind of literature to which he is accustomed. Inevitably a good many paragraphs state the obvious. The work proceeds by the authors' posing questions and answering them: "Is the artist's perspective, his meaning system to be judged by the truth of what it conveys?" "Why is Brooklyn so much richer and bigger . . . and less productive culturally than was Florence?" At other times they use lucid and able surveys of a topic such as international law or scientific observation, occasionally calling in an expert such as Planck or Robert Merton to clinch the argument.

The book's sub-title is misleading. It is called "an introduction to the social sciences," and mercifully it is not that: mercifully, because such a

claim suggests that it contains separate accounts of how social scientists in different fields operate and what claims they make for their subject. Nor does it give an account of what the different social sciences are, or indicate what lines of inquiry are now popular and why. It is really a personal account of what is generally accepted about a mass of topics—the general way in which social scientists look at things—when they analyse society.

Here it is, then, on a plate. Will the hungry sheep look down and feed? Well, possibly. Well-known works of popularisation such as the Wells-Huxley-Wells *The Science of Life* of a generation ago had greater unity and power of narrative; and the very bulk of books such as that and this lead purchasers to lay them on a table and then on a shelf rather than read them. *The Fabric of Society* is emphatically not a cram-book, and it contains a vast amount of information based on compendious reading and up-to-date articles which would genuinely enlighten any student who is beginning to study the social sciences. Paradoxically it may fail in its object precisely because it is so complete and always exhibits the finished product of learning and research. Pupils need an outline of their subject—short, readable, even perhaps contentious. Thereafter they need to read works which are arguing and which involve them in the arguments, or which review some one aspect of a particular field. The danger with this book is that it scarcely implies that there are differences of opinion between scholars about dozens of the concepts and topics which are set out so clearly. At the university good students ought to learn from the great works of original scholarship; the bad ones unfortunately content themselves with reading something infinitely less substantial, stimulating and complete than *The Fabric of Society*.

Against this must be set many merits. This book is written in clear, readable English by men who treat the subject imaginatively and are cultivated. They are cultivated not in a whimsical and affected manner but because they can turn from articles on population statistics to Bodin on the rights of states; they discuss the function of funeral rites by referring to the deaths of Hector and Hamlet. They illustrate with *New Yorker* cartoons role change and relative deprivation and throw in a mention of William James for good measure (the jokes, alas, are laboriously explained in a way that must cause Ross's ghost to walk). Everywhere this study reaches out into other subjects, philosophy, mathematics, literature and history; and if the conclusions which are put forward in each section are simple and the slopes climbed are gentle, the reader covers an immense amount of ground. The society which the authors present is, of course, the United States but they are prodigal in their references to this and other countries. It is neither parochial nor technical, and it is far better than dozens of other duller works which claim to survey the same area.

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NOTES AND MEMORANDA

THE RATE OF INTEREST, MARGINAL EFFICIENCY
OF CAPITAL AND INVESTMENT PROGRAMMING
—REPLY

PROFESSORS Grey and Brockie have provided a great deal of material in rebuttal¹ of the writer's reinterpretation² of their own earlier evidence³ as consistent with usefully high interest elasticity of investment demand. Space does not permit reply on the authors' various citations of authorities, on their introduction of new considerations, many of which are ultimately shown (and a few more of which can be shown) to be irrelevant, and on their misinterpretations of the writer's own position. These are all side issues, however. What is important, although given very little attention in the authors' "rejoinder," is that the rejoinder seems to leave the writer's earlier conclusions unshaken: The authors' original survey of fifty-seven New York Stock Exchange quoted manufacturers is consistent with, and even suggestive of, usefully high interest elasticity of manufacturing investment demand.

The authors now concede the rapid advances in business planning techniques and lengthening of economic horizons that were inferred from their original report, stating that the average maximum acceptable pay-out period for large firms is 7.3 years (median, 6 years). This means that on the average over the first 7 or so years of its use, equipment must earn 13.7% of its original costs *gross* of depreciation charges. (For plants and buildings the figure presumably is lower.) Even assuming so low an annual average depreciation (plus economic obsolescence) allowance as 7%, the average net rate of return implied is only 6.7% of original cost or—if that is not considered the relevant base⁴—say, 9% of original cost less average accrued depreciation. Unfortunately the authors did not indicate whether their survey requested answers in terms of pay-out periods gross of both interest and income taxes (in addition to being gross of depreciation); even assuming the 9% rate to be completely net (and that it rather than the 6.7% rate is

relevant), this would still be a low enough figure to make plausible changes in the cost of (long-term) debt and, especially, equity capital capable of influencing manufacturing investment.

The authors tacitly accept the writer's inference that the survey contained the important finding that 41% of the respondents took the market rate of interest into account in computing the profitability of investment projects financed with *internal* (as distinguished from capital market) funds. The sole reference to this matter ("Our survey disclosed that, on balance, the small firm shows more concern with the interest rate than the large.")¹ may indicate a limited significance for anti-inflationary interest-rate policy effects, for it is the sample's *large* firms (those with 7,500 or more employees) that presumably represent the larger part of manufacturers' capital spending. The authors' uncommunicativeness once more forces us to educated guessing: assuming that the interest-rate question was answered by small and large firms in proportion with their representations in the entire sample, then if no more than one-half (two-thirds) of the "small" firms could plausibly have used the market interest rate in connection with internally financed investment projects, it follows that 34% (21%) of the large firms must have done so. These figures are still entirely consistent with strong investment-restricting effects, for the large (as well as for the "small") manufacturers. As the writer's article described, the form of the question—covering only internally financed expenditures and excluding the cost of *equity* capital—biased the results against the role of the cost of capital (and, therefore, interest-rate policy) in investment decisions.² The authors' new report that the ratio of debt to equity external financing is higher for the "small" firms³ means that the role of capital costs was especially understated in the case of large firms.

The fact that "cheap" money had existed from early in the 1930s until *after* the survey was made leads to a further (unforeseeable) bias: many more firms would presumably pay attention to interest rates today, with rates moving both more volatily and on a higher average level.

Finally, the authors reassert that their survey demonstrates "noteworthy independence of large [manufacturing] enterprises from the capital market" and hence the "evident unimportance of the market rate of interest."⁴ The writer had argued that over one-fifth of manufacturing corporations' long-term financial resources (including depreciation accruals) were obtained externally in all post-war prosperity years. This rate of external financing constituted proof that firms doing the greater part of investment were using at least the 20% of external resources considered to provide adequate contact with the capital market—*unless* it could be shown

¹ A. L. Grey and M. D. Brockie, "The Rate of Interest, Marginal Efficiency of Capital and Investment Programming—Rejoinder," *ECONOMIC JOURNAL*, Vol. LXIX, June 1959, pp. 333-43.

² W. H. White, "The Rate of Interest, the Marginal Efficiency of Capital and Investment Programming," *ECONOMIC JOURNAL*, Vol. LXVIII, March 1958, pp. 51-8. Nothing said in this article was intended to reflect on Brockie and Grey's interesting discussion of the marginal efficiency of capital concept.

³ M. D. Brockie and A. L. Grey, "The Marginal Efficiency of Capital and Investment Programming," *ECONOMIC JOURNAL*, Vol. LXVI, December 1956, pp. 662-75.

⁴ See White, pp. 57-8. The authors' silence on the subject suggests that they would accept the reasons presented for computing average rates of return on an original cost base.

¹ Grey and Brockie, p. 340.

² White, p. 54.

³ Grey and Brockie, p. 340.

⁴ Brockie and Grey, *op. cit.*, p. 666.

than an important number of (large) firms had "used up" the 20% plus aggregate by obtaining over half of their long-term fund externally. The authors' survey, showing that only 7½% of the surveyed firms were so doing and that all of these were "small" firms, was used (the frame of reference being the implications of the survey) to eliminate that possibility, and the proportion of investment adequately exposed to the capital market thereby established.¹

The outlines of this argument have been presented because the authors announced its invalidity without saying either what it is or what is wrong with it: "... by means of an ingenious but we think gratuitous deduction concerning the [large?] minority of firms who resort (frequently or only occasionally) to the capital markets for part of their investment funds, he interprets..."² The paragraph containing this quotation continues by offering, as evidence justifying the authors' disbelief in usefully high interest elasticity of investment demand, the failure of the moderate interest-rate reductions to prevent the 1957-58 recession-phase decline in bank lending to business.³ "Finally, the additional fact remains that among the firms we investigated by far the largest part of investment funds were not obtained from the capital market during the years immediately preceding our study (prior to 1955)," although more was obtained externally in the prosperous years 1956 and 1957.⁴

This sequence of arguments is confusing. If the authors' survey showed that only a small minority, or even a small minority of the large firms in the sample, was using the capital markets, the writer's position would have been shaken. But to attack that position by pointing out: (a) moderate interest rate reductions failed to prevent a recession-phase reduction in bank credit, and (b) that "by far the largest part" of the surveyed firms' investment funds were not obtained from the capital market—which is exactly the writer's postulate: 80% internal, only 20% external—is to lose the contest.

The Brockie-Grey 1955 survey demonstrates conditions much more favorable to interest rates influencing manufacturers' investment than seemed possible from the earlier evidence available.⁵ Further rapid advances in

¹ White, pp. 52-3.

² Grey and Brockie, pp. 333-4.

³ Grey and Brockie, p. 334. Their ascription to the writer of belief that monetary policy is adequate by itself for smoothing the business cycle and is equally effective in recession as in prosperity (pp. 334-5) may be compared with "usefully high interest elasticity of investment demand" and "reopening the case for interest rate policy" (White, p. 52), and with p. 579 of the writer's earlier article cited in the authors' note 3, p. 333.

⁴ Grey and Brockie, p. 335.

⁵ The authors' rejoinder did reveal that the apparent defect which prevented them from publishing the results of their public-utilities survey (other than a footnote statement that public utilities had better investment-selection techniques, longer expected lives for investments and greater reliance on the capital markets than was true for manufacturers—Brockie and Grey, p. 662, note 1) was simply that the utilities said they give no attention to the market rate of interest (Grey and Brockie, pp. 338-9)—not an inconsistent result for a regulated industry that can pass on cost increases but must surrender the benefits of cost reductions.

business investment decision-making procedures and the disappearance of cheap money during the succeeding four years make the possibility of usefully high interest elasticity in the United States still greater.

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A THEORETICAL BASIS FOR SOCIAL ACCOUNTING

No theory of social accounting has been worked out, so far as I know. Aggregation of the figures of a group of companies seemed a procedure which could be extended to the whole economy. The results have not been so meaningful or enlightening as they might have been had a precise logical system been worked out from first principles.¹ The purpose of double-entry accounting is to provide a technique of precise definition and classification of single items which will produce significant aggregates at required intervals. It is based on the device of separating the logically complex notion of property owned or claimed into the two elements of property and ownership and recording the value twice, the value as property in real accounts and the value as ownership or claim in personal accounts—on the opposite side, so that exchange of property, changes in ownership and changes in value are all recorded by means of the same double entry routine, ending in a coherent and intelligible whole; like knitting. When we say that assets equal liabilities or product equals income this suggests, misleadingly, the equality of different things. We really refer to the identity of value in two functions of the same thing, the function of existing and that of belonging to, or being claimable by, some person. Without the initial definition of and distinction between real and personal accounts, social accounts remain vague in meaning and difficult of comprehension.² The obscurity is deepened by "capital reconciliations," which cancel all differences, that is the balances which are the significant outcome of the transactions. No business accountant would confuse his records in this way. The fact that no continuity from year to year by way of balance sheet is attempted is no valid reason for this. Aggregation of company accounts and balance sheets into group statements contains only part of the complete system. Social accounts conceived in this way present in effect a system of incomplete records. What will be attempted here is a re-interpretation of a system (that set out in pamphlet No. 2, entitled "A System of National Accounts and Supporting Tables," of the U.N. Studies and Methods series) as a complete double-entry record of national product and income, and to show, in default

¹ "This practice—(reversing the sides of the income account)—arises purely out of the traditional arithmetic of double entry and has no other significance" (Edey and Peacock, *National Income and Social Accounting*, p. 165 (my italics)).

² "The accounts . . . represent a fairly high degree of abstraction" (*ibid.*, p. 17).

of a full statement of affairs (balance sheet), a statement of changes in national wealth and investment (in accounting terms a statement of balance-sheet changes). As far as possible the content of the individual entries will be taken for granted, although some of these might be examined with a view to improvement.

The accounts should be defined as follows:

Domestic Product Account	} Real Accounts
Capital Formation Account	
National Income Account	} Personal Accounts
Households Account	
Government Account	
Rest of the World Account	

The opening double entry is a debit on Domestic Product account of the value of the domestic achievement, with a credit on National Income Account for the personal title to this value in wages, salaries, fees, profits, rents and interest paid or payable to individuals. The value of the domestic product may be found by the following process:

Analysis of the revenue account of an individual firm—

	Producer goods and houses.	Consumer goods and maintenance of capital equipment.
(a) Charged for individual earnings (wages, salaries, fees, commissions)	X	X
(b) Provisions for replacement of fixed assets	X	X
(c) Distributed profits	X	X
(d) Undistributed profits, including increases in provisions other than b		
= Product value for aggregation	<u>X</u>	<u>X</u>

By excluding all payments to other firms, the aggregates will equal net sales of producer and consumer goods to ultimate users, plus increase in stocks, of home-produced goods; imports are brought in later. Most firms will not have to make any apportionment between producer and consumer goods, but separate totals are required, as will appear.

The product values for firms, aggregated, provide the initiating entry in the social accounts. The debit side of the Domestic Product account may now be illustrated:

Aggregate value of product (credit National Income account)	X
Add Imports (credit Rest of the World account)	X
= Product available to the community	X
Deduct Exports (debit Rest of the World account)	X
= Product retained in the community	X
Add indirect taxation (credit Government account) local rates (credit Government account)	X
= Value of product at selling prices plus increase in stocks at cost	<u>X</u>

The disposal of domestic product is credited on this account and debited:

Households } Consumer goods sold	X
Government }	
Capital Formation account { Producer goods and new houses sold	X
{ Increase in stocks	X
{ (Producer and consumer goods unsold)	
	<u>X</u>

The account will balance out.

The credit on National Income account is transferred to the credit of Households account (personal incomes), Government account (taxes levied on corporations); depreciation (capital consumption) is credited on Capital Formation account and the balance (undistributed profits or corporate saving) is carried down.

Capital Formation account is complete for the year and shows net capital formation as a debit balance carried down. Households account has been credited with personal incomes and debited with personal expenditure other than on new houses. Personal taxation is debited here and credited to Government account. The balance, personal saving for the year, is carried down as a credit balance. Government account will show the realised budget surplus (credit balance) or deficit (debit balance), and the net balance of local-authority income and expenditure. The Rest of the World account similarly will show as a credit balance net increase in overseas creditors or net disinvestment, or as a debit balance net increase in overseas debtors or net investment abroad.

The balances carried down can now be scheduled in the form of a statement of changes in national wealth and investment. This is set out below in conventional balance sheet form.

Net Changes in National Wealth and Investment during the Year 19..

(1) Corporate Saving	X	(6) Net Asset Formation	} . X
(National Income account)		(7) Stocks Increase	
(2) Personal Saving	X	(Capital Formation account)	
(Households account)		(8) Government Deficiency	X
(3) Government Surplus	X	(Government account)	
(Government account)		(9) Increase in overseas debtors	} . X
(4) Increase in overseas creditors	} . X	(10) Increase abroad	
(5) Disinvestment abroad		(Rest of the World account)	
(Rest of the World account)			<u>X</u>

Of these ten items three are alternative, leaving seven actual items for a real case. Five accounts only are used in the exposition followed here. It seems possible that it would not be impracticable to show separate accounts for fixed capital (producer goods) and for floating capital (consumer goods unsold), also for long-term and short-term balances with other countries.

Thus a logically complete system of double-entry social accounts is

available, as easy to understand as the accounts of a single business, leaving the difficulties, which are sufficiently formidable, wholly in the field of statistics.

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JOHN MATTHEWS

"SUBJECTIVE" AND "OBJECTIVE" TAX BURDENS, A REJOINDER

THE question of tax burden has been a universal and eternal problem. In the March 1959 issue of the *ECONOMIC JOURNAL* A. Morag presents an article on the "Economic Efficiency" of Taxation in which he attributes the terms "subjective" and "objective" tax to Paul B. Trescott. The reference is made to an article in *Public Finance* in 1956. The statement that the phrase "subjective" tax burden is original with Trescott in 1956 is unfounded. Without going into an exhaustive study of when the phrase was first used, one can observe the reference in the works of Hugh Dalton in 1922. From the volume by Dalton we quote: "A distinction may, indeed, be drawn between the subjective and the objective burden of taxation."¹ Dalton points out the fact that the objective burden may be that "viewed by the Statesman," as contrasted with the subjective burden, as viewed by the taxpayer, and varying with the "differences of taste and temperament, even if their economic situation as regards income and other factors, is the same."² A perusal of Dalton's volume on public finance will indeed present other commentary on the relative importance of subjective and tax burdens. Among these comments we find: "The primary consideration is the objective burden, as measured by a given loss of resources to a taxpayer in a given economic situation."³

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J. K. MESSING

KEYNES' ATTITUDE TO COMPULSORY MILITARY SERVICE

SIR ROY HARROD, "for the sake of the record," has challenged Mr. Clive Bell's description of Keynes as a conscientious objector in the First World War—"of a peculiar and, as I think, most reasonable kind"—and has denied that this was true in "any sense, peculiar or other," dismissing Keynes' behaviour as "just a little gesture of appeasement to his Bloomsbury friends."⁴

¹ Hugh Dalton, *Principles of Public Finance*, London, George Routledge and Sons, Ltd., Ninth Revised Edition, 1936, p. 49.

² *Ibid.*, p. 49.

³ *Ibid.*, p. 50.

⁴ R. F. Harrod, "Clive Bell on Keynes," *ECONOMIC JOURNAL*, December 1957, pp. 692-9, being a review article of *Old Friends*, by Clive Bell.

According to Mr. Bell, Keynes was a conscientious objector to conscription. This version of the matter is borne out by a draft letter, written and signed in Keynes' own hand, which gives a considered statement of his personal view. The letter in question and other evidence contained in Keynes' papers, on which I happen to be working, seem to support Mr. Bell's interpretation of Keynes' opinions and actions.

Conscription came into force with the passing of the Military Service Act of January 27, 1916, by which all men between eighteen and forty-one who were unmarried or widowers without dependent children were "deemed . . . to have been duly enlisted." Keynes had from the first disliked and opposed conscription not as a pacifist, which in contrast to some of his friends he never was, but as a liberal who denied the right of the State to abrogate to itself a decision which he and many other liberals believed should be a decision for the individual. In the course of the previous months he had been increasingly concerned about the morality of conscription, about its possible economic effects,¹ about his own personal duty in relation to it² and about its consequences for some of his friends.

It is clear that Keynes had been thinking in advance about his own personal position and duties. We can trace the actual events of the next few

¹ Among the Keynes papers are copies of memoranda written by him towards the end of 1915 in which he argued that the country could not afford the dislocation to industry and shipping which would result from conscription and that the financial help which Britain could give her Allies as an alternative was both more economical and more valuable politically. It is clear that the Chancellor of the Exchequer, Reginald McKenna, accepted this view, and argued it, though without success, with his colleagues (see *War Memoirs of David Lloyd George*, Vol. II, Chapter XXIII, p. 720, 1938 edition, Vol. I, p. 432).

It was this stand that Keynes took in a long letter published in the *Daily Chronicle* of January 6, 1916, under the pseudonym "Politicus." The final paragraph is as follows:

"Those who believe that the true Englishman is one who throws himself not where he is most efficient but where his personal sacrifice will be greatest, who believe that our duty to the Allies is not to help them most effectively but to impress them with the nobility of our self-sacrifice by getting as many of our men killed or maimed as we plausibly can, or who believe that the chief test of patriotism is an eagerness to dissipate the national resources at the maximum possible rate, will find much moral solace in compulsory service. But in the business of war there is no room for such sentimentalities. That is not the way to beat Germany."

Keynes appears to have followed this attack on the proposed Conscription Act by suggesting amendments to it, which he sent to Philip Morrell, a Liberal Member of Parliament and a personal friend, while the Bill was being debated. A reply over Morrell's initials, thanking Keynes for his letter and amendments, is in Keynes' files.

² The following extracts from the diary of his father (John Neville Keynes) during January 1916 show his thinking at this time:

"Jan. 6 (The two elder Keynes were visiting J. M. K. in London) . . . The Government have decided on compulsory service for single men. Maynard talks of resigning his post at the Treasury, and we are very much worried about him.

"Jan. 14 Maynard writes, 'Things drift on, and I shall stay now, I expect, until they begin to torture one of my friends. I believe a real split now and a taste of trouble would bring peace nearer, not postpone it; otherwise I'd swallow a great deal. I've been very busy and with occasional excursions into high life,—met the P.M. at dinner on Saturday, refused to dine with the old scoundrel on Sunday, banqueted with the Lord Mayor yesterday.'

"Jan. 16 Maynard is home today . . . I am afraid he takes an extreme view on conscription.

"Jan. 28 Florence [Mrs. Keynes] . . . saw Maynard in London. He is still thoroughly interested in his work, and Florence does not fear his throwing everything up in consequence of the Compulsion Bill."

months in a small file among his papers which contains the documents concerning both his exemption and his application to the Holborn Local Tribunal. It begins with a letter from Sir Thomas Heath, Joint Permanent Secretary of the Treasury, dated February 23, 1916. This is accompanied by a certificate of exemption for six months from the provisions of the Act, issued the same day by the Treasury, "being a Government Department under Section 2 (2) of the Act." The covering letter reads as follows:

"I understand that you have not attested under the Derby Scheme¹ and I have had consequently to take into consideration your position with regard to the Military Service Act. It has been decided to issue in your favour the enclosed certificate of exemption from the provisions of the Act, limited to a term of six months from the 2nd March, 1916, on the ground that you are engaged on work of national importance.

"It will rest with yourself to make any representations which you may desire to put forward to the Local Tribunal on any of the grounds enumerated in Section 2 (1) (b) (c) and (d) of the Act."²

The facts, then, are that Keynes was given a temporary exemption by the Treasury, so empowered by the Act, and that he was informed that it rested with himself to make any claim on other grounds, including conscientious objection, to his Local Tribunal.

It is clear that he did wish to put himself on record. If he had not so wished, there was no reason why he should have approached his Local Tribunal at all. He was exempted in virtue of his work. His approach to the Tribunal must have been made because he wished to be exempted in addition on one or other of the grounds of hardship, ill-health or conscientious objection.

¹ The Derby Scheme was the final attempt to recruit by voluntary means before the adoption of compulsory service in January 1916. Men in vital industries were urged to attest that they would serve with the forces when they were called, but were not to be enlisted. (See David Lloyd George, *War Memoirs of David Lloyd George*, Vol. II, Chapter XIII, pp. 709 ff., 1938 edition, Vol. I, pp. 434 ff.; also H. M. D. Parker, *Manpower* (History of the Second World War, United Kingdom Civil Series), Chap. 1, Sect. 1, especially p. 3).

² Under the Military Service Act 1916 there were in effect two methods by which exemption could be granted:

(i) The individual could make application to a local tribunal on the grounds of: (a) national importance of work; (b) hardship; (c) ill-health; (d) "a conscientious objection to the undertaking of combatant service."

(ii) Certificates of exemption could "be granted by any Government Department, after consultation with the Army Council, to men or classes or bodies of men, in the service or employment of that Department, or, in cases where it appears to the Department that certificates can be more conveniently granted by the Department than by the local tribunal, to men or classes or bodies of men who are employed or engaged or qualified for employment or engagement in any work which is certified by the Department to be work of national importance and whose exemption comes within the sphere of the Department."

It should be noted that Keynes had already been granted exemption under Method (ii) on the grounds that he was "at present engaged on work of national importance." Sir Thomas Heath's letter left him, if he wished, to make application himself on grounds (b), (c) or (d): hardship, health or conscientious objection.

That his approach was on grounds of conscience is clear from a completed draft of a statement of his case to the Local Tribunal. It is addressed to "The Tribunal" and written on King's College writing-paper in Keynes' own hand-writing, dated February 28, 1916, and signed by him. It is as follows:

" King's College,
Cambridge.
28.2.16

"I claim complete exemption because I have a conscientious objection to surrendering my liberty of judgment on so vital a question as undertaking military service. I do not say that there are not conceivable circumstances in which I should voluntarily offer myself for military service. But after having regard to all the actually existing circumstances, I am certain that it is not my duty so to offer myself; and I solemnly assert to the Tribunal that my objection to submit to authority in this matter is truly conscientious. I am not prepared on such an issue as this to surrender my right of decision, as to what is or is not my duty, to any other person, and I should think it morally wrong to do so.

" J. M. Keynes " ¹

There survives no absolutely certain evidence that Keynes sent precisely this statement to the Holborn Tribunal. But we do know that Keynes was asked to appear before the Tribunal and that must imply that he had made application to do so. The next item in the file is a postcard, post-marked "24 Mar 16" and addressed to him at 3 Gower Street, from the Clerk to the Holborn Local Tribunal notifying him that the application in respect of J. M. Keynes would be considered on the 28th day of March 1916 at 5 p.m. This is presumably what Sir Roy Harrod refers to as the "calling-up notice" to which Keynes "replied on Treasury writing-paper that he was too busy to attend the summons."² On Mr. Bell's version that "As for his conscientious objection, he was duly summoned to a tribunal and sent word that he was much too busy to attend," Sir Roy Harrod now comments that "incidentally it was not when summoned to a 'tribunal' that he pleaded that he was too busy, but when he received his ordinary calling-up notice."³

This interpretation seems impossible in the light not only of the surviving evidence but also of Keynes' position at the time.⁴ The evidence seems to accord closely with the memory of Mr. Bell, who, since Sir Roy Harrod published his comment, has written in a private letter to say that Keynes "was

¹ No words are crossed out or changed in the draft, but the word "morally" in the last sentence is inserted with a caret. Keynes typically wrote only one draft, although he might correct it extensively.

² Harrod, *The Life of John Maynard Keynes*, p. 214.

³ *Ibid.*, "Clive Bell on Keynes," *loc. cit.*, p. 696.

⁴ The card is headed "Holborn Local Tribunal" and is signed by the Clerk to the Tribunal. Keynes had been given by the Treasury on February 23, as mentioned above, exemption from the provisions of the Military Service Act for a period of six months from March 2, and was thus not liable for call-up at any moment during this period.

duly summoned to a tribunal, but was summoned to a conference of considerable importance at the same hour. He sent word that he was too busy to attend—or words to that effect" (Mr. Bell has described how he saw a good deal of Keynes at that time).

That Keynes' application actually came to a hearing is clear from the fact that the postcard from the Tribunal is followed in the file by a letter addressed to Keynes at Treasury Chambers, from the Clerk to the Holborn Local Tribunal, dated March 29, 1916, referring to a letter from Keynes of March 27 and informing him that his application for exemption was dismissed, "having regard to the fact that you have already been exempted for six months by the Treasury." He would be entitled, if he desired, to put in an application for further exemption after six months. Thus it is beyond doubt that Keynes' application was heard *in absentia* on the basis of some written statement of his case, similar, if not identical, to that which remains among his papers.

In fact, the Treasury renewed his exemption, conditional, without apparent time limit, on his remaining in their employment. The certificate, dated August 18, 1916, is in the file. When Sir Roy Harrod writes that "this appears to have quelled the authorities, for he was troubled by them no more,"¹ he is referring to Keynes' letter in which he is supposed to have said that he was too busy to attend the summons. It seems, however, that it was not this letter but the indefinite exemption granted by the Treasury which settled the matter.

In *The Life of John Maynard Keynes* Sir Roy Harrod goes on:

"On the other hand, he did not carry this policy through to its final conclusion, for a year or two later the Treasury discovered a gap in its records. In the file there was no notice of exemption against his name. And so, to placate the Treasury Establishment Officer, he walked quietly round and went through the formalities of obtaining exemption."

Keynes' papers include a certificate of registration under the National Registration Acts, 1915 and 1918, dated March 26, 1918. It may be this that Sir Roy Harrod here refers to. But the certificate is a certificate of registration and not of exemption.²

¹ Harrod, *The Life of John Maynard Keynes*, p. 214.

² The National Registration Act, 1915, required "all persons, male and female, between the ages of fifteen and sixty-five (not being members of His Majesty's naval forces or of His Majesty's regular or territorial forces), subject to the exceptions mentioned in this Act" to register and provide certain particulars about themselves. It was in effect a census of the adult population, and though used as an instrument for the Military Service Act, had a much wider and less specific coverage. The Act of 1918 was designed to tighten up the administration and *inter alia* added an obligation on employers to ask all male employees affected to produce a certificate of registration. Apparently registration under the 1915 Act was far from complete (see M. B. Hammond, *British Labour Conditions and Legislation During the War*, Chapter VI, p. 127), and it is possible that Keynes, like others, had neglected to register under the earlier Act.

Of Keynes' views over the following years we know less from his papers. His application had been rejected by the Holborn Tribunal on the ground that he had already been exempted by the Treasury. When the Treasury in August 1916 exempted him without limit of time, conditional on his remaining in Treasury employment, he may very reasonably have assumed that he had no grounds on which to go back to the Tribunal and to ask it to reconsider its decision. What we do know is that Keynes' grave concern regarding the morality and wisdom of compulsory military service was not ephemeral, and that his attitude had not changed substantially before his case came up for hearing.¹

Thus Keynes' own papers seem to show that, in Mr. Bell's words, he was indeed a conscientious objector to conscription "of a peculiar and, as I think, most reasonable kind." The statement of his views which remains among his papers, even if it was not sent to the Tribunal in precisely that form, unquestionably shows his thinking at this time.² As with all else that he wrote, the words are carefully weighed. It is abundantly clear that he was not claiming exemption as a pacifist: he did not argue that there were no conceivable circumstances in which he would voluntarily offer himself for military service. But he was "not prepared on such an issue to surrender my right of decision." His attitude was that of many of the most honest and sincere liberals of the day and reflects a liberal view of the rights of the individual that is almost forgotten to-day.³

It all adds up to something different—and perhaps more creditable to Keynes—than a sop to Bloomsbury. It deserves respect and not apology.

ELIZABETH JOHNSON

¹ A letter to Dennis Robertson, dated June 18, 1916, and thus several months after the Tribunal had dealt with his case on March 28, includes the following passage:

"The Tribunal crisis is getting over now, as concessions to the C.O.'s are impending. But it has been a foul business, and I spend half of my time on the boring business of testifying to the sincerity, virtue and truthfulness of my friends."

² It is wholly consistent with his fundamental personal philosophy as described in "My Early Beliefs":

"We entirely repudiated a personal liability on us to obey general rules. We claimed the right to judge every individual case on its merits, and the wisdom, experience and self-control to do so successfully . . . we repudiated entirely customary morals, conventions and traditional wisdom . . . we recognised no moral obligation on us, no inner sanction, to conform or to obey. Before heaven we claimed to be our own judge in our own case" ("My Early Beliefs," *Two Memoirs*, pp. 97, 98).

While it professes a special kind of conscientious objection, it is exactly the kind attributed to Keynes by Mr. Bell:

"He was not a pacifist; he did not object to fighting in any circumstances; he objected to being made to fight. Good liberal that he was, he objected to conscription. He would not fight because Lloyd George, Horatio Bottomley and Lord Northcliffe told him to" (*Old Friends*, pp. 46-7, quoted by Harrod, "Clive Bell on Keynes," *loc. cit.*, p. 696).

³ Keynes' friend Sir John Simon resigned from Asquith's Cabinet on precisely this issue. He, like many others, volunteered for military service though strongly opposed to conscription either for himself or others.

A COMMENT

GRATITUDE is due to Mrs. Johnson for her diligent research. She has convicted me of two or three inaccuracies in my text, and, more important, of not sufficiently bringing out the passionate fervour of Keynes's objection to conscription.¹ Evidence for this is supplied, *inter alia*, by his draft statement for the Local Tribunal. Whether I missed this, when going through his mountainous files, or saw it, but gave it insufficient weight, I cannot now be sure. In my research into this episode I relied mainly on conversations with friends who had been near him at the time; I pondered over what I learnt for many months before writing. My earnest desire was to set this rather important matter in the right perspective. It was a case where the real significance of a succession of events has to be assessed in the light of one's knowledge of a man's character.

I remain as convinced as I was before that Mr. Bell's statement that Keynes was a "Conscientious Objector to Conscription" needs correction. My views are summarised as follows:

1. The letter from his mother (my *Life of Keynes*, p. 215), dated on the day after he was due to appear at the Tribunal, proves that he had given her no warning of his intention. As it is unthinkable, in view of their life-long mutual relations, that he would have allowed her to get her first information of this in the newspapers, I infer that at some time *before* he was due to appear, he had abandoned his idea of appearing and therewith of being a so-called "Conscientious Objector to Conscription."

2. It would make no sense not to appear because of an "important meeting," since, if he had appeared on conscientious grounds, he would have had to resign from the Treasury, or, at best, have been kept on for unimportant duties; and he must have known that. Therefore the "important meeting" would not explain his not appearing, if he still wished to do so. But it served very well as an excuse.

3. There is the important statement, quoted by Mrs. Johnson from Dr. Keynes's diary,² that he expected that he would stay on "until they begin to torture one of my friends." *Before* he was due to appear before the Tribunal, he had had good news about Lytton Strachey and Mr. James Strachey.³ If this was taken as an indication of what was likely to befall the others, it removed his stated motive for taking action.

4. The verdict of the Tribunal, in confirming the exemption from military service that he already had, did not change the situation in any way. Accordingly his not seeking to appear at a later date is consistent only with his having abandoned his original idea.

5. "Conscientious Objection to Conscription" is not a very clear idea.

¹ I shall rectify these matters if a new impression is called for.

² Page 161 footnote 2.

³ See letter from Mrs. Keynes, quoted above.

Sir John Simon (later Lord Simon), who may be said to have had such an "Objection," resigned from the Cabinet and joined the army. While a Treasury official could not be deemed responsible for the actions of the Government to the same extent as a Cabinet Minister, this would have been the logical course for Keynes to take, *had he deemed any action needful*. I suggest that his idea of the more spectacular, but less logical, course of appearing before a Tribunal as a "Conscientious Objector to Conscription" was actuated by his ardent desire to share in the "tortures" of his friends if tortured they were to be, and that his abandonment of this not altogether logical plan was due to the relatively good news about the treatment meted out to them, as well as to further reflection.

6. Accordingly I conclude as follows. If by saying that Keynes was a Conscientious Objector to Conscription, what is meant is the hypothetical proposition that, had he been a member of the Cabinet, he would, like Simon have resigned, I am sure that that is true. Another hypothetical proposition may well be true, namely that, if the Act had been differently administered involving brutal treatment for his friends, he would have appeared before the Tribunal as a "Conscientious Objector to Conscription." These hypotheticals are difficult. To say *simpliciter* that he was a "Conscientious Objector to Conscription" is, in my judgment, *untrue*. I suggest that the correct way of describing the matter is to say that for two or three months he entertained the idea of appearing before a Tribunal as a "Conscientious Objector to Conscription," but, before final action was required, abandoned the idea as untenable. And I believe that most people will hold that his earlier impulse, so generous in relation to his friends, and his suppression of it, before final action was required, in the light of the facts and of logic, are *both* to his credit.

R. F. HARROD

Christ Church,
Oxford.

CURRENT TOPICS

THE Annual Meeting of the Royal Economic Society will be held on Thursday July 7 at 5 p.m. at the London School of Economics. The formal business will be followed by a discussion of "Problems of European Trade and Relations."

Frances Wood Memorial Prize. The Council of the Royal Statistical Society offers the Frances Wood Memorial Prize of fifty guineas for competition in 1960. As the object of the Prize is to encourage young investigators competitors must be under the age of 35 on January 1, 1960. It is hoped that this offer of a Prize will appeal specially to the younger Fellows of the

society, but it is also open to those who are not Fellows and in particular to members of the Research, Industrial Applications, Medical and General Applications Sections of the Society and of the Local Groups. The Prize is offered for the best investigation, on statistical lines, of any problem, chosen by the competitor, which bears directly or indirectly upon economic or social conditions. Further information should be obtained from the honorary Secretaries of the Royal Statistical Society, 21 Bentinck Street London, W.1.

Previous awards have been:

- | | | |
|------|------------------------|---|
| 1921 | Winifred Mackenzie | Changes in the Standard of Living of the Working Classes in the United Kingdom between 1860-1914. |
| 1923 | E. G. M. Haynes | Human Power in the English Potter Industry. |
| 1925 | Christopher T. Brunner | An Inquiry into Local Variations in the Birth-rate. |
| 1928 | Colin G. Clark | A Graphical Analysis of the Unemployment Position, 1920-28. |
| 1932 | R. W. B. Clarke | Production, Output per Head, Prices and Costs in the Iron and Steel Industry 1924-31. |
| 1936 | C. V. Dawe | An Economic Interpretation of the Agricultural Statistics relating to the Bristol Advisory Province. |
| 1938 | R. Huws Jones | Physical Indices and Clinical Assessment of the Nutrition of Schoolchildren. |
| 1940 | H. W. Singer | The Process of Unemployment, statistically analysed. |
| 1946 | J. Marley | A Statistical Survey of Certain Aspects of the Beef Producing, Dairying and Cattle Rearing Industries in Great Britain between 1939 and 1947. |
| | T. Barna | Britain's Manpower Problem in the Next Five Years. |
| | J. L. Nicholson | Variations in Working Class Family Expenditure. |
| 1949 | L. T. Wilkins | The Prevalence of Deafness in England, Scotland and Wales. |
| 1954 | A. Barr | Rehabilitating the Tuberculous in Northern Ireland. |
| 1958 | David Hewitt | Mortality in the London Boroughs 1950-1952, with Special Reference to Respiratory Diseases. |

THE following have been admitted to Life Membership of the Society:

Ghevaria, V. D.	Mayer, T.	Staley, C. E.
Kobayashi, Kenzo	Richardson, W.	Ta-Chung Lui, Prof.
Kounine, A.	Roach, J. E. Jnr.	

THE following have been admitted to Fellowship of the Society:

Asimakopulos, A.	Johnson, A. M.	Patnaik, J.
Brown, R. D.	Johnson, E. E. Jnr.	Pratt, F. R.
Chan, A. Nam Wah	Khadabux, B. J.	Rademan, C. F. O.
Clark, R. H.	Kinchin, D. H. J.	Rao, B. Ramachandra
Cole, L. W.	Kirkland, R.	Shannon, Prof. R. E.
Colmer, K. H.	Kirkman, M. F.	Shears, D. F.
Coontz, S.	Kukde, N. K.	Singh, Prof. D. Bright
Daniel, C. Glyn	Kumar, R.	Smith, John Brian
Das, K. K.	Lingwood, R. L.	Sreeramullu, C.
Dawe, J. E.	Llewellyn, D. J.	Terrell, R. D.
Deltgen, F. M. F.	Lury, D. A.	Theberge, J. D.
Desai, I. M.	Mapstone, G. E.	Thomas, D. P.
Dhital, V. P.	McDonagh, J. M.	Turner, G.
Edminster, Miss D.	McKee, D.	Twimasi, P. K.
Ehrlich, Dr. C.	McKinneley, I.	Uchay, J. O.
Farrer, R. D.	McLarty, R.	Vaidya, K. G.
Fernando, P. T. S.	Mirrlees, J. A.	Walker, Dr. K. R.
Fieldhouse, R. H.	Moore, B.	Walker, R.
Gherity, Dr. J. A. Jnr.	Mukerji, S. N.	Wilkinson, R. K.
Gibson, N. J.	Mukherjee, S. K.	Winch, D. N.
Hanson, E. J.	Murray, S. N.	Wise, T. F.
Harper, R. J.	Nwachukwu, A. C. J.	Yamane, Taro
Hoie Yook-Loon	O'Brien, C. P.	Yoshio, Katsura
Izzo, L.	O'Halloran, D.	
Jayasinghe, C. E.	O'Riain, M.	

THE following have been admitted to Library Membership of the Society:

- Agricultural Economics Department, King's College, Newcastle-on-Tyne.
- Facultad de Ciencias Economicas, Instituto de Economicas y Finanzas, Cordoba, Argentina.
- Industrial Development Corporation of South Africa, Ltd., Johannesburg, S. Africa.
- National Bank of Libya, Economic Research Department, Benghazi, Libya.
- Wirtschaftswissensch. Seminar der Christian-Albrechts-Universitat, Kiel, Germany.

RECENT PERIODICALS AND NEW BOOKS

Journal of the Royal Statistical Society

OL. 122, PART 2, 1959. *The Determinants of Wage Inflation; United Kingdom, 1946-56*: L. A. DICKS-MIREAUX and J. C. R. DOW. *Production and Productivity Movements in the United Kingdom since 1900*: K. S. LOMAX. *Using an Electronic Computer in a Problem of Medical Diagnosis*: T. H. HOLLINGSWORTH. *Note on the Measurement and Prediction of Labour Turnover*: D. J. BARTHOLOMEW.

Economica

OL. XXVI, No. 104, NOVEMBER 1959. *Economic Growth and the Problem of Inflation: II*: N. KALDOR. *The Relation Between Unemployment and the Rate of Change of Money Wage Rates: A Comment*: G. ROUTH. *Welfare Economics, Ethics, and Essentialism*: G. C. ARCHIBALD. *Underemployment in Agriculture and the Industrial Wage Rate*: D. MAZUMDAR. *Horsley Palmer on Bank Rate*: A. B. CRAMP. *A Theorem on Undercompensated Price Changes*: M. McMANUS.

CONSOLIDATED INDEX. New Series, Volumes I-XXV, 1934-1958.

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VOL. XXVII, No. 72, OCTOBER 1959. *Some Notes on Stability Conditions*: P. NEWMAN. *A Note on Crawling Along the Ceiling*: R. C. O. MATTHEWS. *Interrelated Industries and the Rate of Technological Change*: W. P. STRASSMANN. *Capital Levies in Western Europe after the Second World War*: P. ROBSON. *Investment Allowances, Initial Allowances and Cheap Loans as Means of Encouraging Investment*: J. BLACK. *Cash Circulation in the Planned Economies of Eastern Europe*: J. BARACS. *A View of the Aggregation Problem*: M. H. PESTON.

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126TH SESSION, 1958-59. *The Changing Balance of Fuel and Power*: C. I. K. FORSTER. *Post-war Agricultural Policy in the United Kingdom*: W. J. THOMAS. *The Development of Mechanical Sorting in the Post Office*: K. S. HOLMES. *Investment in the Nationalised Industries*: S. R. DENNISON. *The International Liquidity Problem*: A. C. L. DAY.

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VOL. XXVII, No. 3, SEPTEMBER 1959. *Probability and Economic Decision Taking*: M. B. NICHOLSON. *International Trade, Income Distribution and the Offer Curve*: H. G. JOHNSON. *Periodicity and Stability of Inventory Cycles in the U.S.A. (II)*: D. J. COPPOCK. *Cycles, Accumulation and the Growth of Capacity*: J. K. WHITAKER. *A Monthly Index of Wage-rates by Industries*: J. R. CROSSLEY.

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VOL. VI, No. 3, NOVEMBER 1959. Special Number on Regional Economic Problems. *Wales and the Atlantic Economy*: B. THOMAS. *Employment and Unemployment in Regions and in the Development Areas*: J. SYKES. *Local Unemployment and the 1958 Act*: A. J. ODBER. *Regional Input-Output Analysis and Government Spending*: A. T. PEACOCK and D. G. M. DOSSER. *Purchases by Public Authorities in Scotland*: J. VEVEKA.

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NEW SERIES NO. 32, DECEMBER 1959. *The Economic Position. The Radcliffe Report and Domestic Monetary Policy*: R. F. G. ALFORD and H. B. ROSE. *The European Free Trade Association*: A. C. L. DAY. *Quarterly Income and Expenditure*: C. H. FEINSTEIN. *Prices and Wages*: R. G. D. ALLEN and H. S. BOOKER. *International Finance*: A. C. L. DAY.

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VOL. 21, No. 3, AUGUST 1959. *Innovation and Automation: A Discussion based on Case Studies*: F. R. EELS, A. D. HAZLEWOOD, K. G. J. C. KNOWLES and C. B. WINSTEN.

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NO. 6, NOVEMBER 1959. *The Economic Situation. Trends in World Trade in Durable Consumer Goods. A Review of Soviet Economic Progress*: A. NOVE.

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VOL. VIII, No. 1, OCTOBER 1959. *Discriminatory Pricing as a Barrier to Entry: The Spark Plug Litigation*: A. H. KAHN. *A Critique of United States Experience with Price-fixing Agreements and the Per Se Rule*: A. PHILLIPS. *Restrictive Practices in the Food Trades*: N. CUTHBERT and W. BLACK. *The Restrictive Practices Court and Cotton Spinning*: A. SUTHERLAND. *Accelerated Depreciation Allowances and Industrial Investment*: D. P. BARRITT.

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VOL. XII, No. 2, DECEMBER 1959. *The Economic and Social Development of the Baltic Countries from the Fifteenth to the Seventeenth Centuries*: M. MALOWIST. *Evidences of Industrial Growth on Some Fifteenth-century Manors*: E. M. CARUS-WILSON. *Trade through the Sound in the Seventeenth and Eighteenth Centuries*: W. S. UNGER. *The Miners and the Eight-hour Day, 1863-1910*: B. McCORMICK and J. E. WILLIAMS.

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No. 132, DECEMBER 1959. *Progress by Policy*: G. HUTTON. *Cotton under Scrutiny*: W. G. PILKINGTON. *The Flow of International Capital*.

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No. 54, OCTOBER 1959. *The Radcliffe Report*: R. V. ROOSA. *Equities and Growth*: I. WILSON. *Wage Flexibility and the Distribution of Labour*: W. B. REDDAWAY. No. 55, JANUARY 1960. *Treasury Bills and the Money Supply*: W. MANNING DACEY. *The New Attack on Localized Unemployment*: A. T. PEACOCK and D. G. M. DOSSER. *Industrial Relations in an Affluent Society*: B. C. ROBERTS.

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48, NOVEMBER 1959. *Thoughts on the Agricultural Revolution*: J. T. BERESFORD. *Man-made Timber—Wood Chipboard*: F. C. LYNAM.

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Labour Input in Constructing Indicators of Labour Productivity: E. ANTOSSENKOV. *On Computing Regional Index Numbers:* Z. SIDILIK. *Defining the Replacement Value of Metal-cutting Machine Tools and Forging-pressing Equipment:* A. STEPANOV. *How to Measure the Wear and Tear of Fixed Assets in Connection with Their Revaluation:* V. GORELIK. *A Meeting on Problems of Measuring the National Income of Union Republics:* M. R. *A Meeting of Heads of Statistical Offices of Autonomous Republics, Krai and Oblasts of the Russian Federation:* V. UVAROV.

No. 9, 1959. *The Revaluation of Fixed Capital Has Begun. The Economic Efficiency of Capital Investment and Its Statistical Analysis:* N. SHCHADILOV. *On the Comparability of Dynamic Series:* YA. KABACHNIK. *How to Establish the Replacement Value of Equipment in Thermal-Electric Stations:* A. STEPANOV. *The Practical Application of the Handbooks on Aggregate Indicators of the Value of Dwellings and Communal Buildings:* V. PETROPAVLOVSKY. *A Meeting Convened by the Editorial Board of Vestnik Statistiki on the Application of Mathematics to Economic Research and on Econometrics.*

No. 10, 1959. *On the Eve of the Plenum of the Party Central Committee. Statistical Work at the Present Stage of Socialist Construction in the Chinese People's Republic:* TSZYA TI-YUN. *Successes of the Chinese People's Republic in Economic Development:* M. SLADKOVSKY. *Economic Characteristics of the Population in the Processing Programme of the 1959 Census:* V. ROZDYALOVSKAYA. *On Statistics of Foreign Trade in the U.S.S.R.:* V. ZOLOEV. *On the Question of the Divergence of Prices from Cost in Elaborating National Accounts:* A. SMIRNOV. *On the Problem of Defining the Degree of Obsolescence under Socialism:* A. BUZAN. *How to Check Collective-farm Accounts for Motor Transport:* S. BELOV. *The VII Plenary Session of the Conference of European Statisticians:* V. OVSIENKO. *Problems of the Comparability of Statistical Data on an All-European Basis:* A. PETROV.

Ekonomista (Polish text, English and Russian summaries)

No. 2, 1959. *On the Socialist Way of Production:* S. STRUMILIN. *On the Question of the Concept of Commodity Relations:* J. MUJZEL. *Some Remarks on Input-Output Tables:* E. VIELROSE. *On the Growth of Production of Producers' and Consumers' Goods:* B. MING. *The Rate of Investment as Expressed in the Structure of Employment:* J. PAJESTKA. *Contemporary Bourgeois Theories of Economic Growth:* H. FLAKIERSKI. *Problems of Economic Growth in Under-developed Countries, with Special Reference to Western Asia:* I. SACHS. *Remarks on the Theory of the "Big Push":* P. ROSENSTEIN-RODAN. *State Intervention in the Sphere of Credit and the Functions of the Central Bank in the Principal Capitalist Countries:* J. RUTKOWSKI. *Critical Remarks on the macro-economic Method of Analysis and the Concept of Equilibrium:* W. FABIERKIEWICZ. *White-collar Workers in the United States:* Z. DOBRKA.

No. 3, 1959. *A Model of Economic Growth:* O. LANGE. *Tables of Inter-industry Flows in the Polish Economy:* E. KRZECOWSKA, B. SZYBISZ and L. ZIENKOWSKI. *Some Problems of the Application of Mathematics in Economic Research:* J. PAJESTKA. *The Influence of Migration from Agriculture on the Growth of National Income:* W. HERER. *The Cost and Income Function of the Remuneration of Labour in Small Peasant Farms:* H. CHOLAJ. *The Role of Capital Exports from Industrialised Countries in the Economic Development of Backward Countries:* Z. DOBRKA. *The Problem of Planning Economic Development in France:* J. GRZYWICKA.

Politická Ekonomie (Czech text, some English and Russian summaries)

No. 5, 1959. *The Influence of the Growth of Labour Productivity on the Value-structure of Products:* V. HALAYA. *The Problem of the Circulation of Goods under Socialism:* O. ŠIK. *Prognoses of Business Cycles and Econometrics:* V. KADLEC. *Interference by Government Authorities into the Post-war Economy of the U.S.:* V. SVOBODA.

No. 6, 1959. *For a Decisive Change in Agricultural Production. Principles of the Socialist International Division of Labour:* V. KAIGL. *On Deepening Economic Analysis on the Basis of Materialist Dialectics:* O. FIALA. *Notes on the Remuneration of Work in Co-operative Farms:* J. KARLÍK. *On the Third Edition of the Soviet Text-book on Political Economy:* N. OPARIN. *Notes on the Analysis of Categories in Economics:* J. NOVOZÁMSKÝ.

No. 7, 1959. *How to Increase the Economic Efficiency of Farm Purchases:* J. DUPAL and G. OLMOVÁ. *Problems of Exchange Equivalence Between Capitalist Countries at Different States of Development:* J. MERVART. *On the Concept of the Basic Economic Law of Socialism:* Z. HABA. *On Econometrics in Bourgeois Economics:* Z. TLUSTÝ and J. SKOLKA. *The European Economic Community:* P. TLUSTÁ.

No. 8, 1959. *Questions of Commodity Production under Socialism:* M. KADLEC. *Commodity Production Under Socialism:* F. OLIVA. *Commodity Production in the State Socialist Sector:*

J. SPIŠIAK. *On the Generation of Commodity Production Under Socialism:* Č. KOŽUŠNÍK. *A Contribution to the Question of the Operation of the Law of Value under Socialism:* J. BRÁNIK. *The Value-creating Process under Socialism:* J. REIZER. *Commodity Production in the State Socialist Sector:* J. SLÁMA. *On Some Questions of Commodity Production under Socialism:* M. JÓŽA.

Finansi i Kredit (Bulgarian text)

No. 6, 1959. *The Tasks of This Journal in Connection with the Aim of Economic Advance in Our Country. For Improved Operation of the Bulgarian National Bank:* B. BULGARANOV. *On Planning and Distributing Profits:* V. TODOROV. *The Bulgarian State Lottery:* I. PALIISKI. *For the Financial Strengthening of Merged Co-operative Farms:* G. SOTIROF. *Credits for Insurance:* B. VASILEV. *For Strengthening the Operations of the Bulgarian National Bank Over Industrial Enterprises to Liquidate Their Over-plan and Excess Stocks:* D. KHRISTOV. *New Regulations for Settlement on Acceptance Forms:* P. KHAVEZOV. *The Economic and Financial Situation in Turkey:* A. STOICHEV.

No. 7, 1959. *The Fifteenth Anniversary of the People's Regime. Finance and Socialist Construction:* K. LAZAROV. *The Successes of the Bulgarian Savings Drive:* I. PALIISKI. *Financing Capital Investment and Control by the Bulgarian National Bank During the Years of Popular Power:* I. MANTAROV. *Fifteen Years of State Socialist Insurance in Bulgaria:* Z. MITOVSKI. *New Arrangements in Planning Money Circulation—I:* V. SITNIN. *Pledges by Workers of the Finance and Credit System in Honour of the Fifteenth Anniversary of the Popular Revolution of September 9:* V. ISAEV.

No. 8, 1959. *For a More Active Participation in the Preparation for the Forthcoming Plenary Session of the Central Committee of the Bulgarian Communist Party. Cheapening Private and Co-operative House Construction:* D. ŠAPUNDZHIEV. *The Functions of Local Authorities in Fixing Prices for Fruits and Vegetables:* T. ANGARSKI. *On the Problem of Financial Resources for Modernising Obsolete Equipment:* I. RUSIMOV. *On Establishing Working-capital Norms in Industrial Enterprises in Connection with the Reorganisation of Economic Management:* P. STANOEV. *New Arrangements in Planning Money Circulation—II:* V. SITNIN.

Ekonomski Pregled (Serbo-Croat text, some English summaries)

No. 5, 1959. *The Growth of National Product and Fixed Assets in Yugoslavia, 1947-58:* I. VINSKI. *The Collaboration of Co-operatives and Individual Farmers in the Village of Kozarac—II:* A. STARG. *The Norwegian Economic Plan for 1959:* M. SEKULIĆ.

No. 6, 1959. *Some Aspects of the Problem of Depreciation Allowances in Conditions of Economic Growth:* D. VOJNÍĆ. *Some Problems of Agriculture in Present-day Capitalism:* V. STIPETIĆ.

No. 7, 1959. *The Economics of Our Economic Law:* R. LEGRADIĆ. *Transportation Costs in Particular Services and the Cheapest Route:* D. BEJAKOVIĆ. *Checking the Economy of an Operation:* J. GOJANOVIĆ.

Ekonomist (Serbo-Croat text, some English summaries)

No. 1-2, 1959. *The Value-Price Relationship:* M. SAMARDŽIJA. *Economic Growth, Economic Development, Planning and Planned Economy:* R. BIČANIĆ. *The Relation of Yugoslav Exports to World Business Conditions:* P. MIHAILOVIĆ and S. TANOVIĆ. *Optimal Technique as a Criterion of Investment Policy:* S. POPOVIĆ. *Input-Output Analysis and Economic Planning:* J. SIROTKOVIĆ. *Flow-of-funds Analysis in Yugoslavia:* D. DIMITRIJEVIĆ. *Methodological Problems of the Balance of Payments:* S. OBRADOVIĆ. *Some Reflections on Structural Economic Analysis:* S. BLAGOJEVIĆ.

Statisztikai Szemle (Hungarian text, English and Russian summaries)

AUGUST-SEPTEMBER 1959. *The Preparation of the 1960 Hungarian Census of Population, Its Data Collection and Processing Programme:* A. KLINGER and E. SZABADY. *Analysis of Building Time:* I. GERŐ and F. KOCIS. *A Study Tour in the Central Statistical Office of the Soviet Union:* F. DEÁK and O. LUKÁCS. *Some Factors of the Commercial Attraction Effect:* G. LACZA. *Statistical Accounting of Production Costs in Socialist Farms in the German Democratic Republic:* U. LANGE. *Problems of the Transport and Communication Sector in the 1957 Input-Output Table:* B. LENDVAI and I. SZABÓ. *The Seventh Plenary Session of the Conference of European Statisticians:* Z. KENESSEY. *The Application of Electronic Computers to Statistical Work:* L. PINTÉR. *Secondary Agricultural Education:* T. PÁSZTORY. *The Analysis of Changes in the Balance of Trade:* A. MARTON.

Probleme Economice (Rumanian text: English, French and Russian summaries)

- No. 8, 1959. *Under the Leadership of the Rumanian Workers' Party Along the Bright Road of Socialism*: I. RACHMUTH and F. BALAUER. *The Socialist Industrialisation of Rumania*: R. MOLDOVAN. *The Struggle of the Rumanian Workers' Party to Solve the Agrarian Problem*: V. MALINSCHI. *Aspects of the Economic Policy of the Rumanian Communist Party in the First Stage of the Popular Revolution*: V. RAUSSER. *The Role of the Masses in Elaborating and Executing State Plans*: M. NICOLAESCU. *Changes in the Class Structure of Society Under Popular Democracy*: I. ADAM and M. GHEORGHIU. *The Fraternal Help of the Soviet Union—An Important Factor for the Development of Our National Economy*: M. MĂNESCU. *The Continuous Increase of the Material Welfare and Cultural Standards of the Working People*: S. ZEIGHER. *Ferrous Metallurgy in Rapid Development*: C. TUZU. *Engineering—the Creation of Popular Democracy*: V. ACTARIAN. *The Importance of the Building Industry for Economic Development*: M. SUDER. *The Improvement of the Branch Structure of Agricultural Production*: E. ALEXE. *Training the Personnel Necessary for Building Socialism*: S. BALAN. *The Financing of Social-agricultural Amenities by the State*: I. CRAIU. *Unemployment—the Inevitable Attendant of Capitalism*: E. DOBRESCU.
- No. 9, 1959. *Current Problems of Increasing Labour Productivity in Industry*: I. BATI. *The Role of Trade in Socialist Expanded Reproduction*: O. SNAK. *The Achievements of the Bulgarian Economy on the Road of Socialism*: C. ȘTEFAN. *The Deterioration of the Material Situation of the Working Class in Rumania During the Second World War*: C. BOGDAN. *The Aggravation of the General Crisis of Capitalism Since the Second World War*: GH. DOLGU. *The Rumanian Oil Industry During the 1929–33 Depression*: P. VAGU.

Ekonomia Popullore (Albanian text)

- No. 4, 1959. *For Higher Labour Productivity in the Mining and Oil Industries*: A. ÇARÇANI. *The Elaboration of the Third Five-year Plan Requires Efficient Work from the Planning Staff*. *The Seven-year Plan and the Development of Co-operation between the Countries of the Socialist Camp*: B. MIROSHNICHENKO. *Maximum Procurement of High-quality Hides*: K. NOÇKA. *Working Capital and Its Finance in Construction*: A. HAXHI. *The Analysis of the Economic Activity of Industrial Enterprises Run by the Shkodra Regional Council*: S. SHKËMBI. *Savings-bank Agents—an Important Link in the Network of Savings Banks and Insurance Offices*: S. GJONI. *On the Solution of Some Economic Problems and on Agricultural Credits to Co-operative Farms*: K. KONOMI and L. POLO. *Judicious Control of Wage Fund Contributes to the Utilisation of Internal Reserves in Enterprises*: P. SAMSURI. *The Planning of Wholesale and Retail Prices*: Z. MUÇO.
- No. 5, 1959. *For the Further Development of Vegetable and Fruit Growing. Accomplishing the Tasks to Raise Meat and Milk Output*: S. PASKO. *Protective Screens and Their Agro-economic Importance*: I. NAKO. *Ways to Accelerate the Circulation of Working Capital in the Oil Refinery*: A. BAJO. *Ten Years of the German Democratic Republic*: A. KIRGOFF. *Rapid Economic Growth in the Rumanian People's Republic*: M. MĂNESCU and V. RAUSSER. *For a Wider Use of Natural Gas*: N. ZORAQI. *Some Problems of Credit and Liquidations*: F. SINOIMERI. *The Statistical Analysis of the Quality of Production*: I. TELO.

NEW BOOKS

British

- ADRIAN (LORD). *The Risks of Progress. The Sixth Fawley Foundation Lecture*. Southampton: University of Southampton, 1959. 8½". Pp. 17. 2s. 6d.
- [The question considered by Lord Adrian in this lecture is what our attitude should be towards the possible harmful consequences, especially genetical consequences, of scientific and medical advances which in themselves are immediately beneficial. Radiation hazards are the plainest case in point. Lord Adrian suggests that it will take so many generations for any substantial genetical changes to take place that one may reasonably hope that in the meanwhile medical science will have advanced sufficiently to enable us to cure or avoid the possible ill-effects.]
- ALLEN (G. R.). *Agricultural Marketing Policies*. Oxford: Blackwell, 1959. 9". Pp. xii + 336. 42s.
- [To be reviewed.]

- ALLEN (R. G. D.). *Mathematical Economics*. Second edition. London: Macmillan, 1959. 9". Pp. xviii + 812. 63s.

[In this second edition Professor Allen has not altered the general lay-out or contents of his book. He has made numerous corrections and revisions on points of detail, and he has also completely re-written a number of sections. A long new appendix is added on certain concepts of modern algebra. These improvements serve to establish the book yet more firmly as easily the best available in this field.]

- BEER (S.). *Cybernetics and Management*. London: English Universities Press, 1959. 9". Pp. xviii + 214. 25s.

[To be reviewed.]

- Budgeting in Public Authorities*, by a Study Group of the Royal Institute of Public Administration, under the Chairmanship of R. S. EDWARDS; Research Officer, J. S. HINES. London: Allen & Unwin, 1959. 9". Pp. 300. 28s.

[To be reviewed.]

- CARTER (C. F.) and WILLIAMS (B. R.). *Science in Industry. Policy for progress*. London: Oxford University Press, 1959. 9". Pp. x + 186. 21s.

[To be reviewed.]

- CRANKSHAW (E.). *Khrushchev's Russia*. Harmondsworth, Middlesex: Penguin Books, 1959. 7". Pp. 175. 2s. 6d.

[Mr. Crankshaw's latest book on Russia is an interesting and informative popular discussion of the expected themes. He deals with the political, economic and social problems that the Soviet leaders have faced since Stalin's death. The treatment of economic issues is largely in non-quantitative terms, but it contains much vivid and useful information derived from the author's many visits to Russia and his diligent reading of the Soviet Press. Particularly interesting are the examples he quotes of the distortion introduced into the working of the Soviet economy by suppressed inflation before 1957. Mr. Crankshaw's views and speculations on the psychological and sociological consequences of recent political and economic developments are also interesting and often convincing.]

- DAY (A. C. L.). *The Economics of Money*. Home University Library, No. 242. London: Oxford University Press, 1959. 6½". Pp. viii + 248. 7s. 6d.

[To be reviewed.]

- DENMAN (D. R.) and STEWART (V. F.). *Farm Rents. A comparison of current and past farm rents in England and Wales*. London: Allen & Unwin, 1959. 9". Pp. 206. 27s. 6d.

[To be reviewed.]

- GOLDSMITH (R.) and SAUNDERS (C. T.) (Eds.). *The Measurement of National Wealth. Income and Wealth, Series VIII*. London: Bowes & Bowes, 1959. 8½". Pp. xiv + 389. 45s.

[To be reviewed.]

- GORST (SHEILA). *Co-operative Organization in Tropical Countries. A study of co-operative development in non-self-governing territories under United Kingdom administration, 1945–1955*. Oxford: Blackwell, 1959. 7½". Pp. xv + 343. 25s.

[This contains a factual survey of the development of co-operation in twenty-eight non-self-governing British dependencies since the War, followed by a general analysis of the picture revealed by the detailed description. The chief spheres of co-operative organisation in the countries concerned are in agricultural credit and, where marketing boards have adopted a favourable attitude, in agricultural marketing. Mrs. Gorst writes as an enthusiast for the co-operative principle, but she takes a realistic view of its weaknesses and limitations in practice, and she has many useful suggestions to make on the most promising fields and forms for its further development.]

- HALFORD (R. C.). *Differential Costs and Management Decisions*. London: Pitman, 1959. 9". Pp. x + 115. 15s.

[To be reviewed.]

- HORSEFIELD (J. K.). *British Monetary Experiments, 1650–1710*. London: Bell for the London School of Economics, 1960. 9". Pp. xx + 344. 45s.

[To be reviewed.]

HUGHES (T. J.) and LUARD (D. E. T.). *The Economic Development of Communist China, 1949-1958*. London: Oxford University Press for the Royal Institute of International Affairs, 1959. 9". Pp. viii + 223. 22s. 6d.

[To be reviewed.]

International Economic Papers, No. 9. Translations prepared for the International Economic Association. London: Macmillan; New York: The Macmillan Company, 1959. 10". Pp. 248. 21s.

[To be reviewed.]

JACOBSSON (P.). *Towards a Modern Monetary Standard. The Stamp Memorial Lecture 1959*. London: The Athlone Press, University of London (distributed by Constable & Co., 12 Orange Street, W.C.2), 1959. 8½". Pp. 31. 3s. 6d.

[In this lecture Dr. Jacobsson expresses the liberal point of view with which his name is now associated. He surveys three main fields of policy: the maintenance of exchange stability, the mitigation of booms and depressions, and the relation between monetary expansion and economic growth. In the field of international monetary policy he looks forward to a not too distant day when the major trading nations will feel able to do away with all exchange controls, including control of capital movements. For purposes of domestic stabilisation, he believes that paramount importance attaches to monetary policy, and also that adjustment of costs and prices in recessions has a greater contribution to make than is commonly believed. Finally, in considering the long-run problems involved in deciding on the rate of growth of the monetary supply, he emphasises the need for independence on the part of the central bank. Dr. Jacobsson puts his point of view persuasively and with more moderation than can be conveyed in a brief summary.]

KEIRSTEAD (B. S.). *Capital, Interest and Profits*. Oxford: Blackwell, 1959. 9". Pp. x + 180. 22s. 6d.

[To be reviewed.]

LIPSET (S. M.) and BENDIX (R.). *Social Mobility in Industrial Society*. London: Heinemann, 1959. 9". Pp. xxii + 309. 30s.

[This book is a survey and interpretation of the research that has hitherto been done on the problem of social mobility, together with a report on the findings of a particular case-study (the Oakland study). It is based on a number of articles that have already been published by the authors and their collaborators, but these articles have now been woven into a whole and have also been greatly extended, largely by fuller treatment of the findings of other investigators. The result is an impressive piece of work, which brings together an enormous amount of material and will undoubtedly become a standard reference on the subject. The most important broad conclusion is that the degree of social mobility differs comparatively little between the countries for which survey data exist and has not changed much over time. In their conclusions the authors suggest that the value judgments of many writers on social mobility are based on over-simplified and outdated factual assumptions.]

MACMILLAN (W. M.). *The Road to Self-rule. A study in colonial evolution*. London: Faber & Faber, 1959. 9". Pp. 296. 35s.

[To be reviewed.]

National Insurance Act, 1959. Interrelation with occupational pension schemes. A financial analysis. London: The Life Offices' Association (33 King Street, Cheapside, E.C.2); Edinburgh: Associated Life Offices (23 St. Andrew Square, Edinburgh 2), 1959. 9½". Pp. 23.

[This booklet has been prepared to assist employers and others to see how they stand in the light of the National Insurance Act, 1959. It shows the cost of providing the graduated pensions included in the Act and discusses the alternative lines of action open to employers regarding occupational pension schemes.]

PENROSE (EDITH T.). *The Theory of the Growth of the Firm*. Oxford: Blackwell, 1959. 9". Pp. viii + 272. 35s.

[To be reviewed.]

POLLARD (S.). *A History of Labour in Sheffield*. Liverpool: Liverpool University Press, 1959. 9½". Pp. xx + 372. 35s.

[To be reviewed.]

Readings in the Economics of Taxation, Selected by a Committee of the American Economic Association. London: Allen & Unwin, 1959. 9". Pp. x + 581. 36s.

[This is a most interesting addition to a now famous series. The coverage is deliberately restricted to one section of the field of public finance, partly because the series already contains

Readings in Fiscal Policy. The collection starts with a group of six papers on broad questions of equity and utility in taxation theory. This is followed by four papers on welfare implications. The remaining twenty-two items deal with incidence and incentive effects in their various applications, including the theory of income taxes, sales taxes and taxes on property. The collection differs from many recent volumes of readings in the amount of space given to older writers. Fourteen of the thirty-two articles date from before 1930, and only eight of them are later than 1945. The authors have cast their net widely, and the criticism levelled at some of the earlier volumes in the series regarding over-representation of American economists cannot be made in this case.]

STRACHEY (J.). *The End of Empire*. London: Gollancz, 1959. 9". Pp. 351. 30s.

[To be reviewed.]

SUPPLE (B. E.). *Commercial Crisis and Change in England, 1600-1642. A study in the instability of a mercantile economy*. Cambridge Studies in Economic History. London: Cambridge University Press, 1959. 8½". Pp. xii + 296. 42s.

[To be reviewed.]

Tariffs and Trade in Western Europe. A report by PEP. London: Political and Economic Planning, and Allen & Unwin, 1959. 10". Pp. 119. 30s.

[This is a work of reference. Detailed particulars are given of the tariffs imposed on over a thousand different commodities, classified as far as possible according to the Brussels Nomenclature, by each of the countries comprising the E.E.C. and the E.F.T.A. On the page opposite the tariff schedules are given the value of United Kingdom imports of the commodities concerned from E.E.C., the rest of O.E.E.C., the Commonwealth and the rest of the world.]

VERNEY (D. V.). *Public Enterprise in Sweden*. Liverpool: Liverpool University Press, 1959. 9". Pp. x + 132. 21s.

[To be reviewed.]

WIBBERLEY (G. P.). *Agriculture and Urban Growth. A study of the competition for rural land*. London: Michael Joseph, 1960. 8½". Pp. 240. 21s.

[To be reviewed.]

York: A Survey, 1959. York: Local Executive Committee on the occasion of the meeting of the British Association in York, 1959. 9". Pp. 198.

[This contains a series of some twenty mainly factual essays by different authors on the geography of the region in which York is situated, on the history of the city, and on its economic and social structure. The book is published on the occasion of the 1959 meeting of the British Association in York.]

American

Administered Prices and Inflation. Some public policy issues. Washington, D.C.: Chamber of Commerce of the United States, 1959. 8½". Pp. 81. \$1.00.

[This pamphlet sets out to contest the view that inflation is caused or aggravated by the administered price practices of large-scale concentrated industries. It therefore argues against the policy conclusion which would follow from this view, namely that the right way to control inflation is by imposing price controls.]

The Allocation of Economic Resources. Essays in honor of Bernard Francis Haley. Stanford, California: Stanford University Press (London: Oxford University Press), 1959. 9½". Pp. 244. 40s.

[To be reviewed.]

BATCHELOR (J. H.). *Operations Research. An annotated bibliography*, second edition. Saint Louis, Missouri: Saint Louis University Press, 1959. 9". Pp. 866.

[This formidable bibliography lists over 4,000 items on operations research arranged by alphabetical order of authors. Each of the items mentioned is given a brief descriptive summary, usually of 50-100 words. An index is included which facilitates reference to particular branches of the subject.]

BLOOMFIELD (A. I.). *Monetary Policy under the International Gold Standard: 1880-1914*. New York: Federal Reserve Bank of New York, 1959. 9". Pp. 62. 50c.

[To be reviewed.]

BRY (G.). *The Average Workweek as an Economic Indicator*. National Bureau of Economic Research, Occasional Paper 69. New York: National Bureau of Economic Research (261 Madison Avenue, New York 26), 1959. 9". Pp. 116. \$2.00.

[The length of the average working week is found to vary with the level of business activity, and it leads in time by a significant margin at turning-points. It may therefore be used as an instrument of prediction, and this is the aspect which the author is chiefly interested in. He presents the relevant data for the economy as a whole and for sectoral subdivisions, and he compares the cyclical behaviour of the workweek with that of related magnitudes, such as total manhours worked, total employment, etc. He also discusses the features of the labour market and of managerial labour policy that cause changes in the length of the workweek to precede changes in the general level of activity and production in the manner referred to.]

CHENERY (H. B.) and CLARK (P. G.). *Interindustry Economics*. New York: Wiley (London: Chapman & Hall), 1959. 9½". Pp. xv + 345. 64s.

[To be reviewed.]

The Comparative Study of Economic Growth and Structure. Suggestions on research objectives and organization. New York: National Bureau of Economic Research 1959. 9". Pp. viii + 200. \$3.00.

[The first half of this document consists of a most useful survey by R. W. Goldsmith of the present state and future prospects of research on comparative growth and structure. The author discusses both the substantial issues on which research is being carried out and also questions of method. The second part contains eleven short essays by leading economists on various aspects of research in this field.]

DIEBOLD (W.). *The Schuman Plan*. A study in economic co-operation, 1950-59. New York: Praeger for the Council on Foreign Relations (London: Oxford University Press), 1959. 9". Pp. xviii + 750. 57s. 6d.

[To be reviewed.]

FELS (R.). *American Business Cycles, 1865-1897*. Chapel Hill, North Carolina: University of North Carolina Press (London: Oxford University Press), 1959. 9". Pp. viii + 244. 48s.

[To be reviewed.]

FRIEDMAN (M.). *The Demand for Money: Some Theoretical and Empirical Results*. National Bureau of Economic Research, Occasional Paper 68. New York: National Bureau of Economic Research, 1959. 9". Pp. 25. 75c.

[This is a preview of part of a larger study being conducted at the National Bureau by Professor Friedman and Mrs. A. J. Schwartz. Its main feature is the application of Professor Friedman's notion of "permanent" income as the magnitude to which the demand for money may be adjusted. The paper originally appeared as an article in the *Journal of Political Economy*, August 1959.]

GAULT (E. H.). *Departmental Merchandising Results in Small Department Stores 1956-58*. Michigan Business Reports No. 30. Ann Arbor, Michigan: Bureau of Business Research, University of Michigan, 1959. 9". Pp. 103. \$4.00.

[The stores whose results are analysed in this paper belong to a class which has been undergoing a relative decline, partly on account of shifts of population and partly on account of the development of new types of retail outlet. The difficulties experienced by small department stores are duly shown up in the figures, particularly those relating to the year 1958, when the long-term difficulties were aggravated by the recession.]

HANNA (F. A.). *State Income Differentials 1919-1954*. Durham, North Carolina: Duke University Press (London: Cambridge University Press), 1959. 9½". Pp. xx + 268. 56s. 6d.

[The author analyses differences in income per head between the forty-eight states of the Union in respect of their extent, their movement over time and the relative magnitudes of the causes bringing them about. In percentage terms, differences have narrowed over time, but the ranking of states has altered comparatively little. A large part of the analysis is concerned with the contribution to inter-state income differentials made by differences in occupational and industrial structure.]

HARMON (E. M.). *Commodity Reserve Currency*. The Graham-Goudriaan proposal for stabilizing incomes of primary commodity producers. New York: Columbia University Press (London: Oxford University Press), 1959. 9½". Pp. 140. 28s.

[To be reviewed.]

Investment for Jobs. Washington, D.C.: Chamber of Commerce of the United States, 1959. 8½". Pp. 24. 50c.

[This is a study of the amount of investment likely to be needed in the next few decades in the United States in order to provide jobs for the foreseeable increase in the labour force. The working assumption used is that it costs some \$15,000 of investment to create each new job in industry. A considerable part of the pamphlet is devoted to rather general arguments about the environment favourable to business expansion.]

JAFFE (A. J.). *People, Jobs and Economic Development*. A case history of Puerto Rico supplemented by recent Mexican experiences. A report of the Bureau of Applied Social Research of Columbia University. Glencoe, Illinois: The Free Press, 1959. 8½". Pp. xix + 381. \$6.00.

[The author uses material he has collected relating to Puerto Rico in order to establish the following conclusions. When medical science lowers the death-rate in an under-developed country it may take a generation or more for changes in attitudes and habits to come about which will lead to a corresponding fall in the birth-rate, and in the meanwhile population will increase by a factor of two or more. At the same time the amount of underemployment is so great that very considerable economic expansion can take place without calling for any extra labour, and therefore the increase in the supply of labour brought about by population growth will not necessarily be absorbed even if there is a large rise in G.N.P. As a result, discontent and a sense of frustration may persist or even become worse, notwithstanding a rise in average income per head. In order to avoid this, the Government must strenuously seek to spread the benefits of rising output by welfare and educational schemes, which in addition to lessening discontent directly will also have the still more important advantage of hastening the adoption of attitudes favourable to family limitation. These conclusions are of a generally familiar kind, but the detailed evidence relating to Puerto Rico with which the author supports them is of interest.]

KEEZER (D. M.) and others. *New Forces in American Business*. An analysis of the economic outlook for the '60s. New York and London: McGraw-Hill, 1959. 8". Pp. xiii + 279. \$4.75.

[This is a vigorous, informative, but not very profound survey of the prospects of the American economy. The authors take up in turn the familiar topics: the prospects for maintaining high levels of investment and consumption; the role of government; competition; inflation; agriculture; and international economic relationships. On all these topics much interesting and relevant material is lucidly presented, and the authors then proceed to draw forthright and, on the whole, optimistic conclusions. On the basic question about the prospects for investment, a number of factors are named which in the authors' view should prevent any exhaustion of investment opportunities. These are interesting, but do not seem to add up to an entirely convincing proof that the character of the economy has, as the authors claim, undergone a major change compared with pre-war. They include: the increased importance of research; the scope for replacement of obsolescent equipment; the growth of amenity investment, which does not add to productive capacity; the increased flow of depreciation allowances; and, rather surprisingly, the prospective shortage of labour, which many theoretical economists would treat as a factor limiting investment opportunities.]

MADDEN (C. H.). *The Money Side of "The Street"*. New York: Federal Reserve Bank of New York, 1959. 9". Pp. 104. 70c.

[This is an informative popular account of the New York money market and its mechanics, particularly as they are related to Federal Reserve operations.]

MALENBAUM (W.). *East and West in India's Development*. The economics of competitive coexistence. Washington, D.C.: National Planning Association (London: Oxford University Press), 1959. 9". Pp. x + 67. 14s.

[The author analyses current plans and future prospects for economic development in India, with special reference to the part played by aid from Western countries and from the Soviet bloc. From the political standpoint he finds cause for concern in the fact that Soviet aid is concentrated in a relatively small number of easily identified projects, whereas Western aid, though much larger in a relatively small number of easily identified projects, is therefore superficially less impressive. More seriously distasteful, however, is the unsatisfactory outcome that now seems probable of the Second Five-year Plan period. This, in Dr. Malenbaum's view, is due less to lack of resources, such as increased Western aid might supply, than to shortcomings in the conceptual basis of the Plan. He suggests that the most helpful course might be if closer co-operation between the West and India could be achieved in working out the future programme for Indian economic development as a whole.]

MUSOLF (L. D.). *Public Ownership and Accountability*. The Canadian experience. Cambridge, Mass.: Harvard University Press, 1959. 8½". Pp. xii + 174. 32s.

[This is a readable essay in a field where this quality is too often lacking. It discusses in the light of Canadian experience the difficulties involved in striking the right balance in the working of

public corporations between independence and detailed accountability to government or parliament.]

Prerequisites for Economic Growth. National Industrial Conference Board Studies in Business Economics No. 66. New York: National Industrial Conference Board (460 Park Avenue, New York 22), 1959. 9". Pp. 80.

[This is a verbatim transcript of a discussion on some of the leading issues concerning growth between a group of economists brought together by the National Industrial Conference Board. Each of the participants was given the opportunity to make one major contribution, and these longer statements are linked together by some lively discussion. Quite a number of interesting points are raised, not all of them very familiar—such as the statement that the United States and Canada are nowadays the only countries in the world that experience actual falls in income in cyclical recessions. The chairman at the discussion was Solomon Fabricant.]

STOVEL (J. A.). Canada in the World Economy. Cambridge, Mass.: Harvard University Press (London: Oxford University Press), 1959. 8½". Pp. xiii + 364. 60s.

[To be reviewed.]

WARREN (H. G.). Herbert Hoover and the Great Depression. New York and London: Oxford University Press, 1959. 8½". Pp. 372. 50s.

[This is primarily a study in politics and administration rather than in economic history. Hoover's early career is described, and the author then proceeds to consider the efforts made by his administration to stem the depression. The various measures undertaken and the personalities involved are described in much detail.]

Swedish

ARTLE (R.). Studies in the Structure of the Stockholm Economy. Towards a framework for projecting metropolitan community development. Stockholm: The Business Research Institute at the Stockholm School of Economics, 1959. 9½". Pp. 197.

[To be reviewed.]

LINDBECK (A.). The "New" Theory of Credit Control in the United States. Stockholm: Almqvist & Wiksell for the Institute for Social Sciences of the University of Stockholm, 1959. 9½". Pp. 56. Sw.kr. 4.

[This is a critical survey of the "availability" doctrine of credit control, associated especially with the name of Robert Roosa, according to which small changes in prices of government securities may have important effects on real expenditure, even if the interest-elasticity of investment and consumption are low. The author reviews the various strands in the doctrine and examines their validity and mutual consistency.]

NURKSE (R.). Patterns of Trade and Development. Wicksell Lectures 1959. Stockholm: Almqvist & Wiksell, 1959. 9½". Pp. 63. Sw.kr. 3.50.

[These characteristically lucid and stimulating lectures were delivered by Professor Nurkse shortly before his death. They exemplify the combination of economic history and theory at which he excelled. The first lecture contrasts the impact of world economic development on international trade in the nineteenth and twentieth centuries. In the nineteenth century the economic growth of the North Atlantic economy was transmitted to other regions through an enormous expansion of demand for primary products. In the twentieth century, for a variety of reasons, this pattern of "growth through trade" has been and is likely to be a good deal less prominent. In his second lecture Professor Nurkse considers in the light of this the uses to which developing countries should devote the steadily accruing increments to their productive resources—the dynamic aspect of the theory of comparative advantage. The three alternatives are: increased output of primary products for export; increased output of manufactures for export to advanced countries; and expansion of output for domestic markets and for trade with other backward countries. Professor Nurkse reviews the obstacles to the first two of these and concludes that the third is bound to play a larger part than it did in earlier phases of world economic history. He also considers at some length the application of the doctrine of balanced growth, which he expounded in other writings, to the pattern of expansion of output for domestic markets.]

TRIFFIN (R.). The Future of the European Payments System. Wicksell Lecture 1958. Stockholm: Almqvist & Wiksell, 1958. 9½". Pp. 43. Sw.kr. 3.50.

[These are the first of a new series of annual lectures in Stockholm by visiting economists that have been instituted in commemoration of the name of Wicksell. In the first of his two lectures Professor Triffin considers the nature and historical background of the European payments problem in

general terms. He argues that in the nature of things no simple mechanism of international payments will serve, and he suggests that, partly because of the practical administrative consequences of this complexity, there is scope and need for regional groupings and organisations as well as world-wide bodies like the I.M.F. In his second lecture Professor Triffin puts forward certain more concrete proposals for a European clearing union.]

Norwegian

THONSTAD (T.). Produksjonsstruktur, Import og Sysselsetting: En kryssløpsstudie. (Structure of Production, Imports and Employment: An Input-Output Study.) Samfunnsøkonomiske Studier No. 8. Oslo: Statistisk Sentralbyrå, 1959. 9½". Pp. 129.

[This monograph has a short English summary, and English translations are also given of the main table-headings. It is concerned with the application of input-output analysis to various problems about the relation between the level and structure of demand in Norway, on the one hand, and her demand for imports, on the other. Some of these problems have a considerable general interest, and the input-output technique is applied in a number of different ways in the endeavour to solve them. Much use is made of a rough division of imports into two classes, those that are and are not in competition with domestic sources of supply.]

Egyptian

NATIONAL BANK OF EGYPT. Credit and Banking Developments in 1958. Cairo: National Bank of Egypt, 1959. 9½". Pp. 78.

[This is the first report of a new department set up within the National Bank of Egypt, the Control of Banks Department. The report consists of two parts. The first part describes in general terms the means by which control of banks is exercised in Egypt, and the second part deals with the problems involved in the preparation of statistics of bank credit.]

Official

SOUTH AFRICAN

MCWHIRTER (D. J. L.). Industry in Greater Durban: Part II: Raw Materials as a Factor in Industrial Location. A study by the Department of Economics, University of Natal. Pietermaritzburg: Town and Regional Planning Commission, Natal, 1959. 10". Pp. x + 100.

[This consists largely of a descriptive survey of industries operating in Greater Durban. The final chapter considers in more general terms the factors responsible for Durban's strength as an industrial centre. Much the most important of these is its position as the largest port serving the hinterland where the bulk of the Union's purchasing power is concentrated.]

AMERICAN

NATIONAL SCIENCE FOUNDATION. Bibliography on the Economic and Social Implications of Scientific Research and Development. Washington, D.C.: U.S. Government Printing Office, 1959. 9". Pp. 53. 25c.

[This is a classified and annotated bibliography of recent publications falling within the field specified. This field is interpreted in a broad sense, and a number of the items included are concerned with quite general problems of economic development.]

NATIONAL SCIENCE FOUNDATION. Current Projects on Economic and Other Impacts of Scientific Research and Development, 1959. Washington, D.C.: U.S. Government Printing Office, 1959. 9". Pp. 59. 25c.

[This contains a classified list of research projects currently under way relevant to the economic impact of scientific research and progress. Each item is accompanied by a brief description of the aims and methods of the project concerned.]

JAPANESE

ECONOMIC RESEARCH INSTITUTE, ECONOMIC PLANNING AGENCY. Employment Structure and Business Fluctuations. Economic Bulletin No. 2. Tokyo: Economic Research Institute, Economic Planning Agency, Government of Japan (Kasumigaseki, Chiyoda-ku), 1959. 11½". Pp. 108.

[This is a most interesting essay, in which a large array of statistical evidence is analysed in order to explain why fluctuations in effective demand in Japan appear to have so little effect on either unemployment or employment. The explanation put forward has two main elements. In

the first place, contractions in demand, such as that of 1958, have been largely confined to investment, and output of consumer goods has continued to rise. Since the consumer goods industries contain a larger proportion of small firms with low productivity, this has meant that employment has fallen less than output. In the second place, in prosperous times the small firms draw a sizeable proportion of their labour force from women and others who are not the chief wage-earners in the family, and these withdraw from the labour force in recessions. Adult male workers can always find some sort of job, but in depressed times they are obliged to accept the less well-paid jobs that would otherwise be carried out by subsidiary members of the labour force. In developing their argument, the authors provide much interesting detail about the peculiarities of the Japanese labour market and about their historical origins and effects. Prominent among these is the unusually wide spread in wage-rates. Wages depend largely on seniority within the firm, and large firms offer more stable employment than small ones; hence average wages are much higher in large firms. Not all of the many points made by the authors seem to have been quite fully worked out to their conclusions, and the section devoted to formal theoretical analysis is somewhat disappointing; but this is none the less a suggestive and valuable piece of work.]

INTERNATIONAL

INTERNATIONAL LABOUR OFFICE. *The International Standardisation of Labour Statistics*. Geneva: I.L.O., 1959. 9½". Pp. vi + 124. 6s.

[This follows up earlier reports on the same subject that have been prepared at intervals by the International Labour Office. The first part consists of a description of the work done at the international level in the standardisation of labour statistics. The second part reproduces the basic documents containing international standards in the field of labour statistics.]

ORGANISATION FOR EUROPEAN ECONOMIC CO-OPERATION. *The Elimination of Double Taxation*. Second report by the Fiscal Committee of the O.E.E.C. Paris: O.E.E.C., 1959. 9½". Pp. 51. 5s.

[This report describes the progress so far made towards the implementation of the recommendation made by the Council of the O.E.E.C. regarding double taxation on October 11, 1958. It also contains a new set of proposed articles suitable for insertion in bilateral conventions on double taxation.]

A Public Development Program for Thailand. Report of a mission organized by the International Bank for Reconstruction and Development at the request of the Government of Thailand. Baltimore, Maryland: The Johns Hopkins Press for the International Bank for Reconstruction and Development (London: Oxford University Press), 1959. 9". Pp. xvi + 301. 48s.

[The economic position of Thailand since the War has been, as is well known, more fortunate than that of most countries in Asia, largely because of the favourable ratio of resources to population. There are, however, signs that the causes that have been mainly responsible for growth up to now in income per head are losing some of their force. Most of the best rice land has been occupied and the most accessible teak forests have been cut, while population continues to increase at more than 2% per year. The report maintains that there is none the less still great scope for expansion in primary production. In particular, Thailand's potential as a rubber producer is very considerable if the right inducements to producers can be made available. The report argues in favour of a major change in the cropping pattern in the north-east, which is at present the poorest part of the country. The mission was not on the whole impressed by the Government's success hitherto in formulating coherent aims of economic policy or in carrying them out, and they make many suggestions for improvement, not only in the sphere of primary production, but also in the encouragement of manufacturing, the provision of transport, education, and general administration and finance. The head of the mission was P. T. Ellsworth.]

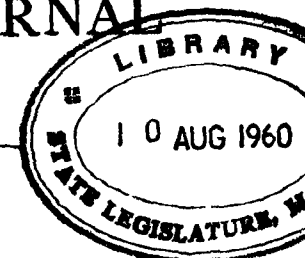
UNITED NATIONS FOOD AND AGRICULTURE ORGANISATION. *Marketing Problems and Improvement Programs*. F.A.O. Marketing Guide No. 1 by I. C. ABBOTT. Rome: F.A.O., 1958. 9". Pp. xiii + 260. 12s. 6d.

UNITED NATIONS FOOD AND AGRICULTURE ORGANISATION. *Marketing Fruit and Vegetables*. F.A.O. Marketing Guide No. 2. Rome: F.A.O., 1957. 9". Pp. xii + 205. 10s.

[The first of these two publications describes the main problems involved in the movement of food and raw materials from the farm to the final consumer. The many practical examples cited are drawn largely from under-developed countries. The final chapter deals with possibilities of improvement. These are subdivided according as they may be carried out by private enterprise, by co-operatives, by marketing boards, by governments or by the F.A.O. itself. The second report deals more fully and in more technical terms with the problems involved in the marketing of fruit and vegetables.]

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NOTE BY EDITORS

THE article which opens this issue is the first of a series of six Surveys of recent developments of economic theory which it is hoped to publish in the *ECONOMIC JOURNAL* at six-monthly intervals. This series, like the parallel series which is appearing in the *American Economic Review*, is supported by a grant from the Rockefeller Foundation. The Editors wish to acknowledge the initiative and encouragement of the late Professor Norman Buchanan, then Director for the Social Sciences at the Rockefeller Foundation, in suggesting and developing the plans for these Surveys. The subsequent Surveys will include "Linear Theory and Activity Analysis," by J. R. Hicks; "Interest Theory," by G. L. S. Shackle; "Theories of International Trade Policy," by Sir Donald MacDougall; "Theory of Oligopoly," by C. F. Carter. The scope of the last article in the series has not yet been finally determined.

A SURVEY OF WELFARE ECONOMICS, 1939-59¹

I. INTRODUCTION

WHILE it continues to fascinate many, welfare economics does not appear at any time to have wholly engaged the labours of any one economist. It is a subject which, apparently, one dabbles in for a while, leaves and, perhaps, returns to later in response to a troubled conscience—which goes some way to explain why, more than other branches of economics, it suffers from an unevenness in its development, a lack of homogeneity in its treatment and, until very recently, a distressing disconnectedness between its parts.²

A survey of the literature, therefore, which sought to do no more than elucidate in rough chronological order the ideas of the chief writers, while it might whet the appetite of some, would almost certainly leave the mind of the general reader in a dazed and dissatisfied condition. An alternative

¹ I wish to acknowledge, with gratitude, the services of Dr. S. A. Ozga, who gave freely of his time in discussing a first draft with me. The paper has benefited greatly from his many suggestions and criticisms. I am indebted also to Mr. Klappholz for some useful criticism on my excursion into methodology, and to Mrs. Diana Oldershaw for thoroughness and care in the cheerless task of compiling a bibliography.

² Little's *Critique*, in my opinion, has gone far to remedy this particular defect.
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procedure, and that adopted here, is the bolder one of occasionally tightening up loose connections and, especially in the later sections, suggesting, if not adopting, a particular perspective. While such a method imparts a more coherent picture than could possibly emerge from a non-committal account of the principal ideas, some degree of personal predilection is obviously unavoidable. It is a matter of prudence that the reader at all times bear this in mind.

On the question of coverage, since welfare economics is here understood as analysis—theoretical welfare economics, as it is sometimes called—and not the application of welfare propositions to economic situations, everything in the larger literature on economic policy has been disregarded. Index numbers, as indicators of welfare changes, are given only footnote treatment, since in all essentials the problems associated with them are the same as those uncovered in the controversy over hypothetical compensation, a matter discussed at some length in Part III. Excluded also is the controversial field of socialist economics except in so far as theoretical innovations are thrown up by the disputants. Again, the accent being on the formal development of welfare economics, the non-static aspects inevitably receive less attention.¹ Thus, until Part V, the framework of our exposition remains a static one. No growth or innovation takes place, no uncertainty exists and individual tastes remain unaltered. In addition, the working population is fixed and is, in some sense, fully employed. Within this framework it is further assumed that individual behaviour is consistent, and—unless otherwise proposed—that the individual is the best judge of his own wants.

To avoid tedious qualification at every stage of the analysis, we shall assume henceforth, unless otherwise indicated, that each individual consumes some of each of the goods and supplies some of each of the factors in the economy; that all goods and factors are sufficiently divisible to warrant the concept of marginal adjustment; that each class of goods or factors is a homogeneous group, any unit in that group being a perfect substitute for any other; and, lastly, that all relevant functions are differentiable and have sufficient curvature to yield tangency solutions.² Nothing unexpected or fundamental emerges from the removal of any of these simplifications, with the exception of divisibility. The consequence of removing this simplification is, however, dealt with in Part IV and an occasional footnote. Finally,

¹ A great deal of welfare economics, in the broader meaning of the term, is spoken by the elder-statesman type of economist, and much of it rings wise and true. But while it warns us, rightly, of the limitations of our analysis, it does not contribute directly to the formal development of the subject. Some of these broader considerations, however, are touched upon in the final section.

² If the functions are not differentiable we get kinks and corner solutions. If they have insufficient curvature we have corner solutions in the choice of output possibilities, and boundary optima in exchange situations. In such cases, though the optimal solution in terms of outputs is unambiguous, relative prices may be indeterminate within a wide range. Treatment of these things is popular in the literature on linear programming.

in order to purge the text of continual amplification, illustration and comment, which would otherwise impede the flow of the argument, footnotes have been freely resorted to. The general reader is advised to omit them on a first reading.

Since we have affirmed that the subject matter of this survey is theoretical welfare economics, we may begin by hazarding a definition of the term. Theoretical welfare economics is, then, that branch of study which endeavours to formulate propositions by which we may rank, on the scale of better or worse, alternative economic situations open to society. The words “better” and “worse” obviously call for clarification, and to this end we first consider the situation of the individual. His indifference map may be regarded as a picture of his chosen ranking of the conceivable combinations of goods and services. If we say that when he moves to a higher indifference curve (or that when he expands the effective area of his choice¹) he is better off, or he increases his welfare, we are giving expression to an ethical judgment; namely (a) that the individual—and no one else—is the best judge of his own well-being. In the Crusoe economy no more than this is required for welfare economics. But it is required. Without it, we may remark that Crusoe moves to a higher indifference curve, but we are then only describing how Crusoe acts: we are not judging his welfare. We can agree that under the utility hypothesis the individual believes himself to be better off in choosing a goods combination II rather than I. But since it is we, as welfare economists, who are to decide how to rank the alternatives facing him, unless we are agreed to accept his own ranking as final his preference field is irrelevant as an index of his welfare.

Since welfare economics is, however, concerned chiefly with community welfare, we shall require additional ethical judgments. The most widely accepted of these is (b) that the welfare of the community depends on the welfares of the individuals comprising it, and on nothing else. The mathematical expression of this statement is, of course, Bergson's social-welfare function in its general form, discussed in Part II. We can make this function a little more specific by attributing to it an ethical property which, it is believed, most people will accept—(c) that if at least one person is better off, no one being worse off, the community as a whole is better off.²

Turning to the more likely case, in which changes in economic organisation make some people better off and others worse off, several avenues are

¹ An interesting suggestion for a welfare economics in terms of expanded choice rather than indifference curves has been made by Lancaster [142]. Though it transpired that the definitions he adopted were not consistent * (see [183], [64] and [191]), it should not be hard to think of some consistent set of definitions which would enable us to determine changes in welfare by reference only to budget data, like index numbers. However, one cannot envisage any great advantage for welfare economics from this innovation.

* Since the above note was written, Lancaster has submitted a new set of definitions and a general proof in the *ECONOMIC JOURNAL*, December 1959.

² In such cases Graaff [84] would say that the social-welfare function was of the “Paretian type.”

open to us: (d_1) we can defer final judgment on the alternative patterns of welfare open to the community until we have completely specified the social-welfare function—that is, until we have ranked all possible combinations of individual welfares—which, in practice, means that we shall defer it indefinitely;¹ (d_2) we can exercise our judgment about resulting welfare distributions whenever we have to rank alternative situations. And, we may go further, and indicate the guiding aim of our policy on distribution, such as to equalise real incomes in some sense. Finally, (d_3) we might try to evade this judgment on welfare distribution by the conservative principle of compensated adjustment. We must suppose, as in (d_1), that any degree of welfare redistribution is feasible, and, on this principle, redistribute in order that no one is left worse off, though some are better off, in effect meeting the criterion (c) above.

There remains the question of methodology, which is touched upon only in the slightest manner in the formal treatment of this subject.² The question to be answered is whether welfare propositions, like positive propositions in economics, are capable of being tested. In the latter we postulate a set of propositions, or axioms, A , and test the implications, B . In effect, hypotheses about welfare can be cast into the form, if W then R ; by which we mean that if we accept certain assumptions about the nature of the economic universe, and if we accept some particular definition of an improvement in social welfare, then we can draw an inference R —namely, that when certain conditions are met social welfare is increased. This inference, R , a welfare proposition, can, conceptually, at least, be subjected to a test, inasmuch as we can inquire of each person whether or not he is better off, or else compare the ranges of goods available to him in two alternative situations.

Formally, then, propositions in welfare economics may be subjected to tests in the same way as those of positive economics. But there are far greater difficulties involved in testing an implication “fulfilling these conditions will make everyone better off” than in testing, say, the implication “if the price rises he will consume less.” Generally, in positive economics any of the implications we seek to observe are simpler than direct tests of the set of axioms from which it is deduced—if these axioms can be tested at all. In

¹ It may be noted in passing that the view that a prior mapping of a boundary encompassing all possible welfare combinations open to the community may proceed without ethical presupposition reckons without ethical judgments (a) and (b) above.

² An exception to this opinion is a recent and highly stimulating paper by G. C. Archibald [6], to which I am extremely indebted. It is difficult, however, to accept his suggestion that welfare economics can be studied without committing ourselves to welfare judgments by the simple expedient of sewing them on to a definition of welfare. This, of course, is possible, but no worthwhile advantage seems to follow from this ruse. The definition, he concedes, if it is to wear, must be “interesting.” But an “interesting” definition, in the context of welfare, is surely one that has broad ethical appeal. A definition which embodies no acceptable ethical proposition and yet is interesting to someone, is interesting only as a weird exercise. In order to decide whether a definition of an improvement in social welfare is to be adopted as the base on which to erect welfare propositions, we are impelled to ponder on its ethical implications.

welfare economics, however, if anything it seems the other way about: a test of the implications is more difficult than a direct test of the assumptions. Indeed, so remote is the likelihood of testing welfare implications that one is tempted to relinquish the orthodox methodology and have recourse to an admittedly inferior method—some might say an inadmissible method—of attempting to ascertain the validity of the premisses, W . After all, if (a) the assumptions about consistency and the shapes of the technological and behaviour functions are correct, and (b) if no other considerations are relevant, then good logic ensures that the implication, R , follows—that if the rules deduced are met, welfare, as defined, is increased.

Both these are, of course, very big ifs. In regard to (b), since our attention may be drawn to additional considerations as the subject progresses, we can never be sure we have not overlooked some factor which bears on the individual's welfare. As for (a), some of the assumptions have so far entered into positive theorising that their undeniable usefulness as assumptions has come to be associated with a belief in their validity. We may decide, after all, that people are in fact sufficiently consistent, and that tastes are sufficiently constant for the period in question, to make little difference to the result. As for the others: the nature of the production functions involved, the relationship between income distribution and relative prices, the interdependence of individual welfares, may gradually yield to patient investigation, so that any assumption about these things can be more than mere guesses. But it is a slow business. In the meantime, the practice has been to allow for our ignorance about such functional relations by requiring that our welfare propositions hold for all conceivable properties of such functions—a procedure which is, perhaps, too severe a test of the applicability of welfare propositions, and is, apparently, in large measure responsible for the indiscriminating pessimism now in vogue,¹ a matter which will receive further attention in the final part of this survey.

The above remarks are to be understood as an attempt to explicate the kind of methodology which appears consistent with the writings of the better-known economists, and to elaborate the sense of the frequent statement that welfare propositions rest on both factual and ethical assumptions. Unless both are granted, the first as being “realistic,” the second as being “widely acceptable,” the welfare propositions deduced from them are of no practical importance.

II. THE OPTIMUM CONDITIONS

Looking back over the last two decades at developments in welfare economics, the names that most readily spring to mind are those of Bergson, Kaldor, Hicks, Scitovsky, Samuelson, Little, Arrow and Graaff. The

¹ The word to be underlined here is *indiscriminate*. There may well be grounds for pessimism concerning the scope for applications of welfare economics, but, as is contended in the final section, most of the pessimism generated is for the wrong reasons.

temptation is to plunge at once into a discussion of the welfare criteria proposed by Kaldor, Hicks, Scitovsky and others, and of the social-welfare function introduced by Bergson, and later explored by Arrow and others, for these are the things which excited the most controversy at the time and still pique the curiosity by their elusiveness. For the purpose of exposition, however, this temptation is to be resisted. During the period in which these welfare criteria were being subjected to close scrutiny, treatment of the optimum conditions was one of the staple materials in text-books on welfare economics, and examples of their application continued to pour into the journals. A survey of this more pedestrian activity, which can usefully be regarded as a search for the necessary conditions of a position of maximum social welfare, is logically anterior in that the range of welfare possibilities open to society should be unfolded prior to the engagement of an apparatus of social choice involving ethical judgments. The next few pages, therefore, will be taken up with the examination of the optimum conditions of social welfare, leaving social-welfare functions and welfare criteria (which may be thought of as properties of a social welfare function) to be dealt with in Part III.

The Thirties

Although several noteworthy contributions appeared in the thirties, no common mode of treatment emerged. For one thing, while the welfare import of a Crusoe economy seemed plain enough, the significance for the community as a whole of meeting the so-called optimum conditions was not always clearly understood. For another, there was a variety of ways in which an optimum position might be expressed and discrepancies as to the proper number of conditions necessary to identify it. A comparison in these respects of the various contributions, in order of appearance, would be a fascinating if exhausting game. The intellectual reward, however, would be slight. We therefore omit in the text further reference to the pre-1939 literature on this aspect¹ except for a few paragraphs on Pigou and Bergson,

¹ The somewhat disconnected nature of earlier developments in this field can be illustrated by outlining some of the principal features of three well-known contributions in the thirties; in chronological order, Lerner, Kahn and Hotelling.

In his article on monopoly (A. P. Lerner, "The Concept of Monopoly and the Measurement of Monopoly Power," *Review of Economic Studies*, 1934), Lerner adopts as a definition of optimum a situation in which no individual can improve his welfare without making another worse off. It is met when the rates of substitution between pairs of goods for all individuals are equal to the technical rate of substitution. According to Lerner, this translates into the condition that product price ratios be proportional to marginal displacement costs, which condition is satisfied if price equals marginal cost. Any divergence between price and marginal cost is a measure of loss entailed by monopoly power.

In his later paper on Socialism ("Economic Theory and Socialist Economy," *Review of Economic Studies*, 1934), without saying more about optimum, he introduces the condition that all factors have the same ratio of marginal physical products, failing which a net increase of output is possible. Though Kahn (R. F. Kahn, "Some Notes on Ideal Output," *Economic Journal*, 1935) objects to Lerner's calling this condition an objective test on the grounds that it may be fulfilled while at the same time the "wrong" amounts of goods are produced, a re-reading of Lerner reveals that

a brief appraisal of the main features of whose work provides the necessary background to the developments in the period that concerns us.

The standard work of reference in the inter-war period was, of course, Pigou's *Economics of Welfare*.¹ In scope, in erudition, in systematic and lucid exposition, the work is a classic which no interested student can read without pleasure and, indeed, without occasional wonder. Mention of issues which are at the hub of current controversy may be discovered ensconced in the middle of an innocent-looking paragraph or tucked away modestly in some passing footnote. Aware of the obstacles to any generalisation in this field, Pigou moves cautiously. Only welfare which can be brought into relationship with the measuring rod of money falls within his province. For the most part he declines the services of the partial consumers' surplus technique

its objectivity consists in its being recognisable by a government bureaucrat producing goods in accordance with some arbitrary scale of values. Significantly, Lerner adds that a pricing system eliminates not only this source of waste but also that from producing the "wrong" goods when measured against people's demands, the latter source of waste being the more important.

Since the apparent purpose of Kahn's paper on ideal output was to put a sharper edge on some of the Pigovian tools, he adopted Pigou's welfare objective of maximising the national dividend. To do this without reference to distribution is, according to Kahn, to suppose we are maximising the satisfaction which would obtain if differences in the marginal utility of money to different people did not exist. So as not to become involved in distributional problems he assumes this to be the case, and is able, therefore, to take the price of a commodity, or factor, as denoting its marginal utility, or disutility, respectively, for the community. These latter assumptions, it may be observed in passing, are not those adopted by Pigou in his *Economics of Welfare*.

Kahn's paper is remembered chiefly for its amendment of two corollaries of the Pigovian system. First, whereas Pigou would have expanded industries with external economies and contracted those with external diseconomies in the belief that these effects were the exception rather than the rule, Kahn proposed that, in the event of such effects being common, the rule should be such as to shift resources from industries whose external economies were below the average to those industries where they were above the average. Second, and more of a departure from tradition, in the absence of external effects, the industries to expand are those whose ratios of price to marginal cost are above the average, and the industries to contract are those whose ratios are below the average. Ideal output requires no more than an equal degree of monopoly in all sectors of the economy. Criticism of this latter proposition seems to have ignored his "provisional" assumption that all factors were perfectly inelastic in supply.

Hotelling's famous paper (H. Hotelling, "The General Welfare in Relation to the Problems of Taxation and of Railway and Utility Rates," *Econometrica*, 1938) was one of the first attempts to vindicate the partial welfare approach of consumers' and producers' surplus in the light of a general welfare analysis. His fundamental theorem attempted to demonstrate that any excise tax which replaced an income tax yielding the same revenue placed the individual in a less-preferred position. A bridge, or other public utility, in which price was set above marginal cost (in order that total receipts cover total costs in decreasing-cost projects) was an example of an excise tax on a product or service in contrast to the alternative of raising the requisite revenue by an income tax, leaving price to equal marginal cost in the public utility.

A rather different argument is used later in the paper to uphold the consumers' surplus notion, which anticipates by a few months the Kaldor formula: if, in introducing an investment, some distribution of the burden is possible such that everyone concerned is better off than without it, there is a *prima facie* case for introducing it. This, he admits, leaves aside the question of whether the necessary distribution is practical. Provided, however, the benefits are great and widespread, it should be introduced even if some are actually made worse off. Extreme hardship, however, would warrant compensation.

¹ A. C. Pigou, *The Economics of Welfare*, 4th Edition (London, 1932).

initially favoured by Marshall, preferring a more general approach, and adopts a dual criterion for the detection of improvements in social welfare: an increase in the national dividend without any increase in the supply of factors, and a transfer of wealth from rich to poor. In regard to the first while there are insuperable difficulties in measuring the national dividend as a total figure, an increase in its value—brought about either by increasing some goods without diminishing others or by transferring factors to activities in which their social value is higher—is deemed an improvement in welfare provided that the share of the poor is not thereby reduced. As for the second, any reorganisation of the economy which increases the share of the poor without injuring the national dividend is to be accepted as a gain in social welfare. Any other consequence of economic reorganisation is ambiguous.

In order that output be truly ideal we must measure in terms of social and not private value; hence, his clear distinction between (i) the value of the marginal *private* net product, which is no more than the marginal physical product of the factor, as appropriated by the producer, times the market price of that product, and (ii) the value of the marginal *social* net product, which is the total of the products and services arising from the employment of the additional factor, no matter to whom they may accrue, each product or service being multiplied by the relevant market price. A large part of the book is devoted to pointing up situations in which (i) and (ii) diverge. In the event that (ii) exceeds (i) in any industry, that industry is to be expanded. If the reverse is true, the industry is to be contracted.

The Economics of Welfare is frequently associated with the controversies of the thirties over interpersonal comparisons of utility. But its enduring contribution is to be found in the continued emphasis on the vital distinction between social and private valuations of economic activities, a distinction evoked nowadays more by reference to “external effects” or “external economies and diseconomies of production and consumption.”

Though Bergson's seminal paper appeared in 1938,¹ his influence on several of the later writers was marked. In particular, Lange, Samuelson, Arrow and Graaff² drew inspiration from his approach and technique. The approach used was the time-honoured one of constructing a more general model under which the contributions of the previous writers could conveniently be grouped. In essence, social welfare was to be thought of as some function of the goods bought, and the factors supplied, by each of the individuals in the community plus, for completeness, any other relevant variables. Without giving it any specific form, this social-welfare function can be maximised subject to the constraints of the production functions. Of the variety of expressions which can be concocted of the first-order condition

for this maximum, Bergson selects four which lend themselves to the following interpretation:

- (1) The marginal social welfare “per dollar” of each commodity be the same for all individuals.
- (2) The marginal social diswelfare “per dollar” of each kind of work be the same for all individuals.
- (3) The marginal-value productivity of each type of labour be equal to the wage of that type of labour.
- (4) The increment in value from shifting a marginal unit of any non-labour factor from a good *X* to a good *Y* be equal to the costs involved in this shift. This condition is more familiar in the special case in which the costs of shifting the factor are nil. The condition then requires that the value of the marginal product be the same in all uses.¹

Conditions (1) and (2) are but formal corollaries of a maximum welfare position for society: in the jargon, they have no more “operational significance” than the equal marginal utilities per penny at which the “discerning” consumer aims. If by unanimous consent the distribution of the work and of the product are ideal, these two conditions are deemed to be fulfilled: no other test is possible.

Bergson's method had the virtue of recognising that the latter two conditions containing the rules for ideal output were separable from any prepossessions about the distribution of welfare which would be reflected in the first two conditions, an inference which was in contradistinction to the impressions conveyed by certain of the Cambridge writers, that they could be accepted only in conjunction with a particular distribution of welfare, equality.²

Development after 1939

Though continually displayed at slightly different angles by the various writers, the optimum conditions after 1939 began to look distinctly shopworn. A chronological reading imparts more of a sense of repetition than of evolution. Our purpose will be served with least tedium if, therefore, we proceed at once to an exposition of the logic of the optimum as it appears to-day, illustrating in footnotes the practice of some of the chief writers.

¹ As may be gathered from a further reading of the text, condition (3) may be viewed as a special case of a more general interpretation of condition (4), extended: (a) to cover all factors and not merely nonhuman ones, and to apply to all occupations including leisure, and (b) to include, in the differences in welfare referred to, the preferences of resource-owners as between occupations in addition to external economies and diseconomies.

² On the other hand, Bergson states that only the Cambridge School (which he associates with Marshall, Edgeworth, Pigou and Kahn) have a clear-cut social-welfare function. If social welfare is the sum of the individual utilities, diminishing marginal utility implies that the maximum social welfare is consistent only with equality of the marginal utility of money income among all individuals. If all have equal capacity for enjoyment, this first-order condition for a maximum is fulfilled when all incomes are the same. * See note on p. 265 below.

¹ A. Bergson, “A Reformulation of Certain Aspects of Welfare Economics,” *Quarterly Journal Economics*, 1938.

² See bibliography, items 144, 222, 14 and 24.

In their various formulations all of the optimum conditions are derivable from what is commonly called a Pareto optimum,¹ defined as a position from which it is not possible, by any reallocation of factors, to make anyone better off without making at least one person worse off (or, more briefly henceforth; to make "everyone" better off²). Since, at this level of abstraction, no institutional restrictions are placed on the degree of factor movement, large or small, a true summit position is implied. In general, there are many such summit positions, each characterised by a different distribution of welfare.³ Only a particular form of the social-welfare function enables us to select among all summit positions that yielding the highest social welfare. The Cambridge concept of ideal output, or ideal allocation of factors, a position from which no reshuffling of factors can add to the social value of the total product, expresses essentially the same idea as a summit or Paretian optimum position.⁴ However, its attainment is contingent upon the fulfilment of a single rule, which we shall designate the *allocative rule*, requiring that the value, at the margin, of any class of factor be the same in all occupations in which it is used.

In consequence, as we should expect, the allocative rule is equivalent to any one of the alternative statements of the optimum conditions. Ignoring for the present the distinction between private and social valuation, and assuming for the moment, as does Pigou, that factor supplies are perfectly inelastic, we can decompose the allocative rule into three popular optimum conditions.⁵ (1) *The Exchange optimum*, which requires that for each individual, the rate of substitution be the same for all pairs of goods in the economy.⁶ It is simple to demonstrate with the aid of the familiar box

¹ See V. Pareto, *Cours d'Economie Politique*, Vol. II (Lausanne, 1897), pp. 90 ff., and also E. Barone, "The Ministry of Production in the Collectivist State," in *Collectivist Economic Planning*, edited by F. A. von Hayek (London, 1935).

² When used as an abbreviation of the relevant expression, "everyone" will be placed in quotation marks, otherwise it carries its normal meaning. If the goods were sufficiently divisible, then a situation in which at least one could be better off and no one worse off would also be a situation in which, literally, everyone could be made better off.

³ To choose as between such positions we must therefore be prepared to make ethical judgments.

⁴ Lerner's "Rule" for the Controlled Economy [148, Chapter 16]—six conditions linked by equality signs—amounts to the Pigou condition that the value of the marginal social net product be the same in all uses *plus* those conditions under which, in a decentralised economy, firms will in fact realise the Pigou conditions, assuming a coincidence of private and social net products.

Though tested in the increasing complexity of successive chapters, the Rule emerges triumphant. Even indivisibilities leave it unscathed, provided that the value of the product of the indivisible block of factors be estimated with reference to the area under the relevant demand curve—this area representing approximately the revenue of a perfectly discriminating monopolist.

⁵ These three do not give the most compact form of the optimum conditions. As we shall see later, the first could be easily made part of the third. But in this limited form they appear frequently in welfare analysis, and will generally suffice when the results of the analysis in question are negative.

⁶ The reader is reminded of our simplification: that all goods be highly divisible; that each individual buys some of all the goods; that all factors enter into each of the goods—unless modified in the text.

diagram¹ that no movement from a tangency position can make both individuals better off. (2) *The Production optimum*, which requires that for each product the rate of substitution between any pair of factors be the same.² Once this condition is fulfilled, it is not possible to produce any more of a good without producing less of some other good (for brevity, henceforth; to produce more of "every" good). (3) Building on these two "lower level" optima, each of which is a locus of "efficient points," is the *Top Level optimum*.³ It requires that the subjective rate of substitution, common to all individuals, be equal to the rate of transformation (or, rate of objective substitution) for all pairs of goods in the economy.⁴ Once top-level optimum is achieved, it is not possible to describe a higher level of welfare for "everyone" given the production possibilities of the existing supply of factors.⁵

¹ The lengths of the two axes measure the given quantities of the two goods to be divided between the two individuals, the origins of whose indifference maps lie in opposite corners. The locus of mutual tangencies is commonly referred to as the contract curve, after Edgeworth.

² The geometric representation is similar to that of the exchange optimum, except that the amounts of the factors are measured along the two axes, and that in principle the iso-product curves may be numbered. The locus of mutual tangencies is frequently referred to as the locus of efficient points, or, sometimes, as the production contract curve.

³ Myint [189, Chapter 8] talks of (i) the subjective optimum, (ii) the physical optimum, and (iii) the general optimum of production and exchange, respectively.

⁴ The standard diagram here is of the transformation curve, or production possibility curve, between two goods being tangent at some point to a community indifference curve. The data necessary to the transformation curve are taken directly from the locus of efficient points in the iso-product diagram. The concept of the community indifference curve will be discussed later.

⁵ To show that these three conditions can be derived from the allocative rule, express the equality of the value of the marginal product in all lines of output as

$$p_x \frac{\partial X}{\partial A} = p_y \frac{\partial Y}{\partial A} = \dots \dots \dots (a)$$

$$p_x \frac{\partial X}{\partial B} = p_y \frac{\partial Y}{\partial B} = \dots \dots \dots (b)$$

where X and Y are products, A and B are factor units, p_x , p_y , are prices of the products X and Y , $\frac{\partial X}{\partial A}$ is the marginal physical product of factor A in the production of X , and so on.

Then: (1) Exchange optimum follows from there being but a single set of product prices facing each individual. Without this provision, the *value* of the marginal product would be ambiguous.

(2) The production optimum follows from dividing (a) by (b) to give $\frac{\partial B}{\partial A}$ in X equal to $\frac{\partial B}{\partial A}$ in Y .

(3) Top-level optimum follows if we divide (a) through by p_y and $\frac{\partial X}{\partial A}$, and (b) through by p_y and $\frac{\partial X}{\partial B}$ to obtain

$$\frac{p_x}{p_y} = \left[\frac{\frac{\partial Y}{\partial A}}{\frac{\partial X}{\partial A}} = \frac{\frac{\partial Y}{\partial B}}{\frac{\partial X}{\partial B}} = \dots \right] = \frac{\partial Y}{\partial X}$$

p_x/p_y faces each individual, so that to each the rate of substitution is $\partial Y/\partial X$, and this is equal to the rate of transformation $\partial Y/\partial X$ (on the right-hand side of the equation) between the products, using any of the factors at the margin.

(It may be observed that this last equation reveals, in brackets, that the ratio of the marginal physical products for all pairs of goods is the same for each of the factors—an alternative statement of the production optimum.)

It is commonly alleged that a sufficient condition for the allocative rule, and therefore for the optimum conditions also, is that in all markets the price of the product is equal to its marginal cost. For multiplying each side of the equality by the marginal physical product of any of the factors yields the equality between the value of the marginal product and the factor price. And since—granted factor markets competitive and, provisionally, ignoring non-pecuniary considerations—the price of any class of factor is the same everywhere, so also is the value of the marginal product.

But is this condition *necessary* to the allocative rule? According to Kahn,¹ the rule is not violated if product prices are not equal to their corresponding marginal costs, provided that they are proportional to them. This “proportionality” thesis, however, requires not only a zero elasticity of all factor supplies, explicitly assumed by Kahn, but also that no good be both a final product and an intermediate good.²

If we now remove the assumption of a zero elasticity in the supply of factors, a summit position is not consistent with the proportionality thesis. If, for instance, product prices everywhere exceed their corresponding marginal costs by a given proportion, the value of the marginal product of each factor exceeds its supply price by the same proportion, granted the above proviso about intermediate goods. Factor owners may benefit by extending their supplies at prices less than the values of their corresponding marginal products, while consumers may gain from lower prices on additional purchases of the various products. The allocative rule should therefore be interpreted to include non-pecuniary activities, in particular leisure, among the alternative occupations open, without constraint, to the factor owner. Put otherwise, to the set of optimum conditions mentioned above, we must add a lower-level optimum condition requiring that the rate of transformation between factor and product be the same as the subjective rate of substitution between factor and product for every individual. We shall refer to this condition briefly as the factor-product condition.

What about occupational preference? If occupations *X* and *Y* pay the same rate but the individual prefers *Y*, he will place more of his factors there. In the limiting case he places all of his factors in *Y*. He may do this—though others may not—even though *X* pays a higher rate than *Y*, and, therefore, the market value of his marginal factor is higher in *X* than in *Y*.

¹ R. F. Kahn, “Some Notes on Ideal Output.”

² In this connection, Little [161, p. 163] gives the following example. Coal, though a finished good, is priced as an intermediate good at its marginal cost. Electricity is priced as a finished good above its marginal cost. The rate of substitution of these two goods is therefore not equal to their rate of transformation. What this seems to show, however, is that, since the prices of all finished goods are required to be a given proportion of the value added at the margin by any (or, in the long run, all) of the factors, if an intermediate good is used as a finished good, in its latter use the price should be the appropriate proportion of its marginal cost, whereas when sold as an intermediate good its price should be set equal to its marginal cost. Whether it is possible always to maintain two different prices for the one product is a different matter.

But if the individual voluntarily forgoes extra payments in *X*, it is obviously because the loss in market value he sustains by reason of his choice is, at least, made up by the value that the individual places on his preference for *Y* (the words *at least* are inserted to allow for the individual who has placed none of his factors in *X* and whose premium for *Y* exceeds the current difference in pay between *X* and *Y*). The allocative rule should, in consequence, be amended to require that factors be so allocated that, to each individual factor owner, the value of any remaining preference of *Y* over *X* is equal, at least, to the additional market value of his marginal factor in *X*. An alternative statement is that a Pareto optimum has not been achieved if a worker can improve his welfare by moving to a lower-paid occupation. These opportunities for individual betterment are, however, exhausted by the factor-product condition mentioned above. For, given the rates of transformation between factor and product in the two occupations, a worker who prefers occupation *Y* to *X* will place more of his factors in *Y* than one who does not, in the limiting case placing none of his factors in *X*.

In passing, it may be mentioned that another, more compact, scheme of optimum conditions can be adopted which encompasses the formulations of several well-known writers. Summarised in a single rule that the rate of substitution between each pair of goods—goods to include, now, both products and factors—for every individual be equal to their corresponding rate of transformation, this statement comprehends six conditions: (1) that the rates of substitution be equal for all individuals as between (a) pairs of products, (b) pairs of factors and (c) any product and any factor; and (2) that the common rate of substitution be equal to the technical rate of transformation in each of the pairs (a), (b) and (c).¹ It may be observed, first, that in fact (1) is implied by (2), for if each individual equates his rate

¹ These conditions can be summarised in the following example of an optimum position, where *A* and *B* are different factors, and *X*, *Y* and *Z* their marginal physical products in three alternative uses.

	<i>X</i>	<i>Y</i>	<i>Z</i>		
<i>A</i>	1	5	8	.	.
<i>B</i>	2	10	16	.	.
.	.	.	.	.	.

Since each of these figures is a marginal physical product, or rate of transformation of factor into product, if we assume that, through prices, each individual equates his rate of substitution to each of these figures, then we fulfil (c) for (2), and therefore also for (1). Reading horizontally, we see that, at the margin, a unit of factor *A* can be transformed into 1 unit of *X*, 5 of *Y* or 8 of *Z*. This ratio of 1 : 5 : 8 is true also for the second line, and represents the product rate of transformation (using any of the factors at the margin) to which the individuals must equate their rates of substitution, thus fulfilling (a) for both (2) and (1). Finally, if we glance down the columns we remark that the rate of technical substitution of *A* for *B* is 2 : 1 in each of the products *X*, *Y*, *Z*. If each individual equates his factor rate of substitution to this technical rate of transformation between factors, (b) is fulfilled for both (2) and (1). Obviously, in such a table, for any number of rows and columns the ratios, row-wise, are all the same, which give another ratio which holds for all of the columns. A failure at any point in these ratios indicates a failure at some point in the optimum conditions.

of substitution to the rate of transformation a common rate of substitution as between the individuals emerges for each pair of goods. Second, that inter-temporal substitution can be allowed for in (1) and (2) by regarding products and factors at different dates as different goods. Something like the conditions in this form will be found in Hicks¹ and in Chapter 8 of Little's *Critique*.²

Having amended our allocative rule to take account of factor-product adjustment and occupational preference or, alternatively, having completed one or other scheme of optimum conditions, we must recognise, first, that perfect competition is neither a necessary nor a sufficient condition for meeting the allocative rule, or the optimum conditions, even under the provisional assumption of coincidence of private and social valuation.³ It is not necessary, since, without perfect competition, the allocative rule could be employed to guide the controlled economy into equating prices to marginal costs. It is not sufficient⁴ simply because a situation in which price equals marginal costs in all lines—a corollary of perfectly discriminating monopoly as well as of perfect competition—does not necessarily entail proper adjustment to the factor-product condition. True, all factors are paid the full value of their marginal product, but—to introduce an inevitable indivisibility at this stage—since universal perfect competition is consistent with fixed hours of work in production,⁵ each worker is subjected to a constraint which, in general, prevents his adjusting the supply of his labour to

¹ See bibliography, item 96.

² See bibliography, item 161. Dealing with the inter-temporal conditions, Little mentions the condition that the rate of substitution over time between goods be the same for each individual and equal to the rate of transformation over time. This is treated as one condition, not two. For the rest he ignores transformation and substitution as between factors themselves, and as between factors and products; instead he has two conditions requiring a common rate of substitution as between goods and money and as between bonds (or shares) and money.

In a simple riskless economy one would suppose Fisher's concept of the rate of interest which equates the marginal time preference of all individuals with the rate of return over cost would satisfy the inter-temporal requirements of an optimum position. We shall, however, touch on this point again in Part V.

³ Despite continued allegations to the contrary. For recent examples see Dorfman, Samuelson and Solow [59, p. 410], and Henderson and Quandt [92, p. 211].

⁴ In industries subject to decreasing returns to scale, owing to some scarce factor being unpriced and left out of the firm's production functions, marginal cost to the industry exceeds the inclusive average cost to the firms (since, in these circumstances, average costs do not include rent payments to this scarce factor). In perfect competition firms would then expand output to the point where the marginal cost to the industry exceeded the price of the product, the latter being equalled by the average costs of firms (excluding, of course, rent to the unpriced factor). A common example of such a case is deep-sea fishing. If someone appropriated the fishing area and charged a rent, based on the catch, so as to maximise his receipts (given the price of fish), perfect competition would result in an output for which price equalled average costs for the firms (including rent) and marginal cost to the industry.

⁵ When we allow for this constraint, or indivisibility in the supply of factors required of the individual, the supply curve of labour to the industry is no longer the horizontal addition of the supply curves of the individual labourers, but a schedule of the number of positive responses to an all-or-nothing offer over a range of such offers.

the going wage-rate. Consequently, his own valuation of his marginal factor may fall short of, or exceed, that of the market.¹

Furthermore, even if perfect competition did meet the optimum conditions laid down, these conditions themselves are only necessary conditions for a Pareto optimum. Since they are all in fact first-order conditions, they are consistent with a constrained minimum position (*a* in Fig. 1). Second-

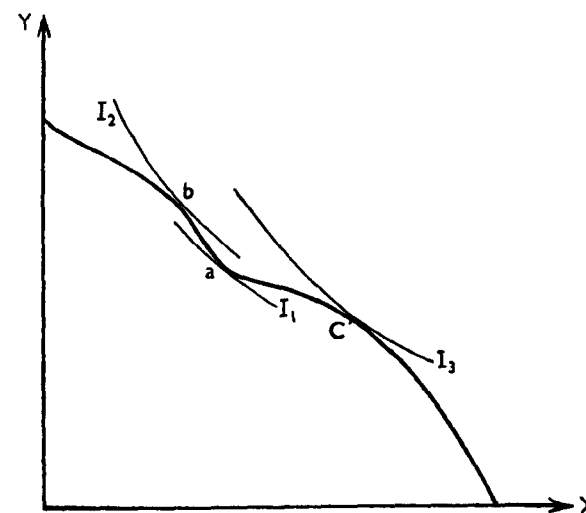


FIG. 1

order conditions are required which, as it happens, are no other than the stability conditions for equilibrium positions.² Nevertheless, even if the second-order conditions are fulfilled, or we have good reason to believe that the position in question is one of maximum, since only marginal conditions are involved we are assured only of a local maximum (*b* in Fig. 1), which may not, of course, be the largest maximum. True sufficient conditions, sometimes referred to as total conditions,³ are needed for a genuine summit position. Such conditions require that for all movements, large or small, from the optimum in question, no other position can be reached at which "everyone" is better off.

¹ Even though his marginal valuation exceed the market price of his labour unit, by accepting the all-or-nothing offer he may still make a surplus, or rent, in the occupation.

² See Hicks [96, p. 704]. Reder [207, p. 45] adds that the attainment of stable equilibrium under conditions of perfect competition satisfy the second-order conditions. Which stability conditions are intended are nowhere to be found, but presumably the Marshallian conditions are in mind—that the demand curve for each product cut the corresponding supply curve from above. Actually, the sufficient conditions for a (local) maximum are more complex, resulting as they do from the expansion of $d^2W < 0$, W being the welfare function subject to the production constraints.

³ See Hicks [96, p. 704]. The total conditions include the possibility of introducing a new good or ceasing to produce an existing good. Apparently no easily observable rules can be enunciated for the total conditions.

Finally, we must remind ourselves that a Pareto Optimum, or an ideal output, is but one of a large number of conceivable summit positions, each distinguishable from the others by a different pattern of welfare distribution.¹ It follows that, although there are particular optimal positions corresponding to any given non-optimal position which make "everyone" in the latter position better off, a movement from this given non-optimal position to any optimal position is not necessarily an improvement for "everyone."

We now turn to some of the outstanding applications of the optimum conditions. For the most part, the formal demonstrations involve little more than an inspection of the optimum conditions under alternative economic organisations. A practical difficulty in all the cases considered is that the optimum rules, corrected for differences between social and private valuations, must be met in *all* sectors for any welfare inference to be valid. If this stringent requirement cannot be met for any reason, there are no general rules to fall back upon; in particular, we cannot suppose that more conditions fulfilled are better than less. Again, we have so far ignored the consequence for the optimum conditions of the influence on the individual's welfare of the welfare of others. These two difficulties, along with others, will be treated in Part V. They are mentioned here in order to impress on the reader the rather provisional basis of the familiar welfare propositions which follow.

The case against monopoly in allocative economics² rested on its alleged restriction of output. This partial view of things was corrected by Kahn's ideal output³ characterised by an equi-proportional degree of monopoly in all lines of production. In so far as Lerner, Reder and Little⁴ reject this solution on grounds that the factor-product condition is not met, two points appear to have been overlooked. First, if Kahn's explicit assumption of a

¹ This is clearly recognised by Hicks [96, p. 701] and, later, by Reder [207, p. 38] and by Samuelson [222, p. 231-2]. In fact, the general proposition that we cannot identify an ideal allocation of resources unless we commit ourselves to a specific welfare function was argued—though in more informal terms involving utility—as far back as 1936 by Harrod (R. F. Harrod, "Another Fundamental Objection to Laissez-Faire," *ECONOMIC JOURNAL*, 1936).

On the other hand, Myint [189], who wrote of a "scientific welfare economics," seems to have put the matter too strongly in stating that the optimum conditions enable one to study "the purely mechanical efficiency of the economic system in satisfying individual requirements" without involving "any normative value judgments" [189, p. 118]. This language can easily convey the impression that allocative efficiency is something to the good which may be usefully pursued independently of any agreement on a desirable welfare distribution. But, as will be made explicit in Part III, an output combination that is "efficient" with respect to the existing welfare distribution may be "inefficient," and therefore non-optimal, with respect to another, possibly more desirable, welfare distribution.

² I think it would generally be conceded to-day that questions of stability, technical efficiency, innovation, the distribution of wealth and power, capture the interest both of the economists and the public more than do questions concerning the optimum output.

³ R. F. Kahn, "Some Notes on Ideal Output."

⁴ See bibliography, items 148, 207 and 161.

zero elasticity of the supply of all factors is accepted¹ the factor-product condition is, in effect, fulfilled. Second, if the view is taken that Kahn's assumption is too far at variance with the facts to be acceptable, perfect competition fares no better than equi-proportional imperfect competition. For, as we have already pointed out, perfect competition is consistent with fixed hours of work in all occupations which, effectively, precludes opportunities for marginal adjustments by factor-owners.

In the belief that price equal to marginal cost was the correct rule for industry, the Government intervening with taxes and bounties in order to correct for external effects, one slipped easily into the marginal-cost-pricing controversy bedevilled by computational conundrums, problems of administration, monetary and fiscal policy, political power and so forth. Allocative considerations alone, as it happens, have little to contribute.² An older element in the controversy goes back to Pigou's *Wealth and Welfare* of 1912, in which the author sought to demonstrate that output under competition was excessive inasmuch as rents which ought to enter into marginal costs were, instead, spread over average costs. The outcome of the discussion which followed this proposition was that—granted the prevalence of optimum conditions in all other sectors, and the coincidence of social and private benefits—the total increment of Ricardian rent and also, for that matter, all transfer rents on intra-marginal factors, should *not* in any case enter marginal costs. Such rents are not real costs but transfer payments, and there is no divergence, on these grounds, between competitive and ideal output.³ However, we must remind ourselves again that price equal to marginal cost in all sectors is not by itself enough to meet the necessary conditions for an optimum. Further, even if these necessary conditions were met, and sufficient conditions also, there is no warrant for the assumption that such a summit position is, in any acceptable sense, superior to all non-summit positions.

The marginal-cost-pricing rule is yet less satisfactory when, as is generally the case, we envisage setting prices only for one or several industries, while having to acquiesce in a diversity of relationships between price and marginal costs in all other sectors of the economy. Finally, if it were decided, for lack of a better rule, to equate price to marginal cost in any case the particular methods used to cover costs in decreasing-cost industries have no direct

¹ This zero elasticity is to be taken to result from a combination of a zero substitution effect plus a zero wealth effect in the supply of factors.

² Few of the contestants in this field of controversy questioned the welfare basis of marginal-cost pricing. For instance, the chief issues raised by Coase [48 and 49], Thirlby [236], Nordie [192] and Vickrey [243], among others, turned upon the practicability and other advantages of alternative methods of covering costs.

Despite its title, I can find nothing in Nancy Ruggles' article [217] that provides a welfare justification for marginal-cost pricing.

³ An excellent survey of this older controversy is to be found in Ellis and Fellner's 1943 paper [63].

by the movement from the community indifference curve I , in the free-trade position, to I' with the tariff. The tariff is an optimum inasmuch as I' is the highest achievable community indifference curve consistent with B 's unchanged offer curve. Thus, it is not possible to move from D and make "everyone" in A better off.

For country A , the slope of B 's offer curve represents the rate of transformation through foreign trade of Y , the good exported, for X , the good imported. Seen in this light, the additional condition required is that country A 's rate of transformation of Y into X through foreign trade be equal to the domestic transformation of Y into X and also, since we assume perfect competition to prevail in A , to the domestic subjective rate of substitution of Y for X —the slope of the community indifference curve I' at D . If we regard the optimum tariff, t , as equal to the difference between (i) π , the domestic price ratio (equals $X'D/X'H$) and (ii) p , the actual terms of trade (equals $X'D/X'O$) we can deduce that the formula $t = \frac{\pi}{p} - 1$, is equal to $X'O/X'H - 1$. But $X'O/X'H$ measures the elasticity of the foreign offer curve at D . Hence the optimum tariff, $t = E - 1$, where E is the elasticity of the foreign offer curve.

An alternative formulation put forward by Kahn,¹ in terms of the elasticities of the relevant demand and supply schedules, rather than in terms of the offer-curve elasticity, appears to lend itself better to estimation and may be derived directly from the optimum conditions in the above paragraph. Since the rate of transformation through foreign trade must equal the domestic rate of transformation, (a) the marginal cost of importing X divided by the marginal revenue from exporting Y must be equal to (b) the domestic marginal cost of X divided by the domestic marginal cost of Y . If we take the foreign supply curve of A 's imports to be upward sloping, the marginal cost to country A of importing X exceeds the foreign price of X by a proportion which varies with the elasticity of that supply curve. The foreign demand curve for A 's export, Y , being downward sloping, the receipts from an additional export of Y fall short of its price, again by a proportion which depends on the elasticity of that demand curve.

In the free-trade position, then, where the international price ratio is equal to the domestic price ratio, the (a) ratio, representing the true inter-

community indifference map. Such a frontier is constructed as the inner limit of all those community indifference curves which for the community have equal welfare value. Any point on this frontier, therefore, indicates the minimum quantities of goods required to attain a given value of social welfare. A criticism of the usual treatment of optimum tariffs, which treatment accepts the optimum tariff position as superior, actually or potentially (*i.e.*, using compensation tests), to the free-trade position, does not apply to Graaff's treatment. The Bergson frontier passing through D does not necessarily have a higher welfare value than that passing through the initial free-trade point, F .

¹ See bibliography, item 119.

national rate of transformation, exceeds the (b) ratio; which is to say, that it costs more to transform Y into X through trade than through domestic production. One therefore proceeds to reduce exports and imports (both by the same value in order to maintain balanced trade) until—with the marginal cost of importing X falling, and the marginal revenue from exporting Y rising (the respective marginal costs in home production moving in the reverse directions)—the (a) ratio is brought into equality with the (b) ratio, and the optimum condition is met.

Since, however, the domestic consumers have regard only to (c), the ratio of the actual price of imports X to the price of exports Y , which ratio is always smaller than the (a) ratio in the absence of tariffs, the consumers' choice may be "corrected" by increasing the price of imports to the required extent by levying a tariff on imports of Y . The tariff which makes these ratios equal is the optimum tariff, and as its height depends upon the shape of the two curves mentioned, it can obviously be calculated with reference to their respective elasticities. Writing η_s for the elasticity of the foreign supply of imports, and η_d for the elasticity of the foreign demand for A 's exports, the optimum tariff can be shown to have the form $\frac{1/\eta_s + 1/\eta_d}{1 - 1/\eta_d}$. Graaff has shown that this formula can be easily extended to cover any number of goods entering into a country's foreign trade.¹

The assumptions of balanced trade maintained, say, through changes in the relative wage-rates of the two countries, of an unchanged level of employment in A , of universal competition and an absence of external effects, are exacting enough, to say nothing of the distribution problem. Even if we grant all this, the formulæ, as Graaff points out,¹ do no more than reveal the relationships which are to obtain in the optimum situation. Guesses at tariff heights using the existing elasticities, if they can be obtained, may be wide of the mark, since the elasticities in question will themselves vary with the height of the tariff.

In conclusion, while there is little doubt that some countries may be in a position to improve their terms of trade with the outside world at some small sacrifice, if any,² in imports, the idea of an optimum tariff with its suggestion that there is some calculable set of tariffs which, in the absence of retaliation, is best for a country is all too facile. Quite apart from the stringent conditions and practical difficulties involved, the welfare significance of this optimum tariff is tenuous in the extreme. We already know that in the event that all the optimum conditions are fulfilled (including,

¹ See bibliography, item 84.

² If at the free-trade equilibrium B 's offer curve were sufficiently inelastic (less than unity), then some tariff imposed by A can improve that country's terms of trade while also increasing the volume of its imports. To illustrate, if B 's offer curve were B' in Fig. 2, intersecting A at F' , a tariff could reduce A 's effective offer curve to intersect B' at, say, G . Country A now imports more and exports less.

here, the foreign-trade optimum condition) in all sectors, the best we can hope for is a Pareto optimum, a necessary condition for a maximum of social welfare. Since there are actually an indefinite number of such summit positions, each corresponding to a different initial pattern of welfare distribution, there are in principle an indefinite number of optimum tariffs. Until we have some rule, evolved from ethical considerations, by which we may choose among the alternative summit positions open to us, there is no warrant for moving to any one of them guided by a set of optimum tariffs calculated on the basis of the existing welfare situation—assuming such calculation practicable. For, as we shall affirm in Part III, there is no acceptable definition of welfare by which an existing non-summit position may be judged inferior to *all* attainable summit positions.

III. THE CHOICE OF WELFARE CRITERIA

With the advent of "The New Welfare Economics" in 1939 there began a period of cautious optimism. It was not to last long. Two years later, in an ingenious paper,¹ Scitovsky demonstrated that the apparently felicitous device of hypothetical compensation advanced by Kaldor and promoted by Hicks was quite capable of giving contradictory results. And, though the device was promptly amended to preclude the particular perversity uncovered by Scitovsky, the damage began to spread. Little's fastidious examination of 1949 left the idea of hypothetical compensation, as a criterion of welfare, in a dubious state.² It was left to Samuelson to push the logic of Scitovsky's initial discovery to its conclusion: that, in general—if we exclude comparisons between situations in one of which there is more of "every" good—it was not possible to rank alternative economic organisations on the basis of compensation tests.³ Arrow's sweeping essay on social choice added to the scepticism which gathered force in the fifties,⁴ so that when Graaff's thesis appeared in 1957⁵ its elegant nihilism did little more than reflect the prevailing mood.

The controversy over welfare criteria was marked by greater critical insight, in respect both of ethical implications and the applicability of deducible propositions, than the more abstract dissertations on the optimum conditions. Interest in these criteria is, moreover, more easily sustained both because of the more explicitly ethical content and by virtue of a clear evolution of the compensation device which we follow in some detail, an evolution which, as it happens, links up eventually with the concept of a Pareto optimum regarded as a necessary condition for a position of maximum social welfare.

¹ See bibliography, item 227.

² See bibliography, item 221.

³ See bibliography, item 84.

⁴ See bibliography, item 154.

⁵ See bibliography, item, 14.

Compensation Tests

The formulation of the principle of hypothetical compensation¹ arose out of the controversies of 1938-39 in the *ECONOMIC JOURNAL*. Harrod,² illustrating the traditional acceptance of interpersonal comparisons of utility by reference to the repeal of the corn laws in 1846, had argued that the gain to the community as a whole might be regarded as exceeding the loss to the landlords only if the individuals affected were treated as equal in some sense. While he was prepared to go along with this, Robbins was not.³ To him this assumption of equal capacities for satisfactions was unwarrantable.

Without challenging Robbins' view of the scientific status of interpersonal comparisons, Kaldor denied their relevance for prescriptive statements.⁴ Indeed, according to Kaldor, the classical argument for free trade involved no such arbitrary element, the essence of the argument being that the Government could so compensate the losers as to make "everyone" better off. The compensation test implied by this view was to be understood as an objective test of economic efficiency and, according to Kaldor, prescriptions based on it had a scientific status detached from any value judgment. Thus, whether one should compensate or not, he submitted, was a political question on which the economist could merely pronounce an opinion.⁵

Hicks,⁶ who found much to admire in the structure of the traditional welfare economics while deprecating their foundations, eagerly grasped this notion of examining the efficiency of alternative economic organisations without reference to the question of distribution, and particularly without

¹ The terminology varies from time to time, and from one writer to another. The most common terms are compensation test, or compensation criterion; principle of compensation, or of potential or hypothetical compensation (with "overcompensation" frequently substituted for "compensation" in all these terms).

² R. F. Harrod, "Scope and Method of Economics," *ECONOMIC JOURNAL*, September 1938.

³ L. C. Robbins, "Interpersonal Comparisons of Utility," *ECONOMIC JOURNAL*, December 1938.

⁴ See bibliography, item 123.

⁵ Stigler [233] objects to the compensation principle inasmuch as its adoption would apparently sanction compensation of successful thieves for the amounts they would otherwise steal, thereby releasing resources engaged in maintaining law and order. In general, he argues, not only thieves and protected industries but anyone contemplating social mischief would, on this principle, be dissuaded from taking action by adequate compensation. As a principle, therefore, it is repugnant to our moral code.

But in fact the compensation principle asks only whether losers *could* be compensated: it does not require that they *should* be compensated. Consequently, from the successful application of the compensation principle to stealing, or tariff protection, nothing more may be inferred than that their removal would increase "efficiency." Whether, and in what manner, compensation should take place, if it should take place at all, is a question of distribution on which our moral sense has to be consulted. Indeed, the declared aim of the compensation test, as Kaldor stresses, is to separate the question of "efficiency" from that of distribution.

See also a comment on this paper by Samuelson [220].

⁶ See bibliography, item 96.

reference to the comparisons of satisfactions as between individuals.¹ Defining an optimum position along Paretian lines,² he pointed out that although there was not one but an infinite number of such optima, each differing from the others by a particular distribution of welfare, one could lay down universally valid conditions for such an optimum.³ If these conditions were not met the position was not one of optimum and, consequently, "everyone" could be made better off in moving to some optimum.

While Hicks followed Kaldor in using the notion of compensation as a wedge between efficiency and distribution, he was more cautious on the question of prescription and toyed with the idea of linking economic reform based on efficiency alone with some measure of actual compensation designed to make it more acceptable from the point of view of distribution, albeit not without reminding us that transfers of wealth might well reduce efficiency.

Scitovsky's paper, two years later,⁴ is memorable chiefly for its apparently paradoxical demonstration, that having shown a position II to be more efficient than a position I on the Kaldor-Hicks criterion, the same criterion might well reveal, following the community's adoption of the II position, that I was now more efficient than II.⁵ With this in mind, the new criterion suggested by Scitovsky was, as might be expected, that which required the result of the original Kaldor-Hicks test to be consistent with that of the "reversal" of this test—by which is meant the original test applied, now, to a movement from II to I. Only if *both* tests disclosed II to be better than I, or I to be better than II, was the Scitovsky criterion fulfilled. Any other outcome was ambiguous.⁶

¹ This, according to Hicks, was one of the three weak links in Pigou's valuation of the social income. The other two were: (1) the distinction between welfare and economic welfare (though this seems to be less a distinction of principle than of measurability), and (2) the measurement of the real value of the national dividend. However, as Hicks does point out, Pigou's welfare propositions refer to *changes* in the national dividend and, therefore, in no way depend upon his success in measuring the national dividend as a whole.

² Implicit in the definition of a Pareto optimum is a Paretian criterion that a position II is superior to I if, in moving to II, "everyone" is actually made better off. But its range of application is likely to be limited. It may be said that Kaldor's achievement consisted in transforming the Paretian criterion from an actual to a potential situation; II, that is, qualifies as the better position if, in the movement from I to II, "everyone" could be made better off. In effect, Kaldor followed Pigou's procedure in dividing welfare economics into propositions about the value of the product and those about distribution. Pigou's indicator for an increase in the national dividend, it should be recalled, was in fact just such a compensation test (*The Economics of Welfare*, 4th edition, pp. 50-5).

³ Hicks' marginal conditions required that the rate of substitution between any two goods (including factors) were the same for each individual and each producing unit. His stability conditions ensured that the position was one of maximum, and not of minimum. His total conditions (which in fact comprehended the stability conditions) would ensure the impossibility of improvement by introducing, or abandoning, any product or factor.

⁴ See bibliography, item 227.

⁵ It should be borne in mind, however, that positions I and II being compared were not, in the Scitovsky treatment, full optimum positions. In his main demonstrations they were two bundles of goods, each divided between a two-person community such that the exchange optimum prevailed in the division of each bundle.

⁶ Scitovsky put it slightly differently. He considered two possibilities, (1) a II position in which redistribution of the II product made "everyone" better off than he was in I, and (2) a

To apprehend the nature of the Scitovsky paradox,¹ and some of the finer points emerging from the further development of welfare criteria by Samuelson and others, familiarity with two popular constructs in welfare economics, the community indifference map and the utility possibility curve, is of great expository value. The former is elaborated below and then employed to shed light on Scitovsky's initial and somewhat esoteric demonstration. The latter construct will be explained later, prior to a consideration of Samuelson's distinguished paper of 1950.

A direct analogy with the individual indifference curve suggests that the community indifference curve be a locus of combinations, or "bundles," of goods as between which the community is, in some sense to be defined, indifferent. It has been found useful to define this indifference in such manner that for any point on the curve (representing a bundle of goods which may be chosen by the community) it is not possible to make "everyone" in the community better off. The exchange optimum, therefore, obtains at every point along the community indifference curve. In consequence, at every such point the rate of substitution between goods is the same for each of the individuals in the community.

Let us illustrate the geometric construction of a community indifference map for a community of two individuals, *A* and *B*, whose respective indifference maps are indicated in Fig. 3.² Since we may form a community indifference curve from any pair of the individual curves, let us start by choosing a_1 and b_2 . The community indifference curve to be constructed therefrom is to have the property that, at all points along it: (i) the individuals *A* and *B* maintain their respective levels of welfare, a_1 and b_2 , and (ii), as mentioned, the rate of substitution be the same for each individual for any division of the bundle of goods held in common.

If, therefore, we place the origin of *B*'s map diagonally opposite to that

I position in which redistribution of the I product made "everyone" better off than he was in II. If (1) were possible and (2) impossible, then we could say that II was the more efficient position. Conversely, if (1) were impossible but (2) were possible, then I was the more efficient alternative. Whereas if both were possible we could say nothing. Other possibilities, such as II better than I by the original test and equal to I by the reversal test, were ignored.

¹ Scitovsky's attitude is less vulnerable than might appear from a reading of later criticisms. If he appeared to accept compensation tests as tests of efficiency he did so: (a) because the more acceptable Paretian criterion was likely to be satisfied very rarely, and (b) because in any case the "principle of compensated adjustment"—the fulfilment of the Kaldor-Hicks test plus actual compensation in order to make "everyone" actually better off, which gives the effect of implementing the Paretian criterion—obviously favoured the *status quo*. Nevertheless, he was not willing to prescribe policy solely on the basis of these tests, and without reference to social justice.

Furthermore, he anticipated Samuelson in defining II to be more efficient than I if for every distribution of welfare each person in II could be made as well or better off than he was in I, a criterion which would be fulfilled if there was an increase in at least one good without there being a reduction in any good. Notwithstanding this generalisation, he held that only two distributions really mattered—a position later taken up by Little in his more down-to-earth approach—that before the change and that after.

² This follows my treatment in 1952 [177]. Graaff has a similar geometric treatment. Scitovsky [228] and Baumol [24] also go into the construction of this curve in some detail.

of A 's origin and, keeping B 's axes parallel to those of A , move B 's map until b_2 just touches a_1 at, say, c' in Fig. 4, then the point Ob (the origin of B 's map) taken with reference to A 's origin, Oa , represents a point on the required community indifference map. Another such point would be Ob' , B 's map having been moved downward to the right and adjusted so that, once again,

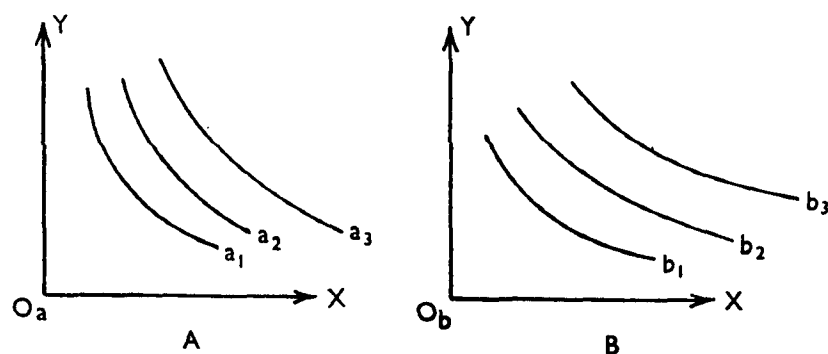


FIG. 3

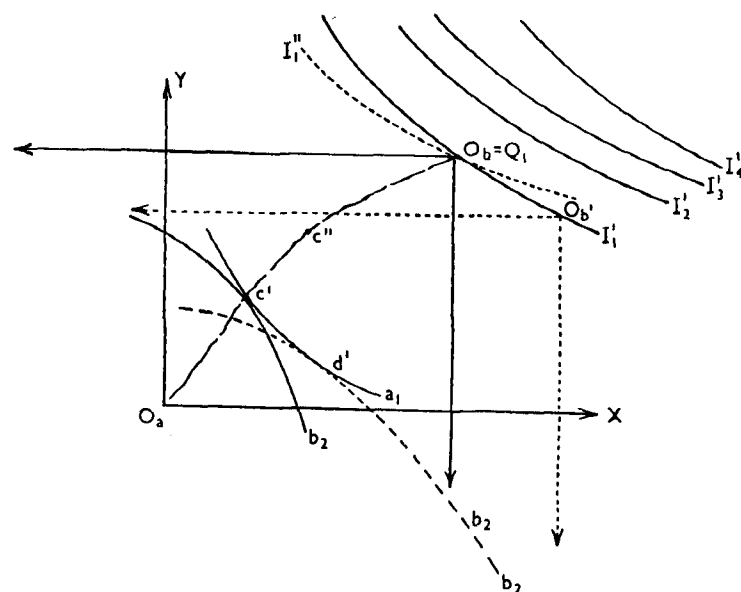


FIG. 4

b_2 just touches a_1 , this time at d' . Clearly, by moving B 's map continuously downward to the right, and then upward to the left, b_2 at all times being placed tangential to a_1 , B 's origin describes the community indifference curve I_1' , having the desired properties (i) and (ii).

Two further observations are necessary before proceeding. First, given any point in the X - Y quadrant, say Q_1 , as represented by Ob in Fig. 4, the particular community indifference curve we have constructed, I_1' —representing the sum of the individual welfares a_1 and a_2 —is not the only

community indifference curve which may pass through Q_1 having property (ii). For we could divide this bundle Q_1 between A and B in an indefinite number of ways, taking care always that, whatever the distribution chosen, the rate of substitution be the same for both individuals. Under this restriction, therefore, redistribution is confined to movements along the contract curve of Q_1 . If, for instance, we move along the Q_1 contract curve from c' to c'' , the latter point being the mutual tangency of a_2 and b_1 , a new community indifference curve I_1'' can be generated from these individual curves in the way described. I_1'' and I_1' cannot, of course, be compared on the Paretian criterion—that “everyone” is better off on one of these community indifference curves compared with his being on the other—since in moving from I_1' to I_1'' individual B is worse off while A is better off. Indeed, we can derive a whole pencil of such non-comparable community indifference curves passing through Q_1 , each corresponding to a different division, along the contract curve, of the Q_1 bundle. It is, clearly, a consequence of property (ii) that each of these community indifference curves passes through Q_1 at a slope parallel to the mutual tangency (on the contract curve) of the individual indifference curves from which it is generated.

Second, if we use the Paretian criterion to rank the community indifference curves its consistent application presents us with a map of non-intersecting community indifference curves.¹ For instance, having I_1' as representing individual welfares a_1 and b_2 , we could proceed to construct I_2' from, say, a_2 and b_3 , I_3' from a_3 and b_1 , I_4' from a_1 and b_3 , and so on—“everyone” being better off in each successively higher community indifference curve. Such curves we may call *comparable*. They form part of a consistent community indifference map. Obviously, quite a number of other consistent maps may be constructed on this principle, beginning with, say, I_1' , though, in general, it will not be possible to move from a curve of one of these maps to that of another.

Fig. 5 illustrates the Scitovsky case with two alternative bundles of goods, Q_1 and Q_2 . The existing division of Q_1 between A and B is given by c' on the contract curve OQ_1 , with I_1' representing the community indifference curve proper to that distribution. On the other hand, the existing distribution of Q_2 is indicated by c'' on the contract curve OQ_2 , with the community indifference curve I_2'' corresponding to c'' . If, now, I_1' and I_2'' were directly comparable we could move direct from one to the other and fulfil the Paretian criterion of an improvement in the community's welfare. They are not comparable, however, and we therefore have recourse to the Kaldor-Hicks criterion, which devises comparability through

¹ It does not follow, however, that successively higher non-intersecting community indifference curves fulfil the Paretian criterion. Individual indifference maps which were identical and homogeneous would yield a unique set of non-intersecting community indifference curves. Irrespective of the manner in which the individual curves were combined, only one curve would pertain to a given bundle of goods.

hypothetical compensation. Through Q_2 we proceed to construct a community indifference curve I_2' that is comparable with I_1' . Apparently, then, there is some division of the Q_2 bundle—that from which I_2' has been generated—which does make “everyone” better off than he is with the Q_1 bundle. If we act on this criterion and arrive safely at Q_2 , however, we discover that Q_1 beckons us with exactly the same happy prospect. For we may construct I_1'' through Q_1 comparable with and, as it happens, above I_2'' .

The apparent paradox is easily explained. With the distribution c' of the Q_1 bundle, the common rate of substitution is, say, $2Y = X$. With X twice as valuable as Y for the community, the bundle Q_2 , which differs from Q_1 in having, let us say, one more of X and one less of Y ,¹ must be reckoned

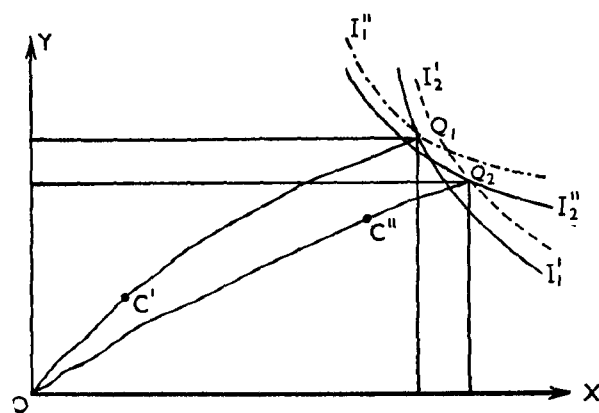


FIG. 5

by the community as the more valuable of the two. Having moved to Q_2 , however, the new distribution of that bundle is that indicated by c'' , a distribution which happens to be associated with a common rate of substitution $Y = 2X$. But on these relative valuations, Q_1 is, for the community, clearly the more valuable of the two bundles. This inter-relationship between relative valuation and distribution is the source of elusiveness and paradox which runs through so much of the initial controversies on welfare criteria and index numbers.

Little's Criterion

In respect of welfare criteria, Little's "Foundations" paper of 1949,² developing more systematically the ideas put forward in Scitovsky's 1942 "Note,"³ represents the most critical opposition to the original Kaldor

¹ So small a difference between the two bundles is adopted to suggest that we may effectively ignore those changes in the community's rate of substitution that result only from a movement along the community indifference curve.

² See bibliography, item 154.

³ See bibliography, item 227.

dichotomy between efficiency and distribution. He is no less critical of the purism of Robbins, since the impossibility of scientific inter-personal comparisons of welfare is not relevant to propositions about group welfare—though not for the reasons put forward by Kaldor, that they might be circumvented by the device of hypothetical compensation. It is not relevant simply because one no longer believes that propositions about group welfare require the adding together of the (cardinal) utilities of the various individuals.¹

Value judgments, affirms Little, in particular those about distribution, cannot be avoided in welfare economics. We should, however, make them explicit and, if we wish to carry the reader with us, endeavour to make them widely acceptable. To say that a policy which meets the Kaldor-Hicks criterion increases the “efficiency” of society is, in effect, to recommend it. Whereas if the value judgments implicit in the criterion are bared, it is unlikely to find favour with many people. Compensation is, after all, only hypothetical: it is consistent with making the poor yet poorer. Hence, to announce, as did Kaldor, Hicks and others at that time, that an objective method of detecting increases in “wealth” or “efficiency” had been discovered, is to mislead opinion by the use of persuasive words. Nothing had been discovered. Kaldor had merely coined a *definition* of efficiency, one whose ethical implications, as it happens, are hardly acceptable.

Turning to the more positive part of his analysis, Little explicitly favours the piece-meal approach to what he calls utopianism, or the all-or-nothing approach of Bergson, Samuelson and others. The value premisses on which his criterion will rest are: (i) that the individual is deemed to be better off in a chosen position than he is in any other position, and (ii) that a movement to a situation in which “everyone” is better off is a good thing. The criterion he lays down, reminiscent of Pigou's dual criterion, is that, in so far as welfare is affected only by the economic variables under consideration, the change to a new situation ought to be made: (a) if the new distribution is no worse than the old, and (b) if it is impossible to make “everyone” as well off in the original position as he would be after the change.

Three things are worth noticing: first, that Little does not commit himself to the extent that Pigou does in the matter of distribution, though one is left with the impression that, like Pigou, he would consider a general reduction of inequality, *cet. par.*, a good thing. Second, that part (b) of the criterion amounts to the fulfilment of the Kaldor-Hicks reversal test for a movement from I to II which Scitovsky had proposed to ensure consistency after the original Kaldor-Hicks test was met. Little refers to this reversal

¹ Indeed, inter-personal comparisons of themselves are not value judgments but judgments of fact resting upon observation and introspection. A “desirable” distribution of real income is, on the other hand, obviously a value judgment. Thus, while we may agree on what constitutes an ideal distribution of real income, differences in our judgments of the facts may preclude agreement on the specific distribution of money, or goods, in the community.

test as the "Scitovsky criterion."¹ Third, an implication in the first edition of the *Critique*² that comparisons of *relative* welfare distributions could be made. Such comparisons would require, as Arrow remarked in the review of that edition,³ both the possibility of inter-personal comparisons and the measurement of cardinal utility.⁴

The particular method employed by Little in judging whether a movement from the initial situation I to an alternative situation II is an improvement for the community is to pose three questions: (i) Is the Kaldor-Hicks criterion satisfied? (ii) Is the "Scitovsky criterion" satisfied? (iii) Has II a better distribution than I? Since the answer to each of these three questions is either a yes or a no, eight different combinations of answers to (i), (ii) and (iii) are possible. In his second edition, in order to meet criticisms of his earlier edition of the *Critique*, particularly those of Arrow and Baldwin,⁵ Little considers the eight possible combinations first under assumption A: that purely distributional changes are not possible.⁶

We may usefully classify his results as follows: of four combinations (out of the eight possible) (i) and (ii) are both satisfied in two of these combinations, and are both *not* satisfied in the other two combinations, while the answer yes to question (iii) occurs only once, in one of the former pair of combinations. For that combination then, in which (i), (ii) and (iii) are satisfied, a movement from I to II is prescribed. Of the remaining four combinations, the answers to (i) and (ii) are opposites in all cases. In two of these cases, however, the answer to (iii) is yes, and therefore, as it transpires, a movement to II is prescribed in either case.

The sanction for a movement to II in the latter two cases may require a word of explanation. Suppose that the Kaldor-Hicks test shows II to be better than I (though the "Scitovsky criterion" gives the opposite result), it follows that a movement from I to II'—II' being the hypothetical distribution of the II bundle which renders it comparable with that of the I bundle—would make "everyone" better off. We now make a further imaginary journey from II' to II, II being the initial distribution of the II bundle. From (iii) being answered in the affirmative, we know that II is better than, or at least no worse than, the II' distribution of that bundle.

¹ From now on, quotation marks will distinguish it from Scitovsky's declared criterion which required the fulfilment of the Kaldor-Hicks test, for a movement from I to II, *plus* the non-fulfilment of the reversal test.

² See bibliography, item 160.

³ See bibliography, item 11.

⁴ A comparison could be made, however, by use of the notion of comparability of distributions. If II' represents a distribution of the II bundle which is comparable with the existing distribution of the I bundle, and if the initial distribution attaching to the II bundle is better than this II' distribution, then the II distribution may be said to be better than the I distribution. It is along such lines that Little proceeds in his second edition.

⁵ See bibliography, items 11 and 19.

⁶ In his first edition Little made the arbitrary assumption that a redistribution of welfare was possible before the change to the new position, but not after, with results that were criticised by Arrow [11] and Baldwin [19].

The total welfare effect may then be regarded as a compound of two improvements: a movement from I to II' which makes "everyone" better off, followed by a movement to II—which is to a better distribution of that bundle, or at least to one that is not worse.¹ We explain the other case in a similar fashion, though beginning the other way round. A distributional change from I to I'—I' being that hypothetical distribution of the I bundle which is directly comparable with that attaching to the II bundle—is, by (iii), an improvement if anything. While, since the "Scitovsky criterion" is met, a movement from I' to II makes "everyone" better off.² To conclude under assumption A, if the Kaldor-Hicks criterion, or the "Scitovsky criterion," or both, are met, and, in addition, the redistribution involved is, at least, not worse, then a movement from I to II is recommended.

¹ In Fig. i let Q_1 and Q_2 be the two bundles, and I and II their corresponding community indifference curves. II' is a community indifference curve passing through Q_2 which is comparable

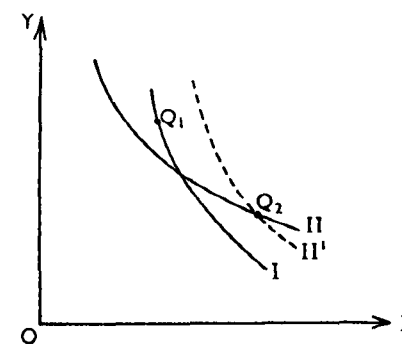


FIG. i

with I. Hence the Kaldor-Hicks criterion is satisfied. If the community moves to Q_2 but maintained the II' distribution "everyone" would be better off. A further improvement takes place in adopting the II distribution of Q_2 .

² In Fig. ii the initial improvement arises from I'', which is a better distribution of the bundle

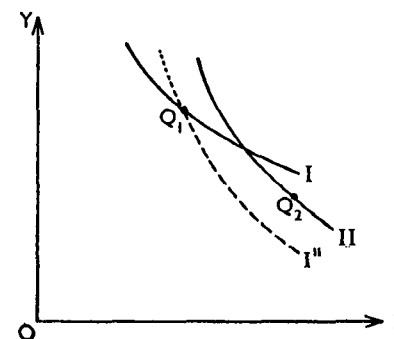


FIG. ii

Q_1 , and one comparable with the II distribution of Q_2 . A movement from I'' to II now makes "everyone" better off.

Following this exercise, Little considers these possible combinations under assumption B, that all distributional changes are possible. This means that "intermediate" positions such as II' and I'' are not merely hypothetical but directly attainable as, of course, is any other distribution. The trouble about such an assumption, as Arrow pointed out,¹ is that in the event of its adoption the logical procedure would be to move towards the attainment of an ideal distribution of welfare with any bundle of goods. Indeed, if all restrictions on direct redistributions were removed the only test open to us would be the straightforward Paretian criterion: we should

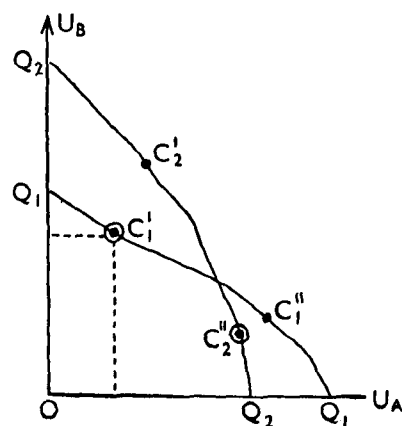


FIG. 6

ask, is "everyone" better off with the ideal distribution of a new bundle II compared with the existing and comparable distribution of the bundle I.

Samuelson's Criterion

Further pursuit of welfare criteria is possible along a rather different route, one which begins with further consistency tests and leads inexorably to a concept of Bergsonian dimensions in which all the welfare potentialities inhering in the resources of an economy are displayed prior to eliciting some acceptable social-welfare function to select for us the ideal pattern of welfare. Our progress towards this concept will be facilitated by the employment of Samuelson's utility-possibility curve to which we now give brief attention.

In construction it resembles the production-possibility curve except that, along each of the axes, the welfare, or ordinal utility, of one of the individuals is measured on any arbitrary scale.² The boundary of all combinations of the individual utilities which are possible with a given bundle of goods forms the utility-possibility curve. If two individuals, *A* and *B*, share a

¹ See bibliography, item 11.

² With ordinal, and non-comparable utility, the scale used on each axis is arbitrary in everything except order.

bundle Q_1 , such a curve may be mapped from data summarised along the contract curve of Q_1 , since each point on the contract curve—and, for that matter, a corresponding point on the utility-possibility curve—may be viewed as providing the maximum utility to *B* consistent with a given utility to *A*.

The initial division of the Q_1 bundle, in Fig. 6, is represented as the point c_1' on the utility-possibility curve Q_1Q_1 . Since *B*'s utility cannot increase without that of *A* diminishing, the boundary Q_1Q_1 is downward sloping to the right. Q_2Q_2 is the utility-possibility curve corresponding to the Q_2 contract curve, with c_2'' indicating the individual utilities corresponding to the existing division of that bundle. In order to compare the alternative bundles Q_1 and Q_2 using the Kaldor-Hicks criterion, we move along the Q_2Q_2 utility curve from c_2'' , the existing distribution—increasing *B*'s welfare at the expense of *A*'s—to c_2' , a point north-east of, and therefore comparable with, c_1' on the Q_1Q_1 curve. Having thus satisfied the Kaldor-Hicks test, we now try the reversal test, which will be based on the c_2'' distribution of the Q_2 bundle. From c_1' we move along Q_1Q_1 to c_1'' , a point to the north-east of, and therefore comparable with c_2'' , in this way making both individuals better off with the Q_1 bundle.¹ Since Q_2 is superior to Q_1 by the original test and Q_1 superior to Q_2 by the reversal test, the criterion proposed by Scitovsky is not fulfilled. If the decision to move from one position to the other depended solely on these compensation tests we should have no warrant to change the initial position.

But suppose the Scitovsky criterion were met? Quite apart from the ethical objections voiced by Little and others to using compensation tests as a sufficient criterion of an improvement in economic organisation, we apparently run into logical difficulties if we persist in its application. For, as Gorman² has pointed out, the Scitovsky criterion may lead us round in circles if adopted as a welfare criterion. To use his illustration, c_1, c_2, c_3 and c_4 indicate the welfare distributions pertaining to four bundles of goods, Q_1, Q_2, Q_3 and Q_4 respectively, whose utility possibility curves are shown in Fig. 7. Bundle Q_2 is easily shown superior to Q_1 by the Kaldor-Hicks test, while Q_1 cannot be shown superior to Q_2 by the reversal test. Hence, by the Scitovsky criterion, Q_2 is better than Q_1 . By the same criterion, Q_3 is shown superior to Q_2 , and, again, Q_4 is shown to be superior to Q_3 . Transitivity requires that Q_4 be superior to Q_1 . But it is manifest from the figure that, by the Scitovsky criterion, Q_1 is superior to Q_4 .³ Clearly, the Scitovsky criterion—and, therefore, the Kaldor-Hicks criterion also—is not transitive,

¹ Though, admittedly, it summarises the Scitovsky paradox with greater facility than the community indifference curve technique, the latter provides greater insight inasmuch as it points up the dependence of relative valuation on distribution.

² See bibliography, item 79.

³ We could demonstrate this intransitivity just as well if, along the axes, we measured goods instead of utility, and treated the curves as community indifference curves, the points c_1, c_2, c_3 and c_4 being alternative bundles of goods.

and could not be used alone ¹ as a guide to policy without risk of contradiction.

Even for a straight choice between two alternatives we may be dissatisfied with the Scitovsky criterion. Though a movement from Q_1 (with

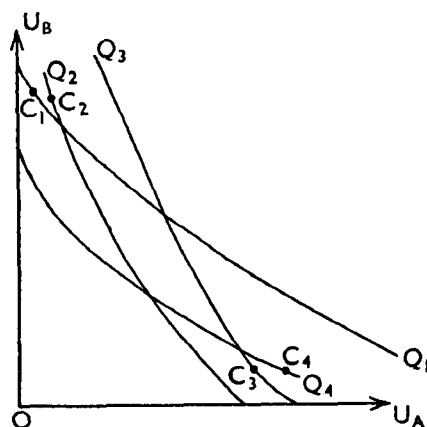


FIG. 7

the attached c_1' distribution) to Q_2 (with the attached c_2'' distribution meets the Scitovsky criterion in Fig. 8, we cannot allow that Q_2 is *potentially* superior to Q_1 when it is superior for only two alternative distributions c

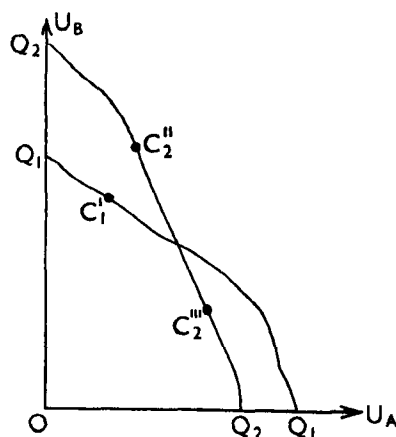


FIG. 8

welfare; at least, not unless, in the nature of the problem, these two distributions are the only ones admissible. If, for example, we had to consider

¹ While Little's adoption of the "Scitovsky criterion" may appear vulnerable on these grounds we must remember that his criterion also demands an acceptable distribution of welfare prior to any change being recommended. The Gorman demonstration of intransitivity does apparently depend on marked differences in the distribution of some of the bundles. Provided, then, that the acceptable range of welfare distributions was narrow, the fulfilment of Little's criterion would preclude, on distributive grounds, such contradiction.

distributions comparable with c_2''' , which would show Q_1 superior to Q_2 , we could no longer assert that Q_2 was potentially superior to Q_1 . Indeed, if, as Samuelson suggests,¹ we put aside for the present the question of distribution in the belief that, at a later stage, we may have the choice of any ("feasible") distribution, a much more stringent criterion is required to designate a potentially superior bundle; namely, Q_2 is potentially superior to Q_1 only if for every conceivable distribution Q_2 is superior to Q_1 —if, that is, the Q_2Q_2 utility-possibility curve is at all points outside that of Q_1Q_1 . A sufficient (though not a necessary) condition for Q_2 to be potentially superior to Q_1 and, to fulfil, therefore, Samuelson's criterion of an increase in "potential real income," is that Q_2 have more of "every" good than Q_1 .²

¹ See bibliography, item 221.

² In view of Samuelson's welfare discussion in his 1950 paper being closely bound up with his examination of index numbers as indicators of a potential increase in the community's real income, a few words on the close relationship between index numbers and compensation tests may be of interest.

For the consistent individual,

$$\sum p_2 q_2 \geq \sum p_2 q_1 \quad \dots \quad (a)$$

implies

$$\sum p_1 q_1 < \sum p_1 q_2 \quad \dots \quad (b)$$

From (a) we can infer that the q_2 bundle is preferred to the q_1 bundle, for in the II situation—that in which the p_2 prices are available—he spends on the q_2 bundle as much, or more, than the cost of the q_1 bundle. (This, indeed, is the interpretation of the (a) notation.) Thus, he could have had the q_1 bundle at the prices ruling in II, but chose instead to spend as much, or more, on the q_2 bundle—clear evidence of his preference for the q_2 bundle. Now, if instead of (a) we had the situation

$$\sum p_1 q_1 \geq \sum p_1 q_2 \quad \dots \quad (c)$$

similar reasoning would point to a preference for the q_1 bundle. Since he cannot prefer both q_2 and q_1 , (c) is not consistent with (a). If (a) is established, we must cross out the greater-than-or-equal-to sign of (c), which, therefore, renders it (b). The sense of (a) and (b) in terms of indifference curves can be seen by the reader in Fig. iii without the need for comment.

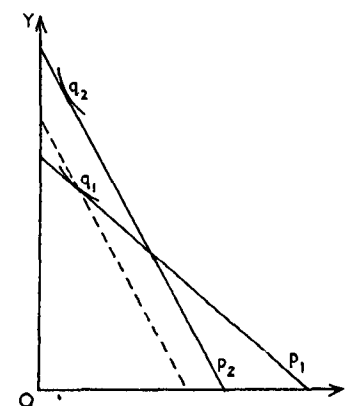


FIG. iii

In the case of the community, however, the simultaneous observation of (a) and (c) does not necessarily indicate inconsistency. In view of the intimate relationship between welfare distribution and relative prices, non-comparable indifference curves attaching to the bundles q_1 and q_2

For some central range of the bundles on the production-possibility curve, all the corresponding utility-possibility curves will overlap. The outer envelope of these overlapping curves, which we may refer to as the utility frontier,¹ is indicated by FF in Fig. 9. Regarded as the boundary of all utility combinations possible with the given resources of the economy, FF summarises the data which in principle can be made available without any ethical presuppositions other than: (a) that the individual is the sole judge of his own welfare, and (b) that the welfare of the community depends only upon the welfares of the individuals who comprise it. And only at a later stage, when choosing as between alternative combinations of individual welfares, are the ethics of distribution involved. The search for a satisfactory test of a potential welfare improvement using only compensation tests has—in its comprehension of all conceivable welfare distributions—joined with the concept of all existing production possibilities to issue in a construct, the utility frontier of society which, though it contains no ethical presuppositions other than an acceptance of individual choice, provides the basic data of welfare possibilities necessary for a comprehensive social choice determined by any method.

may intersect as shown in Fig. iv. With the p_2 prices, q_2 has the higher value for the community, and (a) obtains. This situation corresponds to the fulfilment (for a movement from q_1 to q_2) of the Scitovsky reversal test— q_2 being preferred to q_1 when the comparison is based on the I_2 distribution of welfare. On the other hand, with the p_1 prices, q_1 has the higher valuation, and the index

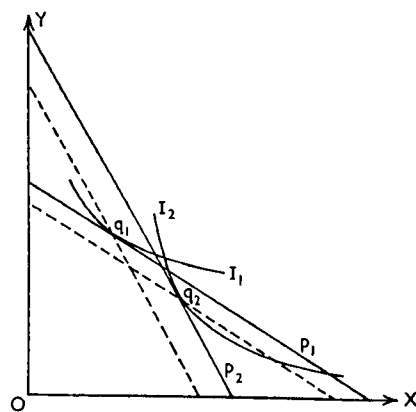


FIG. iv

numbers give us (c). This situation corresponds to the non-fulfilment of the Kaldor-Hicks test, inasmuch as q_2 is not preferred to q_1 , when the comparison between bundles is based on the I_1 welfare distribution.

Indeed, if we think now in terms of the Samuelson criterion, which requires that we compare q_2 and q_1 for all conceivable distributions of welfare, and, therefore, for an implied range of corresponding price ratios, q_2 is potentially superior to q_1 only if, for all such price ratios, q_2 costs as much or more than q_1 . Again, a sufficient condition for this to occur is that the q_2 bundle contain more of "every" good than q_1 .

¹ Samuelson [221] refers to it as the *situation* utility-possibility curve in order to distinguish it from the *point* utility curve of a bundle of goods.

It may be supposed that all welfare distributions on and within the boundary of Fig. 9 can be reached by government policies or, if we wish to appear realists, we can follow Samuelson and include only "feasible" welfare combinations in the picture. The set of W curves in the figure emerges from some acceptable social-welfare function, each such curve being a locus of welfare combinations as between which society is indifferent.¹ If

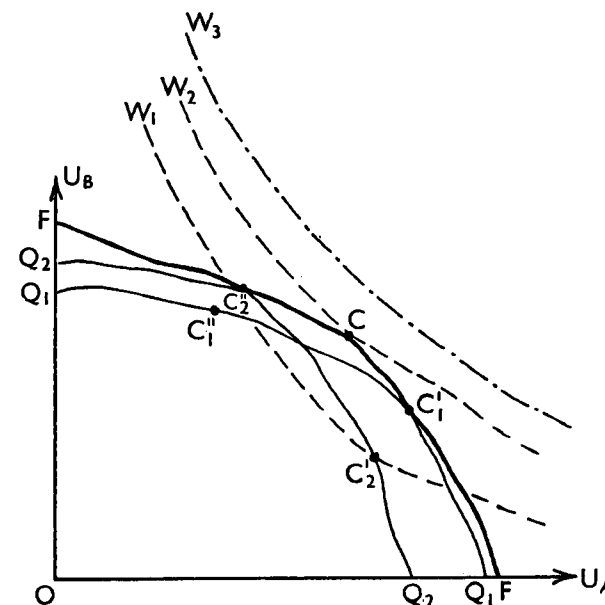


FIG. 9

the social-welfare function is "of the Paretian type," to use Graaff's terminology, the W 's are ranked north-east from the origin; which is to say, if "everyone" is better off, then society is deemed to be better off—an ethical judgment that seems to have met with little opposition. C in Fig. 9 is clearly the maximum social welfare for the particular Paretian type of social-welfare function chosen: of all the welfare combinations open to society that at C has, in the opinions formalised by the welfare function, the highest social value.

Disregarding, provisionally, the social-welfare function, let us briefly explore the properties of the utility frontier. The point c_1' , as the tangency between Q_1Q_1 and the frontier FF , informs us that there is no distribution of any other bundle that can yield a situation in which "everyone" is better off than he is at c_1' . Since on this description c_1' is recognised as a Pareto optimum, all the necessary conditions—the exchange, production and top-level optima—are all fulfilled. Indeed, since the utility frontier is made up

¹ The reader is reminded that we have yet to determine whether a social-welfare function for society can emerge from the separate aspirations of the individuals comprising it.

of tangency points such as c_1' , this frontier constitutes a locus of Paretian optima.

A welfare combination c_1'' on the utility-possibility curve Q_1Q_1 is obviously not a Pareto optimum, being a point below the frontier FF . Exchange optimum obtains and we must assume—if FF is a genuine frontier—that production optimum also obtains. Top-level optimum, however, does not obtain, since a movement from c_1'' to, say, c_2'' involves a change of bundle which in effect makes “everyone” better off, thereby fulfilling the Paretian criterion. But such a movement does not fulfil the Samuelson criterion. For if we consider all comparable distributions of Q_1 and Q_2 , for some of them, Q_2Q_2 will be above Q_1Q_1 , while for others the reverse is true. Once it is appreciated that whether or not any efficiently produced bundle has top-level optimal properties—that rates of substitution in consumption and in production are equal—depends entirely on its distribution,

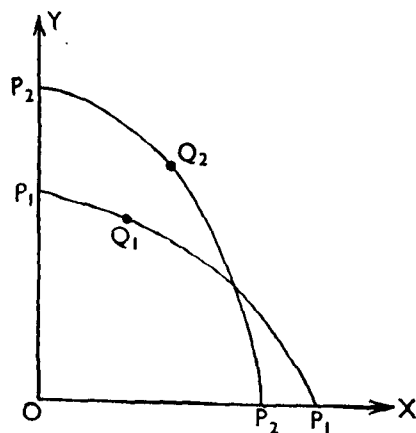


FIG. 10

any belief in the potential superiority of a Pareto optimum disappears. Any Pareto optimum will, of course, be actually superior to some particular range of comparable non-optimal positions. But since the optimal characteristic of a bundle depends solely on the distribution attaching to it, divested of that distribution it fares no better than the other efficiently produced bundles. No bundle, then, is superior to any one of the other efficiently produced bundles for *all* welfare distributions, and therefore no bundle can fulfil the Samuelson criterion.¹

If Q_1 and Q_2 , in Fig. 10, are regarded as bundles of goods on alternative

¹ A similar treatment using community indifference curves can be found in [180], where it is shown that as optimal and non-optimal positions are characterised, at top level, by the relationship between prices and their marginal costs, comparisons between such positions cannot even be made. Only when such a range of bundles (on the production-possibility curve) are divested of their optimal or non-optimal characteristics can comparisons between them be made and, in the absence of a particular welfare distribution, no bundle can be demonstrated superior to any other.

production-possibility curves P_1P_1 and P_2P_2 respectively ¹ we run into trouble according to Samuelson. For though the utility-possibility curve generated from bundle Q_2 lies everywhere above that generated from bundle Q_1 , obviously the utility frontier of the production-possibility curve P_2P_2 will not lie everywhere above that of P_1P_1 . If, now, the community experiences a shift from Q_1 on P_1P_1 to Q_2 on P_2P_2 , producing more of all goods in the new position, the inference that a potential increase of real income has taken place would be false. This afterthought, however, is not very convincing.²

The Social-welfare Function

We have already indicated that, in a manner analogous with the imposition of an individual's ordinal welfare function—in two dimensions, his indifference map—upon his budget constraint, to yield a maximum position, we can impose a Paretian-type social-welfare function upon the boundary of welfare possibilities to reveal the summit position for society. Actually, the original Bergson welfare function was designed to rank not the combinations of individual welfares but, more directly, the combinations of all those variables on which the individual welfares depended, in particular the goods consumed and the services rendered by each of the individuals in society. And, formally, this is how Arrow deals with it.³ He was the first to make the attempt. Although the social-welfare function had received continual mention since Bergson's 1938 formulation, no instruction in the drafting of this grandiose design had been hazarded. Rather it had been invoked in the grand manner of Samuelson as a *deus ex machina* to crown the formal elegance of his “general equilibrium” welfare. Indeed, one could hardly hope to do more with so stupendous a concept—except, perhaps, to question whether such a thing could, in principle, be constructed so as to manifest the aspirations of a free society. This, in fact, was the task that Arrow set himself.

We are to imagine that each individual has his own precise notion of a

¹ The meaning to be attached to a choice between alternative production frontiers is far from obvious. Other than international trade, which presents the community with alternative *consumption* possibilities, one expects, with the passage of time, that the entire production frontier move outward. The choice of accumulating at a faster rate, then, translates into the choice of having the entire frontier move outward at a faster rate.

Even if, owing to the exhaustion of irreplaceable resources, some parts of the frontier shrink, the event is, surely, irreversible.

² The sense of the word “potential” in this context is elusive. In the original Kaldor-Hicks criterion the statement that Q_2 is potentially superior to Q_1 would mean that a *redistribution* of the product Q_2 would make “everyone” better off. Pending the actual redistribution, that is, the superiority of Q_2 remains potential. But what of the assertion that a production-possibility curve P_2P_2 is potentially superior to P_1P_1 , since, for any point on P_1P_1 , there will be some point on P_2P_2 with more of “every” good? For not only is hypothetical distribution involved in this case but also hypothetical movements along the production-possibility curves. But if one can envisage movements from bundle to bundle along the curves, why not also between the curves? If such movements are admitted, however, as it seems they should, the comparison between the two production-possibility curves crumbles. Only the outer production frontier has meaning.

³ See bibliography, item 14.

suitable welfare function for society or, to use Arrow's terminology, that each individual has a particular "ordering," or ranking, of all the conceivable "social states"—each "social state" referring to a distinct combination of all the relevant variables in the economy that enter into the individual's welfare.¹ Suppose there are m distinct social states conceivable, and suppose that there are altogether n different ways of ordering these m social states,² the question to be answered is: regardless of which of these n different ways happens to be chosen by each of the individuals, will it be possible, always, by means of some rules that are ethically acceptable to a free society, to construct therefrom a corresponding social ordering of the m social states?

In order to be ethically acceptable, Arrow proposes that the social ordering to be derived from the individual orderings meet certain "reasonable" conditions: (i) it must be positively associated with the individual orderings;³ (ii) if some social state be removed, as no longer relevant, society's ranking of the remaining social states must not be changed; (iii) the social ordering must not be imposed, either by custom or dictatorship.

After dismissing the rank-order method of voting,⁴ and after a preliminary skirmish with the compensation principle,⁵ Arrow opens a full-scale attack with his "Possibility Theorem" designed to demonstrate the impossibility of meeting these conditions.

Though the problem has been posed on an astronomical scale, the proof is compact enough, involving, in the first instance, only two individuals and three alternative social states, x , y , z . Since among Arrow's axioms is the requirement that for every conceivable set of individual orderings there must correspond a distinct ordering for society, in the event that individual I prefers x to y and individual II y to x , we are obliged to infer that society is "indifferent" as between y and x . To state otherwise, for instance, that society prefers x to y , leads to logical implications which reveal individual I to be a dictator inasmuch as society's orderings will always coincide with his.

If, now, to take an awkward possibility, individual I has the ordering x , y , z , and II has the ordering z , x , y , we are required to infer, as just stated

¹ Although it is allowed that the welfare of each individual may depend on those of others inasmuch as the goods received and services rendered by every individual enter into the social states to be ranked, the formal treatment at no point draws on this complication.

² If we admit only "strong" ordering—no provision for indifference being made— m alternative social states can be ranked in m factorial different ways. The introduction of "weak" ordering—indifference being allowed—multiplies this number.

³ This condition would exclude inter-personal comparisons of utility.

⁴ See bibliography, item 14, p. 27.

⁵ Since Arrow's rejection of the compensation principle on the grounds of inconsistency [1, pp. 34–45] stems from his adoption of a footnote suggestion by Scitovsky [228, pp. 94–5] that two bundles of goods whose community indifference curves intersect be regarded as "equally good," his demonstration is, perhaps, otiose. If anything, the principle of compensation cannot qualify for social-welfare function meeting Arrow's conditions simply because of Arrow's axiom that for n alternative social states a social ordering must be derived, whereas it is generally acknowledged notwithstanding Scitovsky's (unguarded?) proposal—that cases arise for which the compensatory test gives an ambiguous answer, an answer which precludes judgment and prescription.

that society is indifferent as between y and z . In addition, for both individuals, and therefore for society also, x is preferred to y . From which it follows—using Arrow's transitivity axiom—that, for society, x is preferred to z . But, since I prefers x to z , and II prefers z to x , we are bound to conclude, also, that society is indifferent as between x and z , which contradicts the conclusion of the previous sentence.¹

Arrow concludes that, in general, a rule for passing from individual orderings to a social ordering consistent with his "reasonable" conditions cannot be found. Consistency would require an imposed or a dictated social-welfare function.

While the formal lay-out of Arrow's argument was impressive, it would not be unfair to suggest that the conclusion was hardly surprising. One does not have to venture beyond a vision of two stubborn men on an island with mutually opposite ideas about the proper division of labour, and the fruits thereof, to run into an impasse of this sort. Notwithstanding this opinion, Arrow's thesis caused some stir in academic circles. Several papers were published, productive more of symbols than of substance, urging modifications of Arrow's conditions in the attempt to keep the social-welfare function from expiring.² But even if Arrow had proved that, in principle, a completely satisfactory transition from any set of individual orderings to an ordering for society was always possible, the route to the (continually changing) position of maximum social welfare would have been too arduous for the most accomplished econometrician to plot, to say nothing of prompting humanity to undertake the journey.

Summing up, there are three main ways of regarding compensation tests:

(1) As sufficient conditions for prescribing a change to a new position by defining such tests as tests of "efficiency." It is doubtful if anyone holds this view today—or ever did without some qualification. If, however, it were adopted, and one aimed at a test which was to detach itself from any particular distribution, contradiction could be avoided only by espousing the Samuelson criterion. In view of the virtually infinite number of welfare distributions, such a criterion is not a practical proposition. But for the one situation in which the criterion is always satisfied—that in which one of the bundles has more of "every" good than the other—no such test is necessary.

(2) Once proposed, the Samuelson criterion—requiring that the

¹ What this contradiction seems to reveal is that the "social indifference" arbitrarily—though in view of Arrow's axioms, necessarily—attributed to an opposition of values between individuals is not transitive, as we might well suspect.

² Hildreth [106] argues that if one individual barely prefers x to y while another desperately prefers y to x , the social choice should rank y above x . J. C. Wheldon [246] also considers bringing in inter-personal comparisons of welfare, as do Kemp and Asimakopulos [129], who further propose a "constitution" which entails measurable utility. Inada [113] proposes a less-severe set of conditions which lead also to the Arrow result.

Other contributions, such as those of Little [162], Rothberg [213] and Buchanan [44], are of a more philosophical nature.

utility-possibility curve of one bundle be at all points outside that of the other—lent itself to the idea of an envelope of such curves, or a utility frontier encompassing all welfare possibilities latent in the resources at the disposal of the community. Each of the welfare combinations on the frontier corresponds to a position of Pareto optimum, but without some expressed partiality for one distribution of welfare over all others there is no acceptable case in welfare economics for prescribing a movement from a non-optimal position to any optimal position.¹ On the other hand, the formation of a “satisfactory” social-welfare function in order to determine a unique position of maximum social welfare is not only utopian, it is in principle impossible.

(3) Returning to earth again, we may accept compensation tests but only as necessary conditions for policy prescription. For instance, in Little’s piecemeal approach, if the Kaldor-Hicks and/or the “Scitovsky criterion” are fulfilled, then a movement to the new position is recommended provided, however, that redistribution is acceptable.

IV. CONSUMERS’ SURPLUS

One can readily sympathise with the high hopes originally entertained by Marshall for his doctrine of consumers’ surplus as an instrument of social betterment. His definition of the individual consumer’s surplus—the amount a man is willing to pay rather than go without the thing, over the amount he has to pay—had so immediate an appeal to subjective experience that, despite severe criticism of the doctrine and Marshall’s own eventual loss of faith in it, the prospect of its extension as a practical tool of welfare analysis has tempted the ingenuity of several eminent economists, among whom the best known is Professor J. R. Hicks. In his *Value and Capital* consumer’s surplus appeared as a by-product of his ordinal treatment of the theory of consumer’s behaviour. In this more acceptable ordinal form it was further refined and developed in a series of papers appearing in *The Review of Economic Studies* in the early forties.² The substance of these papers, along with some further reflections, may be found in his recent *Revision of Demand Theory*.

Myint, in his 1948 book,³ champions the consumers’ surplus technique as against the marginalism of Pigou. The marginal conditions, he contends, permit only of small adjustments within the neighbourhood of the existing pattern of output. In contrast, consumers’ surplus enables us to meet the Hicksian total conditions which encompass all ranges of output and, indeed, enables us to determine whether or not any particular good should be abandoned or a new one introduced. Again, it is frequently pointed out

¹ It may be stressed, however, that if society is not already at an optimum position there is scope for making “everyone” better off.

² See bibliography, items 100–103.

³ See bibliography, item 189.

that the marginal conditions are inappropriate for goods that are insufficiently divisible to enable the consumer to equate the value of the good to him with its market price. In such cases the value of the “marginal” unit—which may be the only unit purchased—might greatly exceed the price. So much at least may be said in favour of the technique of consumers’ surplus. What of the criticisms? Before we consider them, however, and Hicks’ attempts to meet them, let us glance briefly at the various definitions proposed.

In the course of defining consumer’s surplus in terms of money income in *Value and Capital*, Hicks suggested that the notion was akin to a compensated variation in income. The definition used in this connection was, soon after, shown by Henderson to differ from the original Marshallian definition,¹ the difference turning on the quantity of the good purchased. Marshall’s definition corresponded to the sum of money that the consumer was prepared to pay for the privilege of being able to buy at the existing price *the amount that he was already buying at that price*. On the other hand, Hicks’ definition concerned the sum he was prepared to pay for the privilege of being able to buy the good at the existing price *in whatsoever quantities he wished*.² Inasmuch, then, as Marshall’s definition involved a quantitative constraint, absent in the Hicks definition, the maximum sum of money that the consumer would be prepared to pay would be smaller under the former definition than under the latter.

In the same paper Henderson pointed to a further ambiguity: the

¹ See bibliography, item 93.

² Using Henderson’s diagram on which Fig. v is based, the Marshallian consumer’s surplus

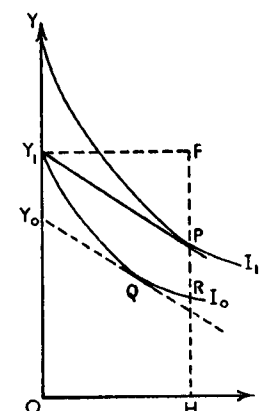


FIG. v

is equal to PR . For if he were obliged to spend FR in buying OH of X he would be just as well off as if X were not available, whereas in fact he has to spend only FP . Hicks’ compensating variation, however, is Y_1Y_0 . For if the consumer is made to pay this much in order to retain the price P he will just reach Q on the indifference curve I_0 , his initial welfare position in the absence of a price for X .

Note, that since the issue in these earlier illustrations was whether to introduce X at a given price or not to introduce X at all, an all-or-nothing offer confronted the consumer.

compensating variation measure proposed by Hicks would differ according to whether the consumer had to *pay* for the opportunity to buy the new good X , or whether he was to *be paid* for abandoning the purchase of X . The same distinction clearly held if the choice was that between buying X at a lower price or at a higher price.

In reply, Hicks¹ carefully traced a relationship between four definitions of consumer's surplus and the Marshallian measure—the area under the individual's demand curve. The scheme required some new terminology in order to effect a double distinction: (a) that between the compensating variation (CV), for either a fall or rise in price, which compensation when paid or received is such as to leave the consumer in his *initial* welfare position, on the one hand, and, on the other, the equivalent variation (EV), again for a rise or fall in price, which involves compensation, paid or received, such as to leave him in the *subsequent* welfare position following the change of price,² and (b) that between the *price* compensating variation (CV_p), or *price* equivalent variation (EV_p), on the one hand, which covers those cases for which the individual is free to choose the quantity of the good in question, and, on the other hand, the *quantity* compensating variation (CV_q), or the *quantity* equivalent variation (EV_q), to cover those cases in which—like the original Marshall definition—the consumer is restricted to the quantity purchased in the absence of compensation.³

¹ See bibliography, item 102.

² It follows, as Hicks points out, that (1) the CV of a fall in price from p_1 to p_2 (the maximum payment by the individual in order to have the new, lower, price p_2 , which payment leaves him at his *initial* welfare) is exactly equal to (2) the EV of a rise in price from p_2 to p_1 (the maximum payment by the individual in order to retain the old, lower price p_2 , which payment leaves him at a new, lower level of welfare, which is equal to the initial welfare in (1)).

³ These four definitions are identified in Fig. vi, in which, for brevity, we consider consumer's

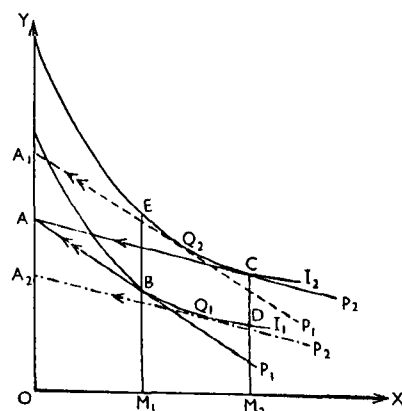


FIG. vi

surpluses only for a fall in price from p_1 to p_2 , the income of the individual—equal to all other goods at fixed prices—being measured as OA .

The CV_p is measured as AA_2 , this being the maximum income the consumer will pay for the

There is no analytical difficulty in extending these four definitions to simultaneous changes in the prices of many goods.¹ Indeed, they can be extended to cover not only all goods bought on the market but also all factors sold by the individual to the market, thereby involving rent in the same fourfold distinction.² In the absence of income effects, all these measures coincide, though in any case the differences between them are thought not to be important for practical measurement.

We are now faced with the rather more difficult task of making the transition from the individual to the community. Hicks attempts this by abandoning Marshall's assumptions about constant market shares and so forth, arising from his cardinal view of utility, as implausible and unnecessary. Without bothering our heads over inter-personal comparisons, if the area between the demand curve and the price is taken as a good approximation of the sum of the individual consumers' surpluses, however defined,³ and if the area between the supply curve and the price⁴ is taken to be a good approximation of the sum of the relevant producers' surpluses, however defined, we may add these areas algebraically as sums of money. If both areas are positive, or if the positive consumers' surplus exceeds the negative producers' surplus (in the case of decreasing average cost), the compensation principle provides a rationale for undertaking the investment in the good in question—or for retaining it if it is already in production. At least it does this if all the gains and losses to the community from the production of this good are summarised in this partial picture given by the market demand and supply curve. In general, this will not be the case. Problems arise when we trace out the effects in the rest of the economy, and it is to such problems that Hicks addresses himself in his *Rehabilitation* paper of 1943.⁵

privilege of buying X at the lower price p_2 . For with only OA_2 of his income left, he can move along A_2P_2 and just touch I_1 , his initial level of welfare, at Q_1 .

The EV_p is measured by AA_1 , this being the minimum sum which the consumer will accept to relinquish the opportunity of buying at the lower price p_2 . With this compensation and the old price he can move along A_1P_1 and at Q_2 just touch I_2 , the welfare level he would reach if he did not relinquish p_2 .

The CV_q is measured by CD . It is the maximum the consumer will pay for the privilege of buying at p_2 if, along with this privilege, he is constrained to buy OM_2 of X , the quantity which he would buy at p_2 in the absence of any compensating payments. Thus, if he buys OM_2 at p_2 , he gets to C . He pays CD and gets to D , which is on I_1 , his initial level of welfare.

The EV_q is measured by EB . It is the minimum the consumer will accept to return to the higher price p_1 , if he is at the same time constrained to purchase OM_1 , the quantity of X which in fact he would consume at p_1 in the absence of compensation receipts. Thus, consuming OM_1 at p_1 places him at B . The receipt of BE takes him to E , which is on I_2 , the higher level of welfare he could have reached with p_2 in the absence of any quantity constraint.

It has been argued [179] that in all plausible circumstances we should consider using only CV_p and EV_p .

¹ Hicks, in his generalisation of consumer's surplus [101], expresses them in terms of Paasche or Laspeyres variations plus income and/or substitution effects.

² See bibliography, item 182.

³ For most purposes, the CV_p definition is appropriate.

⁴ Where the supply curve is above the price the producers' surplus is taken to be negative.

⁵ See bibliography, item 100.

If over the whole economy competition was perfect, and there was a complete absence of external economies and diseconomies, no apparent difficulty arises. The prices of the factors attracted to the new project reflect their values at the margin in all other uses. If, however, prices exceed their corresponding marginal costs in other industries the values of the factors which move into the new project exceed their prices and, therefore, their cost to the new project. Since the opportunity cost of these factors to society exceeds their cost to the new project, some correction is called for and may be administered by raising the apparent marginal cost of the product under consideration by the appropriate percentage prior to measuring the net surplus. If this corrected net surplus, or social surplus, is positive the good should be introduced, and in the amount which makes the corrected marginal cost equal to price, notwithstanding that the commercial criterion, that of a positive producers' surplus, is not met.¹

This treatment does not, however, face up to the chief difficulties. Even within its own limited terms of reference, it does not answer the rather obvious question of what to do when some of the factors to be used in the new good X come from industries whose prices exceed their marginal costs in varying degrees, while others come from industries whose prices fall below their marginal costs, again in varying degrees. In principle, of course, there

¹ The question of whether we are not double counting by adding together consumers' and producers' surpluses deserves some attention if only because of Marshall's warning in appendix K of the *Principles*. Obviously the issue turns on the meaning of producers' surplus. In the *Principles* it is used as a synonym for rents (not profits), which have been defined recently [182] in a manner symmetrical in all respects with consumer's surplus—as the *CV* or *EV* to the individual arising from changes in the prices of the factors that he sells to the market.

In an n -dimensional figure containing both goods' axes and factors' axes, we can regard the individual as both a consumer of goods, measuring the welfare effect of a change in the prices of goods along the goods' axes, and as a supplier of factors, measuring the welfare effect of a change in the prices of factors along the factors' axes. In principle, however, the welfare of all such price changes may be measured along any one, or any several, of the axes. After all, the net effect of any group of price changes is to place the individual on a higher, or lower, indifference surface, the difference between which and the initial indifference surface, being measurable along any one (or several) of the axes, as a *CV* or *EV*.

On a partial view, however, and thinking in terms of individual demand curves, we could add together the consumer's surplus arising from a decline in a group of product prices in the manner suggested by Hicks [99]—the *cet. par.* on successive goods, to include the lowered prices of goods whose consumer's surplus has already been measured. Alternatively, this same decline in a group of product prices could be regarded as giving rise to an increase in rent, or producer's surplus, for the individual, inasmuch as a fall in the price of any product he consumes is *pro tanto* a rise in his real income, or welfare. Now, the addition of an improvement in welfare of this sort, first as a consumer's surplus and then again in the guise of a producer's surplus, is obviously wrong. But this does not mean that there may not be some practical convenience in dividing a given gain of welfare into two parts: a part arising from changes in product prices and a part arising from changes in factor prices. An individual whose factors are attracted into the production of X and who, in addition, is enabled to purchase X at a lower price does in fact gain from both these circumstances. Therefore the total gain which places him on a higher indifference surface and which is, as suggested above, measurable in principle on any one of the axes, is, on this partial approach, split into a measure of the gain from the lower product prices plus a measure of the gain from the higher factor prices, which two measures add together to yield a measure of the total gain in welfare.

is little difficulty: we can value each factor to be used at the value it contributes elsewhere. But we have to abandon any simple practical rule, such as raising or lowering the cost curve of the industry in question.

Many of the chief difficulties in taking account of the repercussions in the rest of the economy are mentioned by Little,¹ whose main conclusions may be summarised as follows: the case for which Hicks' treatment is valid is that for which the introduction of a new good, X , affects only to a negligible extent each of the outputs of all other goods in the economy. However, cases in which other goods, say Y and Z , are closely related to X in consumption are more common. Suppose, for example, that Y and Z are close substitutes for X , and that everywhere price is equal to marginal cost. Now if both Y and Z are produced under constant costs there is little trouble. The area under the demand curve for X is then a measure of the consumers' surplus which meets the *cet. par.* requirement that all other prices be constant, and, in so far as the introduction of X causes consumers to switch from Y and Z to buying X , they are—for all intra-marginal units—made better off, the area between the demand curve for X and its price being a measure of their gain.² Since the assumption of constant costs ensures that no losses of producers' surplus take place in Y and Z , there is no need to correct the producers' surplus in X . Obviously, however, if price exceeded marginal cost in Y and Z the supply curve of X would have to be raised for reasons given above.

In the event, however, that Y and Z are not constant-cost industries difficulties begin to mount. Suppose they are increasing-cost industries, the consequent consumers' surplus in X measured in the usual way will be an underestimate. For in so far as the shift of output from industries Y and Z reduces their prices, when X is introduced, consumers are better off than if, as in the previous case, their prices remain constant. Yet the consequence of a decline in the prices of Y and Z is to reduce this shift of demand from Y and Z to good X , thereby, of course, reducing the area of consumers' surplus in X , notwithstanding the additional benefits accruing to consumers in this case as compared with the previous case. On the other hand, against any gain of producers' surplus in X must be set losses of producers' surplus in Y and Z . However, producers' surpluses are difficult things to measure, involving as they do the rents of all factors whose prices or occupations are changed as a result of introducing X . Profits, which are more closely identified with the area between the price and the supply curve, afford little clue to the magnitudes involved. Even in the special case above, we must be prepared for a rise in the prices of some factors, a fall in the prices of

¹ See bibliography, item 161, Chapter 10.

² True, in so far as demand has shifted from Y and Z to X , the areas under the demand curves for Y and Z have shrunk. But this can be legitimately ignored, for no consumer can be worse off when Y and Z are available at the same price as before, and X is now cheaper (or newly available). In other words, the *cet. par.* being met in the measurement of the consumer's surplus in X , no further correction need be allowed for.

others, both groups of factors being found in many industries besides those of X , Y and Z .

Though we have said nothing yet of divergences between private and social valuation, they require the same sort of correction as discrepancies in the ratios of prices to marginal costs. There is, however, still the familiar and inescapable difficulty arising out of the interdependence of valuation and distribution: in making the transition from the individual to the community, that is, we cannot escape the complication uncovered in Part III. Here, as there, only the Samuelson criterion can serve us without fear of contradiction for all criteria in which distributive considerations are to be set aside.

In order to separate this source of complication from that arising from closely related goods with increasing costs, let us suppose again that all goods other than X are produced under constant costs. The area enclosed between the demand curve for X and the price is a rough approximation to the sum of the individual consumers' CV_p given the existing distribution of welfare, prior to the introduction of X . The area between the supply curve and the price is yet a cruder approximation to the sum of the factor-owners' CV_p at the given welfare distribution. The algebraic sum of all individuals' CV_p , regarded as consumers and as suppliers of factors, is therefore approximately represented by the area enclosed between the demand curve and the corrected supply curve.¹ Crude as this area is as an index of net gain in welfare arising from the introduction of X when all other goods are produced at constant costs, we are required by the Samuelson criterion to measure this social surplus for all conceivable welfare distributions. If for any welfare distribution this area of surplus is negative, there is no warrant, on grounds of "efficiency"—on the Samuelson criterion alone—for introducing X . On Little's approach, however, provided that we approve of the distribution which accompanies the production of X , we should introduce X if the social surplus is large enough to assure us that the sum of the CV_p must be positive. If it is positive, the Kaldor-Hicks criterion is met: with the old distribution (prior to the introduction of X) "everyone" can be made better off by producing X .

In sum, then, as a method of capturing data on which to exercise the compensation tests, consumers' and producers' surpluses suffer not only from the distributional complications common to comparisons based on such tests but also from difficulties in their measurement, largely owing to their essentially partial character. In view of this, one can sympathise with

¹ It is sometimes proposed that the sum of the CV 's should exceed the sum of the EV 's. But on Hicks' definition, if a price moves in favour of an individual the maximum he is prepared to pay for that price is the CV , while if the price moves against him the CV becomes the minimum he must receive in order not to be worse off than before. The gainers can therefore compensate the losers if the sum of all their CV 's is positive.

The sense of this definition is further illustrated in the special case of an individual whose gain as a consumer exactly offsets his loss as a supplier of factors, his net CV being nil.

Little's comment that consumers' surplus is but a theoretical toy,¹ though it is putting the case a little too strongly. After all, what other practical procedures are open to us in a comparison of two situations?

V. SOME RECENT OBSTACLES

In order not to clutter up the main features in the developments over the last twenty years, we have set aside for separate treatment in this section a number of considerations, all of which appear, on the surface of things, to reduce the applicability of welfare economics.

Second Best Optima

The recent paper by Lipsey and Lancaster² was the culmination of a diversity of contributions³ which sought ways of approaching a next best solution whenever some particular institutional or policy constraint prevented the realisation of all the conditions necessary for a true summit position. A common conclusion, albeit a negative one, was implicit in all these writings; namely, that if one or more of the optimum conditions could not, in the circumstances, be met in one or more of the sectors of the economy, one did not make the best of a bad job by proceeding blithely to fulfil the remaining conditions. To illustrate with a familiar problem; the determination of the output of a particular industry when it is known that in all other industries price exceeds marginal cost. Rather than equate marginal cost to price in this particular industry, we should choose an output for which price here, as elsewhere, exceeds marginal cost.⁴ The new rule in this case is, of course, simple and obvious. If, however, some of the other industries were perfectly competitive, some monopolistic and others subsidised there may not be a satisfactory second-best solution at all, and, if there is, the rules to be adopted may be far from simple.

A theorem embodying this negative conclusion is proved elegantly by the simple mathematics of maximising a function of n variables subject to the usual constraints—such as the production function—plus an "artificial" constraint in the form of an *inequality* of one of the conventional marginal conditions. The first-order conditions resulting from this operation are not identifiable as the usual marginal conditions for an optimum but are relatively complex expressions. Indeed, without knowledge of the specific forms of the welfare and production functions we should, in general, be unable to translate such expression even in qualitative terms—we should be

¹ See bibliography, item 161, p. 180.

² See bibliography, item 141.

³ Some examples of the application of second best theory may be found in Jacob Viner's *The Customs Union Issue* (1950); S. A. Ozga, "An Essay in the Theory of Tariffs," *Journal of Political Economy*, 1955; J. E. Meade, *The Theory of Customs Unions* (1955), also [172], [51] and [155].

⁴ See R. F. Kahn, "Some Notes on Ideal Output," and the discussion in Part II. It is assumed, in this example, that the supply curves of all factors are of zero elasticity.

quite unable to say, for instance, that in regard to, say, a good Y the price should be greater, equal or less than its marginal cost.¹

Though no logical difficulties arise in placing this theorem within the body of welfare analysis, it does seem, at first blush, to reduce drastically the applicability of such analysis. For it is too much to hope that welfare economists will be operating in an environment subject to no policy or institutional restraints. And it requires only that in one sector the conventional optimum conditions be abandoned as impracticable for the conventional optimum conditions to be irrelevant in the remaining sectors.

Interdependent Utilities

Though recognition of the effect on the individual's welfare of the possessions of others is not new in the literature, Duesenberry was the first to invest the idea with some formal analysis and to deduce therefrom some implications for welfare economics.² He attacks the problem by supposing a community of three people, each of whose welfare depends not only on his own income but also on those of the other two.³ This interdependence, in effect, imposes additional constraints, so that the first-order condition of a maximum position for each individual is more complex than the usual one. Whereas with independent utilities the individual equates his (subjective) rate of substitution between product and factor to the marginal physical product, there are now, with interdependence, additional terms in the condition so as to take account of the welfare effect upon others of the addition to his welfare. Thus, translating into value terms, if the value of the marginal product were equal to one pound the supply of the additional factors provided is not justified if it merely compensated the individual for the sacrifice involved. The one pound must, in addition, compensate others who are—let us assume—adversely affected by his one pound of additional income. Indeed, it must be enough to cover the effects of all subsequent adjustments to his own and to their incomes. If, of course, instead, the effects on others are beneficial, inasmuch as they rejoice in each other's good fortune, symmetrical reasoning shows that—since each individual in his own adjustment ignores the benefits he confers on others—the application of the conventional factor-product rule results in an output below the true optimum. In such situations no specific rules can be laid down without specific knowledge of the nature of the interdependence.

¹ Though the theory was not generalised to cover a community, the conclusion is applicable to the community. Thus, following the recognition of one or more policy constraints, pursuit of the remaining optimum conditions will not direct us to a point on the second-best utility frontier—a position, that is, in which, accepting the constraints, it is impossible to make "everyone" better off. To reach this second-best frontier, the familiar marginal equalities must give way to other more complex ones.

² See bibliography, item 60.

³ Duesenberry simplifies further by assuming only one good and only one factor. But the results he reaches are sufficiently general for the purpose in hand.

An interesting idea emerges from this analysis. Imagine, says Duesenberry, that, on balance, each income group is adversely affected by the income groups above but not by those below it, then a progressive income tax¹ would be a corrective in the right direction. Ideally, of course, the tax should suffice to cover all the initial and subsequent claims necessary to placate everybody in the lower-income groups, and the stronger is this envy of others,² the heavier must be the tax. In this connection the term "excessive"³ is used to indicate a circumstance in which any net increase of output—for instance, more of "every" good without additional effort—will not advance the welfare of the community no matter how it is distributed. Indeed, any increase of output makes the community worse off, since, no matter how the additional goods are distributed, the additional envy generated cannot be adequately compensated out of these extra goods.⁴

However, if the community were in so unfortunate a position, symmetrical reasoning would surely point to the possibility of improvement through a reduction of output. Empirical confirmation of the existence of excess envy does not therefore constitute a valid objection to the application of welfare analysis,⁵ though the more complex conditions of substitution between factor and product are likely to involve guesswork rather than measurement; to

¹ No reason is given why the tax should be progressive as distinct, say, from a proportional income tax.

² Envy of the possessions of others is frequently referred to, or classified under, "external diseconomies of consumption." But such terminology seems more appropriate to the tangible and, in principle, measurable effects on other people's enjoyment and convenience of the use by others of consumer goods. Such by-products as air pollution, noise, mutual hindrance and litter are obvious examples.

³ See bibliography, item 84, p. 51.

⁴ One might imagine that the existence of "altruistic" interdependence (enjoying others' good fortune) adds to the community's welfare while "egoistical" interdependence (resenting others' good fortune) reduces it, but this is not so. If I am made happy by the thought of those with higher incomes, or advancing incomes, I must be saddened reflecting on those with lower incomes, or declining incomes. If, on the other hand, I suffer mortification contemplating higher incomes, or advancing incomes, I shall feel triumphant in my own progress relative to that of others. How much and in what way a person's welfare is affected by either sort of interdependence obviously depends on his age, his nature, his environment, his movement and position along the income scale, etc., there being no *a priori* reason to suppose that on balance his welfare is increased or reduced by either sort of interdependence. I owe appreciation of this point to Sir Roy Harrod.

Nevertheless, the argument that the application of the conventional factor-product condition results in too small an output in the case of altruistic interdependence and too large an output in the case of egoistical interdependence still holds. For the individual properly takes all his own feelings into account when adjusting the supply of his factors to their prices, but does not take into account the pleasures or pains experienced by others in the community whose welfares are affected by the size of his income.

⁵ Though no formal development is undertaken here, it may be noted in passing that differences in the degree of envy experienced do not disturb this conclusion. We can easily see this by contemplating a situation prior to which the community's mutual envy is not such as to warrant any check on output. Thus we may imagine output to increase along with improvements in technology, this being permitted provided the additional product suffices to reward any additional factors involved and to placate additional envy generated. The additional envy may issue chiefly from one or a group of persons. Increased output is warranted, however, only so long as this additional envy, no matter how distributed, can be more than compensated out of the increase. Symmetrical reasoning applies to differences in degree of altruistic interdependence.

say nothing of the political difficulty of a decision to reduce total output in order to restore a position of optimum.

What of the other marginal conditions of optimum? The general belief seems to be that a true optimum would require their modification also. But if excessive envy has been ruled out on the previous argument as evidence only of a failure of the true factor-product conditions, a failure which results in an output larger than optimum, the belief seems mistaken. Consider a movement from a position where initially there was a discrepancy of the factor rates of substitution as between one good and another to a position in which the factor rates of substitution were the same for the two goods. Since additional goods are made available without additional effort, there is some distribution of the additional goods which will—despite the existence of some (not “excessive”) envy—make “everyone” better off. Top-level optimum remains unmodified for the same sort of reason: if the relevant community indifference curve cuts the transformation curve there must exist a range of output possibilities for which “everyone” can be made better off. Finally, the exchange optimum, requiring the rate of substitution between all pairs of goods be the same for each individual, survives for similar reasons.¹

Dynamics

No body of formal dynamic welfare analysis comparable with that of static welfare analysis exists. Reder made a modest attempt to erect some stylised structure in the shape of an extension of the optimum conditions to risk-bearing and the like,² but the concepts, even in principle, were scarcely

¹ By considering the effect on an individual's welfare of the consumption by another of particular goods, Henderson and Quandt [92] have concluded otherwise. They use two arguments: (1) In a model containing two individuals, each of whose utility function depends upon his own consumption and that of the other, the utility of one of them is maximised subject to a given utility of the other. The resulting expression differs from the familiar one (deriving from independent utilities) by having the ratio of the marginal utilities (to be equated to the price ratio) modified to take account of the losses or gains in the utility accruing as a consequence of the other's possession of the two goods. The interpretation placed on this mathematical expression by the authors is that the equality of rates of substitution is no longer the optimal condition. All that emerges, however, is that in the presence of interdependence the old formula no longer holds. It does not mean that the ratio of the modified marginal utilities are not, in equilibrium, equal.

(2) A graphical illustration in which, with an individual's indifference map drawn on the assumption of independence, the introduction of considerations resting on interdependence moves the individual from his initial (independent) optimum. This obviously will not do. In the two-good, two-person case, in which every combination chosen by one determines the combination of goods left to the other, each individual ranks every point in the box diagram according to the balance of advantage experienced—taking into account his response to the other's possessions—thereby generating a consistent ranking of his indifference curves. An optimum position under these conditions has the usual optimal property. In general, then, regardless of what goes into the individual utility functions, if rates of substitution between any two individuals differ, mutually advantageous exchange—provided the utility functions remain unchanged—is possible.

In any event, the community need not be very large before the individual will discount his influence on the consumption of others completely, accept the given prices and seek a maximum position within his means, thereby equating his rates of substitution to those of the market.

² See bibliography, item 207.

measurable, and the ideas have not caught on. The fashion remains to court disillusion at the static level in a formal manner, and pessimism informally at the dynamic level.

On the question of capital accumulation, extension of the optimum conditions to inter-temporal substitution had led to a proposed rule¹ that the quantity of money be adjusted so as to determine a rate of interest at which full-employment-saving and investment are equal. This rule is rejected by Graaff, among others, chiefly for two reasons.

First, the larger the existing holdings of bonds, the larger must be the supply of money in order to secure the full-employment rate of interest, a rate which therefore varies according to the volume of bonds in the economy. Indeed, if this is an objection, one might go further on the assumption of a wealth-saving relationship, popularly known as the “Pigou effect.” For as Metzler has shown,² with such a relationship the rate of interest appears largely as a monetary phenomenon determinable by the Government's control of the quantity of money. In response to changes in the quantity of money, changes in the price level shift the full-employment saving schedule into equilibrium at the policy-chosen interest rate and investment level.

Second, the rate of saving depends not only on the current bond prices but also on expected future bond prices and, in addition, on variations in the general level of prices expected over time. But these prices, in turn, are influenced by the present and future saving of people, about which the individual saver and investor can have no clear information. Nor can the entrepreneur correctly estimate the productivity of his investment unless the investment plans of others, present and future, are known to him.

Now this second set of objections, though they may have particular relevance to capital accumulation, are surely general to all optimum rules. Unless direct information is available about everybody's present and future activities, or unless we can predict their effects on future prices, individuals are liable to make decisions they will regret and, in so far as they do make mistakes, incur “wastage” on the allocative criteria discussed. Sooner or later, there will appear “too much” investment in *X*, “too little” in *Y* and so on. Obviously these are the inescapable consequences of uncertainty. But having determined the other optimum conditions explicitly in the absence of uncertainty and, for that matter, in the absence of innovation, changes in taste, etc., we should be able to do no less for the conditions determining the rate of accumulation. Having done this satisfactorily, we may then consider the effects of uncertainty not only on the optimum conditions for capital accumulation but also, in general, on all the optimum conditions.

Keeping the analysis within a static framework, then, equality of the rate

¹ See bibliography, item 16.

² Lloyd Metzler, “Wealth, Saving and the Rate of Interest,” *Journal of Political Economy*, 1951

of return over cost with the marginal rate of time preference appears to be a required condition for the optimum rate of investment—always ignoring indivisibilities and divergences between social and private benefit, which may, of course, be of special importance in dealing with investment goods. For if this equality does not obtain, say the rate of return exceeds marginal time preference, there is scope for making some people, as borrowers and lenders, better off without making others worse off—provided, always, we abide, as we do in static welfare analysis, by people's immediate judgment of their own good. And though, as in the first objection, variations in the volume of bonds and money will influence the rate of interest and, therefore, the rate of accumulation, thus giving rise to the problem of additional conditions (connected, perhaps, with the distribution of welfare), this rule will still be necessary inasmuch as its non-fulfilment leaves room for some net improvement in the community's welfare.

If, on the other hand, we do decide to place the whole subject in a dynamic context; to consider, that is, the distribution of welfare over time in conditions of uncertainty and, indeed, in conditions of changing productive organisation and social institutions, the inadequacy of the necessary conditions for an optimum position is apparent. It is with some such context in mind that Graaff abandons the conventional optimum conditions of capital accumulation and takes up the idea of a collective approach to this question. The things to be decided upon, all of which involve value judgments, are the choice of a time horizon beyond which we have no interest, the time distribution of welfare on our side of the horizon, and the amount, if any, of "terminal" capital equipment we bequeath to posterity beyond the horizon. These are not very firm materials to work with and, ere long, scepticism sets in and the whole lot is, in effect, emptied into the social-welfare function, there to meet a fate already prepared by Arrow.

The treatment of uncertainty *per se* is hardly more satisfactory. While there is a general case for spending on research and information services in order to improve expectations and guide business decisions up to the magic point at which the value of additional output attributable to such expenditure is just equal to such expenditure, the application of such an "optimum" rule is mainly guesswork. Again, some writers, such as Graaff, see proper to point out to us that, after all, uncertainty adds zest to life. One is already in danger of trailing off into banalities.

Treatment of the desirability of full employment, on the one hand, and stability, on the other; of government spending versus private spending; of standardisation versus variety; of speed of adjustment as against comfort and security,¹ are subject in greater measure to the same pitfall, since on such broad issues the relatively simple goal of pushing outward the welfare

¹ A rapidly adjusting economy imposes psychological strains on men and women which cannot easily be fitted into the welfare calculus. In this connection consult an informal and lively essay by Honor Croome in *Lloyds Bank Review*, 1959.

frontier or of comparing situations on the basis of compensation tests, give way to vaguer ideas of what is proper, and yet vaguer criteria, if any, for their implementation.

VI. A SUMMING UP

Many of the modern writers on welfare economics take a poor view of its prospects. Little warns us, more than once, against the impressions of rigour and refinement in an analysis which ought to be employed only as a rough guide to policy, though "good common sense" would do as well. Graaff is less compromising. On a close examination, he asserts, every proposition in welfare economics is found wanting. It is more profitable and more honest to bend our energies to the development of positive economics in order to serve the public by providing policy-makers with all the knowledge necessary to choose between alternative programmes. On the other hand, Reder ends his book on a rather indulgent note, one from a theme made familiar to us by Galbraith's *Affluent Society*. We are a wealthy country, he urges, speaking of the United States, we can afford waste. Is it really worth while scrimping at the margin in order to squeeze the most out of our resources? If the implication that welfare economics—which to Reder, but not to others, treats of scrimping at the margin—already enables us to squeeze the most out of our resources is granted, Reder's attitude might be justified, at least for the United States. But the strength of the recent attacks on welfare economics stem, rather obviously, from the belief in its being totally inadequate. If this be the case, there is no point to the judgment that the propositions of welfare economics are superfluous in view of the existing economic milieu. Therefore before passing judgment on the value for our economy of the study of welfare economics, let us briefly review some of the main objections to this study and consider how they might be met.

Though one can understand the general impatience with a subject which promises so much and, apparently, yields so little, Graaff's conclusions are too cavalier by far. Sweeping generalisation is to be regarded askance, no less when it is purely negative. True, few welfare propositions can be predicated which are not, almost in the same breath, qualified out of existence. But this fact is, to a large extent, a consequence flowing from our ignorance of the world we live in. In recognition of it, we busy ourselves ferreting out of welfare analysis all those tacit assumptions that appear to say something about the economic universe.¹ But this purging of tacit empiricism has gone too far. Any generalisation but the most trivial is sure to collapse when all bounds to technical and behaviour possibilities are removed—when allowance is made for any and every imaginable situation. Under so exacting a procedure, it is not at all surprising that unambiguous prescription is hard to come by. What the subject badly needs is a strong

¹ A parallel procedure in positive economics, as objectionable as it is common, is the "repudiation" of economic theorems simply because one can think up a less restrictive set of axioms.

infusion of empiricism to end its unchecked wanderings in the empyrean and to bring it down to earth feet first. Even the establishment of probabilities, or likelihoods, may enable us to escape the otherwise inevitable "perverse" cases thrown up, for example, by the inter-relationship of welfare distribution and relative valuation.

The import of these remarks may be illustrated by reference to some of the difficulties already encountered, assuming, provisionally, that private and social valuations coincide.

The general second-best theorem certainly takes the edge off the marginal-cost rule in all existing types of economies, but, maybe, not more than that. If we grouped commodities into broad categories, on the basis of close substitution, a small departure from an ideal output (in terms of these broad categories) could not, perhaps, be sustained long without a movement in prices so marked as to attract factors to some industries and repel them from others. If there were evidence for this belief then: (1) the existing degree of commercial rivalry might suffice to keep us close to the community's utility frontier, and (2) the precise rule for a nationalised industry may not be important with this scheme in mind. If, for instance, there are no substitutes for the product of a nationalised industry, then regardless of whether the price is set equal to average cost, to marginal cost or to something in between, the output demanded may be much the same. If, on the other hand, the nationalised industry produces a good, say electricity, for which other fuels are close substitutes, although the choice of the marginal-cost or average-cost rule may make an appreciable difference in the sale of electricity, the amounts demanded of all fuels taken together, measured in effective units, in some sense, may alter by very little. We should still be close to the utility frontier. Indeed, if we could rely upon existing enterprise, public and private, to keep us fairly close to an ideal output, we might abandon our concern with "utopian" welfare economics and pay more heed to the piecemeal approach. The compensation tests would then be serviceable in decisions to undertake entirely new projects. And though Little has spoken of consumers' surplus as a toy, it is hard to see how gains and losses on any scale can be computed without something of this sort. However, we are allowing that output in the rest of the economy is only roughly ideal. For this and other reasons given in Part IV, the area between the curves is only an approximation to the sum of the *CV*'s in the community. Only a slight gain in the practicable measure of the social surplus would not then be convincing evidence of the desirability of the investment in question.¹ Setting some minimal size of gain would have the added advantage of eliminating the

¹ Sir Roy Harrod, in correspondence with me, points out that to reject all projects unless a sizeable gain can be expected from their introduction would be a very damping maxim, and if adopted would deprive us of the fruits of progress. If, from our experience of things, a small change can be recognised as connected with a whole series of small changes whose sum results in a large change, then we should base our decisions, not on the data of each small change in isolation, but on the expected result of this large change.

possibility of contradictory answers which may arise when compensation tests are based on different distributions of welfare—though, on looking into the matter, we may have grounds for believing that, for all feasible distributions of welfare, the community indifference map, and hence, the corresponding outputs, vary but little.¹

Turning to interdependent utilities, it must be admitted that if factor payments do not suffice both to compensate the factor-supplier for his additional sacrifice and to allay the heightened envy of others, existing output is too large. There is a temptation, in contemplating this circumstance, to lose patience with human cussedness² and to insist that if both the Smith family and the Jones family receive a 10% increase in their "real" income they *are* better off, even if they both sulk at the other's good luck. But while this may be salutary morals, if welfare is what people experience, there is no escape for us in honest indignation. We may be wise to invest more resources in social psychology in the hope of making people more "rational," but in the meantime we have to concede that an all-round increase of worldly goods may not make people any better off and, indeed, may make them feel worse off.

Nonetheless, we must remind ourselves that the kinds and degrees of welfare interdependence are yet in the realm of conjecture. Common observation, and intuition, suggest that it is a stronger factor at higher living standards than at lower ones. In the poorer countries, where the bulk of the populations still struggle for bare subsistence, it may be negligible.

In recognising that no promising foundations for a dynamic economics have been laid, we must not overlook the difficulties intrinsic to that level of analysis. Though relative prices, outputs and patterns of income distribution may be used, in certain circumstances, as indicators of changes in social welfare, for many of the dynamic factors that enter into welfare—time-paths of response, uncertainty, stability—no equally objective and measurable data exist, a deficiency which, in addition, makes agreement on norms more difficult. While this is a pity, it is not a fatal frustration. If we were more confident of our welfare economics at the static level of analysis it is not likely that we should be much inhibited by the recognition of unsolved dynamic problems. For whatever provision we make for uncertainty, patterns of response, capital accumulation, etc., practical criteria for improving the allocation of existing resources, and for choosing between alternative investment possibilities, could still be profitably applied.

¹ In the extreme case that the community indifference map remained unchanged for all distributions of welfare, allocative efficiency could be effectively separated from distributional considerations. In that event, "efficiency" tests, based on the compensation principle, could never contradict. Such a case, however, does not strengthen any prescription based on "efficiency" tests by themselves. (A sufficient condition for this extreme case to obtain exists when the consumption functions of all individuals are homogeneous and identical.)

Constant costs in the production of all goods do, of course, ensure unchanged relative prices, but do not ensure an unchanged combination of outputs, in response to redistributions of welfare.

² See bibliography, item 209.

Finally, though confidence may grow or decline as a result of empirical research, one thing should not be overlooked: the apparent trend towards economic egalitarianism apparently facilitates the application of welfare economics. For one thing, the stronger is this trend, the less we need worry about changes in the distribution of welfare causing contradictions in compensation tests. Indeed, in so far as equality is promoted by a highly progressive tax structure, the latter may be regarded as a sort of built-in compensatory device.¹ In the limiting case of completely equalising taxes, gainers automatically compensate losers, thereby fulfilling the uncontradictable Paretian criterion while continuously maintaining an ethically unobjectionable distribution of income.

Again, as Duesenberry has pointed out, in a world in which the gains of higher-income groups are resented by the lower-income groups,² an income tax goes some way towards correcting the conventional factor-product optimum condition by reducing the disposable marginal earnings of the factor below their value on the market. Indeed, not only does an income tax correct for social envy, this envy itself is reduced in so far as it is provoked by disposable rather than gross incomes. The more sensitive is the community in this respect, the steeper the progression of the tax necessary to correct the conventional conditions. In extreme cases only complete equality of disposable incomes solves the problem of interdependent welfares. In the nature of things, so extreme an institution is more likely to be encountered in an opulent society than in an indigent one.

Conclusions

It has already been suggested that explorations into the characteristics of the economic universe may show us a way round conceivable obstacles which have all too readily been adopted as logical impasses; that, provided we group commodities broadly, the allocative efficiency of Western economies—in the sense of being close to the utility frontier of society—may merit a high rating; and that a continuation of the trend towards income equalisation reduces the need for correcting the conventional optimum for interdependent welfares while, at the same time, facilitating the application of criteria involving compensation tests. Yet, if all this is accepted it does not follow that the prospects of a rehabilitation of welfare economics are good. For one thing, there are several important issues—such as the choice between variety and dearness, on the one hand, and standardisation and cheapness,

¹ Even though the resultant pattern of consumption varied widely as between one welfare distribution and another, in so far as a progressive income tax narrows the range of possible welfare distributions, it reduces the likelihood of contradiction using the various compensation tests. In the limiting case of complete equalisation no contradiction can arise—whenever “everyone” could be made better off, everyone in effect is made better off.

² There is no reason to believe, however, that a rise in the incomes of others of our group, or of the income groups beneath us, should be any less discomforting than an increase in the incomes of the groups above us. All increases of income, other than our own, amount to a loss of income status relative to some others.

the other, or the proper division between private and public sectors of the economy—which the welfare economist can do little more than discuss in very general terms. For another, the notion of discrepancies between private and social benefit which, at first glance, appears a promising field for the application of welfare economics—and a salutary reminder of the limited capacity of the invisible hand—when pursued in earnest reveals grave difficulties. Certainly, the more serious objections to using index numbers, ‘consumers’ surpluses, in the measurement of changes in social welfare do not reside in the tangle of interdependences which has chiefly engaged the interest of recent writers. (If we do not believe that, over time measured in decades, the great majority of families in the Western world have higher real incomes in the index sense, we can always suppose a tax structure that effectively maintains income equality, in which case a rise in the appropriate index indicates a rise in the real value of goods and services of each family.) So long as we restrict ourselves to measuring in terms of private valuations, such a rise in the index may tell us little of welfare, or happiness, experienced by individuals. Advances in the techniques of production, and in the utilisation of material possessions, have repercussions on people’s welfare far beyond the initial anticipations of satisfactions.¹ Of course, such repercussions may be regarded as manifestations of a divergence between social and private valuations, but they are not thereby rendered amenable to measurement.² Taken together, however, they can be of decisive importance.

While accepting, therefore, “an expansion of the area of choice” as synonymous with an increase of welfare for the individual, and as an unquestionable norm of policy, it requires an alarming degree of complacency to believe that a rising standard of living as commonly understood is the certain instrument of an expanding horizon of opportunities. Obviously the growth of material prosperity, and its dispersion among the populace, entails—by definition, we might say—more goods, and new kinds of goods, among the mass of the people. But it is scarcely less obvious to-day that the

¹ The growth of private motoring provides a topical example. Each individual’s enjoyment of his car varies inversely with the number of cars on the road. So long as cars increase faster than roads can be built the advantages—both for travel and ostentation—diminish. If we remind ourselves of the continual exasperation with which each motorist regards his fellow motorists, not to mention pedestrians, the inconvenience to the latter, the pollution of the air, the incessant noise, the problems of town planning, the growth of ribbon building and consequent spoiling of the countryside, the tying down of large numbers of police, the pressure on magistrates, to say nothing of the toll in killed and injured or the long-run effects on the national character, one may legitimately include that the yearly output of motor cars is too large by far, whatever the distribution of welfare.

² The cost of certain external effects, such as the smoke nuisance of factories, can be measured, roughly, by sample surveys. For an example, see Pigou, *The Economics of Welfare* (4th edition, 1955, n.). But where the discomfort endured leaves no material evidence it may be as difficult for the person afflicted to estimate the appropriate money compensation as it is for others to accept the estimate. In those cases, which are by far the most important, where the introduction of new types of goods (and their conditions of production) change for better or worse a whole way of life for the community, there is no hope of estimating the cost of the “external effects.”

concomitant subtopiaisation of society involves a continual erosion of opportunities, at least for a sensitive minority.¹

To sum up, if welfare economics is to be repudiated as a serious branch of study it is not for the logical difficulties which inevitably appear when generality of treatment is taken to encompass all imaginable relationships. These difficulties, and others, we have suggested, may be far from insuperable. It is rather that a study of welfare which confines itself to the measurement of quantities of goods and their distribution is not only seriously limited, it is—at least in those countries where the mass of people have advanced far beyond subsistence standards—positively misleading. For the things on which happiness ultimately depends, friendship, faith, the perception of beauty and so on, are outside its range: only the most obstinate pursuit of formalism would endeavour to bring them into relation with the measuring rod of money, and then to no practical effect. Thus, the triumphant achievements of modern technology, ever-swifter travel, round-the-clock synthetic entertainment, the annual cornucopia of slick and glossy gadgets, which rest perforce on the cult of efficiency, the single-minded pursuit of advancement, the craving for material success, may be exacting a fearful toll in terms of human happiness. But the formal elegance of welfare economics will never reveal it.

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Abbreviations

A.E.A.	American Economic Association
O.E.P.	Oxford Economic Papers
E.J.	Economic Journal
J.P.E.	Journal of Political Economy
Q.J.E.	Quarterly Journal of Economics
S.E.J.	Southern Economic Journal
S.A.J.E.	South African Journal of Economics
C.J.E. & Pol. Science	Canadian Journal of Economics and Political Science
A.E.R.	American Economic Review
R.E.S.	Review of Economic Studies

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¹ For instance, foreign travel, once suggestive of the lure and enchantment of far-away places, has become a highly organised mass exercise with small opportunity of avoiding motorised traffic, crowds of camera-happy tourists and cynical tourist-hardened populations. For a particularly painful example of these things, read a report on "The Last Days of Andorra?" in *The Economist*, August 22, 1959.

Again, for those who enjoy a beach humming with portable radios, or the lakes teeming with motor boats, the world may be improving. But not for those whose tastes run to quieter things.

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Note to footnote 2 on p. 205.—FRANCIS YSIDRO EDGEWORTH, the first editor of the ECONOMIC JOURNAL, was not, of course, a Cambridge Economist. At seventeen he entered Trinity College, Dublin, and then went on to Magdalene Hall, and Balliol, Oxford. Later he became Tooke Professor of Political Economy at Kings College, London, after which he was Drummond Professor of Political Economy at Oxford. Sir Roy Harrod, in correspondence with me, has made it plain from his fairly intimate acquaintance with the man, that Edgeworth's approach and style of thought were very much in contrast with those of the Cambridge School. He was catholic in his views, extremely widely read, and had a high regard for certain continental writers, such as Auspitz, and Lieben and Pierson. Though he shared in some of the views of the Cambridge School he laid a special stress on the *inequality* of capacities for enjoyment and, therefore, on the desirability of an unequal distribution of income.

THE AGE OF ECONOMIC DEVELOPMENT¹

TEN years ago an international banker speaking on the subject of economic development might have been able to take refuge in a fairly simple brief. Then, during the Marshall Plan, a group of nations with a common heritage and a common predicament banded together to pool their resources and resourcefulness for a limited and easily understood objective: they banded together to restore to themselves the economic strength and financial independence which had been lost in war.

To-day when an international banker talks about economic development he is expected to talk about the underdeveloped countries, which for my purposes can be taken to mean all those countries outside of Europe, North America, Japan and the older Dominions of the Commonwealth. Here there is no common heritage, and in so far as there is a common predicament it suggests no simple, short-term escape. Here the objectives are not easy to define or to understand, because the problems of development involve so many fundamentals. Here the objectives are not limited: we are talking about transforming whole societies and creating new traditions to replace traditions which have been rendered tragically inadequate by the passing of time.

I envy the man in public life to-day whose field of responsibility is outer space; it is such a neat and tidy field compared with economic development!

Perhaps it is because I am uninhibited by an extensive training in any academic discipline that I agreed to appear in this distinguished forum to speak on this tangled subject. Certainly I must disclaim right at the start any intention of making my mark as a theoretician—or even as a lecturer! I am a practitioner without a professional licence, a journeyman in a trade that has yet to be recognised officially as a trade.

I will preface my remarks with a journeyman's view of the nature of economic development, and then describe how the World Bank approaches development problems in practice. In stating the Bank's case I will point out where our path crosses the paths of others—in the underdeveloped countries and in the industrialised countries—who view economic aid in a different way. My aim is to isolate the ground of hope on which the idea of economic aid rests. Some, I am afraid, may find I have marked off a disappointingly limited ground, but I do not regard my conclusions as pessimistic. On the contrary, I believe economic aid is the best way—probably the only really important way—in which the rich and the poor nations to-day can bridge the gulf, not only in wealth but also in communication, that separates them and poses such a threat to world comity.

It is very easy to forget how exceptional, historically, are the attitudes and institutions necessary for modern economic growth. There must be a willingness to work hard in a productive job and to postpone some consumption to-day for investment to-morrow. There must be money savings and institutions capable of investing savings productively. There must be a liberal supply of technical education, liberally spread among the population. There must be a code of laws which places contracts among producers above arbitrary political action. People must be willing to move about to new homes and new jobs. The economy must employ the measure of profit to determine productive efficiency. Society must be willing to accord a measure of respect and reward to the innovator who is willing to devote his time and talents to producing new things.

Just to list a few of the requirements is to illustrate how ambitious is the task of those who would bring modern economic development to an underdeveloped country to-day. And how uncertain is the outcome in a society which sets out to absorb these very special institutions and attitudes! Savings may be put aside voluntarily, or they may be exacted by force. A code of laws may serve the aim of productive efficiency without serving the ideal of justice. Productive efficiency by itself tells nothing about the end which production is designed to serve. Profit may be regarded as the measure of a producer's success in meeting consumer demand, or as the measure of a commissar's success in meeting his assigned production target. Innovators may be rewarded with money or with power—for enriching the lives of individuals or for strengthening the power of the state.

Economic progress, in short, is not the same thing as moral progress. Man does not come naturally by any of the attitudes and institutions necessary for economic growth; he must be driven—even to hard work—by need, or by the prospect of material gain, or somehow these attitudes must be made politically or religiously inspiring. Advocates of these attitudes and institutions, therefore, face great uncertainties from which no innocent optimism can protect them.

Realisation of this fact came hard, even to many of the Great Puritans who did so much to make thrift and hard work respectable in western society. Listen to John Wesley, speaking at the height of the Methodist revival at the end of the eighteenth century: "Our religion," Wesley said, "must necessarily produce both industry and frugality, and these cannot but produce riches. But as riches increase, so will pride, anger and love of the world in all its branches. So although the form of religion remains, the spirit is swiftly vanishing away. Is there no way to prevent this?"

To Wesley and to the other Great Puritans thrift and hard work in a productive job—only, of course, they spoke of it as a calling—was the very ritual of a life of service to God. We can no longer speak innocently of these attitudes as Puritan virtues now that we have seen them regarded in more than one instance as the very ritual of a life of service to an all-powerful totalitarian state.

¹ The Cyril Foster Lecture delivered by Eugene R. Black, President of the International Bank for Reconstruction and Development, at Oxford University, March 3, 1960.

If one were given the choice of starting anew a process called "economic development" in the underdeveloped world to-day one might well and prudently decline on the grounds that the whole idea was too hazardous to merit serious consideration. But of course the process has already started. Outsiders have been disturbing the peace of tradition in these parts of the world for a very long time now. First came the traders and missionaries, the doctors, investors and colonisers; then came modern transportation and communications, modern armies and modern factories. As a result of economic and political penetration and the multiple inventions of science and technology, there is hardly a human society left on earth which has not been thrown off its traditional balance by the expansion of modern economic life.

There is reason to call this the Age of Economic Development. But in these lands that we call "underdeveloped" the impact of economic growth so far has done as much to destroy old habits and attitudes towards life and work as it has to create the new attitudes necessary for a better material life. Economic development in these lands has proved peculiarly fickle; even now it is creating human desires much faster than it is providing means for their gratification.

And, as everywhere that it has gone before, it has left in its wake an immense increase in the sense of human power—man's power over nature and over his fellow man. Millions in these parts of the world have been made aware that their poverty is not inevitable, not divinely ordained. And from these millions leaders have emerged, dedicated to the task of telescoping into a few short decades all the material and social change that evolved elsewhere only over a century or more. Armed with an awareness of the great store of technical knowledge available to man, they are eager to catch up, to narrow the great disparity in wealth which separates their countries from the industrialised countries. They want wealth and power, not only for its own sake, but as part of a renaissance in their own cultures.

At the same time economic development has left in its wake in the underdeveloped world tragic problems which only more economic development can solve. There is no other escape from the problems of population pressure on diminishing food supplies and living space. There is no other escape from the feelings of national and racial inferiority which have come to be associated with mass poverty. There is no other escape for those who have experienced modern education and modern living standards and who now want opportunities to practise their knowledge and to bring a better material life to their countrymen.

So we can say that without economic development there is no hope for a future in these parts of the world in which the people there can live in some decency and order. And we can say that no matter how ambitious the task or how uncertain the outcome, the free world community must participate. They must participate simply to maintain the balance of hope in a future

which is compatible with a respect for individual freedom and for tolerance of racial and national diversity. For those of us born and brought up in the comforts and prosperity of the western world, there has never before been such a fundamental challenge to our beliefs.

If we cannot tame this fickle process called economic development, how do we deal with it in the underdeveloped world? The World Bank has one answer to this question. Let me explain it.

In the World Bank we concentrate on economic development as if its only end were higher consumption and greater comfort. We try to remove the taint of ideology from the language of economics and then relate that language solely to the end of promoting higher material living standards.

We look on ourselves as technicians or artisans, but this is by no means an innocent pretension. We look on ourselves as artisans in order to avoid seeming to make a choice for our member governments from among the various aspirations of their people. Our own vocation, as embodied in our charter, is to deal in economic facts as they relate to higher material living standards for a whole community. We recognise that our member governments must deal in all kinds of facts and often must bend economic facts to ends other than consumption and comfort—to the demands of national security, and cultural development, for example.

Words like "savings" and "investment," "efficiency" and "productivity" are the tools of our trade, and, like good artisans, we try to develop proper standards for their use. But again this is not an innocent pretension. We think that in administering economic aid quality is more important than quantity; even the most enthusiastic supporters of economic aid recognise that the outside world cannot provide more than a small margin of the resources needed; the really crucial economic and human resources must come from within. Therefore, it is only realistic, we think, to try to use economic aid primarily to promote proper standards in the art of managing a country's resources. The Bank adapts its standards to special circumstances and in the light of new knowledge; but we stick to certain fundamentals, even if that means that sometimes we don't do business. We wouldn't get away with this unless we sought constantly to render the language of economics as morally antiseptic as the language the B.B.C. announcer uses in reading the evening news.

Finally, the success of any economic aid agency—whether it be a national, international or regional agency—depends as much as anything on the ability of that agency to make and keep contact among its members despite the changing temperatures in the international political climate. This means the agency must have a sign on its door, "Open for Business Year 'Round." Of course, it is easier to meet this requirement in an international organisation; the Bank has many disagreements with its borrowers, but they are not the kind which lead to withdrawing ambassadors or

mobilising armies. But this protection would be of little use, I think, if we couldn't also establish in our member countries continuing contacts with people who regard the promotion of economic development the same way we do—as an end in itself, if you will. In fact, there exists a very sizeable guild of artisans in economic development in the underdeveloped world to-day; within the guild a very healthy exchange of information on the state of our trade goes on all the time. That there are those continuing contacts with people who speak the language of economics in the same way we do is to me more encouraging than all the statistics in our annual report.

The capital at our disposal is our earnest money, the tangible evidence that we take our vocation seriously. With it the Bank has been able to operate in fifty different countries over the past fourteen years, participating in some 800 development projects and programs, involving a total investment in excess of £3,500 million. This has not been a period noted for international harmony and order. Yet there has been enough order in the underdeveloped world to allow us to think of broadening our work. Our member governments are now considering the charter of a new International Development Association, to be affiliated with the Bank, which will make capital available for investment on more flexible terms than World Bank loans. This new organisation, while disposing of a very modest amount of capital at the start, will enable us to expand our operations in some of the poorest countries, which are now reaching the limits of their ability to repay loans extended in foreign exchange on conventional terms.

Now this is a rather sober and certainly not a very dramatic conception of economic aid. It may seem a considerable feat of mental gymnastics to connect what I have been saying with the noble ends of world peace and freedom. But there is a connection, and I think the best way to illustrate it is to contrast this conception of economic aid with some others which prevail both in the underdeveloped world and outside it.

As I have said, my aim is to isolate the ground of hope on which the idea of economic aid rests. It is certainly not to assert any final authority for a given set of economic criteria; in fact, part of the reason for making comparisons is to illustrate the perils in asserting final authority for any one set of criteria at all when addressing the problems of the underdeveloped world.

Some economists, for example, find it a fascinating exercise to apply economics to India's famous sacred cows. One economist recently pointed out that these cows eat up in one year as much food as the United States supplies to India each year from its surplus stocks. But obviously in this and similar circumstances in the underdeveloped world the economic facts, however fascinating, just don't count for much. As one acute observer remarked, "Theology cannot be answered by economics; only by better theology."

Actually, we have found that it is not so much the older theologies which

threaten the effectiveness of economic aid; rather it is the newer ones. We find our most serious conflicts are with those in the underdeveloped countries—and in the industrialised countries, too—who pursue economic development and seek economic aid for reasons which have little or nothing to do with promoting higher material living standards. And these are conflicts where economic facts do—or should—count for a lot. Let me examine a few—in the underdeveloped countries first.

The governments of the underdeveloped countries to-day, besides having to reconcile traditional attitudes towards life and work, also have to reconcile most of the competing objectives found in richer societies. Maurice Zinkin, in his brilliant book *Development for Free Asia*, puts the matter very succinctly:

"Economic progress is sought today in Asia as elsewhere for reasons which are not economic," he writes. "High cost industries are built up because they are thought to contribute to national power. Labor amenities, better than productivity justifies, are enforced so that (factory) laborers shall have a better life. High incomes are taxed almost out of existence to increase equality. Location of industry is interfered with so that every part of the country shall have its 'fair' share of development. The large farmers, who know about agriculture, have their holdings cut down so that more of the landless can enjoy the pleasures of ownership. And so on."

"The criteria applied [Zinkin concludes] mostly have nothing to do with economics; and the result is, naturally, that though there may be more equality or greater regional fairness or possibly fewer revolutions, there is also less development."

If I didn't know better, I would think Mr. Zinkin had been reading economic reports at the World Bank—and not just those on Asian countries.

It is these conflicts which make economic aid to the poor countries to-day a delicate and at times an agonising business. The claims of poverty appear so compelling that the outsider is tempted to conclude that all argument over the niceties of equality, or of regional "fairness" or of national prestige is really too much of a luxury to be tolerated. But such an attitude does less than justice to the governments of these countries; the political problems they face are excruciatingly difficult; they are the primary agents of change in societies undergoing a wholesale transformation to prepare for modern economic life. In western societies the primary agents of change in the early stages of development were the entrepreneurs; governments could then confine themselves to ruling—to maintaining law and order. Now governments in the underdeveloped world are taking most of the development initiatives themselves, either because there is no entrepreneurial class of any significance or because only the Government can raise the necessary capital. They have to lead as well as rule. To help these governments perform their necessary development functions without generating extravagant forms of political injustice and cruelty is really the major objective of economic aid.

Clearly economic aid cannot escape involvement in the moral and

political hazards which the choices before these governments entail. But in so far as economic aid serves directly and exclusively to promote an orderly consideration of development problems as a means to higher material living standards, it can, I think, be a most helpful and hopeful persuader. The very process of development planning requires these governments to bring together in one place all the competing claims on the country's resources, and to decide upon a reconciliation of these claims in accordance with some set of values. And then planning brings an awareness of costs and benefits; it helps make clear that often the cost of an expensive monument to the glory of the State is to make the population poorer and weaker in the long run because of the waste of resources involved.

Orderly development procedures can help to bring about a realistic division of functions within government and between government and the private sector. They can help persuade a politician that the management of a power system is best left to a technician so that the politician can have more time to devote to the really important development decisions. They can lessen hostility to the foreigner's investment by creating more awareness of how much slower economic growth is without it. They can lessen enthusiasm to penalise the successful farmer and business-man in the name of equality by creating an awareness of how much less food, jobs and basic comforts of life there will be with such penalties.

In practice, the Bank has found that these conflicts are not always as agonising as they appear in theory. We have reason to believe that in many cases argument over the conflicts between growth and equality, growth and national security, growth and cultural development is more a symptom of frustration than its cause. Often the argument is most heated where there have been some tragically wasteful experiences with development, and where as a result order has given way to rationalisation and self-justification.

There is no more certain cause of frustration than the power plant, standing like the statue of Ozymandias in the desert, with no transmission lines connecting it with reality because the money ran out. Or the industrial plant without a market or even the prospect of a market, because nobody looked for a market before building it. Or the brand new turbine rusting on the dockside because somebody decided to buy it before deciding what to do with it. Or the newly irrigated lands lying fallow for lack of anybody to cultivate them. Such situations exist, and they suggest to me that economic facts can be very welcome and hopeful persuaders if they are presented in the right way and with a generous hand and heart.

If these tractable problems can be tackled, there is real hope that the job of reconciling competing objectives will become more manageable with time. There is real hope that people will take ideology less seriously simply because they will be too busy. But how important it is to focus economic aid on the tractable problems, the problems of engineering a series of escapes from the worst pangs of poverty. How important it is to nourish through the

thick and thin of political change every point of contact among the artisans of economic development. How important it is to develop a pride of workmanship so that every ounce of resources available for promoting higher material living standards is used as efficiently as possible. And how important it is that the free world community stand ready to pledge whatever measure of its wealth can be usefully absorbed in this endeavour.

I have spoken of some of the points where the Bank's path crosses with the paths of some in the underdeveloped countries who are pursuing economic development for reasons which have little or nothing to do with the aim of promoting higher material living standards. Now let me turn to the industrialised countries.

There is a tendency on the part of some in the industrialised countries to regard economic aid solely in the context of diplomatic and military policy—either as a weapon in the Cold War or to be used in defence of some narrower political or diplomatic interest. This is hardly surprising. Diplomats and military strategists are trained to think in terms of power; they tend to look on economic aid as nothing different from other exercises of national power—to regard economic aid as just another means of serving narrow national interests.

Certainly I have yet to meet a political leader in the underdeveloped world who seriously thinks economic aid is offered by any sovereign nation for motives completely divorced from its own interests. But I ask these diplomats and military strategists what interests they think they are serving when they offer economic aid in exchange for a military alliance or a diplomatic concession? They are certainly not serving the interest of orderly economic development; in fact, they may well be abetting and perpetuating conditions which in a short time will render their military alliances and diplomatic concessions quite hollow victories.

In these circumstances the Government of an underdeveloped country is likely to feel it has fulfilled its part of the bargain when the treaty is signed or the vote in the United Nations taken. That Government is not likely to take very seriously any protestations of concern about economic development—or pay much attention to what is said on the subject. In these circumstances economic facts can hardly be very hopeful or helpful persuaders.

I sometimes wonder—if you will pardon a digression—what would happen if, where governments believe their interests are served by supporting foreign military establishments, some of the aid money were used to encourage soldiers to try their hand at economic development. In many underdeveloped countries a great deal of prestige is attached to life in the Army; as a consequence, much of the administrative and technical talent to be found in that country is found in the Army. Now armies can perform very useful development functions; the American army certainly did in the last century; in fact, the United States Military Academy at West Point was

founded in 1812 as a school of engineering. The American Army's Corps of Engineers opened up a good deal of the United States, building canals, roads and dams throughout the Middle and Far West. In some underdeveloped countries to-day there would be a radical change in the economic environment if the Army were to perform such tasks. I don't mean by throwing out this suggestion to meddle in the affairs of the military strategists, but who knows: maybe if there were more corps of engineers, there would be better military alliances in the long run.

Of more fundamental concern is the widespread belief in the free world community that economic aid is a weapon in an ideological competition with Communism. This idea of an ideological competition clearly serves the interests of the Communists; but I question that it serves anybody else's interests.

The Communists, of course, paint a picture of the world which has nations divided according to a label stuck on their economic system—the one labelled "Capitalist," the next "Socialist" and the third, "Communist." The pattern reflects their determinist view of history and their belief that theirs is the one sure road to the Good Life. But what other ideology does this pattern fit?

In countries where individual freedom is fostered, conflicts over the use of economic power are resolved through the give and take of the democratic process. There is a continually changing emphasis with the ebb and flow of politics between the aim of an egalitarian distribution of material wealth and the kind of less-equal distribution which is necessary to provide rewards in money for the successful innovator or investor. There is, similarly, a changing emphasis between the demands of growth and national security, between the demands of growth and regional prosperity, and even between the demands of growth and ownership and control of property. It is largely by not claiming any final authority for any determinist view of economics or of history—that is by not taking ideology too seriously—that the western world to-day enjoys democracy and freedom as well as the highest material living standards.

How ridiculous, then, to accept the terms of competition laid down by ideologues who, in the first place, believe quite wrongly that all economic power is vested in the ownership of property; and who, in the second place, have fashioned the implausible theory that, simply by abolishing the institution of private property, economic development can be made into an escalator to carry society to a state where all social friction arising from the exercise of economic power has disappeared?

And how dangerous it is to encourage those in the underdeveloped world to believe that the Communists' terms of competition are anything but an illusion. The leaders of these countries have often stated their determination not to repeat the mistakes which the industrialised nations made during their

development. Economic aid should serve to bolster this determination—and to point out the greatest mistake that can be made is to succumb to the illusion that the competing aims and aspirations of their people, as they concern economic development, can ever be settled once and for all.

Capitalists, of whom I consider myself one—and may not I say Socialists, too?—have come in a great many shapes and sizes for a great many years now. Should we not be proud of this diversity and lay stress upon it? And while we are at it, cannot we say that Communists, too, are beginning to appear in a few different shapes and sizes? Shouldn't we also stress this? After all, the quest for peace demands that the Communists be encouraged to shed their illusions about the nature of competition among nations even as we shed ours.

There is another point of conflict between the view of economic aid as a vocation and another view found in the industrialised countries. There are some who believe that development aid to be worthwhile must have a direct and immediate economic benefit to the donor country. Usually the benefit sought takes the form of an export order or of a new source of raw materials.

The whole question of the relation between trade with the underdeveloped world and economic aid is currently being reviewed in many quarters and involves several very complex technical problems. I only want to underline one broad generalisation.

The relation between trade and investment with the underdeveloped countries is a fundamentally different one to-day from what it was even a generation ago. Before economic development was a primary aim of the governments there, international investment in the underdeveloped world could be regarded simply as an arm of trade—either as a source of export orders or of raw materials. Now that governments in these parts of the world are forcing the pace of development, the rate of increase in trade over the long run will depend increasingly on the development of new markets in the underdeveloped world. And when I use the word "markets" I am talking about customers with whom it will be possible to do business over a number of years, not just on a hit-and-run basis.

This means that trading governments and traders alike need to-day an investor's outlook towards trade with the underdeveloped world. This trade cannot be financed on the old, mercantilist pattern without endangering the whole order of international financial transactions and contributing to the delinquency of the economic-aid idea. Successful trading ventures with the underdeveloped world to-day demand that the industrialised countries give much more time than in the past to trying to calculate the real economic benefits on both sides of the equation, not just the immediate benefits that may accrue to the exporter. In so far as economic aid is used merely to bail out exporters who have unloaded their wares, not wisely, but too well, both the ends of aid and of trade in the long run are frustrated.

And again who is going to listen to what is said about economic

development, or to think there is any serious concern with it, if the idea gets around that what is really wanted is a subsidy for an export industry?

As I said, I have been giving a journeyman's view of economic development, the view of one who practises economic aid as a vocation.

I have said that scientific and technical knowledge is power; that all exercise of power in international affairs—and economic aid is one such exercise—involves inevitably great moral and political hazards. But not to exercise this power clearly involves even greater hazards; it amounts to saying that this knowledge has no enduring worth . . . or to saying that the free nations of the world have lost the courage to use the great power of their knowledge to help others to live in freedom.

To-day the free nations can exercise their power constructively in the world only as part of a contract between or among sovereign equals. That is why it is as a vocation that I pledge the idea of economic aid to you to-day. Until governments—in the capital-exporting countries and in the capital-importing countries—decide that the primary objective of economic aid is the raising of material living standards—until they accept this objective as something different and apart from other objectives they are pursuing—economic aid can only generate false hopes and disillusionment, both in the underdeveloped world and in the industrialised countries.

It is no mean vocation for the free nations to make sacrifices to help find an escape from poverty for those millions whose ways of life have been rendered so tragically inadequate by the recent course of history. Such sacrifices ennoble the ideals of freedom and tolerance far more than any eloquence man can muster.

And in what more practical way can the free nations demonstrate their concern for maintaining peace in the world? By applying our knowledge to specific conflicts, to specific predicaments; by borrowing from the Puritans their love of work and pride of workmanship without their innocent pretensions; by standing ready to do business with one and all who are willing to regard the pursuit of economic development primarily as a means to higher material living standards—by doing all these things, we can have real hope that time is, indeed, on the side of peace and that these societies will evolve in ways which are compatible with a respect for individual freedom and for tolerance among nations and races.

Human progress, someone once said, is best regarded as a series of escapes from one predicament to another, with the ground of hope being the measure of advance. It is very literally, very tangibly to preserve this ground that the world community should aid the economic development of the underdeveloped world as a vocation, as an end in itself.

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SECOND ESSAY IN DYNAMIC THEORY¹

1. I AM offering this article as a companion piece to one that appeared rather a long time ago and contained a form of equation, which has since become fairly well known.² I am now presenting a second form of equation, and submit that the two together provide the inner core of the dynamic theory of an insulated economy.³ Demand and supply are essentially static concepts and not strictly applicable in dynamic analysis. But in a certain sense the equation in the previous article may be regarded as a dynamic analogue of the static law of demand; if that is allowed, the equation in this article may be regarded as an analogue of the static law of supply.

2. I do not hold that the two equations constitute what is called a "model," any more than the laws of demand and supply taken together constitute a model. Rather they should be thought of as laws expressing certain necessary relations. They are not, of course, necessary in the sense of being *a priori*, for in that case they would be empty and uninformative. They are empirical, but necessary in the sense that they flow necessarily from postulating certain very general facts in the human situation, themselves known empirically, such as the existence of a multiplicity of needs and the availability of an insufficient amount of productive resources, which can be applied to alternative uses,⁴ notably to present or future satisfactions. They are prolegomena to model building. In attempting to construct a model we seek to enter more deeply into the empirical phenomena. I believe that a model can properly be distinguished from a set of fundamental laws by the presence in the former of certain adjustable parameters.

3. There has been some terminological hesitation between the use of "dynamics" and "growth theory" in relation to certain matters. I believe that a distinction can be made, and that it would be convenient to use "dynamic theory" for the relations between the rates of increase (or decrease) of certain magnitudes in a growing economy. The theory of economic growth would have a wider ambit, including dynamic theory in this narrow sense. It would comprise also such matters as the sociological effects of the impact of economic progress, the contribution of the social pattern to it, the contribution of education, both general and technological, the need for political security, the usefulness of greater or less governmental intervention in successive phases, the development of moral codes, etc. For instance, there are wise men who hold that the prevalence of graft is the

¹ I am grateful to Mr. M. F. G. Scott for certain helpful suggestions.

² "An Essay in Dynamic Theory," *ECONOMIC JOURNAL*, March 1939.

³ The dynamics of foreign trade and investment, on which Prof. H. Johnson and others have been doing notable work, must be an important part of the total theory.

⁴ Cf. Lionel Robbins, *Nature and Significance of Economic Science*, Chapter 1, p. 15. No. 278.—VOL. LXX.

greatest single obstacle to growth in some developing countries. In fine, growth economics would then constitute the "political economy" of growth, while dynamic theory would be its pure economics.

4. My original equation has been criticised for excessive rigidity, notably for not allowing for the possibility of substitution in the productive process as between capital and other factors. In my *Essay* I used the term C for the optimum amount of capital required per unit of time, given current technology, for the output of an extra unit, and C_p for the actual accretion of extra capital per unit of extra output. In my book, *Towards a Dynamic Economics*, I used C_r for the optimum amount of capital required, reserving C for the amount that actually occurred. This latter symbolism seems better, and I shall adhere to it in what follows. It is argued that the value of C_r must depend on the rate of interest, and that consequently what I have called the "natural" and "warranted" rates of growth are so dependent. Recognition of this, it is claimed, could have far-reaching effects on the analysis.

5. In self-defence I may observe that I did recognise this dependence in the *Essay*. "The value of C_r may be somewhat dependent on the rate of interest" (p. 17). If I did not develop the implication of this any further, that was mainly owing to the maxim of attempting to do only one thing at a time. I must confess, however, that I was also somewhat influenced by the view, which was prevalent in those days, that producers were but little influenced by the rate of interest in their choice of more or less capital-intensive methods of production. When entrepreneurs reported that, owing to the risks of the market or of obsolescence, a piece of equipment was normally expected to pay itself off in four or five years, how could variations in the interest rate within the range commonly experienced have any appreciable effect? This was doubtless too sceptical. Even at that time it was recognised that the rate of interest had influence on long-lasting capital installations. Since then I have been much impressed with the significance of the imperfection of the capital market. The rate of interest should be regarded as the barometric reading in that limited part of the market which is perfect (organised stock exchange, discount market, etc.). When capital disposal is short, the perfect markets record high readings; but for many the shortage impinges on them simply by would-be borrowers finding it difficult to raise money. Accordingly, a wrong impression may be gained by putting the question to producers in the form—are you influenced by the rate of interest? This implies a nice calculation, balancing a rate of interest of so and so much against an expected yield of the projected assets on their cost of production. Many of the producers who deny ever making such a calculation may none the less be influenced for or against a more capital-intensive re-deployment of their productive set-up by whether the required finance is easy or difficult to obtain. In any case, a theory which makes no allowance for the possible variation in C_r in response to the abundance or

shortage of capital disposal is defective in principle. It is now sought to remedy this defect.

6. In my equation for warranted growth, which it is convenient to repeat,

$$G_w = \frac{s}{C_r}$$

s , the fraction of income saved, is taken as an independent variable. Its value is assumed to depend on the private convenience of many individuals, on the desires of many firms to finance themselves from their own ploughed-back profits, etc. This assumption of the independence of s is appropriate in its context. Indeed, the fact that the "warranted" rate of growth may not be equal to the "natural" rate depends precisely on the assumption that private motives may not yield the amount of saving that complies nicely with the needs of the society; they may generate too much or too little saving. The Keynesian origin of this idea is obvious. Natural growth (G_n) by contrast is conceived as a welfare optimum, in which resources are fully employed and the best available technology used. With natural growth so conceived, the amount to be saved becomes a "requirement," which may be greater or less than the actual s . But is not this "natural" rate itself indeterminate, unless the rate of interest is specified? There is clearly a lacuna in the theory.

7. I have to ask the reader in what follows to subject himself to a certain discipline, which may not be altogether easy. I regard the fundamental concept in dynamic economics as the rate of increase, just as the state of rest is that of statics. It is the rate of increase that obtains *at a given point of time*, given the fundamental determinants. In dynamics, or at least in Part I of dynamics—and I do not think that we can yet get beyond that—we are not, according to my view, concerned with a succession of events through time. The analogy with mechanics is, surely, precise. There we seek to determine the velocity of a particle in consequence of the forces acting upon it at a particular instant. Thereafter it may become subject to new forces. The dynamic determinants of economic progress change from time to time, and the consequence of such changes will have to be considered in due course. But, to begin with, we need to determine the rate of increase at one point. This is but applying in the realm of dynamics the procedure so well known, and, I would say, fruitful, in the theory of static equilibrium. It has always been recognised that the determinants of that equilibrium (desires of individuals, etc.) are constantly changing; none the less, it has been found serviceable to establish the equilibrium pattern required by a given set of determinants. I am convinced that we must do this in dynamics also, as an essential prelude to all else. Edgeworth once said of general value theory that "the path is short, but very slippery." If this is true of dynamics also, as is surely the case, we must proceed carefully, step by step. One consequence of this method of initial approach to dynamics is that time-lags do not appear in the equations.

8. This article is unlike the earlier *Essay* in that it will lead into the subject by reference to the welfare optimum. I believe that on a broad historic view we find that attention to the welfare optimum played a vital part in the formulation of static equilibrium theory. This may be a good precedent.

9. The second lecture in the course published as *Towards a Dynamic Economics* is called the *Supply of Saving*. This contrasts with the title of the third lecture, *Fundamental Dynamic Theorems*, and suggests, correctly, that what I had to say about saving could not be regarded as an integral part of dynamic theory. The *Supply of Saving* contains an equation (p. 42) which has been found, justifiably, somewhat obscure. The matter was rendered worse by inaccurate notation in the earlier editions. I will set it out in its most convenient form; the reader need not trouble himself, at this stage, about its justification, which will appear later. C_0 is consumption in year 0, C_r is consumption in year r , e is the elasticity of the schedule of the diminishing utility of income in its relevant range, T is "time preference" expressed in the form that, if a given unit of utility in year r is considered only half as preferable as the same unit of utility in year 0, $T^r = 0.5$, and R^r is the amount of money to which 1 unit will have accumulated in r years at the current rate of interest.

$$C_r = C_0 + e \left(1 - \frac{1}{T^r R^r} \right)$$

In formulating this I was much influenced by F. P. Ramsey's famous article entitled "A Mathematical Theory of Saving."¹

10. Ramsey's article contains a concept which he calls "Bliss," namely, "the maximum obtainable rate of enjoyment or utility." This concept is unsatisfactory for two reasons. It is unsatisfactory for dynamics, because Bliss is essentially a static concept. It is also unsatisfactory for any kind of welfare economics, because Ramsey's technique requires a comparison of the total utility achieved at "Bliss" with total and marginal utilities currently achieved, and this is manifestly altogether impracticable.

11. In my lecture on the *Supply of Saving* I gave a second equation, based on the assumption that it could be foreseen that the globe would be vaporised by a nuclear explosion n years hence. This second equation, along with n equations of the form given above, would suffice to determine the values of all the terms. Thus the Explosion would take the place of Bliss in governing the correct rate of saving. I next proceeded to some more realistic observations about a man's probable attitude to his own life and to his heirs. It was obvious that no precise theory could be based on such vague psychological speculations. Thus the matter lapsed, and my discourse on the supply of savings did not yield anything that could be included among the "fundamental dynamic theorems."

¹ ECONOMIC JOURNAL, December 1928.

12. Although I had warned myself and others in the *Essay* that the formulation of a dynamic theory "involves something wider: a method of thinking, a way of approach to certain problems,"¹ I was still so deeply rooted in static ways of thought, when I composed the Lectures, that I did not perceive that I had under my nose what was really a dynamic equation. As Keynes observed, in relation to a different problem, namely that of his *General Theory*, it is exceedingly difficult to wrench oneself from the habits of thought in which one has been educated.

13. I now set out my "second" equation, derived from my abortive attempt, based on Ramsey, in the lecture on the Supply of Saving. Its demonstration is given in the following paragraphs. I would venture to suggest that its *simplicity* entitles it to be regarded as a fundamental equation. Let r_n be the rate of interest appropriate to a natural (welfare optimum) rate of growth, and ${}_pG_n$ the natural rate of growth *per caput*.

$$r_n = \frac{{}_pG_n}{e}$$

This dispenses us both from having to have regard to "Bliss" or from having to make arbitrary assumptions about what a man may feel that he ought to do for his heirs.

14. The equation supplied in para. 9 above is based on the proposition set out in *Towards a Dynamic Economics* (p. 45) that the individual's distribution of his consumption between year 0 and year 1, in equilibrium, is given by

$$u(C_0) = RT \times u(C_1)$$

where $u(C)$ is the marginal utility of consumption. This signifies that, given the rate of interest and the time preference, consumption is so arranged that no re-distribution of it from year 0 to year 1, or conversely, would increase utility (as modified by time preference). Define, for the sake of simplicity, e as

$$e = \frac{C_1 - C_0}{C_1} \div - \frac{u(C_1) - u(C_0)}{u(C_1)}^2$$

Represent $\frac{C_1 - C_0}{C_1}$ by $G(\text{con})$

Reducing the above, it follows that, in equilibrium

$$RT - 1 = \frac{G(\text{con})}{e}$$

15. The equilibrium of static economics implies that saving is zero. A steady rate of increase implies that a constant fraction of income is saved. If the fraction of income saved is increasing or decreasing, that implies an

¹ *Op. cit.*, p. 15.

² The difference between this definition and $e = \frac{C_1 - C_0}{C_0} \div - \frac{u(C_1) - u(C_0)}{u(C_0)}$ disappears when the matter is expressed in terms of differential equations.

accelerating or decelerating increase of income. Accordingly, in the equation representing the rate of increase at a point of time it should be assumed that a constant fraction of income is saved. Thus for the equation last given we may substitute:

$$\text{In equilibrium, } RT - 1 = \frac{G}{e} \quad \dots \quad (1)$$

This equation defines the equilibrium behaviour for an individual, if we abstract from his employment pattern (retirement in old age, etc.), and assume a constant rate of growth of his income. If we translate this into an equation representing the situation of the community as a whole, e must be a weighted average of the e 's proper to each individual in it, subject to the abstractions of the last sentence. This assumes a constant income distribution. This assumption is simply carried over from the welfare optimum of static economics, where the income distribution is taken as given. Ultimately, we should be able to accommodate a steadily changing distribution of income in dynamic theory; this would (or might) entail a steadily changing rate of growth. (It is quite possible, however, the e does not differ much as between rich and poor.) With e thus re-defined, we can transform equation (1) into a community equation, in which pcG represents the growth of income *per caput*.

$$\text{In equilibrium, } RT - 1 = \frac{pcG}{e} \quad \dots \quad (2)$$

This has its own importance and should be borne in mind in what follows.

16. We may now go over to the "natural" (or welfare optimum) rate of growth. This may be regarded as, in the main (see below), exogenously determined, viz., by the growth of population and technological advance. This includes the rate of growth of skilled personnel, however obtained, e.g., by governmental measures. If we are considering the welfare optimum, we should write, $T = 1$. There ought not to be a time preference! Any authority concerned with planning should, presumably, disregard it. Putting $r (= R - 1)$ for the rate of interest, we then have

$$r_n = \frac{pcG_n}{e} \quad \dots \quad (I)$$

In other words,

$$r_n = \frac{G_n}{e} / G_{Pop}$$

where G_{Pop} is the rate of growth of the working population.

17. As G_n is (in the main) exogenously determined, and as e certainly is, equation (I) should be regarded as stating what determines the natural rate of interest.

18. It may be objected that G_n is itself determined by the rate of interest, so that there are two dependent variables in equation (I). This must be

¹ In the community equation T also must be taken to represent a weighted average.

recognised, subject to the important warnings given below, and, to accommodate the matter, we may have a second equation, showing the dependence of the natural growth rate on the rate of interest thus:

$$pcG_n = f(r_n) \text{ (decreasing or increasing function)} \quad \dots \quad (Ia)$$

19. There is an inclination to suppose that G_n would be greater, the lower the rate of interest. As a generalisation, this is fallacious, and due to a confusion of dimensions, which it should be the first task of a "dynamic economics" to prevent. The confusion arises from regard to two quite different propositions, as follows: (i) If the rate of interest is low, more capital-intensive methods of production will be chosen by the producer, or more capital-intensive products will be preferred (because cheaper) by the consumer, than if it is high. The capital/output ratio will be higher. This means that, given the population and other factors (natural resources, trained personnel, etc.), output per person will be higher. It need hardly be said that higher production does not entail a higher growth rate. (Often the contrary!) (ii) If employment (including employment of skilled personnel) is not full, a drop in the rate of interest can increase it. While unemployed resources are coming into operation, G (actual growth rate) can exceed G_n . It need hardly be said that this does not entail a higher G_n either. It is quite an open question whether G_n will be higher or lower with a lower rate of interest. All depends on the nature of the technological innovations. If these are concentrated on substitute modes of production or substitute products where the yields on the modes and products for which they are substitutes are low, then the low-interest-rate economy will show a higher growth rate than the high-interest one. It will have the opportunity of taking advantage of a number of innovations which the high-interest economy has simply to ignore because, for it, they are outside the range of paying propositions. But if the innovations are such that the substituted processes or products were previously a long way inside the margin of substitution, the reverse may well be true. Compare two economies A and B of the same population increase, of which A uses more capital-intensive methods because its growth *per caput* and its natural interest rate are lower. A consequently has a higher income per head. Let there be an innovation available to both economies, which both will unquestionably adopt, because it is so manifestly high yielding. Thus for both it will cause the same increase in income in the sectors affected. But, because A is initially a higher-income economy, the growth entailed by this innovation will be greater in B, the high-interest country. Finally, there is the point that a *falling*, as distinct from a low, rate of interest could promote *per caput* growth. A falling *natural* rate of interest is a phenomenon of declining growth *per caput* (see para. 25). A fall in the interest rate from a supra-natural level towards its natural level is discussed in paras. 35-8 below.

20. The main objection to equation (I) is the difficulty of computing e .

It is supposed on general grounds to be less than 1. On the other hand, it would probably be wrong to suppose it *much less* than 1, since this would give an unrealistic decline in the marginal utility of income in the ranges of which we have experience. It would follow that the rate of interest ought to be above, but not much above, the growth rate *per caput*.

21. In *Towards a Dynamic Economics* (pp. 43-4) I suggested a method for measuring e . I proposed to take the eighth hour of work (or the sixtieth minute of the eighth hour) as a yardstick of constant disutility for a given individual. By appropriate conjoint variations in his basic rate of pay and his marginal rate (for the last hour or last minute thereof), and by allowing him freedom to vary the time worked, one could find out what increase in the marginal rate sufficed to keep him working exactly eight hours, neither more nor less, as his total income rose owing to an increase in the basic rate. It has been objected to this that a rise in income might make him find more utility in leisure, so that the sixtieth minute of the eighth hour would cease to be a yardstick of unvarying disutility, but would conflate the actual toil of work with the disutility of foregoing leisure, the latter rising as income grew. This objection could readily be overcome by varying the conditions of the experiment. Let us suppose the length of the working day not subject to variation, so that the rising utility of leisure, with higher income, became irrelevant. Let us suppose a piece-rate superimposed upon a basic rate, both variable. The target output, say 100 pieces, should be fixed so that it was quite a considerable effort to achieve it. What increase in piece-rates would be required to induce the man to produce exactly 100 pieces, neither more nor less, as his income went up owing to successive rises in his basic rate? This seems to give an inexpugnable yardstick for cardinal measurement of the rate of decline in the utility of income as income rises.

22. I have suggested applying the experiment to one individual to avoid interpersonal comparison. It will be objected that a single individual's reactions to changes of income—not known to be permanent, if this is a mere experiment—would be quite unreliable. In practice, of course, one would make the experiment with a *large number* of different individuals, who were normally on different income scales owing to their position in the factory hierarchy, and would rely on the large number to overcome differences of personal temperament from man to man. This is the way in which things are commonly done in the natural sciences. Of course, no such measurement could be relied on to be 100% accurate. It is impossible to get measurements of *perfect* accuracy in physics—I am not speaking of quantum physics—or in chemistry. The practitioners of those sciences would not have done so well if they had decided in consequence from the beginning to use no cardinal numbers in the formulation of physical and chemical laws. This is true of economics also.

23. It is next necessary to draw the threads together. The "supply"

equation, which should be regarded as determining the natural rate of interest, is

$$r_n = \frac{peG_n}{e}, \quad \dots \dots \dots (I)$$

where G_n is taken to be an almost entirely independent variable, but possibly depending to a slight degree upon the rate of interest:

$$peG_n = f(r_n) \text{ (increasing or decreasing function) } \dots \dots (Ia)$$

The capital intensity of methods used for increments of production, and of the basketful of goods selected by consumers for their additional purchases, depends on the rate of interest:

$$C_r = f(r_n) \text{ (decreasing function) } \dots \dots \dots (II)$$

This equation should satisfy objectors who complain that I took no account of the substitutability of capital for other factors in my earlier equation. And finally, to repeat the equation from the earlier *Essay* in a somewhat different form,

$$s_r = C_r G_n \dots \dots \dots (III)$$

By this formulation the fraction of income to be saved becomes a *desideratum*, s_r .

24. Two points may be made in passing. In equation (III) the required amount of saving is stated as depending on the amount of capital required for the increment of output. But technical progress may alter, and often increase, the amount of replacement capital required per unit of output; it may also raise the required rate of replacements by rendering obsolete equipment hitherto expected to have a longer life. To take account of this it will be needful to re-work the theory that has been outlined in *gross* terms. This task is not attempted here.

25. This article is concerned with a steady shift of the "production function" outwards from the origin. It is not implied that the successive functions, moving outwards with time, are parallel to each other; the analysis has been consistent with innovations being neutral, labour saving or capital saving. Some students of growth have laid stress on the phenomenon of a movement *along* the productivity function in consequence, not of innovations, but of a rise in the ratio of capital to other factors due to the accrual of fresh saving. Such a movement implies a falling rate of interest (by Equation (II)). A falling natural rate of interest implies a falling natural rate of growth *per caput* (by Equation (I)), save in the event of e increasing, which seems improbable. Thus a shift along the production function, as distinct from a movement outwards of the production function, should occur only in periods when the rate of technical progress is falling. Such a shift may ensure that the rate of growth *per caput* does not fall as quickly as the rate of technical progress. None the less, it is essentially a phenomenon of a falling natural rate of growth.

26. To return to our main theme: it might be thought that, since e is a weighted average, s , the fraction of income actually saved would tend to approximate to s_r , the social requirement. There are a number of reasons why this may not be so, of which I will mention only the most outstanding. (i) T may be less, indeed much less, than 1, especially in developing societies. This would tend to depress saving. (ii) Individuals have their own youth-maturity-old-age patterns, which might cause them to save more or less than they would, if each was immortal and had an income continually growing at the same rate as the weighted average of incomes *per caput* for the economy. (iii) Companies save importantly. It would be wrong to suppose that these shape their policies to conform to the saving patterns required by the weighted average of their shareholders, or that the shareholders treat company savings as in effect their own, and save correspondingly less for themselves. Companies have their own motives, some springing from the long run; they may desire to expand capacity without the forfeit of power or the expense involved in relying on the capital market for fresh funds. The shareholder, on his side, cannot be sure when the companies will distribute the profit on their ploughed-back savings, nor can those who determine current share values in the organised market for shares.

27. To revert to the terminology of the earlier *Essay*, the warranted rate of growth is above the natural growth rate, if actual saving (s) exceeds the required rate of saving (s_r), and conversely. While the natural rate of growth is determined almost entirely exogenously in relation to the variables of the equations and is therefore taken to *require* a specified amount of saving (s_r), the warranted rate of growth is taken to be determined by the actual rate of saving (s). Let us take the two cases, viz., an excess or deficiency of s compared with s_r , in turn.

28. If $s > s_r$, then we have the situation which Keynes diagnosed and about which he feared, along with other proponents of the "stagnation thesis." The warranted rate is then greater than the natural rate; but the actual rate cannot exceed the natural rate save for temporary phases. The natural rate is indeed the greatest that can be achieved on the long haul.¹ If the actual rate of growth is retarded by the full-employment ceiling, then it must fall below the warranted rate and a depression will set in.² Or a downturn can come, for reasons explained in an earlier article,³ before the full-employment ceiling is reached, if producers correctly believe that demand cannot continue to expand indefinitely above the natural rate, viz., at its

¹ It has been suggested to me that this is not *necessarily* true, since, if the rate of interest were pushed and kept down *below* its natural level, a rate of growth above the natural level could in certain circumstances be sustained. This possibility must be recognised. It must be borne in mind, however, that a below-natural rate of interest may equally well be associated with a *lower*, as with a higher, rate of growth (cf. p. 283 *sup.*).

² This is in accordance with the instability principle, as described in the first *Essay*, and I need not revert to it in this one.

³ "Domar and Dynamic Economics," *ECONOMIC JOURNAL*, September 1959.

rate in the recent past. The special circumstances of the post-war period have caused us to think less about the dangers of "stagnation"; but they may still be lurking, especially if the maximum feasible rate of investment in developing countries proves to be disappointing.

29. A suggested recipe for the threat of stagnation, in addition to stimulating all kinds of public investment, or other investments the utility of which might be reckoned to exceed their monetary yields, is a Budget Deficit. As Political Economists we should not wish to discourage the propensity to save. It may be useful to have a high propensity to save deeply ingrained, in case times should change. Furthermore, the ownership of some capital funds gives a man a special kind of happiness and a sense of freedom. Without property we remain, although not in so severe a sense as Marx may have intended, wage slaves. Ownership promotes a spirit of independence. And so, if it happens that the sum total of citizens desire to hold, in the form of savings available for future use, a value greater than the sum total of the capital value of the land, buildings, equipment, work in progress, stock-in-trade, etc., that the community requires, the Government should provide reliable savings certificates. It is essential, of course, that in such a situation it should treat the proceeds of the sale of such certificates as income and remit taxation accordingly, with a view to sustaining the aggregate of demand for goods and services at a level conformable to the growth potential of the economy.

30. I made a cardinal mistake in *Towards a Dynamic Economics*, owing to still being sunk in static slumber. It occurred to me that, if saving were really so plentiful that the Government had to take a surplus off the market and plough it back into current expenditure, the logical corollary of such a state of affairs was that the rate of interest should be zero. If interest is the charge for a scarce factor, the economic function of which is to prevent capital being used for low-yielding projects and ensure that enough exists for all the higher-yielding projects, what need was there to have a positive rate of interest when revenue-yielding projects for capital outlay were so short that one had to plough saving back into public expenditure on current account? This point of view is plausible enough. But in the light of equation (I) it is seen to be wrong. If $\frac{peG}{e} = 3$, it does not increase community welfare to

plough savings into projects that yield less than 3%. We do not want by investment to transfer goods away from present consumption to consumption in subsequent years, if the investment increases the quantum of goods available in the subsequent years by no more than 2%. For the marginal utility of goods will in any case be down by 3% in the next year and by more later; therefore we do not want to give up the enjoyment of goods now unless we thereby get at least 3% more goods in subsequent years. Therefore the maintenance of a positive rate of interest is not inconsistent with the desirability of ploughing back some savings into current government expenditure, not merely

in depression, but on the overall average year by year, providing that productivity per head is still growing. A positive rate of interest should be maintained, even when some savings are being made available to the general body of citizens for current expenditure, in order to prevent savings being ploughed into investments the yield of which is less than the current natural rate of interest, $\frac{p_c G_n}{e}$. The rate of interest should fall to zero only if output per head ceases to grow and $p_c G/e$ becomes zero.

31. If $s < s_r$ the economy may have a chronic tendency to inflation. This occurred for a number of years in mature countries after the Second World War, and it may explain the persistent tendency to inflation in some Latin American countries. For such inflation to occur there is no need for there to be any increase in banking credits; the excess investment, if it occurs, is automatically financed by the excess (inflationary) profits due to the investment. This is a crucial point that divides anti-Keynesians from Keynesians, in the dwindling band of whom I would still align myself. None the less, I would not go so far as to hold that in these circumstances (viz. $s < s_r$) an inflationary tendency necessarily develops. The realisation of excess investment seems to imply, not indeed an increase in banking credit, but an accommodating spirit in the capital market. Developing countries may have a very narrow domestic capital market, or none, save for a tribe of "usurers" lending at exorbitant rates. In mature countries investors can usually pre-arrange finance, even if the total amount so arranged is running ahead of normal savings, i.e., if there is excess of *ex ante* investment; if they do so and proceed on their business the aggregate of savings that they require will become available *en courant* through the inflationary process. But where capital markets are narrow or non-existent it may be impossible to make these pre-arrangements; the inflationary finance will not be generated and the investments will not be undertaken. Lack of saving will prevent the growth that would otherwise be possible.

32. It may be well to dwell a little longer on this point. The Keynesian scheme of thought had an attractive symmetry. If the propensity to save was excessive in relation to the propensity to invest, there would be a lapse into depression and unemployment. In the converse case there would be over-full demand and inflation; this second proposition seemed well confirmed by experiences in war-time and, to a lesser extent, during industrial investment booms. But somehow it has never seemed very plausible in relation to developing countries. There over-full demand does not usually arise in consequence of a deficiency of saving. In fact, the tendency of deficient saving to generate over-full demand must not be taken as a general law, but one dependent on the existence of an accommodating capital market, which allows the process by which excess investment generates the saving required for it (by the inflationary process) to get under weigh. Nor would the introduction of easy finance into developing countries be a satis-

factory recipe, since inflation is something to be avoided and likely to militate against growth in the long run.¹ The true view surely is that, to obtain the optimum rate of growth, which is also in some sense a maximum, saving must be neither redundant nor deficient.

33. It is necessary to look closely at the equation, $s_r = C_r G_n$ when $s < s_r$. It might be thought that the dearth of savings would push the rate of interest up so high as to reduce C_r to a level at which G_n could be sustained. But this may not be so. C_r may not be very responsive, outside certain limits, to a high interest rate. Even if it is, there is no guarantee that it is sufficiently responsive and, more important, no guarantee that the brunt of the shortage of savings will be borne by C_r rather than by G , which can fall below G_n . If the actual growth (G) falls short of the natural growth (G_n), the demand for goods will be deficient and the shortage of savings will not be apparent. If, owing to the lack of demand for goods, producers do not expand orders, G will be low and there will not be inflation nor a felt shortage of savings nor any tendency for the rate of interest to rise.²

34. It is desirable to surround any remarks about developing countries by qualifications. The major obstacle to growth may well be lack of personnel or, to revert to a point mentioned earlier, graft. The concept of natural growth embodies not only technological progress but also the increase of personnel well adapted to enterprise and business management, and the increase of know-how, whether natural or artificially stimulated. Shortages in these respects may account for a low growth rate, rather than any deficiency of s , compared with s_r . If, on grounds of personnel and know-how, a rapid growth is not feasible, s_r will be low, and s , though low, may not fall short of it.

35. None the less, it is desirable to consider the case where s is below s_r and where inflation does not occur because the capital market is insufficiently accommodating. In such a case, to obtain the social optimum, it may be expedient to raise s towards the level of s_r by a budget surplus or compulsory levy. If such measures are introduced *for the first time*, or abruptly intensified, there will follow what we may call a "transitional period." If actual growth has been running below natural growth, solely by reason of the shortage of saving, this entails that there is some underemployment or mis-employment of general or special personnel; output may be low because the capital/output ratio is low owing to the time preference being high (T low). If it were decided to take some action to remedy this state of affairs by causing more saving, then the economy would proceed through a transitional period in which actual growth was above natural growth, owing to the harnessing of previously under-employed personnel and/or owing to the increase of the

¹ See Ohlinschrift, *Inflation and Investment in Under-developed Countries*, by R. F. Harrod (1959).

² It will be evident to the judicious reader that this point, although entirely outside the ambit of Keynes' theories, is profoundly influenced by his mode of thought. It is analogous, within the realm of dynamics and in reverse, to Keynes' point that, if the propensity to save is excessive, causing depression, there will not be any felt excess of saving nor tendency for the rate of interest to fall.

capital/output ratio in various sectors of the economy, through the reduction of the operative rate of interest towards r_n .

36. The features of such a transitional period lie for the most part outside the scope of the analysis of this paper. But some general remarks may be made. Since growth during the transitional period would be above the natural rate, which implies continuing full employment, the equilibrium rate of interest, assuming $T = 1$, during the transitional period (let us call it r_{tn}), would lie above r_n . Often the ruling rate of interest in developing countries, if there be such, is above r_n owing to the low value of T . Cf. equation (2) (p. 282). On the other hand, the equilibrium rate in such countries is kept down by the low rate of growth. Thus it might, in certain conditions, be expedient to establish, during the transitional period, a rate of interest above that previously obtaining. This may seem a paradoxical accompaniment of the imposition of forced saving. But if the special measures taken raise the prospective growth rate, this will temporarily raise the natural rate of interest (r_{tn}) (equation (I)), and may raise it above the rate previously obtaining, except in economies where T is very low. In a developing economy there may be two rates, the high open-market rate, such as it is, largely governed by the low value of T , and a lower rate used to sieve official investment projects. It is important that the latter be kept high, to ensure the maximum rate of growth and prevent capital being deflected into low-yielding projects.

37. It is often stated that developing countries, which are short of capital, should concentrate on labour-intensive projects. This dictum can be accepted only with reserve. Its intellectual basis is presumably that, if $s < C_r G_n$, and if measures are taken to raise s , it is important that the accretion of s should benefit growth rather than C_r . All depends on how great the shortfall of s (by comparison with s_r) is in relation to available personnel and know-how. There is a danger of this shortage being exaggerated if constant attention is not paid to personnel and know-how. If the shortage is not great and if it is feasible within a relatively short term of years to bring capital disposal up to the level required, having regard to available resources of personnel and know-how, then the criterion for investment should be its *yield* and not whether it is capital-intensive or labour-intensive.

38. While it is true that the arrangement for extra saving in a developing country may give rise to a substantial "transitional" period, there is some danger of exaggerating its importance. If at a given point of time, t_0 , growth is running below its natural rate through lack of saving, this implies that there is available personnel to implement improved methods of production, including those arising simply from an increase in the capital/output ratio. It is the process of bringing this personnel into fuller play that constitutes the "transitional" period. But there is not likely to be at t_0 more than a limited fund of such personnel to spare; once that is taken up, "transitional" growth is merged into ordinary natural growth. It is quite

true that, if in the country in question growth has been held back for a number of years owing to deficient saving, its current output at t_0 may be far below the level, let us call it O_n , at which it would have been, if growth had been proceeding at its natural rate in the preceeding years. It by no means follows that an arrangement for extra saving at and after t_0 can raise output to O_n at once or during the "transitional" period. For natural growth *per caput* occurs through the cumulative accretion of experience and know-how and the improvement of personnel. *Lost years cannot be regained in full.* The very essence of growth (*per caput*) is education by practice and the gradual drawing out of the latent potentialities of personnel. *Vires acquirit eundo.* From t_0 onwards it is to be expected that, with the provision of more saving, growth will be raised to a higher level, namely to its natural level, the height of which depends essentially on the capacity of the population to improve itself.¹ The compulsory provision of extra saving should be regarded as releasing the growth potential of the community from bondage. It is important to avoid over-simplified ideas about the consequences of the mere provision of additional saving. This view might be regarded as pessimistic, in that it sets a limit to what can be done by one simple recipe (more saving); but it is optimistic in that it enables us to curb the impulses of those who believe that Utopia can be gained solely by the imposition of harsh austerity.

39. In mature economies also s may fall short of s_r , and this may generate demand inflation, as already noticed. But the authorities may and should seek to prevent demand inflation. Their problem is complicated by the superimposition of cycles on the trend. During the boom all available measures, monetary, fiscal and others, may be needed to damp demand. Monetary measures are probably quicker-working than fiscal. Similarly, all available measures may be needed to prevent a recession gathering momentum. What should be the trend of policy, taking bad times and good together, when actual saving is running below the required level?

40. Keynes and others have held the view that the current long-term rate of interest can be influenced by varying the quantity of money. This has been strikingly borne out by the British experience since the War. Keynes explicitly repudiated the idea of a natural rate of interest. Both Professor Hicks and Sir Dennis Robertson have reproached him for this, the former saying that he left the rate of interest hanging by its own boot-straps,² and the latter making a similar point in a brilliant passage—claiming that we have, after all, to give it an anchorage in the fundamental phenomena of Productivity and Thrift.³ Despite Keynes' disclaimers, I have always held that there is a "natural" rate of interest implicit in the doctrines of the *General Theory of Employment, Interest and Money*, namely that required to sustain investment and aggregate demand at the full-employment, and at no

¹ This is subject to the limitation imposed on the analysis of this article, which relates to an insulated economy and thereby excludes the international flow of capital and know-how.

² *Value and Capital*, second edition, p. 164.

³ *Essays in Monetary Theory*, p. 25.

more than the full-employment, level. If we ask what are the determinants of the value of that "natural" rate of interest in Keynesian theory, the answer must be the Propensity to Invest and the Propensity to Save, the latter determining the value of the "Multiplier." But these are only other names for Productivity and Thrift; so that it turns out that the classical doctrine finds its place in Keynesian doctrine. Keynes was, after all, bred up in that tradition.

41. But the natural rate of interest of the dynamic theory expounded in this article, and by that is simply meant the rate of interest that it is necessary to have if the economy is to advance at the optimum rate in accordance with its growth potential, is determined by the prospective growth of income and the elasticity of the community income utility curve (equation (I)). Thus this dynamic theory is in sharper conflict with Keynes than ever Keynes was with Robertson.

42. Let there be a situation in which s is less than s_r and it is desired to prevent a chronic tendency towards demand-inflation. Classical theory suggests that a rise in the interest rate would be desirable, so as to reduce investment demand and, possibly, encourage saving. But some voices can be heard from the wings suggesting that there is also something called a "fiscal" remedy—or is this allowable only to control the cycle? The voices may suggest that a Budget surplus would be better than a high interest rate, since a high interest rate bridges the gap mainly by lowering investment requirements, while the budget surplus bridges the gap mainly by raising savings. And is it not better to raise savings than to reduce investment requirements? But is it better? Was there discernible, in the voices off, a note that would be condemned by Mr. Little, something persuasive, something emotive, possibly even a "value judgment" itself? Dynamic theory should enable us to resolve the issue on purely rational grounds.

43. Happily in that theory the natural rate of interest is determined independently of the demand for or supply of savings, present or prospective. If we can make approximate guesses about the growth potential per head (*i.e.*, ${}_pG_n$) and the elasticity of income utility, then we can determine what rate of interest is consistent with that. I must not be supposed to be here deprecating such manipulation of the interest rate as may serve to iron out booms and slumps, *i.e.*, to prevent actual growth running away in either direction from a steady path. I am referring now to the average interest rate in both phases taken together. If the actual rate seems low by the criterion of the formula, then there is a case for raising it. (Raising the interest rate should be taken to include making borrowing difficult in imperfect markets.) This may indeed render some investment projects unpayable, but only those whose yield is so low that from the point of view of the social optimum they are undesirable. But if there is no reason to suppose that the rate is below its natural level as defined in equation (I), then there should be resort to a Budget surplus.

44. I may interject a topical observation. I deem it unlikely that Britain will be subject to chronic inflationary pressure on the demand side in the coming decade. But if I am wrong, the evil should be cured by a Budget surplus rather than by any further raising of the interest rate. And indeed, unless national income per head is destined to grow at a much greater rate in the coming period than it has done in the last decade, it would be surprising if 5% were not considerably too high.

45. What has been said is not inconsistent with the idea of easing a transition period by a high interest rate. Reference to such a period has already been made in relation to developing countries, where it may be a phenomenon of substantial magnitude. Big transitions are less likely in mature countries, but not impossible. Suppose a very large capital-requiring innovation. This will raise required saving by raising C_r . The innovation may also affect the nature of replacement equipment and indeed raise the required rate of replacements (*cf.* p. 285 *sup.*). In fine, the change in a dynamic determinant will have considerably raised the requirement for saving (s_r). The rise in the requirement may be permanent or it may not be, that depending on the nature of future innovations. In the former event it might be expedient to ease the transition by allowing a temporary rise in the interest rate rather than by jacking up saving too suddenly and abruptly. But if the rate is raised above its natural level to ease a transition, the target should always be to reduce it again to that level at an early date.

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THE SOCIAL ANTHROPOLOGY OF ECONOMIC UNDERDEVELOPMENT

In this paper evidence is submitted to support the thesis—which evidently been gathering force during the past few years—that the economic condition of the underdeveloped community is fundamentally a function of its social-cultural customs and institutions, in consequence of which generation of economic development of a people by themselves¹ is neither more nor less than a socio-psychological process. This represents a “venture into the preserves of other social scientists” as Belshaw puts it,² but a venture which economists can ill afford not to undertake.

Although our conclusions are based on a study of a specific African people in the southern part of the continent, it is believed that their validity is not thus restricted.

THE PEOPLE AND THEIR ECONOMY

The underdeveloped people in question are South African Bantu, approximately 4,500,000 in number, scattered over 58,000 square mile territory, called Bantu Areas, which adjoin the areas constituting the developed sector of the South African economy. Nowhere in the Bantu territories do the concentrations of population assume the proportions or character of a town in the customary sense of the word. The natural rate of population growth, at 1.6% per cent per annum, is the result of a high fertility rate, limited to some extent by the observance of the traditional custom of spacing, and a fairly high rate of mortality. The growth of their numbers is not prescribed by the ability of their economy to accommodate an increasing population, since the adjacent developed sector takes care of the overflow.

For all practical purposes they can be described as an exclusively agrarian people. Ninety-two per cent have a stake in the land, which, compared to that of the developed sector, is mostly of a good quality and for the greatest part the benefit of very favourable climatological conditions. By the standards of the surrounding developed areas this land could yield at a minimum £90 million worth of agricultural production per annum. In actual fact the value of the annual production varies around £13 million and has shown, until quite recently, no increase since the time the figures were first recorded.

¹ The qualification “by themselves” is necessary, since it is conceivable that an underdeveloped people could be developed by means of factors of production from developed economies.

² Belshaw, *Population Growth and Levels of Consumption* (Allen and Unwin), 1956, p. viii.

³ This is in terms of conventional calculation. When the calculation is in terms of the amount of products consumed, which include certain plants, roots, small animals, etc., found in the field and the meat of cattle and other animals which died, the figure can be put at approximately 10 million.

statistics have become available. As the subsistence farming does not provide adequate sustenance for the population, their income is supplemented by wages earned during intermittent spells of work in the developed sector. These and other contacts with a developed economy have had some effects on the life of the African communities which will be described at a later stage. Thus far they have, however, made little impression on the traditional social and cultural habit patterns which inhibit economic progress.

THE TRADITIONAL SETTING

The tribe, which is based on a nucleus of families descended from a common ancestor(s) (as the result, among some tribes, of fairly rigid marriage rules calculated to strengthen mutual ties) and which has a chief as its binding force, is the social unit. Since chieftainship is an inherited status, the chief is often not endowed with the attributes of a leader. The mental horizon of the people is limited by their allegiance and loyalties, which extend no further than the tribe, and is directed towards the smaller family group in the first instance. The latter forms the economic unit, which is self-contained. Intra-tribal trade is negligible; inter-tribal trade is non-existent. No indigenous medium of exchange had been developed, since there was no need for it. Theirs is the well-known subsistence economy.

Their agriculture has evolved in circumstances in which no store was set by the long-run fertility of the soil because movement to new territory was always possible, and in which the male adult occupied himself with hunting and warfare. Thus the cultivation of the soil became primarily the responsibility of the mother of the family, assisted to some extent by her children. Assistance by the husband is an exception. He and his sons tend the cattle, sheep and goats. It is not good form for the man to “burrow” in the soil. The effect of this custom on agricultural productivity must be obvious.

The success of a crop is promoted by means of ceremonial rituals in which the aid of magic is invoked. The seed may be specially treated by the chief, who may also determine the time of planting and sowing in accordance with the witch doctor's reading of the constellations. Rituals are performed to ensure adequate rain, and certain taboos are to be observed to prevent failures or catastrophes. Thus the manipulation of supernatural forces in the interest of the cultivator takes the place of methods which harness the forces of nature to increase productivity. Instead of using manure as a fertiliser, it is dried and used as fuel. Once again the consequences are obvious.

Stock-breeding, in which cattle predominate, is a way of life: its economic functions are completely overshadowed by its social significance. To each person, while still young, is assigned a specific steer, whose praises will be sung in songs dedicated to it and which may be sacrificed when the person

to whom it has been assigned falls seriously ill, or as a means of keeping on good terms with the ancestral spirits. "The God with the wet nose" it is called in one eulogy. Cattle are very seldom slaughtered for consumption in the ordinary course of events. That is mostly reserved for ceremonial and ritual purposes. In so far as the population does consume a fair amount of meat, it is because the carcasses of domestic animals which have died are not wasted, unless such animals constitute the totem of the tribe. The number of cattle determines the status and dignity of the owner, since it allows him to dispense hospitality and generosity, to repair strained relations and to generate good relations among the living and between the living and the dead, and to procure wives. Cattle are the traditional media for the payment of "lobolo," i.e., the goods to be handed over by the family of the bridegroom to the family of the bride when a marriage is contracted. The more cattle in a person's possession, the more wives he can afford.

In these circumstances it is the quantity of animals that is important, not the quality. For all the functions decimated animals will be as appropriate as any other. Scrub cattle, overstocking, denudation of the veld and soil erosion are the inevitable outcome. Capital formation through a process of increments in the value of the stock is obviated.

As an integral part of their culture, many habits and customs are calculated to promote the propagation of children. Although most marriages are monogamous, it is partly so because the majority do not have the necessary "lobolo" at their disposal to enter into polygamous unions which are the accepted system. The consummation of the marriage is in the procreation of children; girls are the means whereby the family increases its stock of cattle when they are old enough to marry. Procreation is the fundamental condition attached to marriage. Large families are regarded as good performance. Its realisation is promoted by the system of "lobolo." If the bride is barren, or dies young without issue, a sister or younger relative may in some tribes be supplied to make good the deficiency. A widow may be assigned to a younger brother of her deceased husband so that she can propagate children for the deceased. Apart from the economic effects arising from the size, growth and composition of the population, these customs make for limited interests, diverting the attention and endeavour from the pursuit of other, including economic, ends.

In their religion these Bantu communities are ancestor-worshippers. The ancestors act as the mediators between human beings and the supreme Being (God), who has the power of life and death and brings prosperity to, or visits catastrophes upon, human beings, and must be accorded the necessary offerings to prevent their anger. This religion is anti-rationalistic; it is antipathetic towards a spirit of inquiry and demands only conformism. It is not a stimulus to a higher level of material well-being. The *summum bonum* is the honouring of the traditional usages and beliefs. Their own system of education, which amounts to the instruction in age-old customs, mores and

institutions, ensures the transmission of traditions from one generation to the next and the perpetuation of the inherently conservative culture.

In sharp contrast with the individualism which characterises all or most Western peoples, and which has been an outstanding factor in their economic development, the tribal people form organic and integrated societies with a strong community-consciousness, and in which the rights and obligations of the individual are well defined and adhered to. Mutual ties, interdependence and responsibility are established by the system of consanguinity, worshipping of the same ancestors, the possession of the same totems, the system of land tenure and other institutions. Social care is the responsibility of each and all, extending from the family through the household and the family group to the whole tribe. There are no special institutions to cater for the poor, the hungry, the sick, the disabled and the aged. They are cared for by the more privileged. Thus the community guarantees the security of the individual. Mutual aid is extended on numerous occasions, such as the harvesting of crops, the building of huts, weeding, etc. A person may lend-lease part of his wealth to a less-privileged neighbour to enable him to make a better living. Food, housing accommodation and other living arrangements will always be shared with the most distant of relations, even if the latter are strong and healthy and able to fend for themselves but do not feel inclined to do so.

Community-centredness and the absence of individualism are nowhere more strongly reflected than in their economic system. Land is communal property, administered by the chief or headman. For each wife the husband is granted a piece of land for the growing of crops, and each has the right to graze his cattle, sheep, goats or other animals on the commonage. They prosper together and they go hungry together.

However commendable the social security which arises from this type of socio-economic organisation, it is inimical to economic development. It obviates, or greatly diminishes, the necessity for continued personal exertion. Social care and mutual aid coupled with a low standard of living mean that the disappearance of a source of income, or of personal earnings, does not have the significance for the individual it would have in an individualistic culture. Friends and relations can be relied on to come to the rescue or shoulder the extra burden. The progressive individual can never be sure that he will be able to enjoy in full the fruits of his own exertions. If some were to cultivate their piece of land better than the others the increase in the crops would be shared by others; if they improve their land the improvements do not become a negotiable commercial asset. Communal grazing severely limits the possibilities of scientific husbandry by individuals.

A philosophy of life which sets little store by an abundance of material things fits into this social setting. Their needs are relatively few. There is no strong urge to attain ever-increasing standards of material welfare. They do not have the acquisitive instinct. An increased standard of living is

preferably realised in the form of greater leisure. Although the backward-sloping supply curve of effort is not unique to the tribal Bantu, the backward movement starts at a fairly early stage because of the limited and inelastic demand for income. The equivalence of marginal utility of income and the marginal disutility of effort is reached very soon. Nourishment that can be obtained from wild fruit and roots in the fields need not be earned in other ways. There seems to be at the back of his mind some doubt about the necessity and sense of all the urgency, striving, efficiency and high-speed activity of modern industrial life. Work for its own sake is not part of this scheme of things. We have here all types of under-employment imaginable: visible, disguised and potential, and most of it voluntary.

There are in this society no distinctive social classes stratified according to income. In the result a factor is missing which could have acted as an incentive to economic advancement as a means towards social advancement.

A characteristic which more than anything else distinguishes the tribal people from technologically developed communities is the absence of a regard for, and concern about, the future. "The lobotomised personality"—in the phraseology of the psychologists—would not be an inappropriate term in this connection. The future as a concept which elicits action is not part of their culture. The "sufficient unto the day" approach does not make for an inclination to accumulate for the sake of sustaining life at some future time. It is not an unknown phenomenon that good crops in one season may lead to the abstention from ploughing and sowing during the next. This has serious implications for capital formation: there is no, or little, purposeful accumulation of capital. More than that, it means that capital goods put at their disposal are not maintained but allowed to fall into disrepair, without being used as the basis for further capital formation. Maintenance of the fertility of the soil for future production is not a consideration.

In the search for a meaningful definition of the term "underdeveloped community," the above characteristic could be used as a strategic explanatory factor.

In the light of the above and with peace and quiet—except when interrupted by faction fights—representing the dominant note of tribal life, it is not surprising that psychologists find them lacking in self-assertiveness, self-confidence and initiative, and in ability to organise, to plan a course of action and to put plans into action. Understandable too is the deficiency in their psychomotor attributes, which may be in the receptor mechanism—the organising process dealing with the incoming data—and/or in the motor or effector mechanism—which translates perception or assimilation into muscular movements. In the absence of daily contact and acquaintance with the devices of technological civilisation, the actions and experience which can attune the psychomotor mechanism to the requirements of industrial development are lacking. The realisation of their innate intel-

lectual capacities, which are no doubt on a par with those of other peoples, is inhibited by the totality of environmental influences.

THE TRANSITION

Change-inducing factors have been introduced into tribal life as a result of contact with the developed sector and its technological culture. The contact is established, directly, through the periodic temporary emigration of men to industrial towns and cities in the surrounding area, and, indirectly, through the missionaries, traders, civil servants, teachers and development personnel who endeavour to transmit the ideas, knowledge and procedures of the technological civilisation to the people. Of the two channels of contact the former appears to have been, outwardly at least, the more potent. Periodically subjected to the individualistic, rationalistic urban culture, they return to their homelands to find the traditional ties and mores irksome. Their protest is in the first instance directed against parental and tribal authority, either because they have come to dislike authority *per se* or because they consider the persons concerned as too orthodox. Some leave the tribal areas permanently; others retain their domicile, and for them the migratory labour system becomes part of a way of life until the "retiring" age—just after forty—has been reached. In the long run this contact, reinforced by the presence and endeavours of representatives of the developed sector, has an influence which extends over a broader front. But the effects have not been so radical or fundamental as to reach down to the roots of economic under-development.

The development personnel who have been trying to change the economic habits of the people have had a hard and uphill struggle, and their success has been slow in coming. The all-pervading social climate remains a powerful counter-force. Grafting new economic habits on to traditional tribal culture does not lead to abundant growth, where the indigenous under-developed agricultural entrepreneur is to be harnessed as the leader in economic change.

The most marked changes induced by the contact with the developed sector have been in outward appearances of an imitative character. Clothing habits, consumption patterns and housing styles have changed to a considerable extent; technologically more advanced implements are being used in the home and on the lands. These are the most conspicuous elements in the technological culture; they can be visually appreciated and are therefore most easily adopted. The new needs which have evolved in this way spelled the end of the self-sufficiency of their economy. The amount of trading has increased. Much of it is still barter trade, but money as a medium of exchange and as a store of value is growing in importance, and the money sector of the economy is gradually expanding. A class of tradesmen emerged which grew in size as the policy of protection of the

"infant entrepreneur" took effect and the entry of general dealers from the developed sector was limited or prohibited. By ordinary standards this new class is not very successful as yet, hampered as they are by the lack of experience and know-how. But as a means of initiating change it is a most useful agency, inasmuch as some members of the underdeveloped people assume the strategic role, however inadequately, of entrepreneur outside the traditional agriculture industry, and help to increase the size of the market sector and to transform the subsistence economy into a money economy.

The acquired needs also act as an incentive to earn more cash. Encouraged by stock fairs which are specially organised for them, they participate in the selling of cattle on a small scale, while some have proceeded to the slaughtering of animals for commercial purposes. Even so, for the greatest part the necessary cash is still obtained through the performance of wage labour in the developed sector.

The impact of the new habits has, by and large, not extended to the pattern and mode of production. While the men tend to give some aid in the cultivation of the soil, women and children still constitute the predominant labour force. Cattle retain their attribute as a most precious possession. Culling is not yet generally and spontaneously accepted and practised, and soil conservation remains the obligation and function of the developing authority. While some inhabitants are prepared to pay high prices for certain vegetables and other foodstuffs, the prices do not stimulate production of these goods by themselves, even though there is no climatological or physical reason why they should not do so. They prefer to adhere to their traditional crops. Where the agricultural yields are above the average it is invariably a function of the degree of supervision by the extension officer and the aid given by the development personnel in the actual ploughing, sowing and fertilising.

It is not an unusual experience for the agricultural officers to have to persuade the peasants who have been allocated land in new irrigation schemes to start planting every time a new season has arrived.

Neither is it unusual for the Bantu who is employed as demonstrator to instruct his people in all the principles of scientific farming, but to ignore completely all these principles, and to revert to the traditional methods when cultivating his own plot of land.

The institution of private individual tenure of land, where it was experimented with, did not meet with the success hoped for. Very often the land thus allocated became overcrowded with "relations," some of them very distant ones, who attached themselves to the household of the owner or occupier. Evidently the superimposition of private tenure on a communal-tenure habit pattern cannot make for a great measure of success. Farming does not gain either by the facilities for formal education and training. The vast majority who go through school, even those specially trained for agricultural pursuits, shun this industry. The prevailing view among those

who have had four or five years of schooling seems to be that they have been adequately prepared for "white-collar" jobs and that manual labour does not have the necessary status to match their education.

As the activities of the development personnel increased, so did the dependence of the inhabitants on a distant body, "the government," as represented by the personnel. Rather than assume the responsibility for soil conservation, the maintenance of wire fences, of boreholes, etc., it was much more comfortable to leave it to the authorities. The phrase "that the government be respectfully requested" invariably prefixed the motions introduced in their Councils. In fact, the untiring efforts of the developing authority rather than those of the inhabitants themselves have been responsible for the measure of development that has taken place.

There has been no fundamental change in the social structure, habits and institutions of the people. Although nearly half of the population has been converted to the Christian faith, superstition has not lost its grip. The youth is still educated in the customs, mores and folklore of the tribe, and is required to conform. Polygamy, though diminished as a result of the missionaries' influence and of economic pressure, is still practised. The system of lobolo, though disliked by the younger generation and often paid in the form of cash instead of cattle, has been retained. Stock-breeding has largely remained a way of life rather than become a commercial activity, even while the quality of the animals has been improved.

In so far as there has been some change in their philosophy and way of life, it has been confined to the fringes of society. These fringes have not yet produced a body of economic leaders sufficiently strong and experienced and willing to act as initiators within tribal society, to set a cumulative process of change in motion. In other words, the exogenous factor, in the form of the outside body of developers, has not yet engendered a virile endogenous factor, the repercussions of whose activities could permeate the whole of society, which is caught up, economically speaking, in the fetters of its own traditional culture. The social and cultural milieu has proved to be very intractable and has retained its predominance.

CONCLUSIONS

There is much to be gained, and many misconceptions can be avoided, if the economic problem of an underdeveloped community of the type described above is framed, not in terms of the vicious circle of poverty, Malthusian pressure or inadequate capital formation, etc., but in terms of the strategic factors of an ultimate character, namely its social and psychological inertia. Here economic elements as such are not limiting factors of the first order; by assigning them to the category of mediate factors, the accent is put where it should be, and the difference between the underdeveloped and the developed community is clearly pointed up. In the latter the human material can be taken for granted in the sense that it can be assumed

that various economic stimuli will evoke fairly definite reactions; and on the basis of this assumption economic progress can be considered a function of economic factors in an ultimate sense. Even if changing psychological attitudes cannot be ruled out as causal factors in the developed economy, they are of a nature completely different from those obtaining among some underdeveloped peoples.

Economic development of an underdeveloped people by themselves is not compatible with the maintenance of their traditional customs and mores. A break with the latter is a pre-requisite to economic progress. What is needed is a revolution in the totality of social, cultural and religious institutions and habits, and thus in their psychological attitude, their philosophy and way of life. What is, therefore, required amounts in reality to social disorganisation. Unhappiness and discontentment in the sense of wanting more than is obtainable at any moment is to be generated. The suffering and dislocation that may be caused in the process may be objectionable, but it appears to be the price that has to be paid for economic development; the condition of economic progress.

If economic progress is deemed desirable and necessary and policy is to be formulated to achieve this end, the cart could in a certain sense be put before the horse in that economic changes can be utilised to generate the social revolution. Such a policy requires an outside agency or agencies from the developed countries which are prepared to supply the entrepreneurs, the capital and the highly skilled technical labour, who will take the initiative in establishing enterprises in the secondary and tertiary sectors. Providing the capital without the entrepreneurial initiative and managerial abilities to direct its economic exploitation will only lead to the waste of such capital. These agencies are to introduce the elements of technological culture into the pre-industrial societies. The industrial and business enterprises, which draw the underdeveloped people into their labour force and provide opportunities for them to rise in the hierarchy of the organisations, bring them into contact with new ways of doing things and new ways of life and standards of living. They should form the nucleus of urban development. The milieu of the town and city is *par excellence* conducive to a break with tradition, and as the ideas and values evolved in the industrial city permeate through the surrounding rural areas, the attitude of their inhabitants towards farming tends to change, so that it is no longer regarded only as a way of life and a means of supplying a minimum of subsistence. In particular, the proximity of a regular market in the form of the town or city will foster the growing of cash crops.

This approach, which could be termed "development from above," implies that the development of the underdeveloped people is not generated by themselves, and does not emanate from within except in so far as the outside agencies have been brought in at the request of the leaders of the underdeveloped community; which request can be taken as a reflection of

the desire for economic development. However, this exogenous factor is used as a means to spark off an endogenous process of growth. To attain this effect and to ensure the self-perpetuation of the progressive disequilibrium, the policy of "development from above" must be accompanied by a policy of "development from below," which involves the measures usually applied in the community project approach.

What needs to be stressed in the implementation of the latter policy is the indispensability of the services of the social anthropologist who has made a thorough study of the community concerned in each case. Not only should he be able to give advice on the basic growth-inhibiting factors and thus to indicate the strategic elements that have to be influenced, but also to make recommendations regarding the *modus operandi* which will yield optimum results. Thus the waste of much effort can be prevented.

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THE FORWARD POUND 1951-59

To avoid later confusion, I begin this article with some assumptions and definitions. I assume there are only two currencies, the pound and the dollar; two interest rates, British and American three-month rates; and one forward rate, the three-month-forward rate.

Then:

(1) Pounds are sold spot for dollars when the currencies are exchanged immediately on the completion of the deal.

(2) Pounds are sold forward for dollars when the currencies are exchanged when some stipulated time has elapsed from the time the parties entered the contract.

(3) The spot rate is the number of dollars received for one pound spot, the forward rate the number of dollars for one pound forward.

(4) The forward rate is often expressed in the form of a discount or premium with respect to the spot rate. If the spot pound buys more dollars than the forward, the forward pound is at a discount equal to the difference between the spot and forward rates; if the forward pound buys more it is at a premium. The discount or premium on the forward pound may be expressed as a per cent per annum of the spot rate.

(5) The "interest parity" value of the forward pound is that value of the forward pound which, when expressed as a per cent per annum of the spot rate, is equal to the difference between the British and American interest rates. If the British rate is higher the forward pound will have to be at a discount to equal its interest parity, and at a premium if the American rate is higher.

(6) The "intrinsic discount or premium" on the forward pound measures the difference between the actual forward rate and its interest parity value. Suppose that the spot rate is $\$2.80 = \pounds 1$, and the interest rates are equal, then the interest parity is also $\$2.80 = \pounds 1$. If the forward rate is higher, say, $\$2.81 = \pounds 1$, the forward pound is at an intrinsic premium; if it is less there is an intrinsic discount. Thus the intrinsic discount or premium is the forward rate expressed from the origin of the interest parity. If the forward rate is above the interest parity there is an intrinsic premium, if below a discount.

I now wish to look at the forward exchange market and attempt to fit the various types of demand and supply for forward exchange into two demand-supply schedules. To do this, it is necessary to consider in turn

the various types of demand and supply of forward exchange. It is possible to distinguish four types.

(1) *Speculation*. Speculation in the forward market involves the sale of a currency forward with the intention of purchasing it, spot or forward, at a later date in order to meet the forward contract; or the purchase of a currency forward with the object of selling it again (spot or forward). In the first case, given the forward rate, a speculative profit is made if the spot rate rises above the forward rate by the time the forward contract matures; in the second case, a profit is made if it falls below. Thus if a speculator sells pounds forward at $\$2.80 = \pounds 1$, to profit he must buy the pounds at less, say $\$2.79 = \pounds 1$; if he buys pounds forward he must sell at something more, say $\$2.81 = \pounds 1$, in order to profit.

Consider a speculator speculating on the expectation of a given devaluation in the spot pound: he buys dollars forward, expecting to get more pounds for his dollars when the contract matures than he paid for them; or if he sells pounds forward, expecting to obtain the pounds for fewer dollars than he receives for them. Both cases give rise to a supply of forward pounds. Given the spot rate and the expected devaluation, the lower the forward rate, the smaller the profit from a speculative sale of forward pounds in the event of a given devaluation; or the greater the loss if there is no devaluation. Hence the lower the forward rate, the smaller the supply of forward pounds for speculation.

Now consider speculation on the expectation that the pound will not be devalued. Then, given the spot rate, the lower the forward rate (below the spot rate lower limit), the greater the profit if the pound does not devalue and the less the loss from a given devaluation if it does. Hence the lower the forward rate, the greater the speculative demand for forward pounds.

By the same reasoning, it also follows, the higher the forward rate, the greater the supply of forward pounds and the smaller the demand. The net speculative supply of, or demand for, forward pounds is the surplus speculative supply or demand after speculative sales have been matched as far as possible by speculative purchases. If we start with a very high forward rate, given the spot rate, there will probably be a net speculative supply of forward pounds. As the forward rate falls the net speculative supply falls until a forward rate is reached at which there is no net speculative supply or demand. When the forward rate falls below this critical value a net speculative demand for forward pounds will appear, and the lower the forward rate, the greater it will become. The schedule relating the net speculative supply or demand for forward pounds (given the spot rate) to the forward rate I shall call the *B''* schedule (see Fig. 1).

(2) *Interest Arbitrage*. The interest arbitrageur uses the forward market to obtain a safe profit. In order to take advantage of higher interest rates in another country, it is necessary to obtain that country's currency. The

gain from the higher interest rate is then liable to be offset, in part or completely, by the loss which results if the foreign currency is devalued. To cover against this possibility the arbitrageur sells forward the currency he purchases spot. He will be willing to do this so long as the cost of covering is less than the gain from the higher interest; or the profit from the forward purchase is greater than the loss of interest. It therefore follows that there will be an interest arbitrage supply of forward pounds if there is an intrinsic premium on the forward pound, and a demand for forward pounds when there is an intrinsic discount. The higher the intrinsic premium, the greater the supply of forward pounds; the higher the intrinsic discount, the greater the demand. The intrinsic premium measures the profit to be made from selling dollars spot and buying them forward, investing the

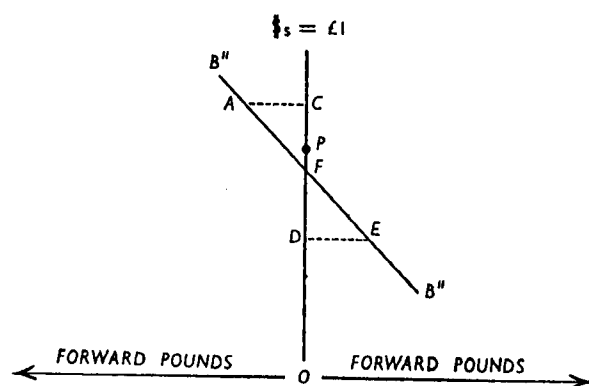


FIG. 1

P is the spot rate.

F the critical value of the forward rate.

$B''B''$ is the net speculative schedule.

AC measures the net speculative supply of forward pounds at a forward rate of C , i.e., a forward premium of CP .

DE measures the net speculative demand for forward pounds at a forward rate of D , or a forward discount of DP .

proceeds of the spot contract in Britain until the forward contract matures. We may call this "inward interest arbitrage." The intrinsic discount measures the profit from "outward interest arbitrage."

The supply of (or demand for) forward pounds does not change uniformly with changes in the intrinsic premium (or discount). It tends to rise slowly as the intrinsic premium (or discount) rises (arithmetically) from 0 to $\frac{1}{2}\%$ p.a. This is because the more complicated transaction involved in interest arbitrage compared with home lending is considered hardly worthwhile for a return of less than $\frac{1}{2}\%$ p.a. by most interest arbitrageurs. Once the intrinsic premium (or discount) reaches about $\frac{1}{2}\%$ p.a., however, the supply of (or demand for) forward pounds increases rapidly, as nearly all

the funds available to the interest arbitrageurs are used. As the intrinsic premium (or discount) rises above $\frac{1}{2}\%$ the supply of (or demand for) forward pounds becomes inelastic again. The profit from interest arbitrage may have to rise to 2-3% before the arbitrageurs can get hold of new funds or operators who do not normally deal in interest arbitrage start coming into the market. Given the spot rate and the interest parity value of the forward rate, a schedule may be drawn relating the interest arbitrage demand or supply of forward pounds to the forward rate. I call this schedule the A' schedule (see Fig. 2).

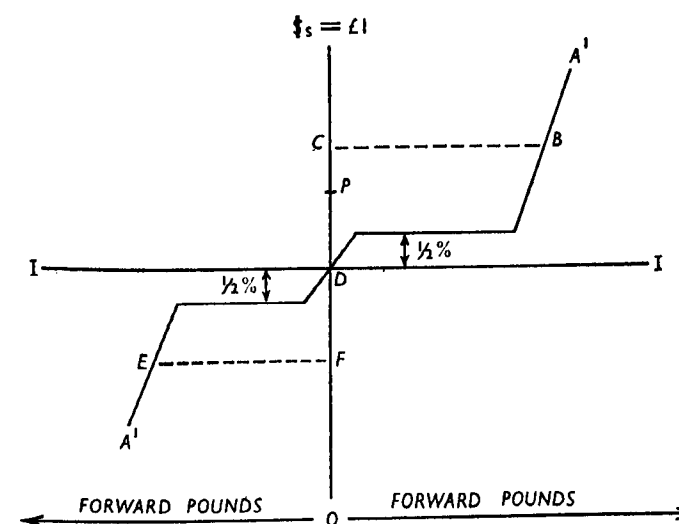


FIG. 2

P is the spot rate.

$I-I$ cuts the Y -axis at a point D equal to the interest parity value of the forward rate [the United Kingdom interest rate is higher than that of the United States for D to BE below P].

$A'A'$ is the Arbitrage Schedule.

EA' is the arbitrage supply of forward pounds for a forward rate of F (an intrinsic discount of DF). CB is the arbitrage demand for forward pounds at an intrinsic premium of CD .

(3) *Commercial Demand for Forward Exchange.* International trade gives rise to receipts and payments in foreign currencies. Traders who are to receive or make payment in a foreign currency may behave in three ways:

(i) They may always wait until the payment or receipt is due and then buy or sell spot. This will not have an immediate effect on the forward market.

(ii) They may always cover forward, buying forward the currency they have to pay, and selling forward the currency they are to receive. Their demand or supply of forward pounds will therefore depend on the level of their imports and exports and not on the spot or forward

rate. (Though the same factors may affect both.) At any given time there will be a net demand or supply of forward pounds for automatic cover. Though the amount will change from time to time, in a static analysis it may be included in the diagrammatic analysis of the demand for forward exchange by drawing a new schedule, called the B' schedule, which is the same as the B'' schedule except that it is shifted to the right to the extent that, at a given instant, there is an excess demand for forward pounds for automatic cover. If there is an excess supply for automatic cover the B' schedule lies to the left of the B'' schedule.

(iii) The third possibility is of exporters and importers who sometimes cover in the forward market and sometimes do not. These in turn can be split into two classes—

(a) Those who always cover, but choose between the forward and spot market according to which is cheaper. Spot sales of pounds by a British importer and the holding of dollars till a dollar payment falls due cost the importer either the interest he could have obtained from lending pounds or the interest he has to pay to borrow the pounds, less the interest he receives on the dollars. If this cost is less, or the profit greater than buying dollars forward, the importer will cover in the spot market. That is when there is an intrinsic discount the importer will buy dollars spot, and when there is a premium will buy dollars forward. A British exporter with dollars to receive will sell dollars forward when there is a discount and sell them spot when there is a premium. This behaviour may be termed "Trader arbitrage," as the demand or supply of forward pounds depends on the intrinsic discount or premium. The supply of trader arbitrage funds in the forward market will be included in the same schedule as the interest arbitrage funds; it is assumed that this does not change the shape of the schedule. This schedule is now called the A schedule.

(b) Traders who sometimes cover forward and at others don't cover at all will be influenced in their choice by the same factors as the speculators. Thus "Trader Speculation" is included in the speculative schedule to make the new schedule the B schedule. The B schedule will tend to be more elastic than the B' schedule.

(4) *Hedging*. An American holder of sterling assets may wish to cover against a fall in their dollar value resulting from a devaluation of the pound. If he only sometimes covers forward he may be regarded in the same way as the speculator. His actions may be included in the B schedule. If he sometimes covers forward and sometimes spot by borrowing pounds his choice again depends on the intrinsic discount or premium, and he also may

be included in the A schedule. The same analysis may be applied to the British holder of dollar securities.¹

We have now split the demand for forward exchange into two schedules, the A schedule, loosely called the arbitrage schedule, influenced by the intrinsic discount and premium; and the B schedule, loosely called the speculative schedule, influenced by the forward rate and the expected spot rate. The forward rate at any given time is determined by the intersection of these two schedules.

It is possible, by making certain assumptions about the shape of the schedules, to produce some sort of explanation of the behaviour of the forward rate from 1951 to 1959.

Consider the case where the spot rate is free to move between certain limits. Speculators may then behave in one of three ways:

- (i) as if they expected the spot rate to move beyond a limit;
- (ii) as if they did not expect the limits to be breached; or
- (iii) as if they did not expect the spot rate to be above or below a certain level within the official limits.

The third case is similar to the second and will not require separate treatment. (Where in the second case I speak of the official limit substitute the expected limit.)

(1) *Speculation on the Expectation of a Devaluation*. If a devaluation is anticipated by some speculators, there will be a supply of forward pounds at a forward rate below the lower limit of the spot rate. This supply will tend to decrease as the forward rate falls farther below the limit. Similarly, if speculators are not too confident that the pound will not be devalued there will be no excessive demand for forward pounds at forward rates below the limit. The demand will, however, rise as the forward rate falls. (The same, *mutatis mutandis*, can be said for expectation of a revaluation.) The B schedule in this case is drawn as in Fig. 3 (B_0B_0). P_0 is the spot rate, U its upper limit and L its lower, B_0B_0 is the speculative schedule. The "net speculative" demand for forward pounds increases with a fall in the forward rate below L , and the supply for a rise above U .

Assume that a fall in the spot rate gives rise to increased expectations of a further fall, then the BB schedule will shift to the left. In doing so an intrinsic discount will tend to be produced. This discount widens as the spot rate falls and narrows as it rises (Fig. 3).

With different assumptions we get the opposite result.

(2) *Speculation in Conditions of Confidence in the Limits*. If there is no expectation of a spot rate fall below the lower limit there will be no speculative

¹ For the Analysis so far I am in the debt of Mr. A. E. Jasay, who presented the framework in his article "Bank Rate or Forward Exchange Policy" (*Banca Nazionale del Lavoro Quarterly Review*, No. 44, March 1958).

supply of forward pounds at forward rates below that limit. There will, however, be a large speculative demand at forward rates below the lower limit. Hence the speculative schedule becomes elastic to falls in the forward

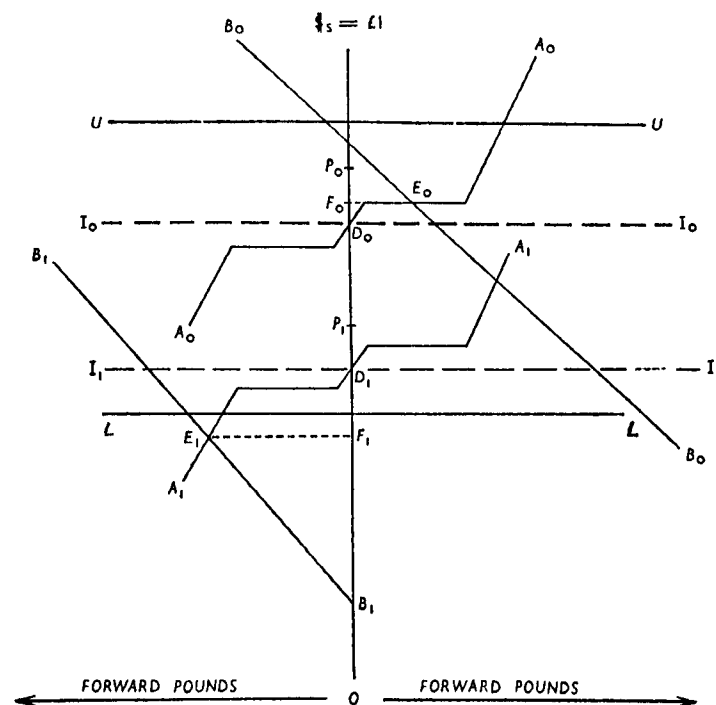


FIG. 3

P_0 is the initial spot rate.

I_0I_0 cuts the Y-axis at D_0 , the initial interest parity.

UU cuts the Y-axis at the upper limit.

LL cuts the Y-axis at the lower limit.

A_0A_0 is the Arbitrage Schedule corresponding to D_0 .

B_0B_0 is the "Net Speculative" Schedule corresponding to P_0 .

A_0A_0 cuts B_0B_0 at a forward rate F_0 (an intrinsic premium F_0D_0), where the net speculative demand F_0E_0 equals the arbitrage supply F_0E_0 .

P_1 is the new spot rate.

D_1 is the new interest parity (interest rates unchanged $P_0D_0 = P_1D_1$).

A_1A_1 is the Arbitrage Schedule corresponding to D_1 .

B_1B_1 is the new "Net Speculative" Schedule. The shift from B_0B_0 being due to the fall in the spot rate.

F_1 is the new forward rate given by the intersection A_1A_1 with B_1B_1 .

F_1 gives an intrinsic discount of D_1F_1 .

rate approaching and passing the lower limit. Similarly, the speculative supply of forward pounds becomes elastic for forward rates approaching and above a level beyond which the spot rate is not expected to rise (normally the upper limit). This type of speculative schedule is shown in Fig. 4 (BB)

Now assume that:

(a) a movement in the spot rate does not lead to a shift in the net speculative schedule because it gives rise to expectations of a subsequent movement in the opposite direction;

(b) that the B schedule becomes completely elastic at a point closer to the vertical axis than the point at which the A schedule becomes inelastic.

Then if the interest parity dictates a forward rate below the rate at which the demand for forward pounds becomes elastic an intrinsic premium is

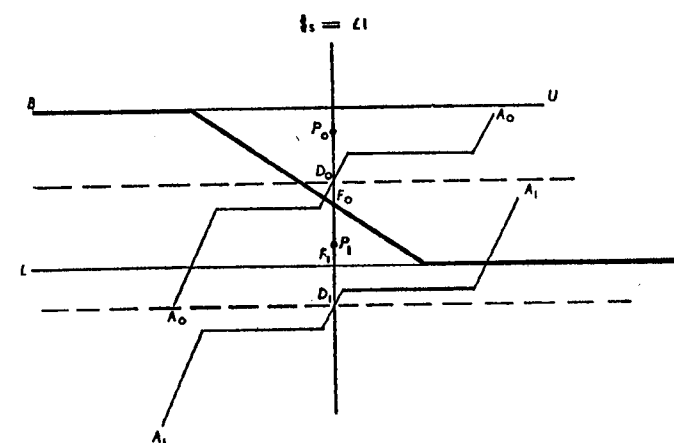


FIG. 4

P_0 is the initial spot rate.

BB is the "Net Speculative" Schedule.

A_0A_0 is the initial Arbitrage Schedule corresponding to D_0 .

F_0 is the initial forward rate given by the intersection of A_0A_0 with BB corresponding to an intrinsic discount of F_0D_0 .

D_1 is the new interest parity resulting from either a fall in the spot rate to P_1 ($P_0D_0 = P_1D_1$) or a change in the interest rates (P_0D_0 to P_0D_1).

A_1A_1 is the new Arbitrage Schedule corresponding to D_1 .

F_1 is the new forward rate given by the intersection of A_1A_1 with BB . It represents an intrinsic premium of F_1D_1 .

produced, and if it dictates a forward rate above the level at which the supply becomes elastic a premium is produced. This situation can result from a movement in the interest parity value of the forward rate caused by either a shift in the spot rate, a change in the interest rates or both.

It follows that an intrinsic premium may be produced by a spot-rate fall or a widening of the interest differential, and may be removed by a rise in the spot rate and a narrowing of the excess of the British interest rate over the American. Similarly, an intrinsic discount may be produced by a rise

in the spot rate and a narrowing of the interest differential and be removed by a spot-rate fall or a widening of the differential (see Fig. 4).

Thus we have two possible types of intrinsic discount or premium:

(i) An intrinsic premium associated with a spot-rate rise and a discount with a fall (see p. 309, section (1)). The premium tends to disappear with a spot-rate fall and the discount with a rise. I shall call these "doubt" intrinsic premiums and discounts.

(ii) An intrinsic premium associated with a fall in the spot rate and a discount with a rise (see p. 309, section (2)). The premium tends to disappear with a spot-rate rise and the discount with a fall. I call these "confidence" premiums and discounts.

Two further comments are necessary before considering the actual behaviour of the forward rate between 1951 and 1959:

(i) The forward rate normally lies within $\frac{1}{2}\%$ p.a. of its interest parity. Only when speculation is large does the *B* schedule cut the *A* schedule where the latter is inelastic at the extremes.

(ii) An intrinsic discount at the same time as the forward rate is below the lower limit logically entails speculation on the expectation of a devaluation. When there is an intrinsic discount the forward rate equates the arbitrage demand for forward pounds to the speculative supply. Therefore there is a speculative supply of forward pounds at a rate below the lower limit.

Three charts show the behaviour of the forward rate between 1951 and 1959:

Chart 1 shows the spot rate and the three-month-forward rate.

Chart 2 shows the forward discount or premium and its interest parity (I have taken the three-months treasury-bill parity).

Chart 3 shows the difference between the forward rate and its interest parity, the intrinsic discount or premium. Where the discount or premium is greater than $\frac{1}{2}\%$ p.a. the graph is shaded.¹

There were four periods when there was an appreciable (greater than $\frac{1}{2}\%$) intrinsic discount on the forward pound.

(1) *December 1951 to December 1952.* Following the re-opening of the foreign-exchange markets in mid-December 1951 the spot pound fell to its lower limit, and a substantial discount appeared on the forward pound. This meant that the forward rate was below the lower spot rate limit. In addition, there was a sizeable intrinsic discount. This in itself is evidence of speculation on the expectation of a devaluation. Nor is it surprising that

¹ See Appendix.

there was such speculation. Space permits mention of but few factors leading to speculation against sterling. The terms of trade had moved against the sterling area, the balance of payments was adverse, excess home demand was impeding exports and encouraging imports. In consequence, the reserves fell when the pound should have been seasonally strong.

As the spot rate fell in December, the intrinsic discount increased. It decreased again in March with the rise in the spot rate due to the Bank Rate rise and the Budget. However, the decline in the reserves at the beginning of 1952 gave rise to doubts concerning the ability of sterling to withstand the seasonal strain. As a result, renewed speculation cut short the spot-rate recovery and produced a wide intrinsic discount once more. The intrinsic discount remained substantial until it became clear that the pound had withstood the autumn strain without having to devalue. Then the spot rate recovered and the intrinsic discount gradually disappeared. Thus in 1952 there were conditions under which it seemed evident there was substantial speculative pressure on the expectation of a devaluation and an intrinsic discount of the type expected (Doubt) appeared. That the intrinsic discount was so large and persistent is partially explained by the lack of substantial interest arbitrage on account of exchange restrictions.

(2) *April to September 1953.* The intrinsic discount of more than $\frac{1}{2}\%$ p.a. that appeared in 1953 was different from that of 1952. In April to June 1952 the intrinsic discount was at its lowest, whereas in 1953 it was highest. The spot rate was rising in April when the discount appeared. In the second week in May spot sterling suffered a set-back, but the intrinsic discount narrowed as the forward rate was almost unchanged. The intrinsic discount reacted to changes in the spot rate in this manner until it disappeared with the fall in the spot rate in September. This intrinsic discount was a "Confidence" discount. In view of the strength of the spot rate, it was unlikely that there was much speculation on a devaluation, but still the interest parity dictated a forward rate above the level the spot rate was expected to be in three months time. Three months from April to July is July to October, the period of seasonal weakness. The forward rate required was about $\$2.81\frac{1}{2}$ in April to July, a very high level for the spot rate in autumn. Hence the intrinsic discount as the forward rate refused to rise to this level. The fall in the spot rate lowered the interest-parity value of the forward rate until the forward rate could approximate to it.

(3) *November 1956 to January 1957.* In July 1956, following the nationalisation of the Suez Canal, the spot rate fell to $\$2.78\frac{1}{2}$, the forward rate fell below $\$2.78$, but the forward discount on the pound did not appreciably widen. As a result, the forward rate stayed close to its interest parity and no appreciable intrinsic discount appeared. This is probably accounted for by the fact that since 1952 the volume of interest arbitrage had increased with relaxation of exchange restrictions. The Anglo-French intervention in Suez and the closing of the canal increased speculation, and the forward

discount rose to about 4%, while the intrinsic discount rose to about 2%. There was some improvement in the forward rate on December 11 and 12, when the measures taken by the British authorities to defend sterling became known, and the I.M.F. granted assistance. But it was not until January 1957, with the publication of the reasonable December reserves figures and the feeling that sterling had got over the worst, that the intrinsic discount disappeared. It disappeared with the rise in the spot rate. Enough has been said to support the statement that the 1956 intrinsic discount was due to speculation on the expectation of a devaluation. The intrinsic discount behaved as a "doubt" discount.

(4) *May to October 1957.* The 1957 crisis is familiar to most people. For my purposes all that need be said is that the intrinsic discount did tend to widen with the fall in the spot rate and narrow with the rise. The rise in the Bank Rate, together with the firm statement that the pound would not be devalued or the mark revalued, led to a rise in the spot rate and a narrowing of the forward discount to meet the wider interest parity. As a result the intrinsic discount was gradually removed. The 1957 crisis illustrates just how far the forward rate may have to fall before the speculative supply of forward pounds has been reduced sufficiently to match the limited arbitrage demand. The forward discount actually rose to 6% and the intrinsic discount to 5.4%.

During the period an intrinsic premium greater than $\frac{1}{2}$ % appeared on three occasions.

(1) *January to February 1954.* This intrinsic premium was probably due to some expectations of revaluation or convertibility with a free pound. It appeared when the pound was strong and rising and disappeared when the pound fell.

(2) *May 1954 to April 1955.* The premium that appeared in May was probably due to the interest parity dictating a forward rate as low as \$2.80 $\frac{1}{2}$ at a time when the spot rate stood at \$2.81 $\frac{3}{4}$ and when there was great confidence in sterling. In 1953 the spot rate had been around \$2.81 $\frac{1}{2}$ from May to July, and had only fallen to \$2.80 in the last three weeks of September and the first week of October. Compared with the previous year, the reserves were higher, the trade position appeared favourable and the pound had not been under serious pressure for two years. So it may have been anticipated that the spot rate would not fall too low or remain depressed for long in the autumn. Hence until the spot rate fell in August the forward rate refused to fall below \$2.81 $\frac{1}{2}$. The fall in the spot rate was regarded as only temporary, so that the lower it fell, the greater was the expectation of a rise. The forward discount narrowed and finally disappeared, and as a result the intrinsic premium grew. The fall in the spot rate and its failure to recover in late 1954 were thought to be due to the dock strike and delayed seasonal pressure on account of leads and lags in sterling's favour. Hence the

expectation of a rise and the large intrinsic premium. In fact, the dock strike masked a deterioration in the sterling area's external position. The intrinsic premium disappeared with the recovery of the spot rate in 1955 and the realisation of the true position.

(3) *January to June 1958.* After the 1957 crisis the British Bank Rate remained at 7% for some time, while foreign rates declined. The interest parity widened. Thus, although the spot pound was strong again, the interest parity value of the forward rate was still below \$2.78. The forward rate could not fall to this level, and so an intrinsic premium was produced. In March and April the interest parity narrowed but the forward discount remained unchanged; thus the intrinsic premium was temporarily removed. It reappeared in May, when the interest parity widened again and the forward discount narrowed. The gap was closed with the fall in the excess of the British interest rates over the American.

There is, of course, a complete neglect in this analysis of periods in which the forward rate was close to its interest parity. If space were available it would be necessary to consider these periods and to show that the non-existence of a substantial intrinsic discount or premium did not conflict with what we might expect from theory. However, the aim of this paper has been to show that by making certain not too unrealistic assumptions it is possible to give some sort of explanation of the forward-rate movements. It has not been intended to prove that those assumptions are correct. The problem this analysis produces is therefore that of testing whether speculation has in fact been of the type suggested at the different times. This could possibly be done by using some independent index of confidence, but unfortunately such an index would be by no means easy to obtain.¹

B. READING

*Nuffield College,
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¹ For charts of rates see pp. 316-319.

APPENDIX

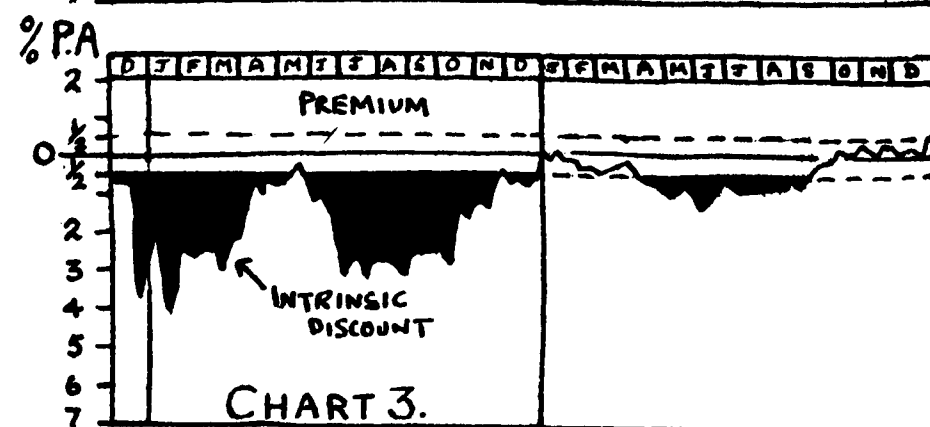
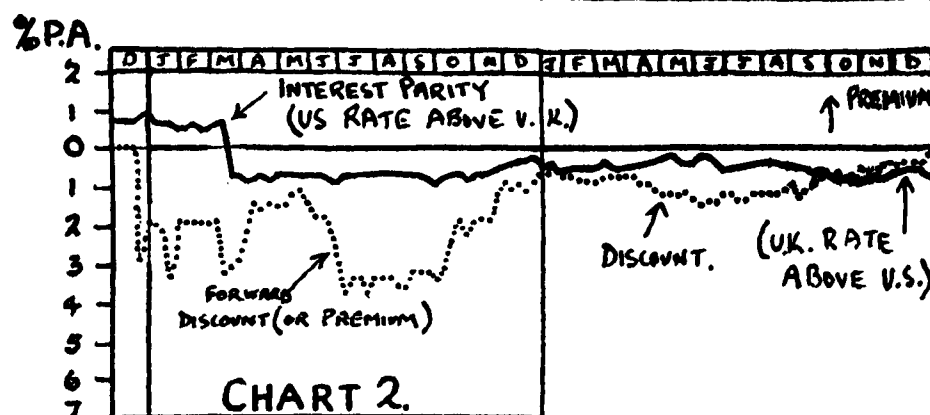
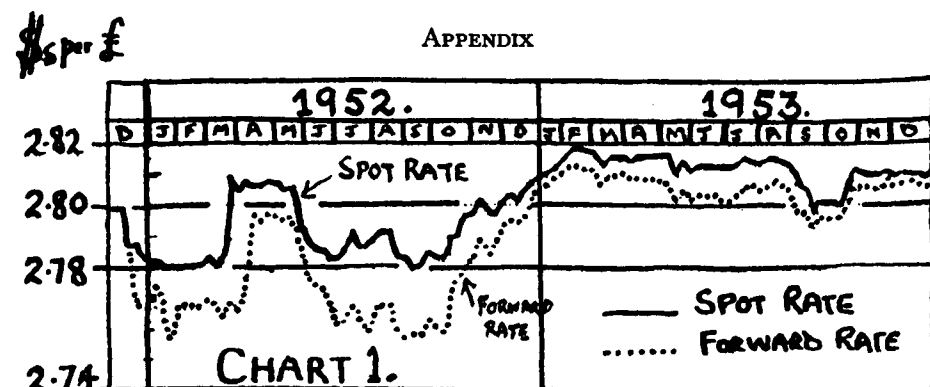
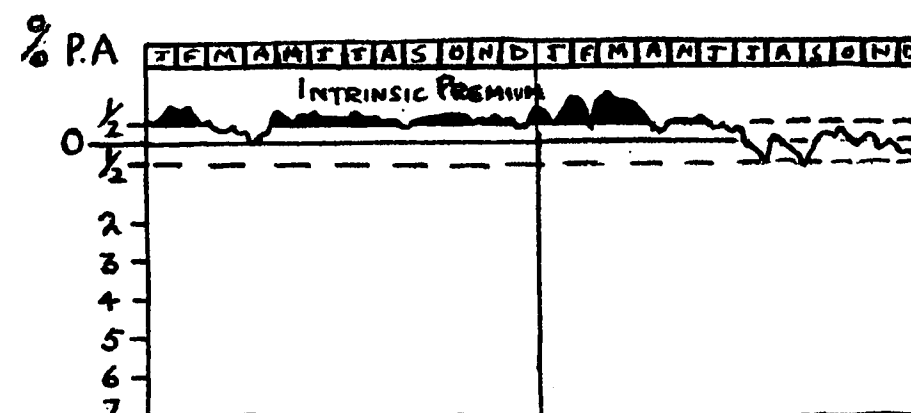
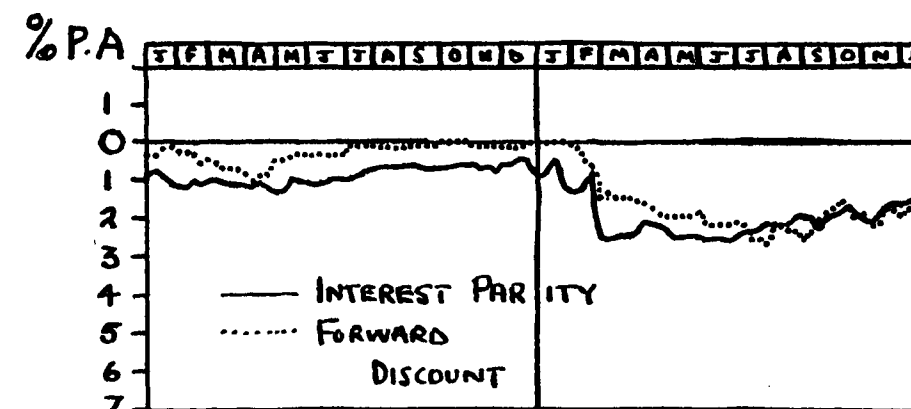
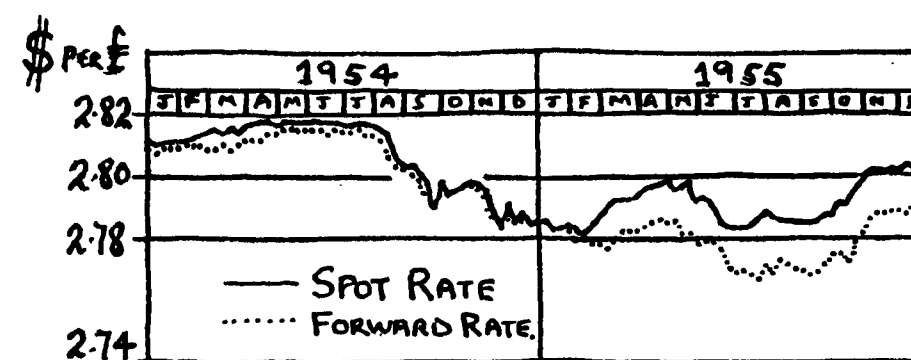


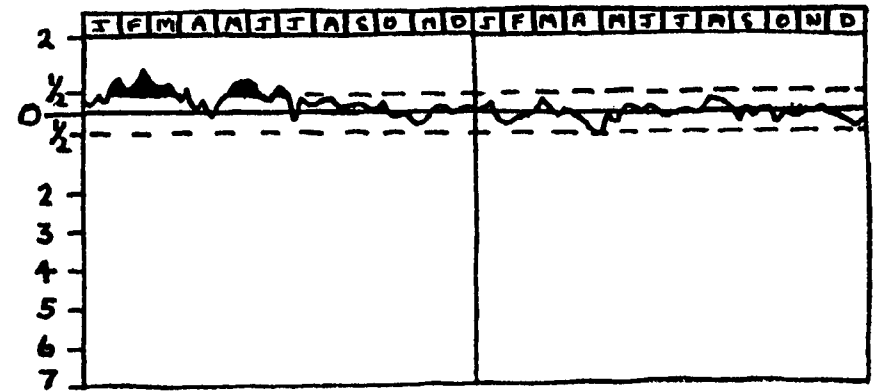
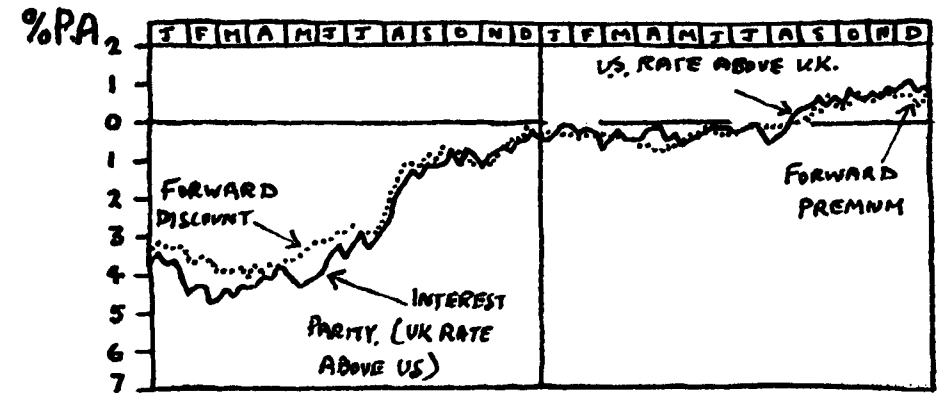
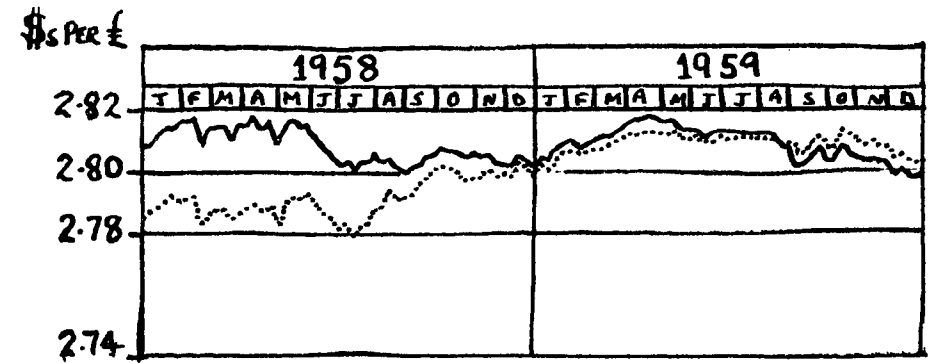
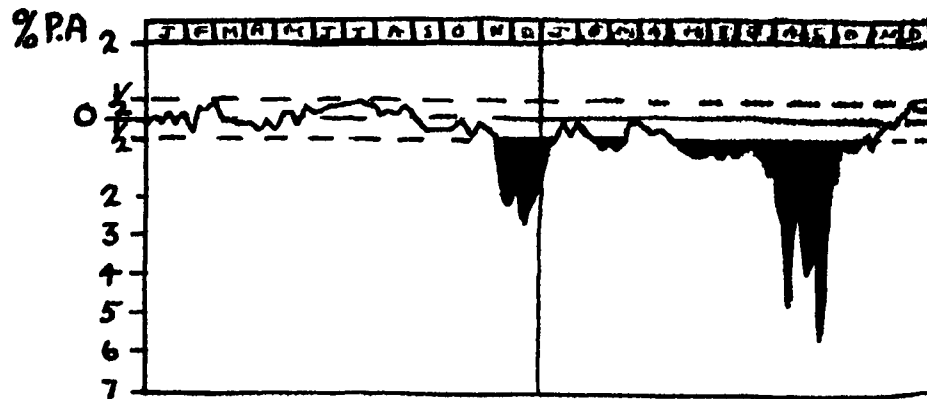
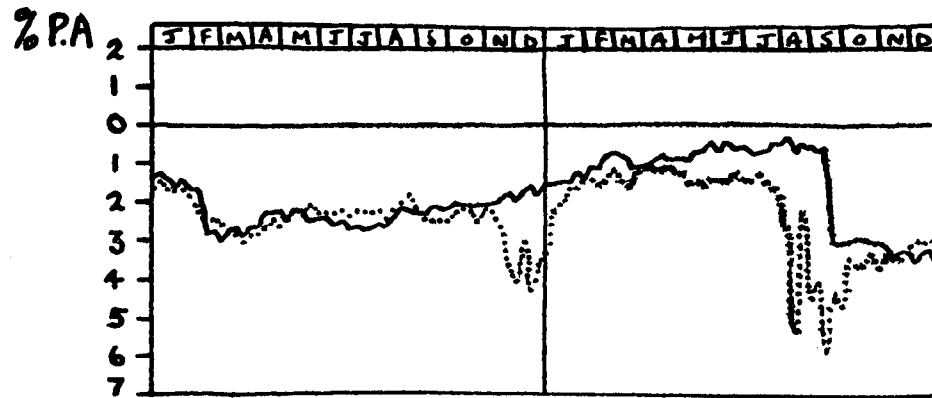
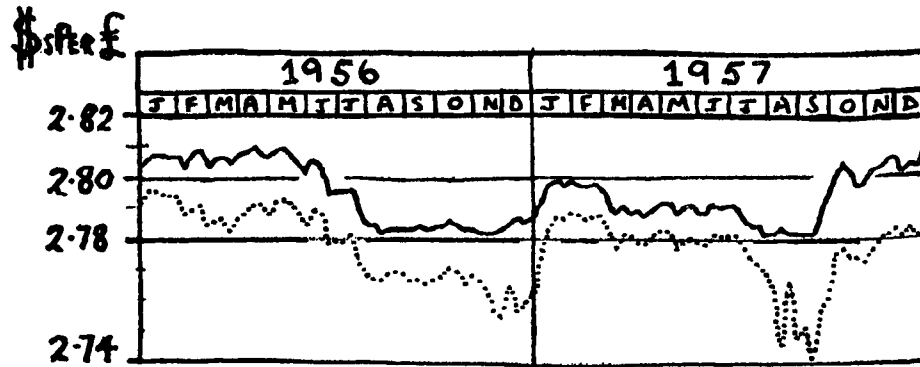
Chart 1 shows the spot rate (continuous line) and the three-months-forward rate (dotted line) between the pound and the dollar in terms of the number of dollars exchanged for one pound. They are both plotted weekly using figures for Wednesdays. The spot rate is the average value of the days spread, obtained from Samuel Montagu's *Review of Foreign Exchanges*. The forward rate is calculated by subtracting the forward discount or adding the forward premium to the spot rate. The forward discount or premium is obtained from the same source; the average of the closing rates is taken.

Chart 2 shows the forward discount or premium as a per cent per annum of



the spot rate (dotted line). Premiums are plotted as positive, discounts negative. The interest parity (continuous line) is the difference between the weekly average tender rates of allotment on British and American three-months treasury bills. These are obtained from the Bank of Canada *Statistical Summary*. The interest parity is plotted as negative when the British rate is higher than the American.

Chart 3 shows the intrinsic discount or premium, that is the difference between the two lines in Chart 2. A premium, where the forward rate is above its interest parity, is plotted as positive. Horizontal lines are drawn at 0, and $\pm \frac{1}{2}\%$ p.a. Where the intrinsic discount or premium exceeds $\frac{1}{2}\%$ p.a. the graph is shaded



REAL BALANCES, EXPECTATIONS AND EMPLOYMENT

My purpose in this note is twofold, namely: not merely to criticise the "real balance" approach to employment but also to demonstrate a theoretical possibility of underemployment equilibrium in terms of *expectation* functions. Such a demonstration may throw further light on the fundamental question of whether the price mechanism in general and the interest mechanism in particular are or are not capable of automatically restoring a full-employment position. That question has been revived recently by the "liquidity trap" *v.* "real balance effect" debate between Professor J. R. Hicks and Professor D. Patinkin in the pages of the *ECONOMIC JOURNAL*.¹

The basic difficulty with the Hicks-Patinkin debate is that both of them have, wittingly or unwittingly, forgotten Keynes' first lesson in monetary dynamics: that "changing views about the future are capable of influencing the present situation."² As a consequence, Hicks has found it necessary to invoke the Keynesian assumption of an infinitely interest-elastic liquidity preference function in order to prove his case of the "liquidity trap," while Patinkin has found it expedient to invoke the Pigouvian assumption of a real-balance-elastic saving function in order to provide a neo-classical escape from that Keynesian-Hicksian "liquidity trap." It will be shown that the former assumption is as unnecessary as the latter assumption is insufficient in proving the case against and for automatic full-employment equilibrium.

The essence of the Hicks-Patinkin debate seems to be as follows: Hicks argues that the falling wages and prices needed for the "real balance effect," while they reduce the interest rate (via their primary effect of decreasing the demand for transaction-money and hence of increasing the supply of speculative or asset money, given the fixed quantity of money), nevertheless provoke an infinitely interest-elastic liquidity function (*LM* curve) at a low interest rate thus brought about so as to make it intersect the investment saving function (*IS* curve) at a point corresponding to an underemployment equilibrium income. Accordingly, the economy is trapped in that underemployment equilibrium position, inasmuch as the infinitely interest elastic liquidity function prevents any increase in the total quantity of money from lowering the interest rate further to a level for which investment can equal full-employment savings. This is where Patinkin comes to the

rescue. Patinkin counter-argues that the falling wages and prices *also* have the effect of increasing real balances and hence of reducing savings (via the "Pigou effect") into equality with full-employment investment. Analytically this "real balance effect" is shown as shifting the *IS* curve upward and rightward to intersect the *LM* curve at a point corresponding to the full-employment equilibrium values of interest and income (see Fig. 2 in his "Rejoinder," *ibid.*, p. 585). Thus the economy has presumably extricated itself from the Keynesian liquidity trap.

This is as far as the Hicks-Patinkin debate takes us. It is necessary to go further in order to see whether a regime of complete wage-price flexibility, such as envisaged by Pigou and Patinkin, may not affect the behaviour of investment and saving in a destabilising manner. For this purpose we would have to introduce expectations as explicit variables in the saving and investment functions based on dynamic assumptions. Let us build an alternative model of an economy with wage-price expectations as well as wage-price flexibility.

Such a model can be described by means of the following system of difference equations and behavioural assumptions:

$$(1) \quad I_t = I\left(r_t, y_t, \frac{w_{t+1} - w_t}{w_t}\right),$$

$$(2) \quad \frac{\partial I}{\partial(\log w)} > 0,$$

$$(3) \quad S_t = S\left(r_t, Y_t, \frac{M_t}{p_t}, \frac{p_{t+1} - p_t}{p_t}\right),$$

$$(4) \quad \frac{\partial S}{\partial(\log p)} < 0,$$

$$(5) \quad I_t = S_t; \quad Y_t = Y^o(I_t, S_t),$$

$$(6) \quad M_t/p_t = \bar{M}/p_t,$$

$$(7) \quad L_t = L\left(r_t, Y_t, \frac{w_{t+1} - w_t}{w_t}\right),$$

$$(8) \quad \frac{\partial L}{\partial(\log w)} < 0,$$

$$(9) \quad M_t/p_t = L_t; \quad r_t = r^o(L_t, M_t/p_t)$$

Here the subscripts t and $t + 1$ denote the variables in terms of the present period and the next period; I and S stand for real investment and real savings; M/p and L are the amounts of real balances supplied and demanded, $\bar{M}$ being the fixed quantity of nominal balances held by the public; Y^o and r^o are respectively the equilibrium values of real income (Y) and the interest rate (r); $\log w$ and $\log p$ represent percentage changes in the money wage rate and the price index. Here we suppress the labour market equation or

¹ See J. R. Hicks, "A Rehabilitation of 'Classical' Economics?" *ECONOMIC JOURNAL*, Jun 1957, and D. Patinkin, "Keynesian Economics Rehabilitated: A Rejoinder to Professor Hicks," *ibid.*, September 1959. Their debate is the continuation of the so-called liquidity trap controversy started by Keynes' "The Psychological and Business Incentives to Liquidity" (Chapter 15) in the *General Theory*. The controversy was renewed by D. Patinkin, *Money, Interest and Prices* (1956) especially Chapters 13 and 14.

² *General Theory*, p. 293.

the simplifying assumption that employment is a linear function of income, so that the "full-equilibrium" position of our general system consists in the simultaneous solution of equations (5) and (9) for r and Y , with the other independent variables serving as shift parameters. The key variables of this system are the *expected* percentage changes in the money wage-rate and the price index, $(w_{t+1} - w_t)/w_t$, $(p_{t+1} - p_t)/p_t$, in equations (1), (3) and (7) corresponding to the crucial assumptions expressed by (2), (4) and (8).

Equation (1) gives current investment as a function of an expected percentage change in the money wage-rate as well as of current interest and income, while (2) specifies investment as an *increasing* function of a percentage change in the money wage-rate. This latter functional shape is based on the assumption that private investment would be profitably withheld in anticipation of lower and lower labour cost, and vice versa. In the present context of unlimited wage falls this means that investment will decrease with wages over time, the amount of that decrease depending on the prevailing elasticity of wage expectations. Equation (3) gives current savings as a function of an expected percentage change in the price index as well as of current interest, income and real balances (a decreasing function of real balances via the "Pigou effect" assumed), while (4) specifies savings as a *decreasing* function of a percentage change in the price index. This last relation, in the present context of complete downward price flexibility, means that the consuming public would withhold current consumption expenditure in anticipation of lower and lower prices and so increase current savings, the amount of that withholding depending on the prevailing elasticity of price expectations.

Equation (5) states the condition for equilibrium in the *commodity* market and the implied dynamic determination of equilibrium income. Equation (6) gives the supply of real balances as a function of a constant stock of money and current prices, while equation (7) gives the demand for real balances as a function of an expected percentage change in the money wage-rate as well as of interest and income. (8) specifies the demand for money in real terms as a *decreasing* function of a percentage change in the money wage-rate, implying that in the present context of complete downward wage flexibility the public's demand for real balances would rise in anticipation of further wage falls and greater uncertainties that accompany those wage falls. Equation (9) states the condition for equilibrium in the *money* market and the implied dynamic determination of the equilibrium rate of interest.

Simultaneous solution of equations (5) and (9) for r and Y represents one of an underemployment equilibrium characterised by

$$(10) \begin{cases} I_t = S_t; Y^o(I_t, S_t) < Y_f, \text{ where } Y_f \text{ is full-employment real income} \\ M_t/p_t = L_t; r^o(L_t, M_t/p_t) > r_f, \text{ where } r_f \text{ is full-employment interest} \end{cases}$$

This position of underemployment equilibrium expressed by (10) can be further clarified by reference to Fig. 1.

In Fig. 1 the slope of the IS curve is larger than that of the LM curve so as to assure stable equilibrium, whether with or without full employment (on the tacit assumption that the marginal propensity to save exceeds the marginal propensity to invest, which may be zero or small). The solid IS curve may be thought of as having shifted leftward to its present position through the influence of wage-price expectations, and the solid LM curve may be thought of as having shifted also leftward to its present position through the influence of wage expectations—according to our specific assumptions. The leftward shift of the IS curve implies that the increasing effect of price expectations on savings necessitates a lower rate of interest to

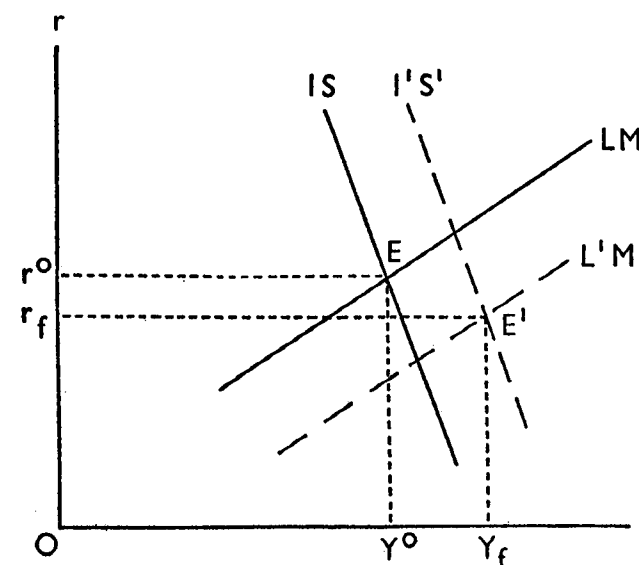


FIG. 1

discourage savings and to stimulate investment into equality with each other at any level of real income. On the other hand, the leftward shift of the LM curve implies that the increasing effect of wage expectations on liquidity-preference necessitates a higher rate of interest to reduce the demand for real balances into equality with the supply of real balances at any level of real income. The LM curve is assumed to shift leftward by an amount larger than the amount by which the IS curve shifts leftward, that is, on the plausible ground that the influence of wage expectations on liquidity-preference in a regime of indefinitely falling wages and consequently increasing uncertainties is greater than that of wage-price expectations on the propensities to invest and to save (money is hard to come by in such a regime).

The IS and LM curves, as such, are seen intersecting at equilibrium point E , corresponding to the equilibrium values of r and Y (that is, r^o and

Y^0), but those equilibrium values of interest and income are respectively larger than full-employment interest r_f and smaller than full-employment income Y_f . There is no automatic mechanism to restore a full-employment position here, no matter how flexible wages and prices may be. For the interest rate cannot fall as a result of falling wages and prices to the required full-employment level, so long as the LM curve keeps on shifting leftward under the influence of wage expectations by an amount equal to or larger than the amount of leftward shift of the IS curve under the influence of wage-price expectations. In the absence of these expectations the IS and LM curves would shift to the hypothetical positions of $I'S'$ and $L'M'$, as Patinkin describes.¹ In that case those curves would intersect at E' corresponding to full-employment income Y_f and full-employment interest r_f .

Thus it is not necessary to postulate an infinitely interest-elastic liquidity function (horizontal LM curve) *à la* Keynes or Hicks in order to demonstrate a theoretical possibility of underemployment equilibrium. Thus it is not sufficient to postulate the "real balance effect" *à la* Pigou or Patinkin in order to restore a full-employment position. Thus, furthermore, the foregoing analysis may have corrected the misleading impression that Patinkin has effectively "repudiated" Keynes' theory of underemployment equilibrium.²

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¹ See his "Rejoinder," *op cit.*

² See H. S. Ellis, "Limitations of Monetary Policy," *United States Monetary Policy* (Columbia University, 1958), especially p. 150 (American Assembly).

MARGINAL PRODUCTIVITY AND PROBABILITY DISTRIBUTIONS OF FACTOR SERVICES¹

I

IN the theory of the firm the business-man, confronted with given technological conditions, buys factors of production and converts them into output. It is assumed that there are given prices of factors of production and that the entrepreneur makes decisions about the amounts of labour, capital and raw materials he buys. He controls the quantity of each factor employed in his firm. Furthermore, it is assumed that there is a unique one-to-one relationship between the factor units purchased and those fed in to the production system. Thus, if we buy (or hire) 100 machines, it is assumed that day-in day-out we shall obtain exactly the same services from those machines. Similarly, it is supposed that when 100 men are hired we get the same quantity of labour services from them each day. This is obviously not true in practice. Both machines and men have their "off-days." Although we may purchase 100 machines, there will be some thought in our minds that only rarely will we have 100 of them running. On most days some machines will be broken down. The flow of machine services will vary considerably from day to day. Similarly, although the number of workers on the pay-roll is fixed, the flow of labour services does not stay at one value. It varies from day to day according to weather, sickness, whim and other accidental influences.

In the real world the firm, then, controls the quantity of factors, but it does not, and usually cannot, control the quantity of factor services.² These behave essentially like a random variable. And we may reasonably assume that the entrepreneur has been in the business long enough to enable him to get a good idea of the extent and character of this variation. To formalise this, we can suppose that he knows exactly the joint probability distribution of the services he will get from given factor purchases.

The important question is what difference does this make to the theory of the firm? In particular, does this give us the same results concerning the employment of factors and marginal productivity curves as the ordinary theory—except that we now have to work in terms of "averages of factor services"? It is tempting to suppose that one need only substitute average labour services, average capital services, etc., in the isoquant and marginal-productivity diagrams and then carry on as before. In the next section

¹ I am grateful to Mr. Meyer Burstein for useful discussion.

² The firm can sometimes control the quantity of factor services to some extent but this always involves additional costs, e.g., providing air-conditioning, hiring more repairmen for the machines. See, for example, W. Feller, *An Introduction to Probability Theory and its Application*, 2nd ed. (Wiley, 1957), pp. 416 *et. seq.*

we shall show that such a procedure would give incorrect results. In fact, the usual effect of variability in factor services is to increase the importance of the factor substitution effect. The marginal expected productivity curve is less erratic than is the ordinary marginal productivity curve.

II

Consider a firm producing holes in the ground and buying only two factors, labourers and spades. Let us suppose that one man must be combined with one spade to produce one hole, and that the production function

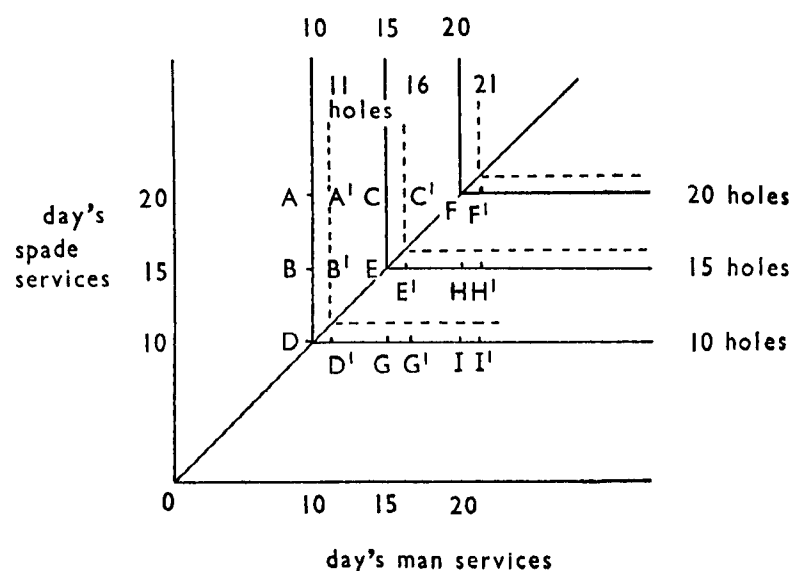


FIG. 1

is a homogeneous one. There are, however, rigid proportions, so that, for example, ten spades and one man still produce only one hole a day. The production function is illustrated in Fig. 1.

The entrepreneur can hire any number of men he likes, but the services they produce is a random variable. If he hires 15 men, we can suppose that *on the average* he gets 15 man services. The probability of him getting exactly 15 man services on a particular day is, however, only one-third, and it is equally likely that he get 10 or 20 man services instead (*i.e.*, prob (20) = prob (10) = prob (15) = $\frac{1}{3}$). Similarly, when he buys 15 spades the probabilities of 10, 15 and 20 spade services are also assumed to be equal at one-third.¹ We further assume, for convenience, that the "off days" of labourers are not associated with the "break-down" days of the

¹ We have assumed conventionally that the average of the probability distribution of a service is equal to the number of units of a factor hired.

spades. That is, we assume that the probability of a spade being broken is not changed by the fact that there are less labour services available.¹ The probability of producing at the points A, B, C, D, E, F, G, H and I is then $\frac{1}{9}$ each. The expected output is, however, not 15 holes, but:

$$(\frac{5}{9} \times 10) + (\frac{3}{9} \times 15) + (\frac{1}{9} \times 20) = 12\frac{7}{9} \text{ holes}$$

The chance variation in factor services forces the entrepreneur to accept inefficient proportions, so expected output is less than it would be if these chance variations were eliminated.

Consider a small increase in the quantity of labour purchased (say one man), while the number of spades remains constant. The effect will be to

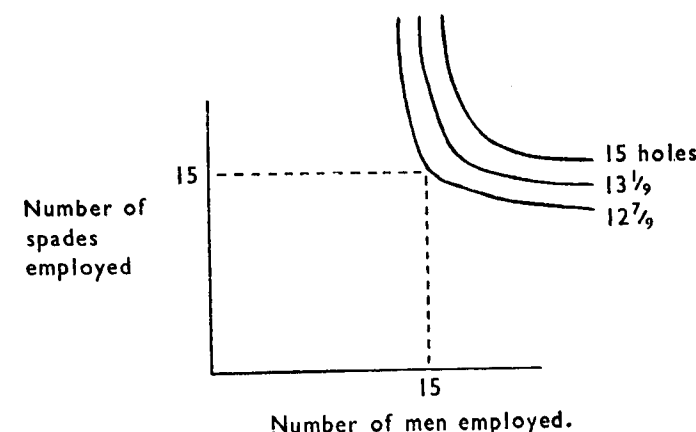


FIG. 2

move A, B, C, etc. to the primed points A', B', C', etc. We suppose that the distance AA' is equal to the distance BB' and to CC', etc.; and these are all equal to one unit.² If we now calculate expected output, we get:

$$(\frac{2}{9} \times 11) + (\frac{1}{9} \times 16) + (\frac{2}{9} \times 15) + (\frac{3}{9} \times 10) + (\frac{1}{9} \times 20) = 13\frac{1}{9} \text{ holes}$$

Thus, the effect of the entrepreneur hiring an extra man is to increase expected output by $13\frac{1}{9} - 12\frac{7}{9} = \frac{1}{9}$ hole. This might be called the marginal expected productivity of labour.

We can construct the equal-expected-product curves and the marginal expected productivity curves corresponding to the analogous concepts in the ordinary theory of the firm. The iso-expected quantity curves are shown in Fig. 2. On the axes we show the number of spades and men "on the pay-roll," which, by convention, we have assumed equal to the *average*

¹ Formally, this amounts to assuming statistical independence.

² Formally, this assumption means that the joint probability distribution is changed only with respect to one of its means.

supply of the corresponding service. The iso-expected quantity curves are not rectangular. They consist of small flat segments, beginning with a vertical and ending with a horizontal segment. These are just like the isoquants of a firm that has some elasticity of substitution within a certain range of factor proportions. The introduction of stochastic elements into factor supply converts fixed factor proportions into the more conventional case when a change in relative factor prices will cause a change in factor proportions.

In Fig. 3 we have drawn the marginal productivity curve of labour for a given quantity of spades (15) purchased.

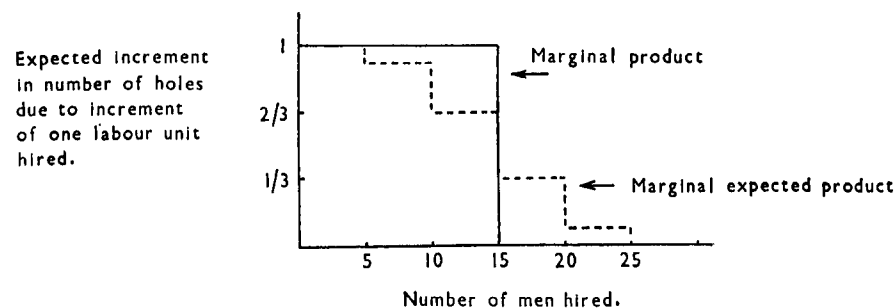


FIG. 3

Instead of a curve which is 1 up to 15 men, then zero thereafter, we have a series of six steps from 1 to zero. A fall in the real wage of labour from 0.9 holes to 0.8 holes will induce an expansion in labour purchases from 5 to 10 men—provided that we cannot change our purchases of spades. There is, or course, still some rigidity in the marginal expected productivity. A fall in real wages from 0.8 to 0.7 holes has no effect on factor proportions. But this is simply a consequence of having a discrete probability distribution. In fact, the distribution of labour services and spade services would approximate to a continuous distribution which falls off to zero at extreme values. Then it is intuitively obvious that, as one moves the continuous distribution along the horizontal of Fig. 2, the decline in the marginal expected product is gradual. The marginal expected productivity curve (with 15 spades) is then shown as MEP ($s = 15$) in Fig. 4. The demand curve for labour of the firm will cut across the marginal expected productivity curves as shown. These curves again are the same as those that appear when there is some substitutability between factors. But these are *expected* relationships and were derived from a case in which, technologically, proportions were fixed.

If we now drop the assumption of fixed proportions, the above analysis can be applied to isoquants which have the ordinary smooth convex pattern. The general effect of stochastic supplies of factor services is to give rise to

lower and usually flatter iso-expected quantity curves. If the original isoquants had little curvature the ratios of marginal productivities will be almost the same as the ratios of marginal expected productivities.

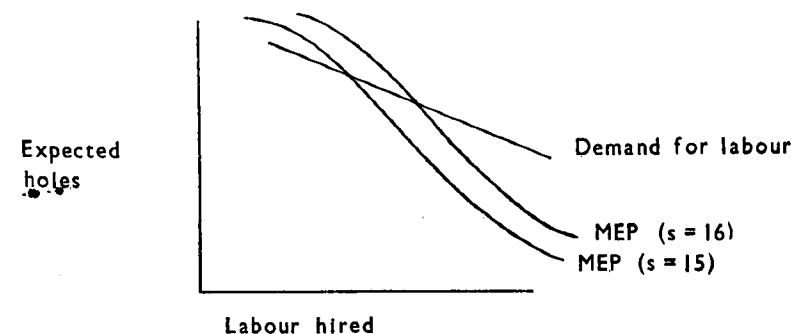


FIG. 4

III

The statistical implications of stochastic factor services should now be briefly reviewed. Again we shall drop the assumption of fixed proportions and use instead the conventional form of the production function.

At first sight it might appear that stochastic quantities of factor services would seriously impair the ordinary least-square regression methods used to estimate the coefficients of the production function. Errors of observation in the independent variables normally means that the least squares estimates are biased. Consider, for example, the Cobb-Douglas production function $X = AL^\alpha K^\beta$, where X is output, L is quantity of labour and K is quantity of capital. Our model suggests that the entrepreneur buys L units of labour but feeds into the production process Lv units of labour service, where v is a random variable, and buys K units of capital but feeds in Ku units of labour service, where u is a random variable. And to complete the statistical model we might suppose there are other random influences on output which may be denoted by the multiplicative random variable ϵ .

$$\begin{aligned} \text{Thus:} \quad X &= A(Lv)^\alpha (Ku)^\beta \epsilon \\ \text{or:} \quad \log X &= \log A + \alpha \log (Lv) + \beta \log (Ku) + \log \epsilon \end{aligned}$$

Now we observe only L , K and X , and normally errors of observation in the independent variables would prevent one getting consistent estimates of α , β and A . But we can clearly write the above equation as:

$$\begin{aligned} \log X &= \log A + \alpha \log L + \beta \log K + \alpha \log v + \beta \log u + \log \epsilon \\ &= \log A + \alpha \log L + \beta \log K + w \end{aligned}$$

$$\text{where } w = \alpha \log v + \beta \log u + \log \epsilon.$$

All that is required to get consistent estimators of α and β by least-squares methods is to assume that the combined error term w is independent of $\log L$ and $\log K$.¹ This is a fairly general condition, and one suspects that it is frequently approximately true in practice.

IV

The most obvious empirical conclusion is that the economist should view with considerable suspicion "technologically" fixed proportions. In particular, technological rigidity does not imply economic rigidity. Substitution is much more important than may appear from considering the non-stochastic production function. Furthermore, this analysis casts additional doubt on the empirical validity of assumptions of fixed factor proportions in aggregate economic models—such as those of Professor Leontief.

We have shown that it does matter considerably when one introduces the stochastic elements into the theory of the firm. If they are introduced into factor services the results are quite different from the determinate non-probabilistic case and from the case where the probabilistic term is simply added to (or multiplied by) the production function.

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¹ This method of estimation follows the theory of Joseph Berkson, "Are There Two Regressions?" *Journal of the American Statistical Association*, Vol. 45 (1950), pp. 164–80. See also, R. C. Geary, "Nonlinear Functional Relationships Between Two Variables when One Variable is Controlled," *Journal of the American Statistical Association*, Vol. 48 (1953), pp. 94–103.

INCOME DISTRIBUTION IN THE EDGEWORTH BOX DIAGRAM

THE problem to be discussed concerns the relationship between an income-distribution constraint and the efficiency conditions of exchange between two persons. It is well known that the Pareto conditions do not yield a unique allocation of resources, and that an additional constraint, such as income distribution or a specific market structure, must be introduced to complete the model. In this paper it will be shown that it is not generally true that a particular distribution of income is compatible with only one allocation of resources (*i.e.*, that there is a one-to-one correspondence between points on the contract curve and possible distributions of income). Consequently, there arises a certain logical difficulty connected with the usual definition of income distribution.

It is assumed that there are two consumers, I and II, having utility functions, $U_1(X_{11}, X_{12})$ and $U_2(X_{21}, X_{22})$, respectively, where X_{ij} is the consumption of the j^{th} commodity by the i^{th} consumer. The standard assumptions are made concerning these functions, that they are continuous, have continuous marginal rates of substitution, are monotonically increasing (*i.e.*, there are no points of satiation) and give rise to strictly convex indifference curves. The total quantities of the two commodities to be allocated between I and II are X_1 and X_2 .

The contract curve is defined as the set of all points (or allocations of X_1 and X_2) for which the marginal rate of substitution between the two commodities is equal for the two consumers. At any point on the contract curve an equilibrium price ratio may be defined equal to the marginal rate of substitution at that point. In this model, of course, only relative and not absolute prices are determined.

Consider any point on the contract curve. I's allocation of resources will be $\bar{X}_{11}$ and $\bar{X}_{12}$, II's will be $X_1 - \bar{X}_{11}$ and $X_2 - \bar{X}_{12}$. Let the relevant equilibrium prices be p_1 and p_2 . These are determined up to a positive factor of proportionality, a , *i.e.*, only relative prices are determined.

I's income can be defined as $a\left(\frac{p_1}{p_2}\bar{X}_{11} + \bar{X}_{12}\right)$, and II's income as $a\left[\frac{p_1}{p_2}(X_1 - \bar{X}_{11}) + (X_2 - \bar{X}_{12})\right]$. The ratio of their incomes is

$$R = \frac{\frac{p_1}{p_2}\bar{X}_{11} + \bar{X}_{12}}{\frac{p_1}{p_2}(X_1 - \bar{X}_{11}) + (X_2 - \bar{X}_{12})}$$

which, it will be noted, is independent of the absolute price level.

The definition of income used here is the same as that in the conventional theory of individual consumer behaviour. Given a , p_1 and p_2 , $a\left(\frac{p_1}{p_2}X_{11} + X_{12}\right)$ defines a set of parallel lines on one of which lies the contract curve point $(\bar{X}_{11}, \bar{X}_{12})$. That line defines the set of alternative purchases confronting I from which he chooses, by assumption $(\bar{X}_{11}, \bar{X}_{12})$. Similarly, it may be seen that $a\left[\frac{p_1}{p_2}(X_1 - X_{11}) + (X_2 - X_{12})\right]$ defines a set of parallel lines, on one of which lies the contract curve point $(X_1 - \bar{X}_{11}, X_2 - \bar{X}_{12})$. This line defines the set of alternative purchases confronting II from which he chooses by assumption $(X_1 - \bar{X}_{11}, X_2 - \bar{X}_{12})$.

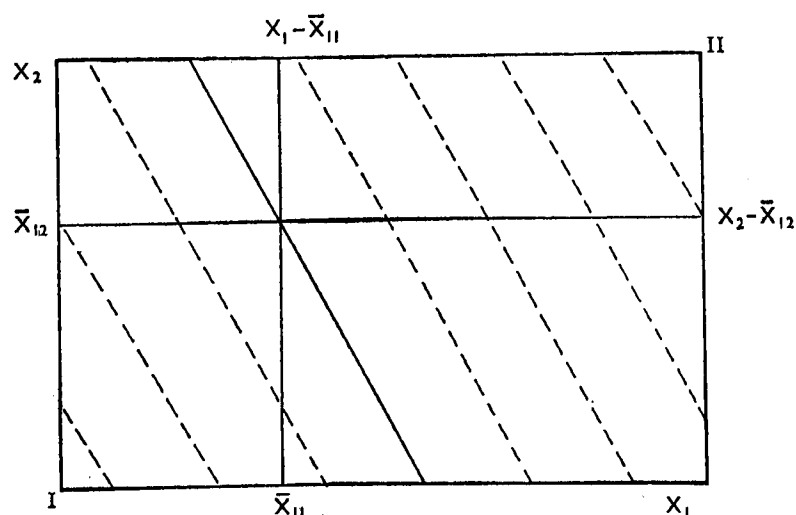


FIG. 1

In Fig. 1 it may be noted that the parallel lines defined by $a\left[\frac{p_1}{p_2}X_{11} + X_{12}\right]$ and $a\left[\frac{p_1}{p_2}(X_1 - X_{11}) + (X_2 - X_{12})\right]$ are the same lines viewed from I and II respectively. Moreover, the unbroken line which goes through the point $(\bar{X}_{11}, \bar{X}_{12})$ and, looked at from I, defines I's income, looked at from II, defines II's income.

That no income distribution is incompatible with the efficiency conditions of the contract curve may be proved very simply. In the formula for R , by assumption, the quantities and prices vary continuously, so that R also varies continuously. At $X_{11} = X_{12} = 0$ R also has the value zero. (Relative prices here are equal to the marginal rate of substitution of consumer II, and are non-zero, by assumption.) Similarly, at $X_{11} = X_1$ and $X_{12} = X_2$, R has the value infinity. Thus, R varies continuously along the contract curve taking all values between zero and infinity.

Given that R is a continuous function of the points on the contract curve, the interesting question is whether it is a monotonically increasing one. In the Edgeworth box illustrated in Fig. 2 A and B are two points on the contract curve. At B consumer I's utility is higher than at A and consumer II's is lower. It would be reasonable to say, therefore, that a move from A to B shifts income distribution in favour of I. The question is whether this is shown by R , that is, whether R at B is necessarily greater than R at A . It

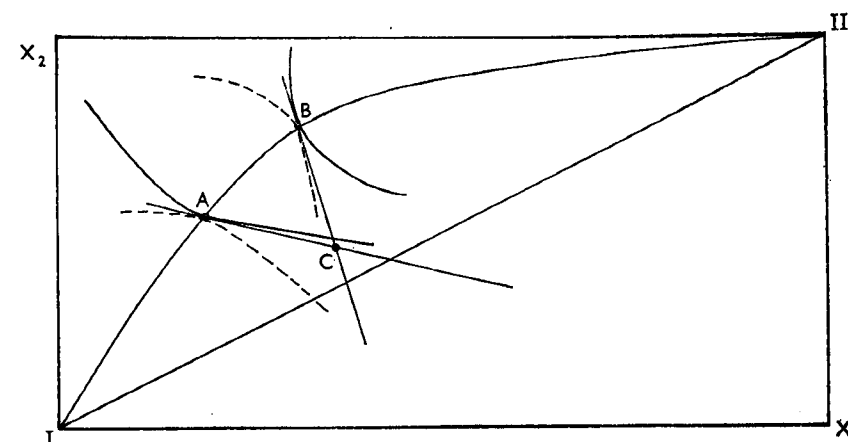


FIG. 2

can be proved that this is not the case and that R need not increase monotonically along the contract curve from left to right.

A necessary and sufficient condition for R at B to be less than R at A is that when the budget line through B is steeper than the budget line through A the lines intersect above the diagonal, and when the budget line through B is flatter than the budget line through A the lines intersect below the diagonal.

Let the point of intersection be C . At the equilibrium prices ruling at A income distribution at C is the same as that at A , and at the equilibrium prices ruling at B income distribution at C is the same as that at B . In comparing R at A with R at B , therefore, it suffices to consider the behaviour of the ratio

$$\frac{\frac{p_1}{p_2}X'_{11} + X'_{12}}{\frac{p_1}{p_2}(X_1 - X'_{11}) + (X_2 - X'_{12})}$$

as $\frac{p_1}{p_2}$ varies, where (X'_{11}, X'_{12}) are the resources allocated to I at C . The derivative of this expression with respect to $\frac{p_1}{p_2}$ has the same sign as the expression $X_2X'_{11} - X_1X'_{12}$. Thus, for R at B to be less than R at A either $\frac{p_1}{p_2}$ is

greater at B and $\frac{X_2}{X_1} < \frac{X'_{12}}{X'_{11}}$, or $\frac{p_1}{p_2}$ is smaller at B and $\frac{X_2}{X_1} > \frac{X'_{12}}{X'_{11}}$. Fig. illustrates the former case. The latter case is entirely symmetrical except that A , B and C are now all underneath the diagonal instead of being above it as in the diagram.

Another way to approach this theorem is to consider the initial non equilibrium point C . The situation under discussion is then one in which the offer curves of the two consumers intersect more than once. Regarding from I 's position, A and B are points on his offer curve obtained by rotating the price line about C , and from II 's position they are points on his offer curve also obtained by rotating the price line about C .

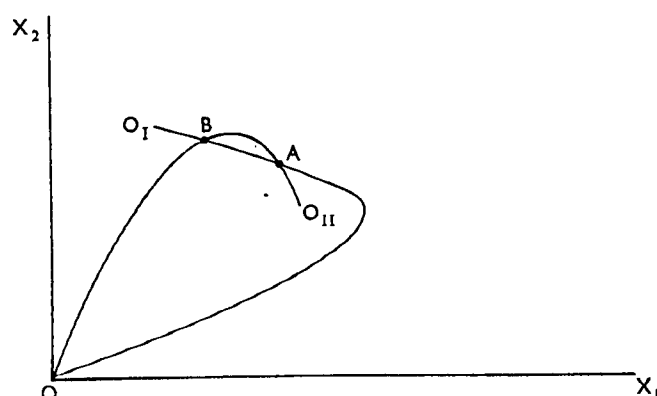


FIG. 3

In Fig. 3 O_I is I 's offer curve, I offering X_1 in exchange for X_2 , and O_{II} is II 's offer curve, II offering X_2 in exchange for X_1 . O_I and O_{II} intersect more than once, points A and B in Fig. 3 corresponding to A and B in Fig. 4. A and B are, therefore, equilibrium points reached by quantity-adjustment from C .¹

The fact that R is not a satisfactory measure of real income distribution is, of course, merely another example of the index-number problem.

In Fig. 4 it is impossible to say whether the individual's real income is higher on HH' or JJ' without knowing whether h or h' and j or j' are the corresponding equilibrium points. This is precisely what is happening in the Edgeworth box, and is a phenomenon which indexes such as R are unable to take into account. Indeed, the general point discussed in this paper will hold for any measure of income distribution which is solely a function of money income and prices.

¹ An interesting corollary which may be obtained, therefore, concerns the definition of income distribution at points off the contract curve such as C . If it is argued that this should be measured at the relative prices ruling at the quantity-adjustment point reached from C , contradictions may arise, because there may be several such points.

A final conclusion to be noted is that if there are any points on the contract curve for which R is an unsatisfactory measure of income distribution, there will be an infinite number of such points. Since the contract curve

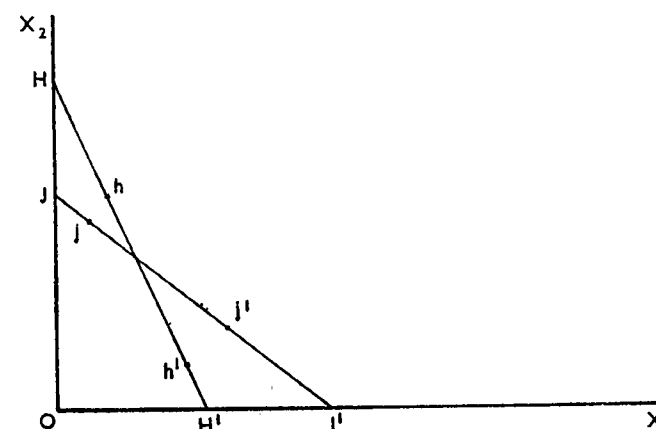


FIG. 4

cannot bend back on itself, it may be defined either by X_{12} as a single valued function of X_{11} or X_{11} as a single valued function of X_{12} . Assuming that the former condition holds, it follows that R is a continuous function of X_{11} .

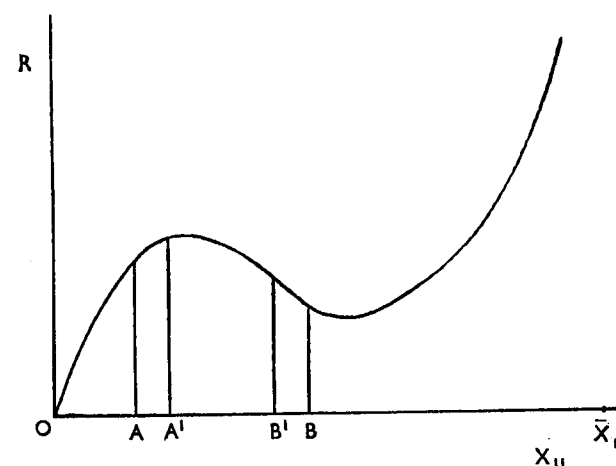


FIG. 5

In Fig. 5 R is shown as a function of X_{11} illustrating the theorem. Since R at B is less than R at A , and R is continuous, there must be a range of points A' and B' between A and B such that R at B' is less than R at A' .

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A MODEL FOR THE STUDY OF PROTECTED OLIGOPOLIES¹

"... propositions of pure economics ... are nothing but glorious tautologies in the sense that, given certain axioms, the final result is all wrapped up in the starting point for anyone with sufficient intuition to see it there. But such intuition ... is ... one of the marks distinguishing angels from men; and no mere man need be ashamed of spending a reasonable portion of his time and wits in deductive reasoning." Sir Dennis Robertson.

THIS paper presents a model which takes into account the many repercussions of a tariff on market structures and competitive behaviour. Its purpose is to give a realistic account of the effect of the Canadian tariff on competition and productivity in Canadian industry. But the model is general and can be used to analyse the effects of protection in other countries. It may be of interest for an analysis of economies that are about to change the present nature and degree of their protection.

A fundamental characteristic of the Canadian economy has been in the past and is today the lower real output *per caput*, and the consequently lower standard of living, than in the United States. The differential in real output *per caput* has been estimated to be between 30 and 35%. Money income is about one-third less in Canada than in the United States, whereas the most costly of a representative collection of goods and services is about the same in the two countries.²

Output per worker is lower in all sectors of the economy. Manufacturing is the most important of these sectors in its contribution to gross national product, and the lower productivity per worker in that sector is the main cause of the lower standard of living in Canada.

Previous writers have given several explanations for the differential in real output *per caput*, including differences in climate, national characteristics, abundance of capital and endowment in natural resources.³ But the most widely accepted hypothesis concerning the discrepancy in productivity in manufacturing between Canada and the United States holds that the small size of the Canadian market for manufactured goods⁴ necessarily results

¹ The Social Science Research Council of Canada provided grants for a study of which this paper is a part.

² J. H. Young, "Some Aspects of Canadian Economic Development" (unpublished Ph.D. dissertation, Cambridge University, 1955).

³ *ibid.*

⁴ The median ratio of United States to Canadian industry size was 10, with quartiles at 8 and 13 in 1947. G. Rosenbluth *Concentration in Canadian Manufacturing Industry*, National Bureau of Economic Research, Number 61, General Series (Princeton: Princeton University Press, 1950), p. 82.

in sub-optimal scale for plants and firms, with a consequent loss of productivity.¹ Those who argue from the small size of the Canadian market show that runs of single products in Canadian factories are shorter than in their counterparts in the United States, with the result that much more time is used in change-over for each unit of output. The machinery used in Canada is often less efficient because indivisibilities in the use of the most efficient methods of production can be overcome only at higher scales of production than exist in Canada. Furthermore, the most automatic equipment, which is sometimes the most efficient, is also the most costly to reset when a change in the size or style of a product is required. The alternative sometimes adopted in Canada to using less efficient or less fully automatic equipment is to acquire equipment which is most efficient and to bear the cost of conversion and resetting, or of keeping the machinery idle for part of the time when runs are insufficiently long to operate it continuously.

This explanation takes account of the possible effect of the foreign tariff on Canadian productivity in so far as it recognises that this tariff may limit the size of the market in which Canadian producers can compete with foreign producers on equal terms. But it goes both too far and not far enough: too far in assuming that the foreign tariff reduces markets open to Canadian producers to a level at which efficient organisation is impossible in most cases; not far enough in accepting as given the existing structure of markets for manufactured products and the pattern of competitive behaviour which prevails in them. This acceptance is unrealistic and inadequate, and vitiates the deductions which flow from it.

The foreign tariff only creates a more or less separate market in Canada that is smaller than, for instance, the market in the United States. The Canadian, as distinct from the foreign, tariff shapes the internal organisation of each market. It affects the number of firms, the pattern of competitive behaviour, the size which firms attain, the degree to which they diversify their product, the ease of entry and the character of potential entrants.

The model here used to reveal the full effect of the Canadian tariff on manufacturing industries in Canada belongs to the familiar genus of particular-equilibrium models, and the technique used is that of comparative statics. The original position of equilibrium in the model is one in which no duties are levied by Canada on imports of the commodity under consideration. It is also assumed that foreign countries tax exports from Canada, and that Canada erects a tariff against imports of some one commodity. The new equilibrium is described and compared with the old. Each country levies dumping duties on imports equal to the difference

¹ D. H. Fullerton and H. A. Hampson, *Canadian Secondary Manufacturing Industry*, Royal Commission on Canada's Economic Projects (Ottawa: Queen's Printer, 1957). This is the most recent and full treatment of the problem from this point of view.

between the price at which a supplier sells in his domestic market and the price at which he sells in that country's market, when the former price is higher than the latter.

In the long run the Canadian tariff affects the number of firms competing in the Canadian market and is one of the factors which determine the scale of their operations. Entry into markets for manufactured goods is affected by the presence in Canada of two special factors which operate together with the other forces affecting entry.¹ These factors are the foreign tariff imposed against Canadian goods and the Canadian tariff imposed against foreign goods. The foreign tariff creates a small market in Canada separate from the world market. The size of the separated market constitutes an impediment to entry whenever it is small in relation to the optimum scale of the firm. The Canadian tariff, on the other hand, increases the maximum price which can be charged in the protected market without attracting imports. Thus, *ceteris paribus*, the Canadian tariff is always an inducement to the establishment of firms in the Canadian market. The effect of protection on entry is the result of these two opposing consequences of the existence of a foreign and a Canadian tariff. It is independent of other barriers to entry, such as product differentiation, marketing barriers and absolute cost advantage accruing to existing firms.

The extent to which the effect of the foreign tariff is a deterrent to entry depends, other things being equal, on the relation of the minimum optimum size of the firm to the size of the relevant market. The minimum optimum size of the firm is the smallest size of firm at which all economies of large-scale operation become exhausted. The principal determinant of this minimum optimum size of the firm is the minimum optimum size of the plant. However, the size of the plant is likely to set only the lower limit to the optimum scale of the firm, because instances of diseconomies of multi-plant operations are rare: in most cases multi-plant operations either bring economies or are neutral, other impediments to growth than economies of scale being responsible for limiting the size of actual firms. These other impediments are negatively sloped average-revenue curves facing the firm, rising selling costs which result from product differentiation and non-price competition, the unwillingness of the entrepreneurial group to expand at the risk of losing control, limits imposed by the ownership of resources, other institutional reasons, and accident.²

Economic analysis has added little to our understanding of the forces that determine the minimum optimum scale of plant since Adam Smith described them in his account of the efficient operation of pin factories. Principles

¹ These other forces are described by Joe S. Bain in *Barriers to New Competition* (Cambridge, Mass.: Harvard University Press, 1956).

² Alfred Marshall's analogy between the pattern of growth of trees and of firms has received recently statistical confirmation in H. A. Simon and C. P. Bonini, "The Size Distribution of Business Firms," *American Economic Review*, Vol. XLVIII, No. 4, September 1958, pp. 607-618.

such as those of specialisation of labour and process, indivisibility, economies of increased dimension, pooling of risks through large numbers and of balanced structure of equipment at the various stages of production are used by economists only to describe and not to analyse technological and organisational determinants of optima. For the investigation of existing markets and their structure, the general principles, which never operate in isolation, are of little help. Therefore, it is necessary to obtain in each specific instance estimates of the minimum optimum size of plant and firm based on engineering and organisational experience.

The minimum optimum size of plant must be carefully defined. The size of plants is usually given in terms of the value of output, or of the physical quantity of input of raw material or of output of finished goods. Such measures are insufficient for the purpose of determining the minimum optimum scale of plant. They must be supplemented by information concerning the variety of products whose value or tonnage or input requirement is given, for it is usually the case that a diversified output of a certain value or volume has higher costs per unit than an undiversified output. A minimum optimum size of plant therefore implies the output of a basket of products requiring the least costly adjustments, the use of the most efficient equipment and the least idle time for the equipment. A firm of minimum optimum size is made up entirely of plants of the minimum optimum sizes, the number of plants being determined by economies of scale available to the firm as distinguished from individual plants.

The minimum optimum size of firm in the Canadian market¹ is not a single value, for it depends on whether the firm is an entirely separate entity without affiliation with foreign firms or whether it can rely on foreign firms for certain services and supplies. Firms which are independent can overcome indivisibilities in research, product design, marketing and the supply of parts and components by taking advantage of external economies, that is, by purchasing their requirements from specialised firms. However, specialised firms are often not available to supply all these indivisible needs of independent firms, and therefore the minimum optimum size of firm must in these cases be large enough to warrant the inclusion of the indivisible operations in the scope of the firm's activities. In contrast, affiliates of foreign firms operating in Canada can usually overcome all of these indivisibilities by acquiring from the foreign associates all the needed goods and services that are not available on the market and require large-scale operations to make them economically feasible. Thus the scale at which independent producers attain minimum optimum size of operations is likely to be significantly larger than the minimum optimum scale of Canadian affiliates of foreign producers. Wherever this is so, given the market size,

¹ The Canadian market is the market open to Canadian producers, whether in Canada or abroad. In fact, most Canadian producers of manufactured products sell chiefly in the domestic market.

the barrier to the entry of independent firms is higher than to firms which can rely on others for certain services and parts.

As Bain has pointed out, entry is impeded where the output of a firm of minimum optimum scale would supply a large proportion of the firm's market because the new entrant either commences production at the minimum optimum scale, thereby depressing the price, or it enters at sub-optimal scale and thereby incurs the penalty of higher cost, though it does not depress price as much. Choice between these two courses of action on the part of the new entrant depends on estimates of the effect on the price of the product of entry at different scales, and on estimates of the effect on costs of reductions in scale from the minimum optimum. Thus, other things being equal, the steeper the envelope curve to the left of its lowest point or points, the less elastic the aggregate demand curve in the market, and the stronger the probable reaction of existing firms, the greater the barrier to new entry.

Given the minimum optimum scale of firm, the shape of the envelope curve, the elasticity of aggregate demand and the probable reaction of rivals, the impediment to entry depends on the size of the market. This market must be measured by the amount of the commodity produced in Canada. However, this measurement is only an approximation of the dimension of domestic and export markets which would exist if in fact all firms in Canada were of the optimum size. In so far as they are not, their costs are higher, and therefore measurements obtained from statistics of actual production are a low estimate of the potential size of Canadian markets, because lower costs might bring lower prices. Moreover, the definition of the commodity or groups of commodities sold in the market presents problems identical to those of the definition of the commodity or group of commodities produced by the plant.

The discussion up to this point leads to the conclusion that entry into a Canadian market by production in Canada is easier the smaller the minimum optimum size of firms in relation to the relevant market. The relevant market is not in all cases the national market. Regional sub-markets exist, usually because of high transportation costs created by low value in relation to bulk or weight, perishability of product and servicing problems. In supplying regional markets, a firm has the choice between concentrating production under a single roof, thus incurring transportation costs, and supplying each region from a plant located in it. In the latter case the firm may be unable to operate plants of minimum optimum size if some regional markets are not large enough to accommodate one. Thus, a firm made up of several sub-optimal plants may appear to be of the minimum optimum size or larger, whereas, in fact, its average costs are higher than those of a firm operating plants of the most efficient size. It should be noted, however, that high transportation costs can be prevented to some extent from creating regional sub-markets by collusive pricing policies such as those employing basing points or identical delivered prices. One of the incidental effects of

the Canadian tariff, which imposes an artificial transportation cost on foreign producers, is that it permits oligopolistic Canadian industries so to price their products as to merge some of the regional markets. In the absence of the tariff each region would be part of a larger international market. Each market would be supplied by the least-cost producer, taking transportation costs into account. Thus, a determination of the minimum size of the Canadian market which uses statistics on existing markets overlooks the problem of regional distribution of demand, and may cause an overestimate of the size of markets which would exist without the protection of the Canadian tariff.

In the following analysis the foreign tariff is treated as one of the given conditions which determine the size of the market open to the Canadian producers in each industry. The imposition of the Canadian tariff is the force which disturbs the initial equilibrium and, therefore, is the force whose consequences in the long run are analysed. The maximum to which the Canadian price may be put up as a result of the imposition of the Canadian tariff acts differently as an inducement to entry in each of the main market types, competition, monopoly and oligopoly, because the process of price formation is not the same in each of these market types and, therefore, a given rate of protective duty has different consequences in each case. The simple models that can be used to analyse the impact of the Canadian tariff on industries that are perfectly competitive or monopolised are omitted from this discussion. Manufacturing industries tend to be oligopolies in Canada and in the United States, which is the principal supplier to Canada of manufactured products at present. Therefore, the case of chief interest is that of the impact of the tariff on oligopolistic market structures which exist both abroad and in Canada.

After the Canadian tariff is imposed, an oligopoly in the Canadian market results because an oligopoly existed in the world market prior to the imposition of the tariff and the firms located in Canada, now more isolated, form the nucleus of a domestic oligopoly. Alternatively, if prior to the imposition of the tariff producers did not exist in Canada, the tariff may create a Canadian industry which is oligopolistic.

If the oligopoly is not collusive, oligopolists tend to keep their prices close to the minimum long-run average cost of firms of optimum size. If the number of oligopolists is small they keep their prices low because of the fear that their rivals may pursue this policy themselves, because of the fear that new entrants may be attracted by high prices if they do otherwise and because of the fear of imports when their costs are little below world prices plus duty. If the number of oligopolists is large they are compelled to keep their prices close to the lowest point on their envelope curve because their rivals do, in fact, cut prices under them if they keep prices high and entry of new firms actually takes place under the same conditions. Moreover, should prices be pushed up by costs and temporarily exceed world price plus duty,

they are soon pulled back by a flow of imports. In the case where there are several oligopolists, the structure of the industry may well be unstable because of an inflow and outflow of firms and because of changes in the size of existing firms caused by alternating periods of high prices and intense competition.

If the oligopoly is collusive, price is fixed at a level which takes into account the threat of potential competition from imports and from new entrants. In the case where, in the view of the oligopolists, the appropriate profit maximising policy requires their continued domination of the market, price tends to be fixed at a level below world price plus duty and tends towards the minimum long-run average cost of the firm of optimum size. On the other hand, if it is the oligopolists' view that profits can be maximised by a policy of charging high prices, these prices attract new entrants, and thus more firms become established in the market than can be accommodated at a price that covers the minimum average costs of firms of optimum size. The ensuing market structure is one in which the number of firms is large, the scale of firm is sub-optimal and average costs are high. Thus, the high price tends to be justified in terms of high costs by the market structure which it produces. In the case where economies of scale place insuperable barriers to entry, firms tend to be of the optimum size and high prices make for permanently high profits.

This discussion of the effect of tariffs on oligopolies in Canadian manufacturing industry has neglected so far all barriers to entry that are not related to economies of scale. Each of the other barriers to entry is now discussed in turn, and in conclusion the overall barrier is considered. If product differentiation and marketing create barriers additional to those owing to the net effect of tariffs, collusive pricing becomes more likely. Product competition provides an alternative to price competition when products are heterogeneous, and the fear of new entrants attracted by high prices is reduced by the barrier erected by differentiation. As was noted above, pricing up to the tariff is likely whenever a substantial barrier to entry exists, and it is therefore more likely with product differentiation and marketing barriers than without. Given the level of price, probably determined in collusion, the structure of the market depends on the height of the barriers created by the net effect of tariffs, product differentiation and marketing, and the character of the latter barrier.

Where the barriers created by product differentiation and marketing are slight and the deterring effect of the foreign tariff is small in relation to the inducement to entry offered by the Canadian tariff, that is, where the increase in cost incurred from operating a firm of sub-optimal size is small in relation to the increase in price made possible by the Canadian tariff, the probable market structure is one in which several firms of sub-optimal scale resort to non-price competition to sell differentiated products which are close substitutes.

If the barrier provided by product differentiation and marketing is high, the size of the firms is likely to be closer to the optimum and marketing costs are probably high in the sense that profits may be no higher than the average in manufacturing as a whole. Indeed, in industries where economies of scale are unimportant, product differentiation is likely to depend on large advertising expenditures because brands are numerous in such industries or at least potentially numerous. Heavy expenditures on advertising and marketing are required to establish the identity of each existing brand and to prevent the creation of new popular brands. Large selling outlays become possible when the products are strongly differentiated and a margin is available between production costs and price to finance such outlays. Where economies of scale are important, actual and potential brands are fewer, and relatively smaller advertising outlays are sufficient to establish the identity of each product *vis-à-vis* its rivals. In the aggregate, advertising outlays of these industries need not be large to create a barrier against newcomers, and profits are abnormally high.

It should be noted that in markets where product differentiation is important subsidiaries or affiliates of United States firms have a considerable advantage over independent firms in Canada. This is so owing to the fact that the policies of United States firms directed at creating barriers to entry in United States markets through product differentiation also create, as a by-product, preference for their product in Canada because of the considerable exposure of Canadian consumers to American advertising media. Economies of large-scale advertising are marked, and the cultural similarity of the United States and Canada is sufficient to permit the successful extension of American advertisements to Canada. The marginal cost is low of using in specifically Canadian contexts with little or no adaptation the very expensive and presumably persuasive advertisements used by parent companies of Canadian firms in the United States. The total sales of independent firms are often too small to support the most effective advertising.

The discussion of the effect of tariffs when absolute cost advantages enjoyed by established firms constitute the barrier to entry proceeds by the consideration of each kind of advantage in turn: resource ownership, patents and techniques for the control of production, and imperfections in the input markets. If the ownership of a resource by established firms constitutes a barrier to entry in the world market the imposition of the tariff may result in the creation of an oligopoly in Canada whether foreign production is carried on by a monopolist or by oligopolists. For instance, this may be the case when foreign producers are integrated disproportionately at the several stages of production and sell their raw or semi-processed materials at a high price calculated to block entry into the world market for the final product. The protected Canadian processors may be able to purchase their raw or semi-processed materials at the high prices charged by the integrated foreign producers and establish production behind the tariff.

If resources are located partly in Canada and partly abroad the oligopoly which appears in the Canadian market has characteristics determined by the net effect of tariffs on entry and the nature of the barrier erected by resource ownership. If resources are in many hands the net effect of tariffs determines the size and number of firms. In the more usual case in which ownership of resources is concentrated it is resource ownership rather than the net effect of tariffs that determines the size of firms. Hence, resource ownership may lead to firms of much larger than the minimum optimum scale either if the long-run average cost curve is horizontal once it has attained its minimum level or if the effect of the Canadian tariff permits higher than minimum costs. In such a case collusion and pricing up to the tariff is likely with above-average profits permanently maintained unless a part of them is absorbed by high costs of production at a greater than optimum scale, or by selling costs. However, high selling costs are unlikely in a resource-based industry.

Patents and other methods of controlling techniques of production, such as secrecy concerning engineering processes, affect the structure of an industry in the same manner as does the ownership of resources. However, in so far as patents are vulnerable to attacks of public opinion and government policy, they are less durable. Patents and other forms of control over techniques of production may form an absolute barrier to entry into the industry in question, or they may merely oblige competitors to incur higher costs by employing inferior methods or to produce inferior products, depending on how easy it is to circumvent the patents or the other obstacles to production, and depending also on the presence of close substitutes in consumption. Where these forms of control erect absolute barriers to entry, the maximum number and size of firms in the industry is determined by the licensing policy, and by policy with regard to sharing secrets on the part of the owners of these controls. Where a sufficient number of patented or otherwise controlled processes exist to permit new firms to enter should the net effect of tariffs induce them to do so, these controls cannot be considered to form an absolute barrier to entry, even though they themselves cannot be duplicated without the acquiescence of the owners. Where these forms of control make entry into the industry difficult but not impossible, the number and size of firms in the industry is determined by the combination of the net effect of tariffs and of cost disadvantages imposed by the necessity of relying on inferior methods of production, on inferior products, or on payment of royalties to the holders of patents and of fees to possessors of special knowledge.

Where the number of firms in the industry is kept low by the net effect of tariffs and by controls over techniques of production, and where the fear of potential entrants is remote, a tendency to collusion exists. Either profits or costs are high, depending on the absence or presence of competition through marketing expenditures.

The barrier to entry formed by controls over techniques of production is likely to be higher for independent producers than for affiliates of foreign firms, because the latter are the principal holders of patents in Canada owing to earlier technological development in the United States, the United Kingdom and Continental Europe. Foreign owners of patents are more likely to make them available to their affiliates than to license independents. Foreign corporations are also under some compulsion to establish affiliates in Canada in order to safeguard their patent rights. As for technological knowledge, which is a by-product of production itself, it is likely to be passed on to the personnel of affiliates and not to be sold to independents, for few firms are in the business of selling knowledge.

The last barrier to entry whose effect in conjunction with the imposition of the Canadian tariff must be considered is the well-known one which arises from imperfections in the market for inputs. These imperfections work to the advantage of some established firms, thereby making entry more difficult for others. The most important of the markets in which these imperfections exist, and typical of markets where problems may occur with respect to other inputs, is the market for capital. The operation of this market works to the advantage of firms which are absolutely large. Such firms obtain capital more readily than small ones because, with the existing institutions in the capital market, the cost of catering to their needs for finance are lower, and also because of the oligopsonistic power of large firms.¹ Furthermore, the internal resources of large firms provide them with absolutely large pools of capital which notoriously escape interest rates charged in the market to enterprises of a similar character. Thus, once again, a barrier to entry of new firms is greater for independent firms than for the affiliates of established foreign producers, many of whom are absolutely large. Indeed, in many instances this barrier, which is absolute to independent firms, does not exist for affiliates.

The model presented in this paper for the analysis of protected oligopolies suggests some conclusions important for public policy. First, a widely advanced argument in support of protection in Canada claims that foreign tariffs so reduce the efficiency of the Canadian producer by restricting the size of the market available to him and thereby forcing a small scale upon him that his costs and, therefore, the domestic price are raised to the point at which, paradoxically, he requires protection himself. This argument could apply only where the Canadian market, national or regional, is served by a single firm whose scale is below the minimum optimum scale for firms in that industry. As soon as the relevant market contains more than one firm, the argument that it is the foreign tariff which forces small scale on Canadian producers falls down: the small scale must be owing to some other factor. In fact, few markets in Canada are served by only one firm.

¹ R. F. Henderson, *The New Issue Market and the Finance of Industry* (Cambridge: Bowes and Bowes, 1951).

Cases exist in which oligopolies in Canada are already as efficient as their foreign counterparts and yet are not able to export because of foreign tariff protection. In these cases, if there are no diseconomies of production at greater than existing scale, the removal of foreign tariffs may increase the scale of operation of firms in Canada. If there are no differential locational disadvantages for new entrants in Canada the removal of foreign tariffs may increase the number of firms. Thus, in certain circumstances the removal of foreign tariffs may increase firm size or the number of firms or both, but these are clearly not cases in which the inability to export to foreign countries because of foreign tariffs reduces the efficiency of the Canadian oligopoly below levels of efficiency achieved abroad. At most, foreign protection affects the size of the Canadian industry. Whenever an inefficient oligopoly exists in Canada, the question necessarily arises of why prices are not cut to eliminate some firms and to permit the increase in size of the remaining ones. Foreign tariffs are of only peripheral significance in this matter.

Another case exists in which the foreign tariff may conceivably affect adversely the efficiency of Canadian industries. In so far as external economies are important, Canadian manufacturing industries would be more efficient if they were larger. Since some of these industries would be larger if there were no foreign tariff, they would also be more efficient. In so far as external economies of firms in one industry are internal economies of firms in other industries, the model takes them into account in its discussion of the cost curves of the latter group of firms. In so far as economies are external to all firms, it is impossible to analyse this phenomenon in a general way. However, an attempt can be made to identify the sources of external economies and to determine their significance in each specific industry.

Second, there is the widely expressed concern with the effect of the inflow of foreign capital on the performance of the Canadian economy. The model indicates that impediments to the establishment of foreign subsidiaries would reduce the productivity of Canadian industry below its present level. The effect of the foreign tariff makes entry into Canadian industries difficult. Any reduction in the minimum optimum size of firms offsets the effect of foreign tariffs, tends to maintain competitive conditions and makes more likely the establishment of efficient firms. Since affiliates of foreign firms can enter at lower scales than independents, foreign direct investment is beneficial in this respect.

Third, it is evident that the extent of the market is not often a limit on specialisation in production. The productivity of oligopolistic firms can be raised, without increasing the size of the market, if competitive pressure can be brought on their prices and costs. Such pressure may result in a reduction in the range of products supplied or in advertising and marketing costs, and it may also result in the elimination of some of the firms in markets where

the net effect of tariffs has produced overcrowding. As is often the case, the goals of public policy conflict: efficiency requires fewer units of larger size, and competition requires many units. Once competitive pressures have led to efficiency, measures must be applied vigorously to prevent collusion, and to force the few efficient units to pass on to the consumer gains in productivity obtained from the reorganisation of the market. Tariff reductions may also be useful instruments for increasing competition, for they force increases in the scale of such sub-optimal firms as are able to face foreign competition and reduce overcrowding.

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THE WITHDRAWAL OF RAILWAY SERVICES¹

I. INTRODUCTION

THE increasing rate of withdrawal of the less remunerative of the services provided by British Railways has made more important the accurate measurement of the costs and receipts of individual services within the railway system. This paper discusses:

(a) the measurement of total costs and receipts attributable to an individual service;

(b) the estimates of expected *changes* in costs and receipts upon withdrawal of a service;

(c) certain analytical flaws in the criterion used in the construction of such estimates, for the examination by the consultative committees² of any proposal to withdraw a service. The form of the criterion is not laid down in the Transport Acts and, indeed, has changed in various respects over the past eight years. The present form, which will be referred to as the agreed scheme, was established in discussions held in 1958 between the British Transport Commission and the Central Transport Consultative Committee.³

II. RECEIPTS

The measurement of *total* receipts earned by an individual service is in itself a difficult problem. For passenger traffic, British Railways currently take two sample weeks in each year, and for these weeks a count of passengers boarding and alighting at each station is made by the station staff; from this, a figure for receipts is obtained by multiplying by the average fare for the Region. There are several possible sources of error: the use of the average fare for such a large entity as a Region may be inappropriate to the particular service;⁴ the sample results may not be representative of the year as a whole because of seasonal variations; and the method of collecting the data permits falsification of the results by the local staff (who are interested parties), a danger of which the railway officers are well aware.

These results are used merely to give the railway management a rough idea of the revenues of each line. When withdrawal of services is mooted

¹ The writers have benefited from discussions with various persons, including certain members of British Railways' staff. These persons do not necessarily share the opinions of the writers expressed in this article.

² For the constitution, and other functions, of the consultative machinery see the Transport Act, 1947, Section 6, and C.T.C.C. *Handbook on Transport Users' Consultative Committee* (London, no date).

³ The form of the agreed scheme is laid out in the Appendix of the C.T.C.C.'s *Annual Report for 1958* (H.M.S.O., 1959).

⁴ In at least one Region attempts are being made to use rates per mile for particular services rather than the average fare for the whole Region.

a more thorough analysis is made, covering a short period, usually one month, from which an estimate of annual receipts is obtained, after making some allowance for seasonal variations. For the purposes of this analysis, passenger traffic is divided into three categories: (a) traffic local to the line; (b) traffic which is forwarded from a station on the line to a station not on the line, or vice-versa; and (c) traffic which passes over the line but which originates and terminates at stations not on the line. The first category is usually the most important; the third category applies, of course, only to lines having at least two points of connection with the rest of the system. The methods used for the measurement of receipts vary from case to case, but the following details give some idea of the general approach. In the first category receipts are measured in the obvious way, namely by finding the value of the tickets sold. In the second category the sales of tickets at stations on the line are examined and a proportion of the value (that part relating to mileage travelled on the line itself) is used as the measure of receipts. The corresponding proportion of receipts from tickets sold at other stations is included only if such tickets are an important part of the total traffic,¹ in which case the tickets collected at stations on the line are examined. Similarly, the third category is ignored unless it is of importance; if this is so, the passengers must be counted directly, since their tickets are not collected at any point on the line itself. This number is multiplied by the fare for the distance travelled on the line to give an estimate for this class of receipts. Though basically sensible, much approximation is involved in these methods, with the consequent possibility of error. For freight and parcels traffic, data is available from ordinary working records.

Having thus estimated total receipts earned by the line, there is then the problem of estimating what part of those receipts will be lost in the short run to the railway system as a whole when the rail services in question are withdrawn. In general, the proportion lost is greatest for the first category and least for the third. This is illustrated by British Railways figures relating to passenger traffic on the St. Ives-Kettering line, where passenger services were withdrawn, and parts of the line closed completely, on June 15, 1959:

TABLE I
Annual Passenger Receipts and Estimated Loss, St. Ives-Kettering Line

	Receipts, £'000	Estimated loss of receipts, £'000	Estimated loss as a proportion, %
(a) Local	1.3	1.3	100
(b) Local/through	12.2	8.9	73
(c) Through/through	25.2	1.8	7
Total	38.7	12.0	31

¹ But when return tickets are purchased at stations on the line the value of both parts of such tickets is included in the analysis, and hence the corresponding incoming journeys are always taken into account.

The "receipts" column relates to mileage travelled on the line itself;¹ on withdrawal of the passenger services *all* these receipts are lost. The "estimated loss" column refers to the system taken as a whole. Some receipts elsewhere may also be lost after withdrawal, but, alternatively, some passengers may travel more extensively on the rest of the system; the *net* effect may be positive, neutral or negative. For receipts in the first category, unless there is a highly convenient alternative rail route between two or more of the stations on the line from which the service is to be withdrawn there would be no extra receipts elsewhere to compensate for the loss of local traffic. Similarly, in the second category one would expect increased receipts elsewhere only if at least two of the stations are junctions with the rest of the system. The estimate shown in Table I rests on the assumption that extra travelling on the rest of the system will cause a net increase in receipts for that part of the system of about £3,300 per annum (being the difference between the entries in the first and second columns). This type of estimate is based on a knowledge of the nature of alternative public transport, convenience of changing from bus to train, distances involved and so forth. In the third category the likelihood of passengers using an alternative rail route is higher: the table shows that a net increase in receipts of about £23,400 is expected for the rest of the system. In summary, the estimated (opportunity) loss of receipts to the system as a whole is frequently, but not invariably, less than the receipts on the line itself. The proportion lost depends upon local circumstances, the evaluation of which rests largely on personal judgment.

The short-run estimates just described exclude long-run factors on the demand side, notably the effect of car-ownership. But in the long run it seems reasonable to expect that the withdrawal of public-transport services will, by reducing the proportion of journeys which can be undertaken by such transport, encourage private individuals and firms to buy their own cars and trucks. Thus, because services are withdrawn from part of the rail system, receipts on the rest of the system are eventually likely to decline after any short-run rise, and the final level of receipts earned on that remaining part may well prove to be lower than the level obtaining on that part before the withdrawals take place.

III. Costs

In the past the railway companies did not usually cost individual services, even though to do so might have been possible in principle, though perhaps expensive in practice. After nationalisation, a Traffic Costing Service was set up; but only in the last few years, when there has been greater freedom to vary freight charges according to the costs involved, and when investment and disinvestment proposals under the 1955 modernisation

¹ Among the lines closed by British Railways it is unusual to find one where local traffic forms such a small proportion of the total.

plan have required evaluation, has British Railways been encouraged to discover more about the costs of individual units. Thus, the agreed scheme now requires that "the estimates of savings will be based as far as possible upon local conditions. Where the figures available relate to an entity larger than the branch line under consideration (*e.g.*, as regards coal consumption or repairs to locomotives) the estimates made will take to account the circumstances of the workings on the branch line concerned."¹ This requirement followed criticism made by the C.T.C.C. of the basis of the cost estimates presented at the Lewes-East Grinstead inquiry.² In these estimates broad, unqualified regional averages were applied to the costing of the small branch line concerned. Although these criticisms were justified, it must be remembered that in many instances the use of some form of average is inevitable. Take coal consumption as an example: where a locomotive hauls several different types of train during a single shift it is far too costly to measure how much coal has been consumed in the working of each type. In the Lewes-East Grinstead case (where the locomotives concerned did not work exclusively on that line) the coal-consumption figure used was based on an average for the whole of the Southern Region. However, the Traffic Costing Service has so developed in recent years that the averages now used relate to entities which are smaller and more relevant than the whole region. In some regions at least the procedure is to select for examination some locomotives which work exclusively on main-line expresses, some on nothing but cross-country stopping trains and so on. Coal consumption (per train mile, etc.) can be ascertained for each of these categories, and hence estimates of total coal consumption on any particular line can be built up from this basic data. Though this method still does not measure actual consumption and though differences in geography, traffic density, etc., will lead to inaccuracies, the new method is almost certainly more reliable than the old.³

In costing any service the first task is to ascertain what factors are used; these include train crews, station and signalling staff, permanent-way maintenance staff, rolling stock, fuel, buildings, bridges, tunnels, permanent way and a share of the central organisational staffs. Many of these factors (*e.g.*, station staff) are frequently used exclusively for the service in question, and hence their costs can be uniquely ascribed to that service. But some factors (*e.g.*, a motive-power depot) are used jointly by several services. In order to estimate the *total* costs of a single service, an allocation of joint costs is inevitable; however, when estimating the costs which could be avoided

¹ C.T.C.C., *op. cit.*, p. 16.

² See C.T.C.C., *Proposed Withdrawal of Train Services from the Lewes-East Grinstead Branch Railway*, February 1958, Cmnd. 360, subsequently referred to as the Lewes-East Grinstead report. Most of the calculations were made in 1953 for a previous hearing, but were not fundamentally changed for the 1957 inquiry.

³ The cost of locomotive repairs is another example. The regional average used in the Lewes-East Grinstead case is stated on p. 19 of the report of the inquiry, and described on pp. 12-13 of the *Minutes of Proceedings, First Day*. The Traffic Costing Service now measures the costs each month of individual motive-power depots, and so again an average for a smaller entity is now available.

by withdrawal of the service there are usually fewer allocation problems, since joint costs which are unaltered by the withdrawal do not enter into the calculations. For example, if a locomotive is used both on the service to be withdrawn and on other services, then to calculate avoidable costs, an allocation of direct maintenance costs will be required; on the other hand, if the costs of supervision at the motive-power depot will remain unaltered, then an allocation of these overhead costs is not required.

Both British Railways and the C.T.C.C. agree that avoidable cost, and not total cost, is the relevant concept.¹ Until the agreed scheme came into operation, however, the time period upon which the avoidable cost should be based had been subject to dispute. In 1951 the B.T.C. records that the term cost "as used in context with the traffic costings carried out by the Commission" means "the actual expenditures incurred, or to be incurred, by the Commission *in the long run* to maintain and operate the apparatus required for a given level of services and traffic."² Thus, in keeping with this approach, the cost calculations presented at the Lewes-East Grinstead inquiry included renewal charges for all the capital assets involved, even though some of these had many years of useful life still to come, and hence would not have needed replacement until many years after the inquiry. The C.T.C.C. were very critical of this approach,³ taking particular objection to the calculation of renewal and interest charges. These were dismissed as purely notional and the Committee argued that the Commission should base its case solely on "direct factual savings," *i.e.*, day-to-day expenses which would be saved immediately the line was closed. Thus while the Commission had taken a very long-term view, the Committee went to the other extreme and looked only at very short-run costs.

For non-specific assets, the railway accountants had used a straight-line depreciation method based on replacement cost, and this method has been carried over into the agreed scheme. But for specific assets there was considerable difference of opinion: the Committee objected to certain features of the sinking-fund method which had been used. In particular, the Committee could not accept that the annual payment into the sinking-fund was a cost which could be avoided by closing the line, its objections being based on several grounds:

(1) Though the method was consistent with British Railways' long-run approach, the Committee, from its short-run point of view, did not want to see included charges for renewals that would not be undertaken in the immediate future.

¹ As with all opportunity cost rules, the agreed scheme thus allows, in theory, the withdrawal of a "profitable" service, *i.e.*, a service where the *total* costs ascribable to the service are less than the revenue associated with the service; on the other hand, popular usage refers to the withdrawal of unprofitable or unremunerative services; in practice, it seems unlikely that the withdrawal of a profitable service would be considered.

² British Transport Commission, *Annual Report for 1951*, p. 71.

³ Lewes-East Grinstead Report, *op. cit.*, paras. 24-30 (our italics).

(2) The Committee criticised the patently careless way in which the technical lives of some of the assets had been calculated; in the case of many assets still in use the expired life to date was greater than the estimated life used in the sinking-fund calculations, but no adjustment had been made to the renewal charges.

(3) There was in fact no sinking fund, because the financial difficulties of the Commission prevented the establishment of such a fund; instead the Commission charge renewals to revenue, as and when they occur. The Committee could not accept a notional payment into a notional fund.¹

The agreed scheme is a compromise from the point of view of the time period considered; briefly, the cost saving to be taken into account is the opportunity cost relative to the next five years²—that is to say, the annual cost is defined as one-fifth of the actual expenditure which British Railways would expect to incur during the next five years' working of the line, including renewal expenditure on such specific assets as would actually need to be replaced during that period.

The related problem of charging interest on capital assets caused considerable confusion at the Lewes-East Grinstead inquiry largely because of disputes over accounting technicalities. The economic argument is that, according to the opportunity cost criterion, the interest charges on new capital expenditure (including renewal of assets) must be regarded as an avoidable cost; since the railway accountants were taking a very long-run view, it was legitimate to include interest charges on *all* the capital assets. It seems likely that this view was the basis of the arguments presented at the inquiry, but these were put forward in an obscure and inconsistent manner, and it was not made clear that the inclusion of interest charges and the use of the sinking-fund method were separate issues. The Committee was unable to separate the two issues, and in rejecting the use of the sinking-fund method it also entirely rejected the inclusion of any interest charges.³ As a consequence, interest charges are not allowed in the agreed scheme.

IV. CRITICISM OF THE AGREED SCHEME

As is immediately clear, the agreed scheme diverges from the opportunity cost criterion by its exclusion of interest charges on such new capital expenditure as is incurred during the time period considered.⁴

¹ Until the Committee voiced its criticisms the railway accountants were intending to use, in the future, the notional sinking-fund method for *all* capital assets; see *Minutes of Proceedings, Second Day*, p. 71.

² The scheme speaks of "a short period of years, normally five years," but in practice, the period considered seems invariably to be five years. This point is of considerable importance and is discussed below in detail.

³ The arguments for and against the sinking fund and the inclusion of interest charges appear at length in the *Minutes of Proceedings, First Day*, pp. 14-18, 46-7, *Second Day*, pp. 4-12, 17-19, 29, 45-8, 54-7, 71-4.

⁴ But it may be noted that for internal purposes British Railways continues to include interest among avoidable costs.

A second criticism concerns the treatment of renewal charges for specific assets. The St. Ives-Kettering case is used to illustrate the point. The booklet¹ issued to those who proposed to lodge objections at the inquiry held on April 14, 1959, by the East Anglian Transport Users' Consultative Committee included the table of estimated savings as laid down in the form of presentation of the agreed scheme; this is reproduced below:

TABLE II

Estimated Savings from Withdrawal of Services, St. Ives-Kettering Line

	Per annum, £.
(A) Immediate and short-term savings of working expenses (Savings in rolling-stock repairs have not been included)	33,000
(B) Provisions for renewal saved (Provisions for rolling-stock and plant have not been included)	57,400
<i>Deduct</i>	
(C) Estimated loss of gross receipts	13,900
(D) Estimated cost of providing alternative road services (cartage)	100
(E) Net estimated savings from closing: (A + B) - (C + D)	76,400

At the inquiry the deputy chairman of the Committee told an objector that of the annual saving of £57,400 on provision for renewals, £32,000 was the annual portion of £160,000 which would be required for the renewal of some bridges if the line were kept open for another five years.² Thus a specific asset, in this case a bridge with a technical life of perhaps 100 years, must be written off in five years, by virtue of the treatment prescribed in the agreed scheme. The fallacy in the analysis lies in the application of the opportunity-cost criterion to an unnecessarily restricted range of options. The appropriate question to ask is not whether the line will cover its avoidable costs if run for the next five years, but rather: "Is there any period of time for which the avoidable costs over the whole of that period can be covered by the estimated extra revenue?" If one or more such periods can be found, then the criterion would then dictate that the line should be kept open.

The general point may be illustrated by means of Fig. 1, which describes a hypothetical example having some of the characteristics of the St. Ives-Kettering case.

Time (in years elapsed from the present moment) is plotted along the horizontal axis, and discounted cumulative costs and receipts along the ordinate. The cost curve is based upon engineers' forecasts of how much expenditure would be necessary in each of the next n years if the line is to be operated in a given way.³ Each year's expenditure is discounted to the

¹ British Railways (E.R.), *Proposed Withdrawal of Train Services between St. Ives and Kettering* (February 1959).

² *Hunts Post* (Huntingdon), April 16, 1959, p. 13.

³ This rule is modified in one respect: for non-specific assets the sum to be included in the total of avoidable costs is the relevant fraction of replacement costs, in accordance with the straight-line depreciation method mentioned previously.

present, and cumulative sums for the first year, the first two years taken together and so on are then prepared. Estimated extra receipts are similarly analysed. The graph then represents the present values of opportunity cost and receipts for each of these future time spans. In drawing Fig. 1, a constant rate of revenue has been assumed, whereas the cost curve assumes a fairly steady rate of expenditure except for a large "lump" of investment about year x corresponding to the renewal of bridges

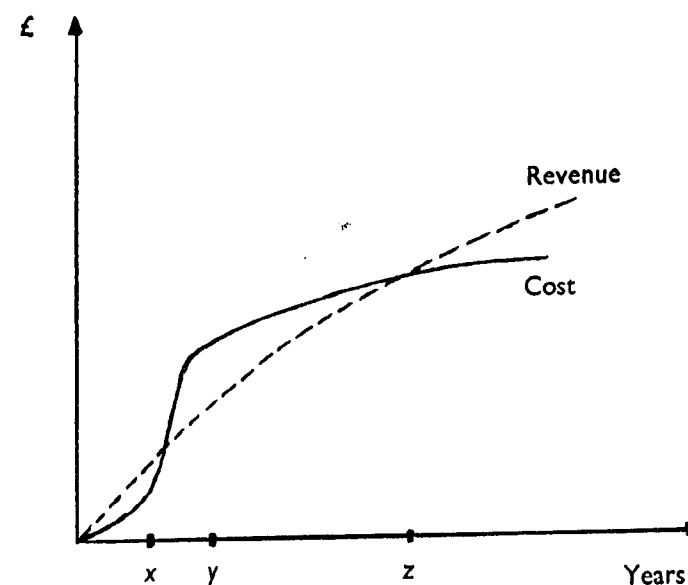


FIG. 1

in the St. Ives-Kettering case. The five-year period usually considered in the agreed scheme corresponds in the graph to a period such as the first y years, where a substantial lump of investment has been undertaken just before the end of the period. Running the line for exactly that period is unprofitable (*i.e.*, cumulative costs exceed cumulative revenue), *but* as the graph shows, there are other periods for which the line could be run profitably: either for a period of less than x years, in which case the lump of investment is not undertaken (the bridges are not renewed), or for a period of more than z years, in which case the investment is undertaken but is used for a fairly long period. This is no more than a formalisation of common sense: the business-man controlling a not very profitable business does not usually undertake major investment in non-transferable plant unless he expects to use the plant for a major part of its technical life.

Finally, the agreed scheme is restrictive in that each service is considered *separately*. The opportunity cost criterion is used only to measure the change in net revenue on closing one service where the comparison is only with the

status quo. But in areas with several unremunerative lines and some degree of duplication of services the interdependence of revenue should be recognised. A fuller opportunity cost analysis would seek to find out, for example, which of lines A and B should be closed in order to give the greater improvement in net revenue, on the assumption that at least one line should be kept open. Some clause requiring maximisation of net revenue would be necessary to guide the decision in such a case.

V. SUMMARY AND CONCLUSIONS

1. The principles used approximate to the opportunity cost concept.
2. An analysis of tickets is used in measuring total receipts; the estimate of receipts expected to be lost requires personal judgment.
3. Some use of averages is inevitable in estimating the costs avoided by the withdrawal of a single service. However, with the development of the Traffic Costing Service these averages are becoming more reliable.
4. There has been major disagreement between British Railways and the consultative committees over the choice of the time period upon which estimates should be based. The agreed scheme represents a compromise between the long-run views of British Railways and the short-run views of the C.T.C.C.

5. There are certain objections to the agreed scheme:

First, the choice of the time period upon which it is based is too restricted. The ruling that major replacement expenditure on long-lived assets should be wholly written off within the period is unsound. This is not a quantitatively unimportant objection; in the St. Ives-Kettering case the annual sum under this heading, £32,000, formed a large proportion of the estimated annual savings from withdrawal. A more satisfactory method of treating renewals is suggested.

Secondly, interest on new capital expenditure is excluded.

Thirdly, the interdependence between withdrawal proposals is not recognised.

6. Because so many of the services withdrawn have been very unremunerative, it does not necessarily follow from these objections that any mistaken decisions have been taken.

7. This paper has concentrated upon economic factors. It is recognised that in considering withdrawal proposals both British Railways and the consultative committees have also to take into account wider questions of social policy.

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INTERNATIONAL RESERVES AND LIQUIDITY¹

I. INTRODUCTORY

THE abrupt return to "non-resident convertibility"² by most Western European countries at the turn of 1958/59, and the doubts which have crept up about the ultimate strength of the dollar since, enhance rather than diminish the importance and economic-political actuality of the two documents reviewed in this paper. The first of these had been prepared by the staff of the International Monetary Fund, at the request of several member governments, for the meeting of the Fund at New Delhi in the autumn of 1958. It formed the basis of the discussion on the adequacy of international liquidity available at present, and led to the resolution instructing the Executive Directors to consider the increase in the Fund's quotas, an instruction which was carried out and forms part of the second document.³ Both thus achieved their purpose in the narrow sense of the word—the increase in the lending capacity of the two Bretton Woods institutions.

In the present review I shall try to demonstrate that self-imposed limitations have vitiated the attempt to offer a serious contribution to a debate of great importance on the monetary needs of the non-Soviet orbit, faced as it is with an increasingly effective Communist challenge. The problems discussed are far more complicated than they seem to believe, and the solution recommended and adopted does not offer a lasting basis for the steady growth of the non-Communist world.

II. BACK TO THE QUANTITY THEORY

The Staff Report of the I.M.F. does not provide a solid theoretical foundation for an evaluation of policy for international reserves. It is based on the double axiom that the supply of money has a direct and simple relationship to business activity and the balance of payments, and that reserves have a similar role in determining money supply. The following *obiter dictum* (p. 68) is typical:

"The link between the amount of reserves and the amount of domestic money has been weakened in all countries that have not made a stable fixed rate of exchange an overriding objective of monetary

¹ *International Reserves and Liquidity*. A Study by the Staff of the International Monetary Fund. Washington, D.C., 1958. *Proposals for increasing the Resources of the International Monetary Fund and the International Bank for Reconstruction and Development*. Cmd. 652, London, February 1959.

² In some countries, of which Germany is perhaps the most important, the degree of convertibility was greater. *De facto* all controls over the export of capital have been abandoned.

³ The second part concerns the increase in the borrowing powers of the International Bank simultaneously proposed and agreed upon.

policy. *An increase in the supply of domestic money may not lead to a loss of reserves if the exchange rate is allowed to depreciate*” (my italics).

This implies that international reserves and their maintenance are not merely ends in themselves but are also something which could by themselves (without some conscious policy decision involving outlay) have a direct and immediate influence on economic activity—“increased reserves failed to stimulate trade” (p. 25). “It is indeed questionable in retrospect whether any amount of reserves would have been large enough” (in 1931) to “stave off the troubles in the existing exchange structure” (p. 23).

The Keynesian analysis, which showed clearly that it is *outlay* and *not its monetary image* that matters, has been completely thrown overboard. Even odder seems the treatment of capital movements. It is implied that the need for reserves will depend on the “degree of efficiency of the prevailing international credit system” (p. 9), and “day-to-day disturbances, and even seasonal movements, of international payments need make no great demands upon reserves when credits of various kinds can be arranged.”

No doubt international capital movements and a well-working international credit system might, in certain circumstances, help to bridge gaps between imports and exports. But it is illegitimate to imply (pp. 2, 3, 6, 10) that the movements of international short- and long-term capital are necessarily of a “balancing” character.¹

The vital question is totally neglected, whether the need for reserves is determined not merely by the *size of foreign trade* (or rather international payments) but also by its *instability*.² The question is not discussed whether such instability could be dealt with more quickly and at less cost in terms of income foregone, by policies which embrace not merely “the realism of the existing pattern of exchange rates” and “the appropriateness of domestic and monetary fiscal policies” (p. 9), but the whole armoury of counter-measures, including quotas which have been tried with great success in countries such as Australia.

Few people who had lived through the last international liquidity crisis of 1929–34 will recognise their memories of those past events in the interpretation of history offered in this document (p. 23). It is not astonishing, therefore, that the analysis of the current situation is somewhat less than balanced. It is flatly asserted that the increase in the granting of private international credits (p. 27) has decreased the risk of foreign exchange “tensions.” The fact that the public sector has grown since before the War seems to be regarded as a *destabilising* factor, as it often makes countries’ economies “less flexible” (p. 28). One would have thought that the growth of the

¹ The Radcliffe Committee has accepted the view (§ 727), though they also admit that in an open system restrictive measures must become necessary to restore confidence in the currency (§§ 402 and 436).

² This is also true of Professor Triffin’s essay, however welcome his support for increased liquidity. Review of the Banca Nazionale del Lavoro 1959.

public sector (and welfare transfer payments), especially in America, and the consequent strength of the built-in stabilisers of budget surpluses and deficits, had made the monetary system safer, far more flexible and therefore had stabilised the economies. The fact that the 1953–54 and, again, the 1957–58 United States recession was rather quickly reversed and did not result in vast export surpluses is demonstrably connected with this development. Surely the Fund cannot prefer a greater flexibility—downwards.

Accordingly, a somewhat narrow view is taken of the functions of the Fund. “The financial assistance of the Fund is of course a short-term character, mainly intended to bridge the gap while the countries *themselves* [my italics] take whatever measures may be necessary to restore equilibrium.” Not a word is said about the assistance of the Fund being required for so long as a major creditor country suffers a deflationary bout. The implication is that the assistance must be used to give time to the *debtor* country to take restrictive measures and cut back ambitious development programmes, irrespective of what the *depressed creditor* may be doing in his turn. This must give a deflationary bias to the world economy.

So long as the United States were continuously fully employed there might have been some excuse for refusing to create additional international liquidity out of thin air, on the argument that it might merely fan the inflationary excess in the United States. But was there any justification for this policy in 1957–58? Are poor countries to cut their development expenditure because there is a recession in the United States or the United Kingdom? Will that not aggravate the recession in the fully developed areas? Will that further fall not create a cry for more “flexibility”? Where is this cumulative process to end? One wonders why, for instance, nothing is said of the so-called scarce currency clause, which was to have been the great safeguard against persistent creditors by enforcing reasonable creditor policies, and on the basis of which such eminent economists as Keynes and Harrod recommended the acceptance of the Bretton Woods Final Act.¹

The document is not clear on this point:

“There is now greater understanding of the conditions necessary for an improvement in the reserve position. For example, a recent statement by the Monetary Committee of the International Chamber of Commerce recommended that countries gradually reduce their debts to central banks, and thus strengthen not only their internal conditions but also their reserve holdings.”²

A combined deflationary action on the lines suggested by all countries would obviously not merely fail to strengthen anybody’s “internal condition” but would also lead to severe unemployment. If the process is ruthlessly pursued

¹ Significantly the Radcliffe Report completely repudiates these romantic claims (§ 690).

² Semantic philosophers might be tempted to use this passage as an examination question, asking how many tacit and inconsistent assumptions lurk in the latter part of the second sentence.

by *all*, even their foreign reserves cannot increase. The deflationary policy of any single country will, oligopolistically, be matched by countervailing efforts at deflation of others, all descending in a spiral without any change in their reserves.

The tantalising problem whether high investment and faster development might not in the longer run enable a balancing of international payments of weaker countries without import cuts, and on the basis of a steadily increasing standard of life, is not even considered.

This attitude necessarily aggravates the deflationary bias inherent in the Bretton Woods arrangements, and it is only slightly mitigated by the existence and activity of the Bank. The latter has certainly performed an important task in easing the flow of funds towards underdeveloped areas. But two factors stand out, both sobering to optimism. The rate of lending, while increasing, has yet to reach the rate of \$1 billion per annum. It remains less than 1% of world imports. The worsening of the terms of trade of primary producers by 2½% would wipe out the effect of this lending.¹ In actual fact these terms moved 7–8% against the primary producers between 1957 and 1958.² Thus the sort of policy advocated by the spokesmen of the International Monetary Fund is likely to harm the poorer countries more than any aid that is or can at the moment be contemplated.

Perhaps the most important conclusion of the Staff Report is the continuous fall³ recorded since 1948 in the rate of expansion of both international trade⁴ and manufacturing production.⁵ The Report complacently states:

“Past experience seems to show that periods of very rapid expansion are generally followed by periods of more moderate growth. It is of course impossible to forecast what the rate of growth will be in the years immediately ahead, but it would probably not be over-optimistic to retain the conventional ‘normal’ annual rate of about 3 per cent for the growth of world trade.”

Considering that the latter rate is less than half that achieved in the period 1948–56, when the reconstruction of war-damage in large parts of the non-Soviet world had far advanced, this view is indeed not “over-optimistic.” It is less than a half, probably nearer a third, of the rate achieved by the

¹ Cf. National Institute of Economic and Social Research, *Economic Review*, No. 1, January 1959, p. 15.

² This has at last been pointed out by the U.N. World Economic Survey for 1958, especially pp. 3–11. In the previous year the U.N. still seemed to be worried by world inflation.

³ Table 17, p. 70.

⁴ From 7.5% per annum in 1948–1956 to 5.4% between 1951 and 1957. Since 1957 world trade has fallen about 10% (International Financial Statistics, I.M.F., August 1959, pp. 22–3).

⁵ From 6.1% per annum in 1948–56 to 5% in 1951–57. Between 1957 and 1958 world industrial production fell 3%, and even in the first quarter of 1959, despite the American recovery, stood only fractionally higher than in 1957 (*Monthly Bulletin of Statistics*, U.N., August 1959, Special Table A, p. viii).

Soviet bloc, according to United States intelligence reports. Inasmuch as “past experience” is based on the absence of any coherent attempt to control cyclical fluctuations, this estimate of the future implies a dismal reflection by the staff of I.M.F. on the skill which is likely to be evinced in the management of the international economic destinies of the non-Soviet orbit.

The Report fails to discuss these further implications of its own analysis in terms of loss of growth of output or equality. The implication is that monetary policy not merely works but works with great ease and subtlety—and achieves as good results as can be expected. The book-keeping identity between the foreign balance and the difference between domestic output and national expenditure is (as seems to be the fashion these days) used in a schedule-sense to demonstrate that cuts in home outlay, through monetary policy alone, will optimally and smoothly readjust the balance of payments.¹

The Report seems to show conclusively that most governments and central banks “tried to achieve ratios” between imports and reserves “in the sense that if reserves rose beyond some such level, they saw fit to adopt a more expansionist policy” (p. 48). They do not seem to realise that this demands arrangements for a continuous supplementation of the increase in international liquidity if this (depending mainly on the increase in monetary gold) falls short of the desired rate of expansion of production and trade. But there is no discussion of such policy aims and, after a lengthy statistical exercise, which aims at showing that the rate of increase in monetary reserves need not be as high as that of the (rather modest) estimate of economic growth of the free world, the Report comes to the conclusion: ² “It is doubtful whether, in the circumstances of the world today, with world trade greatly expanded in volume and value, the Fund’s resources are sufficient to enable it fully to perform its duties under the Articles of Agreement.” On this basis the Executive Directors recommended a 50% increase in quotas.³ This was accepted and carried out.

III. AN ECONOMIC THEORY OF RESERVE HOLDING

Judgment on the adequacy of international reserves will depend on the aims of economic policy and the role which these reserves can play in the execution of that policy in relation to other means of policy.

(a) The policy followed by the (dominant) members of an open system, their willingness and ability to limit surpluses and deficits on international payments, the rapidity with which single countries can, under the prevalent rules of the game, legitimately take steps directly to limit the consequences of a loss of balance, these are some of the factors which will decide on the adequacy of monetary reserves. *The need for liquidity is a combined function*

¹ Cf. Sir Robert Hall (*Economic Journal*, December 1959, p. 651).

² *Ibid.*, p. 99.

³ *Ibid.*, p. 16.

of the size of likely balances, i.e., of the volume of international payments and the magnitude and duration of their instability. Fundamentally this is determined by the policy framework (in particular the range of "admissible" means of readjustment) and the ends of policy, especially how much unemployment and slowing down of growth countries will tolerate.

(b) It should be noted, moreover, that a very large proportion of total trade and payments is concentrated into a few major powers. The number of these effectively independent units is further reduced by groupings (often regional and sometimes—as was the case with the Sterling Area until convertibility was introduced—backed by explicit institutional arrangements) based from this point of view on a key-banking centre and key-currency.¹ The more complementary the regional grouping, the freer it is in its choice of policy or the less intent to achieve certain policy aims not shared by the rest of the world, the smaller its need for reserves. Shared policy goals, whatever their nature, whether avoidance of unemployment or of gold losses, will in any case reduce this need for the world as a whole. Thus the assumption of the Staff Report that the following of "sound" policies all round reduces the need for reserves is accurate. It amounts to the basic assumption that countries will not attempt to maintain employment if some powerful ones refuse to do so.

If, on the other hand, full employment is a universally declared policy, and Governments are able and willing to intervene promptly in case of a deflationary or inflationary shock by all appropriate means, including controls and fiscal policy, the minimum safe levels of reserves will be far smaller than in a system in which prolonged unemployment is tolerated (or even induced, in order to ensure price stability) in dominant countries while others try to avoid competitive deflationary policies. A system which freely permits capital movements, even if they are of a speculative nature, will, under modern conditions, require far higher reserves than a system where speculative capital movements are severely discouraged.² It is the volume of *payments* and its instability, and not merely that of *visible trade*, which is the rational determinant of reserve requirements.

The relationship of the member countries of the world economy to one another is therefore one of oligopoly. Countries will trim their behaviour to one another. The discouraging feature of this relationship is that, so long as

¹ Economically the United States itself is a regional (rather than national) unit, whose high complementarity, which automatically reduces dependence on foreign supplies, is further backed by tariff and quota regulation.

² This has been accepted by the Bretton Woods Conference which (Art. VI. Sec. 2/3) prohibited the use of borrowing power at the Fund to sustain capital exports. The I.M.F. seems to regard all capital movements as "balancing" and does not discuss the need to encourage the application of its own charter. The spirit of the charter contrasts sharply with the attitude of the Bank of England as characterised by one of its ex-Directors, Mr. Siepmann (letter to *The Times*, August 31, 1959). This regards control of capital movements as "futile and mischievous" or worse. The Radcliffe Committee (par. 728) is sceptical of the effectiveness of control, but did not discuss this (possibly dominant) reason for its failure in Britain. It nevertheless advocates its retention.

international reserves are scarce, behaviour which will induce gains of gold will be at a premium, because severe losses of gold must induce others to follow suit in such policies (the recent behaviour of European countries when the United States was embarrassed by gold losses is an excellent example). Thus scarcity of reserves is likely to aggravate itself; and uncertainty about strong countries' monetary strategy would have the same result. Safety first would counsel deflation.

There is a further reason why it is only too likely that the system will have a bias against full growth and employment and in favour of avoiding gold losses at whatever cost in terms of expansion. Under modern conditions¹ adherence to the "classic" rules which demand symmetrical expansion as well as contraction might seem incompatible with domestic stability, especially price stability.² If the problem of domestic inflation cannot be solved by policies not impinging on the balance of payments (by their employment effects), a balanced functioning of the world payments system will not prove possible. Any increase in reserves will then represent a deflationary impact abroad because it originates in a cut in demand.³

(c) The acquisition of international reserves by any one country as a result of export surpluses or borrowing represents a real sacrifice in terms of forgoing investment (or for that matter consumption). This sacrifice can be justified by using them to pay for imports only if it enables the holder to increase over time the growth of its economic activity and investment, despite disturbances in its balance of international payments, in comparison to the level which would have been possible without such reserves. Inasmuch as the initial level of investment would be higher if export surpluses were not used to accumulate reserves, this means that the reserves enable the avoiding of a more than proportional toll over time as a result of these disturbances and the restrictions which they make inevitable. These disturbances can originate either abroad, i.e., a fall in the demand for exports (or a flight of capital), or internally, e.g., through crop failures. "Free" reserves are therefore one of the means by which the necessity of interrupting the growth of the economy might be obviated and optimum growth over time might be secured.⁴ Only by fulfilling this role can the sacrifice incurred by keeping resources uninvested be justified. It should be noted that the use of reserves is a once for all gain. Only if the consequential increase in

¹ This was the case already in the 1920s. When Mr. Montagu Norman persuaded Governor Strong in 1927 (Sir H. Clay, *Lord Norman* (London, 1957), p. 237) to lower the discount rate in order to ease London's difficulties the drift towards the stock market crash of 1929 started.

² Cf. *Oxford Economic Papers*, June 1958.

³ This is especially true if one of the international banking centres whose liabilities constitute the reserve of other countries were to start trying to "increase its liquidity" by "repaying liabilities." The thoughtless advocacy of increased liquidity for London has been one of the danger points in the last recession. The warning of the Radcliffe Committee (par. 663) against thoughtless forcing of repayments is welcome.

⁴ An alternative would be to hold reserve productive capacity or stocks of commodities.

national income results in an increase in investment would it have continuing beneficial effects.

The forgoing of the increase in the level of investment implied in a cumulative increase in the reserves reduces the potential maximum rate of growth. If an increase of the rate of growth enhances the possibility of accelerating the increase of income without imperilling the balance of payments (and enables the country, eventually, to acquire reserves without slowing down growth) the accumulation of reserves is not justified. It should be noted that policy measures (*e.g.*, exchange or import control) which obviate cuts in investment in case of balance-of-payments difficulties would reduce the rational need for reserves.

Borrowing could be the other alternative. The choice between borrowing and reserve holding will depend on the terms at which the former can be procured¹ in comparison to the loss of real income due to the holding of reserves (which might themselves yield some income).

We might conclude:

(i) The poorer the country, the smaller its capital supply, the greater probably the real sacrifice implied in the holding of reserves in terms of the potential income forgone.

(ii) This sacrifice by poorer countries might be reduced by keeping their reserves in freely marketable, income-earning assets,² though the maximum rate of income earned in this way must be well below the increase in domestic output and income forgone.

(iii) Poor countries will probably have greater need for holding reserves than richer ones, and this for two reasons. On the one hand, the instability of primary products markets and of harvests is notorious, and they mostly depend on a few products of this type, which increases their risk. On the other hand, their capacity to obtain credits on reasonable terms is much less than that of richer countries, unless purposive international institutional arrangements are made.

(iv) The limitations on the choice of policy (*e.g.*, the prohibition of direct controls over imports and exports) imposes disproportionate burdens on poor countries. Their acceptance of such burdens is rational only if international arrangements are made to offset this burden by special grants or credit arrangements.

None of these points have been considered by the Staff Report.

¹ Thus on the character of international financial organisations.

² This is the justification, from the "lending," colonial, territories' point of view, of the British colonial currency and banking system. Unfortunately the investment policy of the Crown Agents for the Colonies (latterly for Overseas Territories) was so unthinkingly mechanical that the dear money caused considerable capital losses to these relatively poor territories. The emotional reaction to this admitted mismanagement might well be a liquidation of the sterling reserve system (the number of new "Commonwealth countries" accumulating gold reserves is steadily increasing). This, as we shall see, inevitably imposes a strain on the world reserve situation.

(d) If reserves are kept in assets of another country total international liquidity is increased, as the accumulation of gold exchange is the alternative of acquiring gold. This introduces a further complication because the acquisition of these assets (instead of gold) has a (relatively) inflationary impact, their repayment a deflationary impact. If the former happened in a situation of all-round full employment, and if the financial centre disregarded in its policy making the increase of its liabilities, the process might facilitate general inflation. This danger has been much emphasised. Less attention was paid to post-war¹ waves of liquidation of gold exchange reserves. This happened at almost regular two-yearly intervals in the case of Britain, and contributed much to the severity of the balance-of-payments crises which caused interruptions of expansion in this country. There has also been at times some liquidation of dollar balances.² If this process were to gather momentum it might well result in a general deflationary pressure.³

(e) An overall shortage of liquidity will make itself felt by simultaneous pressures on the reserve position of a number of countries while no major country deems it advisable to permit the loss of gold reserves in accordance with the "classic" rules of the gold standard.⁴

This might force deflation on a number of others to prevent their losing gold. An oligopolistic struggle might arise: attempts at increasing reserves would cancel each other. The reserve position of individual countries would not improve. But the general deflationary pressures would leave all worse off in terms of increased unemployment and fallen national incomes. The costless provision of *additional* reserves, *e.g.*, by increases in the price of gold or the creation of additional internationally accepted means of payment, would then be the proper response, which should be contrasted with efforts of single countries to raise their reserves by attempts at redistributing *existing* reserves. On the other hand, no amount of additional reserve can be "sufficient" if the losing countries continue policies which lead to deficits in the balance of payments.

(f) If the rate of increase in international liquidity permits the achievement of full employment any further increase of reserves must be sterilised to avoid inflation. At this point some rules of discipline will have to be evolved stabilising the rate of investment and consumption in the poorer

¹ And of course in the period after 1929. Indeed, the severity of that depression can, to a considerable extent, be explained by the financial crisis which began in 1931 and finally disrupted even the United States banking system and currency.

² Since 1956 the more rapid expansion of *exchange* as contrasted with *gold* reserves has come to an end. Total world gold reserves have increased by almost \$2 billion between 1956 and 1959, and the gold reserves outside the United States at the end of 1956 by almost \$3½ billion. Official foreign-exchange holdings, however, have been slightly drawn down from \$17.015 to \$16.540 billion at the end of 1957. This was mainly due to a liquidation of sterling liabilities, but balances in America have also been reduced by almost \$300 million.

³ Cf. the United States Secretary of the Treasury's declaration to the 1959 meeting of the Governors of the Bretton Woods institutions as reported in *The Economist*, October 3, 1959, p. 63.

⁴ This is exemplified by the perverse reaction in Europe to United States gold losses. Cf. below.

areas of the world. Inasmuch as these areas will have to rely more and more on stand-by credits for meeting exceptional strains (having used their low-yielding assets to speed up development), it should not be impossible to maintain such discipline.

(g) The holding of "own" reserves (in contrast to stand-by credits) might be confined to richer countries. Their redistribution between "richer countries" through international lending operations, and from poorer to richer countries through permission to use reserves for an increase in investment, might be used to speed up development in poor areas and concentrate burdensome reserves in the hands of rich and, possibly, of middle-class countries, which can afford them. Thus an international co-operative reform of reserve policy would have contributed to the equalisation of the rate of investment and growth,¹ while minimising the overall need for reserve-holding.

IV. THE ELEMENTS OF A SOLUTION

A satisfactory solution of the problem of international reserves must, in my opinion, be able to provide the basis of stable and rapid growth in the non-Soviet orbit. It must purposefully eliminate purely financial obstacles in the way of continued growth.

It should be noted that such a solution is intimately bound up with the diagnosis of the cause of inflation. No Government will, or can afford to, tolerate the emergence of a strong upward trend in prices. This is still automatically identified with the existence of excess demand. It follows that inflation is fought mainly, if not exclusively, by restrictive monetary policies. The experience of the 1957/58 recession, when the rise in manufactured prices continued despite large unemployment, has been completely disregarded. This failure of diagnosis has made rational and balanced international economic policy impossible in the non-Soviet orbit. Large and persistent creditor countries (such as Germany) may well refuse to use the increase in their reserves because of the fear of aggravating the international rise in prices. Thus deficit countries must redouble their effort at restriction. The oligopolistic game described in the previous section will then become unavoidable. Good international behaviour demands that the problem of securing stable prices—a perfectly legitimate and politically vital policy goal—should be secured without increasing the unbalance in international payments through one-sided deflationary action. A rational solution should therefore include:

- (i) a mechanism by which internationally acceptable means of payments (*i.e.*, liquidity) can be created, when necessary, sufficient to

¹ These problems were treated exhaustively in two publications of the Oxford University Institute of Statistics: *New Plans for International Trade* (M. Kalecki, E. F. Schumacher and T. Balogh, Oxford, 1943) and *The Economics of Full Employment* (F. A. Burchardt and others, Oxford, 1944).

obviate the contingency of a general deflationary pressure merely on account of their scarcity relative to the demand of monetary authorities; while the emergence of such a shortage is not yet a proven fact, the conjuncture of American fears of further gold losses, at a time when they are far from fully employed, with a situation in which no other country feels sufficiently comfortable to expand vigorously, suggests that the time might not be too distant when such shortage will be obvious;

(ii) rules by which the need for such additional international liquidity could be minimised, or at least kept within limits; the creation of vast amounts of cash (*e.g.*, to counteract a persistent deflationary pressure) itself might result in a loss of confidence and painful attempts to liquidate the system.

I shall deal with these two aspects of the problem one by one, though the acuteness of the first problem will be determined by the success with which the second is tackled. As we have seen, the problem of liquidity is a question partly of the relation of "stocks" (international reserves) to "flows" (the balances arising out of international payments) which will be determined by policy and partly (but in some sense more acutely) by the consistency of the "stock" itself. It might be as well to get this latter problem out of the way.

(a) *The Effectiveness of Reserves*

The Geneva Conference in 1922 advocated: (i) the restriction of the circulation of gold; (ii) the use of the gold exchange standard; and (iii) a redistribution of gold reserves; these were to be the main ways in which the "effectiveness" of insufficient gold reserves (so to speak their velocity of circulation) could be increased.

(i) The hoarding of gold has been increasing since the War, and so has the industrial demand. While the French stabilisation and the return to "normality" in Europe might reduce the former, this is not a factor which ought to be regarded too optimistically. It is not likely that the addition to the monetary gold stock will be at a rate higher than \$700 million per annum. This is equivalent to less than 1½% of total world reserves (including foreign exchange) and about 2% of gold reserves.¹ This rate is rather low, especially if (as seems likely) policy trend towards greater "liberalisation" continues. The latter trend inevitably results in larger potential

¹ The argument that it represents a much larger portion of gold reserves outside the United States (about 3% as at the beginning of 1959) does not mean much. The reaction of the United States Government to recent gold losses shows that the point at which defensive action is going to be taken has been reached. The "free gold" (*i.e.*, gold available for balance-of-payments purposes and not absorbed by reserve requirements accommodated only \$8.2 billion out of a total of \$20.6 billion reserve at the end of 1958). The free gold was just over \$8 billion. The short-term liabilities of the United States amounted to \$14.6 billion and foreign portfolio investment in the United States (which are liable to liquidation in bull markets) to \$9 billion. Of the short-term debt \$8.7 billion represented the holdings of foreign governments and central banks. Thus the possibility of embarrassment is not inconsiderable unless international co-operation is forthcoming.

balances, *i.e.*, increased need for reserves because of the rather slow effectiveness of monetary measures (as against direct controls) in readjusting trade and payments; and the likelihood of increasingly acute speculative capital movements.

(ii) The transfer of gold reserves from the United States to the "middle-income-class" countries (mainly Europe) has increased the "effectiveness" of gold-holding. In these countries "free gold" is a larger portion of the total reserve. But (as seems certain)¹ this process of redistributing world reserves has exhausted the limit of comfort and tolerance of losses in the United States. Thus, no further gains can be expected from this source.

(iii) The trend in gold-exchange holdings has shown marked instability since 1956. Between the end of 1957 and June 1958 almost \$0.7 billion liabilities were liquidated. Most of this was due to the penury in primary producing countries; there is no evidence of liquidation of balances due to nervousness about the dollar.² A number of central banks, however, might have decided as a matter of policy to hold a larger portion of their reserves in gold. Sterling liabilities have been at times (*i.e.*, 1957) under violent pressures. Their recent recovery need not be more stable than in 1950.

It would be foolish to think that an increase in gold exchange balances will contribute significantly to the problem of international reserves. Both in the case of England and in the case of America the very accumulation of exchange reserves by other countries has been regarded as a growing national weakness instead of being viewed as a vital contribution to maintaining the liquidity of the world economy as a whole. Indeed, it is all but certain that more formal arrangements would be needed if the fact that international liquidity is provided by liabilities of the United States or the United Kingdom is to be prevented from increasing instability. The liquidation of gold exchange reserves, as at the end of the 1920s, took place at the most awkward moment from the point of view of the domestic monetary policy of the "banking centres" and led to the prolongation and aggravation of the depression.

To obviate any repetition, rules for good neighbourly conduct between treasuries and central banks should be worked out. This might take the form of an agreement between the members of I.M.F. not to demand the conversion of existing foreign-exchange balances into either gold or other currencies (*e.g.*, from sterling to dollars) unless it is needed for payment of genuine current transactions and non-speculative lending operations. Countries which have no exchange control even on capital movements would have to pledge themselves to discourage such transfers between the currencies of member countries, and at any rate refrain themselves from such transactions in respect to their own holdings. There is acute prejudice

¹ See above.

² Unofficial holdings rose. So much for the claim that foreigners need be "reassured" by deflationary measures of the U.S. dollar!

against such undertaking for fear of "exchange losses." But such losses are unlikely unless a large-scale conversion of foreign-exchange liabilities is attempted. A gold clause might obviate unjustified fears, and thus prevent its having to be implemented.

On the whole, the elaboration and acceptance of such rules of good-neighbourly conduct seems (at any rate in the short run) more conducive to preventing international economic difficulties arising purely out of financial reasons than more ambitious plans—put forward by Professor Triffin—providing for the absorption of existing foreign-exchange assets (and liabilities) by the International Monetary Fund and their liquidation.¹ The liberal attitude of the United States Government in permitting the loss of some \$4 billion in two years without severe restrictive action, which enabled the replenishment of European reserves through an improvement in the balance of payments, contrasts painfully with the sluggishness with which the Western European countries responded to the need to ease the problem of the United States. The strengthening of the Common Market will further increase this trend. This emphasises the need for more conscious institutional safeguards internationally.

(b) *Reducing the Need for Reserves*

The need for reserves would be reduced if a mechanism existed which would impart alternating bias to international adjustments so as to preserve or restore the balance in international payments at a high and stable level of employment. The bias would have to alternate according to whether employment was rising or falling.

At, or nearing, full employment it would be as necessary to exert an increasing deflationary pressure as it is to ensure that adjustments are made mainly by creditor countries expanding demand and economic activity, so long as there is unemployed or under-employed productive capacity. We have already pointed out that this problem is complicated by the fact that prices might be rising irrespective of the fluctuations in employment. Neither the Staff Report nor the Report of the Executive Directors² recognises this double requirement because of their failure to diagnose correctly the process of price inflation.

(i) *Automatic Credits: Regional or Universal Clearing*

One way to reduce the need for liquidity, and at the same time to apply some pressure on persistent creditors (to which debtors automatically are subject), is by obliging them to provide credit to carry the part or the whole of their surplus.³ In this way the creditor will share in the inconvenience of

¹ The liquidation of these assets would be undertaken safely only if the resultant increase in the liabilities of the I.M.F. could be counted as part of the reserves of member countries. Cf. below.

² *Op. cit.*, Cmnd. 612.

³ This is, in my opinion, a more illuminating way of regarding clearing arrangements than defining them as increasing international liquidity.

the unbalance, and will, within reason, *i.e.*, within the limits imposed by the general world economic position, have to contribute to the readjustment—thus he will have to promote an increase in income, demand and imports to “clear” the credit balance. This method has severe limitations. It cannot offset a persistent deflationary bias in the world economy, and it might promote inflation when all participants are fully employed.

Such clearing systems were not difficult to organise on a bilateral or (like E.P.U.) multilateral basis, so long as convertibility was limited and payments had to be made through Central Banks. They were restricted to regions within which differential liberalisation of trade and payments had been promoted and did not extend to transactions with countries beyond the regions. These were dealt with on a different (though not necessarily bilateral) basis.

The introduction of full convertibility has made the task more difficult. The consequences of the rise of the so-called free market in “transferable Sterling” in Zürich and New York exemplify these difficulties,¹ which stem from the possibility that debtors within the region might be creditors outside, or vice versa. So long as *all* countries in the region are in balance with the *outside* countries and this balance is not the consequence of special discriminatory restrictions, no special problem arises. But if the region as such, or important parts, are in disequilibrium with the rest of the world, convertibility and non-discrimination cause a conflict of interest. Direct settlement, short-circuiting central banks, becomes advantageous for the creditors within the region; the currency of the ultimate largest outside creditors will be desired by all. Thus the need for *universally* acceptable liquidity increases. The automatic credit mechanism between members can no longer function at the moment it is most required, or rather it will force the creditors within the region to finance the deficits of the debtors with outside countries. At that point the interest of the creditors in the clearing could be maintained only if they were able to obtain discriminating favourable conditions for their exports within the region. It would otherwise suit them more to use their surpluses in the most advantageous market. Thus a regional clearing would not really work in a regime of full convertibility—unless it involved reciprocal commercial discrimination in favour of the participants’ exports. The proposal of creating a quasi-multilateral clearing in Europe without retracing the liberalisation in convertibility and commercial policy will founder on this obstacle.

It would, of course, be possible to provide for compulsory deposits by creditor countries,² and thus for forced multilateral credits. As soon as there is complete convertibility, however, regional creditors cannot possibly be

¹ Cf. my paper in *The Banker*, 1954, and Sir Donald MacDougall’s evidence to the Radcliffe Committee. The Germans, in particular, made full use of this possibility of reducing their credit balances in E.P.U. while receiving 100% gold payment.

² This has been suggested by Professor Triffin (*op. cit.*).

required to adopt an expansionist policy—for their balance with the countries outside the clearing agreement might then deteriorate and the regional clearing does not help them to meet their obligations. In a multilateral world, as the Americans now have an opportunity of seeing for themselves, the most sluggish major creditor (at present the Common Market countries) determines the basic monetary situation. Without discrimination in favour of each other’s products, self-interest drives all members of a region towards complete convertibility and the by-passing of clearings, which would reduce capability of purchasing in the cheaper market.

In a universally convertible world the answer might be sought in a *universal* compulsory clearing. The aim of forcing the central banks of the creditors to do part of the “readjustment” by providing automatic credits might be achieved by obliging the central banks of the “strong” currency countries to undertake all supporting operations of the “weaker” currencies in the “free” markets, and by providing that only part of these balances would have to be repurchased by the debtor countries against gold (or equivalent convertible currency). Credit would be provided automatically to sustain trade and payments and reduce the extent of the immediate readjustment, permitting the creditor country to expand, rather than the deficit country to contract. While this system is advantageous in a world threatened with a secular shortage of international liquidity, it would hamper efforts to impose a brake on expansion once full employment has been attained. If the present system is markedly deflationist in its bias this would be one-sidedly expansionist.

(ii) *Purposive Creation of Equilibrating Demand*

It seems unlikely that such a universal clearing agreement would be more easily negotiable than a more purposive and, therefore, more satisfactory arrangement.

The most logical and effective of such schemes was evolved at the Oxford Institute of Statistics during the War,¹ and completely lost sight of. It merits resuscitation. It provides for the automatic use of persistent surpluses of “mature” creditor countries whose creditor status is due to their less than full employment, for loans on a medium-long-term basis to be used for the acceleration of the economic development of “underdeveloped” countries. These loans would be additional to loans and grants provided for on a non-cyclical basis to promote development in order to reduce international inequality. The demand would be canalised towards the “mature” deficit countries, *i.e.*, countries in balance-of-payments difficulties to the benefit of those underdeveloped countries which need them most.

In times of general full employment the mechanism would necessitate restrictions on the part of the fully employed mature deficit countries. At

¹ *New Plans for International Trade*, *op. cit.*

the same time the extent of this readjustment would be limited to the minimum.

(c) *Creating Additional Liquidity*

It is unlikely that any of these "balancing" schemes could become fully operative for a considerable time or that they would work so perfectly as to obviate all increase in the demand for international liquidity beyond likely availabilities. The possibility of a scarcity of international liquidity has been accepted, as we have seen, even by the Staff and executive Directors of the I.M.F. Their recommendation was to (a) increase the quotas of the I.M.F. and the capital available to I.B.D.R. I shall try to show that this scheme is unlikely to fulfil the requirements. Alternative steps to increase liquidity would be: (b) an increase in the price of gold, and (c) the enlargement of the conceptions of Bretton Woods. Of the two, the latter is by far more preferable because it is more flexible.

(i) *The Increase of I.M.F. Quotas.* The raising by 50% of I.M.F. quotas was recommended last year and carried through as a full solution of the quest after increased international liquidity. It can undoubtedly palliate a really grave liquidity crisis, and is therefore welcome. It is hardly likely, however, that it will prove an effective solution for preventing less-spectacular long-run deflationary pressures, especially if the Staff Report is right in stating that most countries wish to preserve a stable ratio of reserves to imports. In any case, quotas in the I.M.F. do not formally form part of the reserves of the country, and their enlargement, therefore, does not represent an automatic increase in reserves. They can only be used with the consent of the Fund, and consent has not hitherto been given unconditionally. Inasmuch as even that part of the quota which has to be paid in gold is not absolutely at the disposal of the country, one can argue that the increase in quotas actually diminishes the fully available reserves of member countries; they certainly diminish the reserves visibly available. The Fund in 1959 rightly undertook open-market operations, *i.e.*, bought United States Government securities to offset the diminution of the United States gold reserves due to the payment by the U.S. of the increase in its quota in a period in which the U.S. were already losing gold, thereby acknowledging the fact that an increase in I.M.F. quotas is not equivalent to an increase in world reserves. While this has been a most interesting and hopeful precedent, it does not solve the problem which must be solved, *i.e.*, the securing of a net increase of visible reserves parallel with the expansion of production, trade and payments.

Now it is impossible to establish an internal credit mechanism without giving some discretion to its management. And these discretionary powers must include authority to impose conditions to would-be borrowers to prevent inflationary excesses. The criticism which can be levelled against the Bretton Woods Act, and even more against its interpretation by the manage-

ment of I.M.F., is that it is entirely one-sided, imposing readjustment on the debtors only, irrespective of the general world situation. The use of quotas was made conditional on the imposition of stringent general deflationary policies going far beyond the original (and already one-sided) obligation to pay an increasingly penal rate of interest and the pressure for early repayments. Thus the utilisation of these quotas will in all probability result in restrictive action, even if the world position cries out for expansion. It is completely different from countries using their own gold reserves. There is a further important drawback. I.M.F. quotas will not increase automatically with the increase in the need for liquid reserves, *i.e.*, with the expansion of output, world trade and payment. Their expansion must be specially arranged. This will take time. Moreover, *in each subsequent period the need for borrowing will increase because the ratio of "own" reserves to payments will decrease if the rate of growth of gold reserves remains below that of output and payments.* Recovery will, therefore, be increasingly burdened with repayments. A deflationary bias will be imparted to the world economy. However helpful it might be to stem exceptional crises, the increase in the I.M.F. quotas will not safeguard stable expansion.

(ii) *An Increase in Gold Prices.* An increase in gold prices could give a full (if inordinately expensive) answer to the problem of increasing international liquidity and increasing demand. It has consistently been advocated by Sir Roy Harrod, apart from interested parties. A doubling of the price, for instance, would add some \$40,000 to gold reserves and substantially help to restore the "liquidity" of the two great "banking centres" and thus reduce the risk of a wholesale liquidation of sterling or dollar balances, a risk which conjures up the picture of a liquidity crisis. An increase of the gold price would also accelerate the expansion of the volume of gold production (apart from the increase in its unit-value); it might well reduce the tendency to hoarding which has been estimated at about \$1 billion in the last three years alone.¹ The yearly addition to monetary gold might then increase towards \$3 billion, thus sensibly diminishing the gap between the expansion of reserves and trade or output. It would increase the purchasing power of the producing areas and thus tend to maintain world demand.

The arguments against an increase in gold prices are so well known that they need not be repeated at length. It would benefit mainly South Africa and the Soviet, in no way high-priority claimants for extraordinary international largesse. Moreover, the rate of increase of reserves would not be adequate unless a quite exceptional amount of resources is devoted to gold-mining—surely a rather wasteful method. Finally, in the once-for-all gain due to the revaluation of existing reserves, those countries most in need would benefit least, because though the distribution of gold reserves has improved, it was the rather rich European countries which benefited. In any case no Republican administration in the United States would countenance

¹ B.I.S. Report, *op. cit.*, p. 117.

t for a moment. It has been, and must remain, ruled out in practical politics.

d) *The Enlargement of the Bretton Woods Conception*

We can now draw together these various suggestions into what I think might be considered a consistent scheme. In its totality such a scheme would seem quite unattainable at the moment politically. It has, however, the great advantage that it can be achieved progressively. Such a solution should ideally combine the "liquidity approach" (*i.e.*, the capacity to create new liquidity) with the "equilibrium approach" (*i.e.*, arrangement to reduce the need for liquidity) in an organic way without mixing it in the sense that *one* institution would be made responsible for these two tasks, which might be incompatible. One single authority should be responsible for *short-term* aspects of the problem of maintaining balance between countries (including, however, that of imposing on persistent creditor countries the obligation to take action to help in eliminating the surplus). A second should be in charge of *long-term* measures mitigating the tendency to unbalance while co-ordinating these with the endeavour, now accepted by all highly developed areas, towards diminishing international economic inequality, *i.e.*, channelling capital and technical and administrative ability towards the underdeveloped areas.

It should be noted that this dichotomy of tasks has been recognised by the leading spirits of the Bretton Woods Conference in the creation of two institutions. It is unfortunate that at no time does there seem to have been a co-ordination between them to minimise deficits caused by recessions in economic activity in leading countries. But, as we have seen, the post-war obsession with inflation was overruling a rational approach to the problem.

(i) *Towards an International Central Bank*

The transformation of the I.M.F. into an international central bank would be the least costly and most effective way of dealing with the problem. This would necessitate a reshaping of the Charter on an essential point. The present system of quotas treats borrowing as "sales" to the Fund of the borrowing country's "weak" currency against the purchase from the Fund of "strong" currency. Thus there is no relationship between the changes in the reserves of a country and its position at the Fund. In fact, the *increase* of a country's "quotas" (*i.e.*, in its borrowing capacity) results, as we have seen, in a *fall* in its visible reserves because of the gold payment of 25% of the quota, and the existence of stand-by arrangements does not visibly increase the liquidity of the Central Bank. This might be regarded as basically unimportant and merely a question of book-keeping. Unfortunately confidence depends on such irrational factors, and the present arrangements are

symbolical of the incapacity of the Fund to relieve a shortage of international liquidity in such a way as positively to strengthen national reserves.

In order to bring some systematic interdependence between borrowing and repayments at the Fund and the level of the reserves, and thus the policy of member Central Banks, several solutions are available.

(a) It would depart least from the present constitution, if the first (gold) tranche of the quota were treated as *part of the reserve of a member country*. This solution would not increase the Fund's capacity to create liquidity. It might therefore be acceptable to the majority at present. It would represent a notable step forward.

(b) The next possible step would be to *increase the first tranche* of the quota from the present 25% to a higher percentage *without additional gold payments* and continue to include it in the reserves of member countries.

(c) Finally, *all deposits of countries with the Fund might be treated as part of the member countries' reserve*. If these remained, however, convertible into gold or other "scarcer" or "stronger" currencies the danger would remain that the Fund might be denuded of "acceptable" means of payments. Thus this final step would have to be linked *with an undertaking not to withdraw or convert deposits with the Fund*. At this point the Fund would become a central bank and the centre of a universal clearing capable of creating an adequate volume of international liquidity.

Borrowing from an international central bank would, of course, have the same effect as using the quotas of I.M.F. It would be invidious, and would force the country in question to restrictive measures. This would be perfectly justified at times when employment is high and discipline must be enforced to prevent inflation. It would not be sufficient when there is a danger of cumulative deflation. If "rediscounting" were all an international central bank could do there would be no reason to establish one.

A central bank, however, could undertake *active open-market operations* increasing the liquidity of those countries which legitimately need it.¹ Such occasion would arise if countries came under pressure because of depression elsewhere (as was the case in most primary producing countries last year).

(d) An elaborate new disciplinary code would have to accompany the establishment of such an institution so that the possibility of creating internationally acceptable liquid resources should not be misused. In this manner a middle way between uncontrollable inflation and undesired deflation might be found.

(e) Two methods are available to give creditors further safeguards as an inducement to accept such a solution. The first is to increase its vote as its deposits increase and stipulate that further creation of international liquidity would be subject to an affirmative vote by increasingly qualified majority. If, *e.g.*, the German basic deposits represent *X%* of the total and this increase to,

¹ The I.M.F., by buying United States securities against gold, in fact inaugurated such international open-market operations (*cf.* above).

say, $Y\%$, its vote might be increased by a given percentage which is in relation to X/Y and so on. Expansion of total liquidity by over 5, 10, 15, 25% per annum might be subject to the affirmative vote of a qualified majority, e.g., $\frac{3}{5}$, $\frac{2}{3}$, $\frac{3}{4}$, $\frac{7}{8}$, etc., of all votes. This would enable large creditors to veto further expansion.

Alternatively,¹ the Central Bank's maximum lending power might be limited by some formula (e.g., a certain percentage of growth or a certain relationship to aggregate foreign payments).

All these are points of detail. The important thing is that means should be found by which changes in deposits or drawing rights at the I.M.F. should make themselves automatically felt (as is the case in the Gold Exchange Standard) as *an equivalent change in international liquidity* of the countries concerned and thus *automatically influence policy*. Without this the required balance in the reaction of the system cannot be achieved and it will remain biased against debtors. I think the foregoing scheme achieves such balance because the Central Bank in its lending and open-market operations can insist on "autonomous" or persistent debtors taking effective remedial action.

(ii) *Towards an International Development Fund*

When the two Bretton Woods institutions were created a wit remarked that the Fund ought to have been a Bank and the Bank a (continuously alimented) Fund. The fifteen or so years of peace-time experience confirms the prescience of this joke. The point on which the Bank's activities have least achieved the desired effect is that its lending had no relation (and under its present dispensation could not have any relation) to the ebb and flow of economic activity in highly developed areas. Yet it could have exercised a doubly beneficial effect if its aim of lessening international inequality, through stimulating investment, had been pursued so as to help in taking up the slack in international productive capacity.

I am not here concerned with the question of whether a decisive increase in the allocation of resources by highly developed countries for aid to poor areas is desirable, though it would obviously in itself contribute to the maintenance of demand. What would, in this context, be desirable is the automatic use of an increasing portion of persistent creditor balances for long-term investment in underdeveloped areas. Such a link between the Central Bank and a Fund to which longer-term lending activities are entrusted would decrease the need for international liquidity by reducing the credit (and debit) balances of persistent surplus countries and thus help in limiting the need for the expansion of international liquidity.

In the past year the dollar has been under some pressure, and the awkward

¹ This would be less desirable, as *mechanical* percentage increases in the *stock* of reserves might not be able to deal successfully with unexpected fluctuations in *flows* (i.e., in the balances of payments). This is the real weakness of Professor Triffin's proposals as against the original Oxford Institute scheme.

narrowing in the gap between United States "free gold" and potential demands on it has shown the weakness of the existing arrangements. A further liquidation of the gold-exchange standard and the reduction of dollar and sterling balances could hardly help, resulting in several cuts in foreign aid and starting a deflationary spiral. Britain and Western Europe have mainly benefited by the discomfiture of the United States. But their monetary strength would be undermined by an active American policy reducing the deficit. It would therefore be no more than prudent if they took the initiative in buttressing the international credit mechanism. As a first step they might sponsor the calling of an international financial conference, to work out, as a first priority, rules of good-neighbourly behaviour which will prevent or reduce the dangers of those sudden gusts of hot money, by refusing to convert gold-exchange balances in their possession into gold. Hot money must not be allowed to endanger the stable expansion of the non-Soviet world as it did before the War. Such an international financial conference should, secondly, also set in motion reforms needed for the gradual transformation of the two Bretton Woods institutions into an effective force to stabilise growth in the non-Soviet orbit.

Institutional reform cannot accomplish much if the determination is lacking in using the instrument created. But at the moment there are unnecessary legal constrictions which would prevent the best intentions from succeeding.

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REVIEWS

The Wage Rate under Collective Bargaining. By J. PEN. Translated from the Dutch by T. S. PRESTON. (Cambridge, Mass.: Harvard University Press (London: Oxford University Press), 1959. Pp. xiv + 216. 48s.)

A FEAR which must sometimes afflict theoreticians is that economic theory may already have given to the practical policy maker all the usable insight and guidance it ever can. The complexity and subtlety of the phenomena are such, it might be argued, that economics is driven to resort, on the one hand, to heroic short cuts like the concept of perfect competition or of general logically and temporally simultaneous equilibrium, and, on the other, to deliberate and conscious imprecision, to the use of such ideas as "welfare," "real income," "the general price level," "the quantity of capital," "the representative firm" and to Marshallian so-called "woolliness" in general. The inexactness or plural meaning of these terms is indeed inherent in them and is part of the fabric of economics, and the passing of the years makes Marshall's imprecision seem the outcome, not of defective thinking but, on the contrary, of a deep understanding of the true nature and limitations of economics. Meticulous rigour in our subject is illusory and the search for it is destructive. But is it true that there is therefore nothing left to do now except embroidery upon a garment already cut and sewn?

When, in answer to this, we point to the great gaps and abnegations of theory, the reply may be that they correspond to problems not solvable with the *economist's* tools. Economics is the pure logic of choice; to bring in psychology or to discuss tastes or the choice of ends would be a breach with our Rule. And so we are left with Edgeworth's dictum that the price in bilateral monopoly is indeterminate.

This position ought to be shattered once for all by Professor Pen's remarkable book. Here are assembled questions of what the opposing parties know and do not know; of their conjectures and risk evaluations; of their judgments of what it is, on a balance of many considerations, advantageous for them to seek; of their methods of brain-washing each other; of the effects of their fearing to lose prestige (though Professor Pen does not investigate why prestige matters); and of the psychic momentum of the bargaining contest itself *qua* game of personal rivalry; all this fits easily and naturally into the frame of an argument which never for a moment loses sight of its target, that target being the solution of a quite central and vital problem of economic theory. It is easy to make lists of "influences" which in some unspecified way may bear on the outcome of some intricate

process; to define with exactness as Professor Pen has done the elements involved in such a process and show precisely their logical relations and semantic inter-dependencies is something altogether different. Professor Pen has solved the bilateral monopoly problem, but not by means of that insufferable prig, Economic Man. It is not Economic Man's greed but his omniscience and infallible rationality that make him irrelevant.

What Professor Pen has created is a scheme for ordering and inter-relating a number of ideas, not perhaps in themselves novel but used in a highly original and unconventional way. He shows how little penetration theory has made into the bargaining problem by pointing out that even the very familiar distinction between a person's desires and his circumstances (the "internal and external limitation" on his actions) has not been applied to the bargainer. In value theory the difference of meaning between the indifference curves and the opportunity line is elementary, but discussions of trade-union policy still mix together the influences which shape the union's aims and those which limit the realisation of those aims. The expression of the union's aims is in Professor Pen's construction a curve which, because the union is not simply concerned to push the wage-rate as high as it possibly can, but, on the contrary, recognises the danger of causing unemployment, raised prices of wage-goods and other things disadvantageous to the union, has a maximum at some particular wage-rate. Another such curve expresses the aims of the employers' organisation, and this curve too has a maximum at a level of wages below which the employers see falling labour efficiency, resentment, disloyalty, labour shortage and so on. It is an essential part of Professor Pen's analysis that these curves are not to be looked on as rigid and unchangeable in form, but, on the contrary, the proximate purpose and *modus operandi* of bargaining will be to modify them gradually, until their maxima coincide at a particular wage-rate, which can then become the agreed contract rate. What limits the toughness and implacability of one side in maintaining its initial aims in face of the offers, persuasions and threats of the other? It is simply the risk of causing a "conflict" (strike or lock out, the name matters little). There will be a maximum level of this subjective probability which the bargainer can accept, and it will be equal to a very simple expression involving the three quantities: ophelimity of the most preferred wage-rate, ophelimity of the starting or existing wage-rate, the one which the *other* party has just proposed, and the net ophelimity of a conflict. (This latter ophelimity need by no means always be negative: a bargainer may for various reasons, at some stage of the negotiations, come positively to desire a conflict, though not at the price of a sufficiently favourable contract available instead.) For *each* bargainer an equation can be set up in which the bargainer's maximum acceptable probability of conflict (adjusted for the bargainer's risk-aversion or risk-preference) is set equal to the *actual* risk which he believes to be involved in his own rejection of the other party's latest bid. When these

equations, one for each party, are both simultaneously satisfied; that is, when *each* party, in his *own* judgment, has pushed the other "to the brink," then each will feel that he has wrung from the circumstances the greatest obtainable ophelimity and will be content to agree there and then to a contract.

Even the bare bones of this theory as we have outlined them give some hint of its ingenious simplicity. But no sketch in a few pages can do justice to the care with which Professor Pen has sought out every difficulty of defining and understanding the curious situation of bilateral monopoly. What in this context is the Edgeworthian "contract zone"? How can there be effective isolation of two bargainers in a world of many firms and industries and many trade unions, all wanting labour or employment? What can be meant by "power," and on what circumstances does it depend? (Power, the author says, is "a relative concept, and the extent of power varies with the proposed terms of exchange . . . somewhere within the contract zone there is a wage rate which establishes an equilibrium of power. Once this wage rate has been found, wage determination has been defined.") The author understands very clearly the function of a scheme of thought such as he has constructed:

"We do not ask of the bargainer that, to answer the question whether he will continue to bargain or will conclude a contract, he should first calculate the advantage which he hopes to gain with further bargaining, and should then divide this by the disadvantage which—compared with an optimum contract—he would suffer in the event of a conflict, and after that should value the quotient found as a risk factor, and compare the risk factor computed in that way with the actual risk of a conflict. . . . However, we think that this procedure offers a starting point from which to establish afterwards why a bargainer was ready to accept a contract at a certain wage rate, and so to systematise the factors which brought this about."

This modest, practical descriptive function could well be more generally recognised as a *sufficient* justification for theory-building. This is the right claim to make, and it is here very fully established.

If the reviewer has complaints about this book they are not directed to the author. There are a few rather tiresome misprints (the eternal confusion between the numeral *one* and the letter *el* has here been made by a printer yet again, with variations) (pp. 132 and 200). The diagram on p. 38 is hopelessly at variance with the text, and even in the diagram on p. 84 (which is perfectly intelligible nevertheless) the lettering of points is at fault. The notes to each chapter are gathered at the end of the book. For Chapter III those referred to in the text by numbers 28–43 are entirely missing. There is no index. The publisher of this book is the Harvard University Press.

If it is incumbent on a reviewer to find at least one matter of substance on which he can differ from the author's view, perhaps this reviewer should

try to do what is expected of him by asking whether the notion appropriate to defining that "brink" up to which, but not beyond which, each bargainer seeks to push his opponent, may not be *possibility* rather than *probability*? For the author nowhere states or suggests that we are to look on each instance of bargaining as one of a series. The bargainer, we must suppose, is really anxious not to push his opponent too far, he does not merely reckon an occasional accident as the price of his long-period prestige and bargaining power. If we are right in this it is the *possibility* of a conflict which concerns him. Possibility, like probability, is a matter of degree, but there is no unique one-one correspondence between their degrees.

If there is any justice in the world, this book will achieve its place amongst the classics.

G. L. S. SHACKLE

University of Liverpool.

The Public Stake in Union Power. Edited by P. D. BRADLEY. (Charlottesville, Virginia: University of Virginia Press, 1959. Pp. x + 382. 56s.)

THESE essays are based on lectures given in the University of Virginia by a group of distinguished economists who had little or no experience of specialist work in the field of industrial relations. The names of the contributors, including among others, Chamberlin, Knight, Hayek, Haberler and McCord Wright, command respect. All are American except Mr. P. T. Bauer, who deals with "Regulated Wages in Under-developed Countries." The exclusion of the "specialists" and the complete reliance on what are called the "generalists" stems from the thought, expressed by Dean Charles C. Abbott, that "most academic experts in this field have largely ignored two of the major public issues in the contemporary scene: the consequences of union monopoly; and corruption, with its twin 'thug unionism.'" This is fair comment on both sides of the Atlantic. On the other hand, there are generalists whose remoteness from the scene borders on unreality. It would be a gain if more specialists would escape from the inhibitions which prevent them from coming to grips both with the major issues of public policy and with the important matters of theory.

The present volume is no exception to the rule that most collections of essays are of uneven quality. But the volume as a whole is an important contribution to our literature and is greatly to be recommended. The central theme, though it is not rigorously maintained, is that there is a public interest or "stake" which can be, and often is, jeopardised by the exercise of union power. The nature of "the public interest" is not defined, and there might have been some advantage if one of the lectures had attempted to explore that nebulous conception. Where the conception is employed, as for example in most anti-monopoly legislation, there is generally a guiding

assumption such as the notion that the operation of competition promotes the public interest whereas interferences with these forces are contrary to the public interest. Of course, in any real world the problem is much less simple.

Professor Chamberlin comes nearest to the point in the opening lecture, starting from "the proposition that labor unions do have monopoly power." This raises the query whether labour monopolies are significantly different from industrial monopolies. Are the gains of labour monopolies, like other monopoly gains, obtained at the expense of all other elements of society and so contrary to the public interest? But there may still be differences which affect, on the one hand, the public awareness of the evil and, on the other, the shape of possible public policy. As regards the first of these, the effects of labour monopoly power lie "buried in the cost structure and forgotten," and this is a source of strength to the unions which exercise this power. As regards the other, there is general agreement that the procedures which may be invoked against industrial monopolies are inapplicable to labour monopolies. Professor Chamberlin does not believe in the efficacy, in this connection, of countervailing powers or of government wage-fixing methods or, by implication, of national wages policies as commonly understood. He thinks that the problem could be dealt with by attacking those accretions of power which form no part of the collective bargaining process *per se*. Thus unions might be subjected to the anti-trust laws in respect of practices which lie outside the field of employer-employee relations; legal responsibility with regard to contracts should be similar to that required of other organised groups; where there is a closed shop union members should be protected against the abuse of union power; picketing should be subjected to substantial restrictions; loopholes in the Taft-Hartley ban on the secondary boycott should be closed; and unions should not be allowed to concentrate their resources on ruining a single employer.

The other major issue relates to the problem of inflation and the influence of wage movements in generating inflation. Professor Haberler argues in relation to the wage-push or demand-pull debate that the crucial operational question is whether, in the event of demand being controlled sufficiently to prevent a general rise in prices, employers' resistance to wage demands would be stiffened to the point of ensuring that the resulting wage level would be compatible both with the given price level and the maintenance of full employment. Or would union pressure succeed in pushing wages beyond that level, with consequent unemployment? In a later essay Professor Falkner makes a valuable contribution to the discussion of demand inflation, cost inflation and collective bargaining. It is difficult to avoid the thought that experience lies on the side of the pessimists, but among the pessimists there are two opposing views. There are those who think that creeping inflation is unavoidable and that it is a lesser evil than unemployment and loss of output. Chamberlin does not accept this conclusion. But there is also

the question whether full employment without inflation could not be achieved by means of a change in the present methods of collective bargaining. This, in my view, is a crucial issue and one which deserves fuller consideration than it has, as yet, received. Unfortunately the willingness of the two sides of industry to discuss the matter in serious terms is bedevilled by the fear that, in the mere discussion of the problem, some tactical advantage would be given away. But there are signs, at least in this country, that a change of attitude is possible in the foreseeable future.

Space does not permit adequate reference to the other essays and in particular to the thoughtful contribution from Professor McCord Wright, who finds a long-run close association between the values of economic growth, political freedom, democratic opportunity and the free market. But Dean Abbott has much cause to be satisfied with the result of his experiment.

D. T. JACK

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National Wages Policy in War and Peace. By B. C. ROBERTS. (London: Allen & Unwin, 1958. Pp. 180. 15s.)

THE main aim of this book is to discuss how useful national wages policies have been as a tool of anti-inflationary policy. In the central chapters accounts are given of wage policies and economic developments in a number of countries with varying degrees of centralisation in their wage-fixing institutions. Mr. Roberts discusses the experience of the Commonwealth Court of Conciliation and Arbitration in Australia and of post-war wage policy in the Netherlands, examples of a high degree of centralisation in wage fixing for fairly prolonged periods. He gives accounts of government intervention in wage fixing, regarded as an emergency measure, in Britain and the United States in war-time and in the United States in 1950-52. He describes developments in post-war Britain and Federal Germany, and wage policy in Sweden, where such a thoroughgoing attempt at central control of wages as in the Netherlands has not been made, but where wage negotiations are considerably more centralised than in Britain, the United States or Germany. In these chapters the general economic developments, the objectives of the wage policies pursued, and also the institutional frameworks and the political attitudes and opinions among trade unionists and employers towards wage policy are discussed.

Mr. Roberts stresses that wage policy must be "set in the framework of the social and political institutions, traditions and practices of each nation state." Swedish and Dutch trade unions, for instance, have been willing to submit to much more influence and control from their own central organisations than have their British and American counterparts.

Mr. Roberts points out that wherever the central wage-fixing authorities

have attempted to use wage policy as a brake in a generally inflationary situation by maintaining a level of wages lower than that which the trade unions feel that they could achieve by bargaining, or that which the employers would be willing to pay in order to get labour the system has been subject to considerable stress. This led in the United States to the breakdown of the Wage Stabilisation Board before the threat of a mine-workers' strike, and in the Netherlands to increasing demands in 1954 and 1955 from some of the employers' and workers' representatives for greater flexibility in the system of wage determination, demands that were to some extent met in the wage settlement of 1956. He says that "failure has been due, not to a lack of knowledge but to the difficulty of persuading people to act in a manner which seems contrary to their immediate interests."

Mr. Roberts argues that where there is demand inflation a national wage policy cannot be successful, and that it would be redundant if excess aggregate demand is prevented by other measures. He shows that the idea of a national wages policy is unpopular among British trade unions. He advocates that monetary policy should be used to control inflationary pressure, leaving the trade unions free to pursue the immediate interests of their members in collective bargaining. He favours a more decentralised system of collective bargaining, so that the official wage structure may be better adjusted to differences in local circumstances and so that there is less likelihood of a single wage claim becoming a major political issue.

The conclusions drawn in this book are rather more sweeping than seems justified by the general historical evidence presented. The experiences described do show that a centralised wage policy, especially when not wholeheartedly supported by the parties on the labour market, cannot be relied on to preserve price stability when other tools of economic policy are working in an inflationary direction. But a national wage policy, even if the intentions of those pursuing it as to wage structure and development are not completely effective because of wage drift, and even if, as in Sweden, less centralisation and less restraint can be agreed to in some years than in others, may still be a useful extra tool of economic policy, and may contribute towards the achievement of a higher rate of growth without excessive inflation.

THEODORA COOPER

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Wage Determination: An Analysis of Wage Criteria. By JULES BACKMAN. (Princeton, New Jersey, and London: Van Nostrand, 1959. Pp. xv + 316. 51s.)

THE author, in addition to being Professor of Economics in New York University, has been an adviser on labour and other economic problems to leading industries and to major corporations. It is no doubt the experience which he has acquired in these two capacities which leads him to the conclusions that there are "fundamental lessons that must be learned by

union leaders and the workers they represent" and that it is "the task of economists to educate public officials, workers and the public generally as to the evil consequences of a continuation of wage inflation." He considers that "economists abdicate their role when they throw up their hands in despair and proclaim that nothing can be done about this situation."

The gist of the book is to argue the case that advances in wages (and other non-wage benefits) should be limited to advances in productivity. It does not deal with wage theory, which, the author tells us, "has little value in the give and take of collective bargaining." It examines the arguments which are customarily advanced in wage negotiation, deals with the sources from which the materials for such arguments can be culled and evaluates the weight which such arguments carry in wage determination. This description and analysis relate mainly to the United States, but occasional references are also made to Canada. Much of it, however, follows a pattern which is common in this country also despite the different institutional background. The same arguments and similar data appear to be relied on in nearly all wage negotiations, and it is this which gives to such proceedings something of a ritualistic character.

The emphasis placed by the parties on the various factors varies, of course, from time to time, and the use made of the available data appears to be highly opportunistic. Although all the usual arguments are advanced and no case appears to be regarded by the parties as complete without covering all the familiar traditional ground, main emphasis in recent years seems to have been placed on arguments based on wage comparison. In America, so far as plant bargaining is the rule, intra-industry comparisons are added to the inter-industry comparisons which constitute the main argument in British industry-wide collective bargaining.

While it is easy to formulate a list of the arguments advanced in wage negotiation, it is more difficult to assess the relative weight accorded by the parties to these arguments in the process of wage determination. Some indication can be obtained from the awards of arbitrators, and in America they seem to be less reluctant than here to give reasons for their awards. Arbitration proceedings in America are more formal and protracted than here. An account, for example, is given of an arbitration affecting railroad non-operating employees in 1947 when daily sessions lasted for nearly a month, the stenographic record of the proceedings extended to 3,252 pages and the data used ranged from the educational attainment of children to the consumption of spinach. Whether such proceedings achieve more rational results than the unsupported allegations bandied about in a single-day arbitration in this country is debateable, but it does appear that in America as here a main factor, not only in wage argument but also in wage determination, has in the post-war period been the element of comparison. It is a wage criterion which the author criticises as leading to uniform national patterns of wage increases and to rigidity. No doubt, also, in

times of high employment it is a factor leading to inflationary wage movements when there is no central control of wages.

The author sets out and examines the various proposals which have been advanced in the United States to stop the wage-price spiral. They are as numerous as the schemes which have been advocated in this country, and they do not differ substantially from them. They range from full-blooded government control to exhortation and advice in all its forms. The author sees little hope of a solution in government control of wages in peace-time. Even under conditions of war-time emergency it proved largely ineffective, and he believes that in peace-time it would be neither acceptable nor effective. His own answer is that monetary and fiscal policy must be the primary instruments of government action in this field, but he also appears to have a hankering after reducing the power of "labor monopolies."

H. S. KIRKALDY

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Industrial Organisation. By JOE S. BAIN. (New York: John Wiley (London: Chapman & Hall), 1959. Pp. xviii + 643.)

THE high expectations which are aroused by the announcement of a new book by Professor Bain are not disappointed by this "basic text-book." It is true that it suffers from some of what appear to be the characteristic features of American basic text-books, in particular a comprehensiveness and elaboration in which everything must be explained, and each concept spelled out almost every time it occurs, just to make sure that there can be no misunderstanding. A certain repetitiveness which is useful in oral exposition (the book is apparently based on Professor Bain's lectures) can become tedious in a printed text; and the printer has provided a plentiful supply of misprints to add to the complications of the occasionally somewhat involved style. In spite of all this not merely undergraduates but those who are already versed in this field will be repaid for the labour of reading through its six hundred and fifty pages.

The book falls into three parts. After three introductory chapters, which provide an analytical setting of types of market structure and a general description of the "environment" of American industry, there are eight chapters which constitute the main argument; these analyse American industry in terms of market structure, market conduct and market performance, with emphasis on the inter-relations between these three criteria. Finally, there are four chapters on government interventions which affect competition.

Market structure has four chapters out of eight in the middle section of the book, and is treated at almost three times the length given to either

Conduct or Performance. The central theme is the degree of concentration of control (in buying as well as selling), which is shown to be far from the simple concept which is often too readily assumed. A wealth of material is assembled to elucidate the different patterns of market structure as shown by various degrees of concentration in different industries, in which "variety rather than uniformity" is found to be the distinctive feature. The determinants of concentration are analysed in a fairly short chapter, in which it is shown that "there is no one simple force determining concentration and no especially simple explanation." This is linked with a useful chapter which surveys changes in concentration in United States industry over the past ninety years, with the important conclusion (among others) that "any drift toward higher concentration requirements for efficiency has been for several decades at least fully offset by market growth," a point which is often overlooked. Finally, there is a discussion of the relation between product differentiation and conditions of entry into markets; the author's earlier studies in this field are well known, and this text provides a useful summary of his conclusions.

Market conduct is concerned partly with arrangements by sellers for determining outputs and prices, including independent, collusive and quasi-collusive action, and principles and methods of price calculation; on the latter, Professor Bain is emphatic that "margin-adding as a price-making device does not contradict or even seriously bring into question the hypothesis that a variety of maximising principles of price making are systematically being applied." There is an interesting review of this aspect of market conduct in a number of industries. Other matters covered are the determination of selling costs and "predatory and exclusionary tactics." Market performance is "the crucial indicator and measure of how well the market activity of enterprises contributes to the enhancement of general material welfare." It has various dimensions: productive efficiency, progressiveness in techniques, the suitability of the products, conservation of wasting resources and price flexibility. Professor Bain believes that on all of these matters except the first the evidence on which to reach any definitive conclusions is inadequate; thus, "we cannot honestly do much more than acknowledge the record of technological change in each industry, being grateful for gifts received from progress where it occurs, and must leave the evaluation of 'progressiveness' performance blank for the moment." Equally, the results of "theorizing are so inconclusive as to be almost useless." His comments on the other dimensions are also more "theorizing" rather than examination of empirical evidence, and the treatment accordingly brief. Perhaps this scepticism about the value of inference from incomplete (though not always negligible) evidence is on some matters carried a little too far.

For productive efficiency, however, the evidence is regarded as adequate; it includes the author's own investigation of twenty industries, which he has

also used in earlier studies. A result of particular significance is the relative unimportance of economies and diseconomies of scale: "in a preponderance of cases, plant scale curves tend to be at least moderately flat (and sometimes very flat), so that plants of half-optimal scale would experience no more than a 2 or 3 per cent elevation in unit costs and plants of quarter-optimal scale no more than a 5 or 6 per cent elevation," while "even where there are some large-firm economies, then, they are not very important, since the scale curve for the firm, beyond the size of one plant, is typically quite flat." Specific findings for the twenty industries are, *inter alia*, that in all the great bulk of output comes from plants of "reasonably efficient" scale, though with a fringe of "inefficiently small" plants, but that concentration of control is either moderately higher or much higher than is required for productive efficiency: while warning against too sweeping generalisation in this field, especially on the basis of a limited sample, the results "do lend support to the thesis that in at least half or more of all [manufacturing] industries the leading firms are in significant degree larger than necessary from the standpoint of efficiency in production and distribution, and that seller concentration is, in a corresponding sense, unnecessarily high." In consequence, the "impact of market structure on performance is probably found in the main with respect to dimensions of performance other than efficiency." Analysis of profits leads to the general conclusion that "high excess profits" are largely monopolistic profits, rather than the result of rewards to innovation and the like, and that they are mainly a consequence of high seller concentration together with high barriers to entry.

These, and other, conclusions are highly relevant to the discussion of government policies, which is conducted in terms of the analysis of the relation between market structure and performance. There is an admirable review of the anti-trust legislation; this section could, indeed, be used as the best up-to-date general account for students in this country, while one conclusion, that "prohibition of collusive behaviour cannot properly be viewed as a sufficient public policy toward monopolistic tendencies, or as the keystone of a general policy with this orientation," is of considerable significance for present problems here. Professor Bain also reviews, with unfavourable results, policies for the support of agriculture, of small units in the distributive trades, and of areas adversely affected by economic change.

It is impossible in a short review to do justice to the wealth of material and ideas which Professor Bain puts before us. This volume is more than a textbook (even for what must be the strong stomachs of American students); it is an authoritative and, in spite of its laboriousness, a stimulating survey of a wide range of problems in the particular setting of American industry as a case study of an "enterprise economy."

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Taxation of Agricultural Land in Underdeveloped Countries. By H. P. WALD. (Cambridge, Mass.: Harvard Law School International Program in Taxation, 1959. Pp. 231 + xiii. 36s.)

THIS book surveys the whole range of land taxation—taxes based on land area, rental values, incomes, incremental values and so on. In Part I the different taxes, their characteristics and their importance are described. In Part II the merits of land taxes are discussed from the viewpoints of equity, administration and general economic policy. Part III suggests ways of making land taxation more effective and how it could be used to further particular policy ends.

The author has gone into this subject extremely thoroughly and ranges with care over the many problems of development in many areas. The result is a most valuable storehouse of information about land-tax practices and problems which is not available anywhere else in such a handy form. At the same time some of the argument, especially at the theoretical level, is rather tedious and pedestrian; more ruthless cutting would have improved the presentation and enlivened the arguments.

One cannot avoid the suspicion that the author is sometimes flogging a dead, or at any rate a dying, horse. If land taxation cannot be made to work without such effort, why try? Is it not likely to be a better use of the scarce resources of underdeveloped countries to improve the administration of established indirect taxes and push ahead with the development of a wide-ranging personal income-tax system of some sort? Despite these reservations, it is still very valuable to have all the arguments for land taxation clearly set out.

One final point should be made about this book. Both economists and laymen in this country should ponder on the fact that this highly technical economic study springs from the *Law School* of an American University.

A. R. PREST

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The Balance of Payments of Rhodesia and Nyasaland, 1945–1954. By A. G. IRVINE. (London: Oxford University Press, 1959. Pp. xiii + 642. 63s.)

THIS volume must represent a record of its kind. Surely there is no other unadorned balance-of-payments study which runs to more than 600 pages of text and a total of 161 tables! Nor does it digress. With the exception of a brief historical review, which is concerned to demonstrate that the author owes nothing to his predecessors, the book is exactly described by its title.

In connection with the historical review only two comments seem to be required. The first is that the opening sentence, to the effect that "no No. 278.—VOL. LXX.

estimates of the balance of payments of any of the three Central African territories . . . were made before 1939" (p. 1), is not true. An estimate of the 1931 balance of payments of Northern Rhodesia appeared in a book published in 1933 (*Modern Industry and the African*, edited by J. Merle Davis), and the working papers were carefully preserved on the files of the Northern Rhodesian Customs Department as late as 1947. Secondly, it is only fair to note here that this reviewer is summarily convicted of gross errors of concept and fact, which were perversely allowed to appear in print after the author had produced his first estimates on the same subject. It is possible to answer some of the charges in this systematic indictment; however, since Mr. Irvine's object in making it was not to raise any issues of theory or fact but to establish, in his usual thorough fashion, his own claim to be effectively first in this field of study, any argument seems superfluous.

For there is no doubt at all that this is now the definitive text on the balance of payments of the Federation and its component territories. The practical statistician faced with a similar task in some other colonial or semi-colonial territory and the economist whose analysis depends on a proper interpretation of the Federation's trade figures will find this an invaluable reference book. Whether Mr. Irvine will succeed in preventing economists from ever again using Rhodesian balance-of-payments statistics compiled before he began his work in August 1947 is not so certain. For economists are notoriously deviant in their use of statistical data, being always liable to use existing estimates where no reputable data are available.

The two chapters on concepts and measurement are by far the most interesting in the book. The author took as his starting point the I.M.F. *Balance of Payments Manual*, but the Federation threw up many major problems of interpretation which, in the last analysis, could only be dealt with arbitrarily. These he discusses in rewarding detail. The most intractable problem, of course, is the definition of a "resident." Here the basic principle adopted is the "centre of interest" criterion. A resident is one whose "centre of interest" is wholly or mainly within the Federation, and in the case of resident institutions this principle is extended to include the requirement that they should be "an integral part of the country's economy." These are vague enough criteria for practical purposes, as the author recognises, and they leave considerable scope for variation in treatment. After the visible trade section of the balance is explicitly designed to provide a record of merchandise transactions between residents (so defined) and foreigners, for example, it seems a little odd to find that "all entrepôt trade is included in both imports and exports on a gross basis, and all entrepôt stocks are recorded as domestic investment" (p. 97).

Some two-thirds of this volume is taken up with an exhaustive, entry by entry, comment on each item of the balance for each territory and for the Federation as a whole. It would perhaps be an exaggeration to say that if a randomly chosen half of Mr. Irvine's tables had been omitted by a weary

compositor they could have been reconstructed in full from the remaining tables and the textual commentaries. But it is certain that many nine-year series are repeated three or four times in tabular form and that the textual commentary on each table involves much repetition of the figures and mechanical statement of the obvious.

Overlaid by this dull mass of detail, however, there are some descriptive gems of considerable intrinsic value. The description of the operation of the "colonial sterling exchange standard" on pp. 550 *et seq.*, for example, is a model of its kind; and there are various other aspects of the mechanism of international transactions which are splendidly defined by Mr. Irvine's exhaustive descriptions. The trouble is that in his determination to give every figure its full treatment in text and table, the author has smothered some unusually interesting contributions in a tedious stream of trivialities.

PHYLLIS DEANE

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Cybernetics and Management. By S. BEER. (London: English Universities Press, 1959. Pp. xviii + 214. 25s.)

CYBERNETICS (*κυβερνήτης*, a steersman, *gubernator*, a governor) is the science of the control of complex systems; not control in the repressive sense which we have all come to hate, but control in the sense of the co-ordination and harmonious working of interacting components. The ideal controlled system is the one which controls itself without any outside control. The human body, for example, considered as a machine for maintaining a constant blood temperature, is self-regulatory. So is the automatic pilot of an aeroplane. So also were large sections of the economic system believed to be until recently. The cybernetician is concerned with the general structural properties of controlled systems, with studying their behaviour, with setting them up and with designing them economically. In consequence, he ranges over a wide field of interest, from the simple regulating machinery of a steam engine to the properties of the human brain, from running a chess club to the organisation of the biggest industrial combines, from business management to the control of the whole economic system.

Mr. Beer's book is an admirable introduction to the basic ideas of the subject, stimulating, not too long and drawing on a wealth of examples from many fields. It will not turn the reader into a cybernetician, but it can hardly fail to convey to him the importance and the fascination of the subject.

The book is in four parts. In the first Mr. Beer develops the fundamentals, stressing the importance of feedback in control systems, the problem of communicating information through a system and the possibility of studying behaviour of highly complicated systems by regarding them as Black Boxes. (A Black Box is a set-up for which we can observe the output

for given inputs, and hence study its behaviour operationally without necessarily understanding what goes on inside.) In the second part the author discusses the logical theory of cybernetics—logical algebras, binary decisions and the theory of automata. It is interesting to find that some of the oldest problems of logic (especially the one about “Minas the Cretan says that all Cretans are liars”) have a direct bearing on the design of automatic control systems.

In the third part Mr. Beer goes on to what he calls the biophysical theory—the construction of machines for adaptive behaviour, machines that learn and teach, and the possibility of constructing intelligent machines. The fourth part deals with the “materials” from which cybernetic “machines” can be constructed; the words in quotes are used in the widest sense, so that, for example, random numbers are a “material” from which a simulator of chance can be built; and a “machine” can be built of colloid material so as to grow.

In these two last parts, perhaps, the reader will begin to feel his feet leaving the ground. It is fascinating material, and much more than pure speculation. But the business manager who is reading this book to find out whether he can improve his own organisation will probably wish that he could be taught to walk before he can run, and run before he can fly. However, Mr. Beer's object is to survey the field of present and future possibilities, not to provide a text-book for the cybernetic practitioner, and in this object he has certainly succeeded.

The central problems of economic action, so it seems to me, are essentially of a cybernetic kind. Economists are now sufficiently alive to the importance of trying to trace all the connective relations in a system before its stability and oscillatory behaviour can be adequately discussed. Feedbacks and closed-loop models are becoming a standard part of the econometrician's methodological tools. But we still know extraordinarily little about certain determinants of economic behaviour—for example, how long it takes for a rise in the bank rate to affect savings and expenditure, or how long rises in earnings take to lift consumers' expenditure to new stable levels (if at all). The lengths of these time-lags and the magnitudes of responses are just as important to the stability of an economy as the nature of the inter-relationships themselves. Until we can measure them we shall continue with our periodic drains on exchange, our sudden changes in bank rates, our pig cycles and our nervousness about over-production and under-employment. Economists, who have been talking cybernetics for centuries without realising it, can gain a great deal from the study of self-regulatory systems in other disciplines, and many of them would, I think, derive profit as well as pleasure from this very readable book.

M. G. KENDALL

London School of Economics.

Organizations. By J. G. MARCH and H. A. SIMON. (New York: John Wiley for the Graduate School of Industrial Administration, Carnegie Institute of Technology (London: Chapman & Hall), 1959. Pp. xii + 262. 48s.)

PROFESSOR HERBERT SIMON has built up a well-deserved reputation for systemisation in problems of administration, and his *Administrative Behaviour* is on the way to becoming a classic. The present volume widens the scope of the activities surveyed and yet still further refines the system, so that a set of over two hundred propositions “a numerical index to variables” is provided. Yet, forbidding as this sounds, the text of this book must, for brevity and relevance to their thought, be given high priority in economists' background or collateral reading. After an illuminating sketch in Chapter I of the many hands providing bits and snacks of organisation theory and data, the authors get down to assembling the jig-saw puzzle.

They start (Chapter 2) at a place that should appeal to economists—Scientific Management and the study of Industrial Fatigue, which I can recall as introduced to Cambridge classes by Pigou as early as 1913. This proved in time too mechanical an approach, and the authors proceed to take up the unanticipated consequences of treating an organisation as though it were composed of machines; there are “motivational constraints” on decisions within (Chapter 3), and decisions to participate at all (Chapter 4) in organisations, and also conflicts (Chapter 5) in organisations. These three chapters introduce us to morale and its relation to production, to labour turnover (the end of participation), to incentives, group pressure and identification, but pay less attention to Elton Mayo than might be expected. Simon's model for tackling the decision to participate, expounded in his *Administrative Behaviour* and summed up here, will strike a familiar chord. It is an input-output equilibrium or “Inducement-Contributions balance,” round which to range the irrational and rational factors involved, such as the propensity to search for and perceive alternatives, the ease of movement and the personalities of the participants. The authors work through finally to consider the rational action (Chapter 6) and the planning and innovation (Chapter 7) which economists postulate of the entrepreneur in the first instance.

A further recommendation to economists is that with the exception of some rather novel adjectives (Professor Devons is, p. 205, called “insightful”) there is a welcome absence of the sociologist's professional jargon. What jargon is used is largely the modern economist's own. With rate of innovation and decision-making, appear marginal calculation, production and utility functions, programming, resource-allocation, game theory and optimality. However, economists must be warned that the authors believe (p. 205) that in the real world satisficing (*sic*) rather than optimising must be looked for, and that they use external economies and diseconomies (on

the same and other pages) apparently to refer to differences of social from trade net product.

The authors are not just content with a model of terms and conceptions. They join some economists and also (though surprisingly cold-shouldered) some political scientists like G. E. G. Catlin, in lamenting the absence of research. Their last words (p. 210) voice the complaint that empirical evidence of a reliable and persuasive kind is almost non-existent. And this complaint they claim to have made throughout the volume. It is disappointing therefore that the authors have not built upon recent empirical inquiries into the economic world, their knowledge of which appears rather out of date. It is particularly odd that American authors should ignore the implications of the empirical evidence supplied by Gardiner Means and R. A. Gordon on the scope of the large American Business Corporation and the Managerial Evolution.

In analysing the participants (p. 89) of business organisations they lump the participant who is emerging as the most important of all—the top manager in a company—with all salary and wage-earning employees, and the whole lump is ranked with the other minor participants—the shareholders, suppliers, distributors and consumers. The manager, moreover, apparently takes the initiative only when (p. 109) adjustments are necessary for survival. Models of bureaucracy are, it is true, discussed at some length (pp. 34–37), but the top hierarchy which figures in all the three models selected is not identified realistically, and English readers are likely to miss any reference to Urwick's optimum span of control or Parkinson's Law.

It is still more disappointing that the authors announce no projects of their own for empirical research. All they do is to hope their labours "will be more than repaid if they encourage others to join in the task of replacing fancy with fact." Let us hope, however, that "join" means "join *them*," for some real field-work under the auspices of Professor Simon with his flair for integrating economics with other social sciences would indeed be welcome.

P. SARGANT FLORENCE

University of Birmingham.

Studies in the Theory of Money, 1690–1776. By D. VICKERS. Philadelphia, (Pennsylvania: Chilton Company, 1959. Pp. viii + 313. \$6.50.)

"THIS book," the author says in his Preface, "is a systematic examination of the monetary theories which developed in England in the hundred years preceding the appearance of Adam Smith's *Wealth of Nations*." It treats of nine authors: Locke, Barbon and North, writing at the end of the seventeenth century; Law, Berkeley and Vanderlint, who are classed as Inflationists; Cantillon, Hume and Steuart, who are credited with introducing "process analysis" or dynamic theory. The book is a valuable

contribution towards understanding the monetary theories of the period. It has relatively little to say about the coinage troubles about which so much has been written, but the author lays stress on the preoccupation of all the nine with the question of employment.

Locke perceived the essence of the quantity theory of money: "any quantity of money (if it were but so much that everybody might have some) would serve to drive any proportion of trade, whether more or less; there being counters enough to reckon by" (p. 61), and "the value of money in any one country is the present quantity of the current money in that country in proportion to the present trade" (p. 67). Were the money halved, either half the work-people would be unemployed or money incomes would be halved (p. 56). Locke thus brought out clearly the aim of so adjusting the supply of money as to maintain full employment. The later writers recommended various expedients for keeping up the supply of money: luxury spending might be encouraged; a favourable balance of payments would add to the monetary supply by imports of bullion; the use of paper money and of credit could be expanded.

The book brings out the various points of view very effectively, and traces their development in the course of the period covered.

It is interesting to note that an increase of credit was regarded as primarily facilitating consumer expenditure by the rich. Before the Industrial Revolution investment in industrial plant as a source of expenditure and therefore of demand for labour was hardly thought of. Barbon saw that the common view of interest as paid for the hire of money was a mistake, "for the interest is paid for stock," but Professor Vickers rightly interprets "stock" to mean working capital (p. 91). Hume mentions among uses for which men borrow money that of supporting a manufactory (p. 235), but did not distinguish between the yield of plant and the profit on the sale of products as a source of interest.

Even when Steuart wrote (1767), industrial capital had not secured a place in analysis. His theory of banking treated improved land as the only form of fixed capital. Steuart is the only one of the nine who wrote a treatise on economics, and the chapter devoted to him (pp. 240–90) is longer than any of the others. His most notable contribution to the subject was the concept of money of account, which is very judiciously criticised (pp. 274–80). Steuart describes money of account as "no more than an arbitrary scale of equal parts invented for measuring the respective value of things vendible" (pp. 277–8).

He imagined that the unit of account, being a measure of value, possessed in some sense stability of value, and that its link with gold or silver impaired its stability because the metals themselves were liable to vary in value. He advocated a system of bank money based not on gold and silver but on property. There was here some confusion of ideas. Professor Vickers does not quite go to the root of the matter (pp. 279–80). Is not Steuart's

fallacy essentially contained in the conception of the money of account as a unit for measuring *value*, instead of as a unit for measuring *debts*? The measurement of debts includes the measurement of prices and therefore of relative values, because the quotation of a price is an offer to create a debt. But the fabric of debts in a community has no inherent tendency to stability of value.

Berkeley came near this conception of a money of account when he asked "whether the true idea of money, as such, be altogether that of a ticket or counter," and later "whether its true and just idea be not that of a ticket entitling to power." His use of the term power is explained when he recommends as the public aim "that men's industry should supply their present wants, and the overplus converted into a stock of power." Power thus means accumulated wealth, and evidently the ticket entitling to power is something more substantial than a unit for measuring values. Berkeley, like Steuart, missed the explicit definition of the unit of account as the unit for reckoning debt. But in "the overplus converted into a stock of power" there is an interesting suggestion of capital accumulation as an object of expenditure and a source of demand.

RALPH HAWTREY

London.

British Monetary Experiments, 1650-1710. By J. KEITH HORSEFIELD. (London: Bell, 1960. Pp. xx + 344. 45s.)

THE recoinage crisis of 1696, Mr. Horsefield remarks, was the last occasion in English history when a monetary controversy centred in the state of the coins. Thereafter, interest moves from coins to bank-notes as the major vehicle for internal payments. This is another way of saying that the underlying theme of the book is the growth and development of credit investments and institutions—bills of exchange, promissory notes, cheques and the banks which operate them. The climax came in the years 1694-96 when the appalling state of the silver currency combined with the exigencies of war to produce a crop of schemes for banks, including the Bank of England, the Bank of Scotland and the ill-fated Government Land Bank. While the first had to suspend payment, and the last failed, the recoinage was carried through and the Exchequer Bill made its debut. Round these stirring events swirled a shower of pamphlets. 1695 and 1696 alone saw the production of at least 250 pamphlets, and many more probably disappeared. Clearly Mr. Horsefield has chosen a fruitful if difficult field of inquiry.

He has chosen to begin virtually at the end, chronologically speaking, of this problem, with the recoinage controversy, going on to examine the role of the guinea. Next comes a study of banks and paper money. Finally, he examines the theoretical arguments put forward during the controversies—the adumbration of the self-balancing mechanism of international pay-

ments, the theories of banks and the idea of a "fund of credit" that was connected with the war-time need to transfer tax proceeds from the provinces to London.

The handling of the recoinage crisis and controversy is a considerable *tour de force*. As Mr. Horsefield says, the story has been told often and he does not repeat it in full. His contribution lies in quantifying—as he does convincingly—a situation which neither side in the controversy fully appreciated. The "restorers" proposed to put back the coins to the nominal weights of the Elizabethan recoinage. The "devaluers" proposed a devaluation of some 20%. Both measures were deflationary—the restoration rather more than the devaluation. But the restorers, amongst whom John Locke was an important figure, won, bringing the major benefit to creditors, landlords, most workmen and recipients of fixed incomes generally, including the King. Business-men, by and large, stood to gain little and sometimes to lose.

It is Mr. Horsefield's contention that advocates and opponents of devaluation alike were misled by a failure to understand the actual monetary situation, *i.e.*, the fall of 32% (should it not be 35%?) in the money supply in 1696. Few realised that the basic problem was the monetary standard. And the currency shortage resulting from the recoinage was, it is argued, the reason why the Land Banks of 1695-96—precursors in one sense of the Building Society, as Mr. Horsefield points out—failed. In both England and Scotland, therefore, banking was practically confined to a single institution that managed, though precariously, to survive the crisis.

The sections about banks follow from consideration of currency decline. "What remedy is there," asks Petty, "if we have too little money?" Answer: "We must erect a bank." And so the schemes of banks of various kinds proliferated, basing their credit on goods, government revenues, commercial obligations or land.

Mr. Horsefield's strength lies in his technical equipment as an analyst and in the skill which he has brought to the task of statistical reconstruction. The complex problems with which he deals have not previously had such penetrating treatment. On every point he has something new and arresting to say. Yet a price has to be paid for these expert probings in depth. His somewhat allusive exposition makes heavy demands on the reader. It is not clear what considerations govern his choice and rejection of topics for treatment. The studies remain separate studies and are hardly welded into a whole. Even the professional might legitimately plead for more guidance through these perilous waters. The studies might also have been bonded more securely into the larger context of economic development. The rise of government borrowing is sketchily treated. It is hardly sufficient to rely on W. R. Scott's indicator of trade conditions, which is now fifty years old and open to criticism in the light of later work. It seems curious that in a study of monetary problems little mention is made of the silver drain to the

East and elsewhere. A study of this period might also profitably have included a look at the European situation, especially in Holland, where similar problems are revealed in Dr. van Dillen's records of the Amsterdam Bank. One hopes the Mr. Horsefield will extend his inquiries to give us an authoritative and connected financial history of this period, which he is clearly so well qualified to do.

CHARLES WILSON

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An Economic History of Transport. By CHRISTOPHER I. SAVAGE. (London: Hutchinson, 1959. Pp. 216. 18s.)

TRANSPORT historians, as a rule, are dedicated to detail. They revel in technical data and go to endless pains to establish when this section of track was opened or that lock built. But with the economic purpose of these developments they are usually unconcerned. Even broader surveys, such as E. A. Pratt's *History of Inland Transport and Communication in England* and W. T. Jackman's *Transportation in Modern England*, which do touch upon economic questions, do so only incidentally amidst pages of narrative. There is clearly the need for a short and readable book which treats the subject generally and in economic terms and, in addition, deals with the period since the First World War.

Mr. Savage devotes just under half of his book to the inter-war years. The introductory chapter of his War History volume on *Inland Transport* has provided a sound foundation on which to build, but he has not chosen here to venture beyond 1939. The growth of road competition both in short- and long-distance passenger services and in goods traffic is ably summarised, as are the State's efforts at safeguarding the public interest on the railways and restricting damaging competition on the roads. Although the author agrees that the Government handicapped the railways by treating them as a monopoly even after road competition became severe, he argues that they were themselves partly to be blamed for some of their misfortunes because of a too rigid interpretation of some of their obligations, such as those relating to "undue preference." It would have been useful had he been able to explore a little farther the whole question of railway efficiency. What effect, if any, for example, had railway investment in buses in discouraging the improvement of local services by rail, which were the costliest of all to run?

The earlier part of the book, which deals with British transport history from the eighteenth century to the First World War, is disappointing. It contains little more than the familiar string of unexplained events; no serious attempt is made to discuss transport developments as *economic* history. Railway amalgamation is outlined without reference to price movements, as is

the greater emphasis on improved service which accompanied falling prices after the early 1870s. The assertion that "railways could and did provide cheap, rapid and safe travel for all classes of society" needs qualification. When, in fact, did railways begin to cater for the "labouring poor"? Should there not be some indication of wage levels or of the contribution of workmen's fares and excursion trains instead of merely the unsubstantiated assertion that "the poor man . . . got his charter in 1844"? Or, moving back in time, should not any discussion of coaching go beyond the well-known examples of higher speeds to investigate fares, the cost of running coaches and the fortunes of coach-operating firms—to explore, in fact, Jackman's Appendix 6 as well as his Appendix 5?

Even as an outline of fact in the traditional pattern, the eighteenth- and nineteenth-century section of this book is wanting. Mr. Savage would have done a good service to teachers of economic history had he made more readily available the conclusions of recent research which are at present not widely known; but instead he pins his faith in the older writers. The account here of the beginnings of the Canal Age, for example, adds nothing to what Samuel Smiles wrote a century ago: no attempt is made to put the Worsley-Manchester venture into perspective, the old error about the Bridgewater canal's opening to Manchester in 1761 is repeated, and the fact that pits to the east of Manchester continued to provide most of the town's coal by land carriage is overlooked. It is to be regretted, too, that coastal trade has been neglected, for it forms an important part of the story. In the light of this omission the incongruous postscript on American transport, containing no information that cannot be found fairly easily elsewhere, seems all the more curious. It is a great pity that a book which may form a useful basis for those studying inter-war transport economics should, so far as the previous years are concerned, belie its title.

T. C. BARKER

London School of Economics.

The History of the Hudson's Bay Company, 1670–1870. By E. E. RICH, with a Foreward by the RT. HON. SIR WINSTON CHURCHILL, Grand Seigneur of the Company of Adventurers into Hudson's Bay. *Volume I: 1670–1673.* (London: The Hudson's Bay Record Society, 1958. Pp. xv + 687.)

"THERE is nothing impersonal about the story of the Company." This prefatory remark by the author sets the tone of this impressive and absorbing study of the fortunes of the early trade. Round the courtiers, princes, politicians and generals of the first managerial phase and the active commercial men who ruled the Company over the half-century preceding the Treaty of Paris, Professor Rich has woven a narrative which runs from small and uncertain beginnings to the substantial corporate achievements of the

mid-eighteenth century. This focus on personalities, incidents and events is productive of an illuminating study of business strategies conducted in the face of the complex political and economic changes of this formative period of the Company's development. Every aspect of its affairs—finance and markets, supplies and shipping, personnel, Indian relations and exploration, European rivalries and trade systems—is treated with a wealth of detail and skill in sifting evidence which mark this work as a product of first-rate craftsmanship. A mass of material is weighed and analysed to create a clear-cut impression of the strategies of managements faced with an extraordinary range of uncertainties in the old world and the new. For those accustomed to treat in general terms the problems of initial phases of development or the preconditions deemed essential to a shift to more advanced stages of growth, this volume will provide chastening albeit instructive and thought-compelling reading. Entrepreneurial and business historians, too, will learn much from the author's skilful interweaving of economic, political and social elements into a convincing historical pattern.

To review the variety of topics discussed by Professor Rich is out of the question, but two aspects of the study may be singled out for special comment. The first relates to the strategies of management, the second to the author's contributions to a balanced view of the fur trade as a whole. Probably the most striking feature of the Company's activities is the remarkable constancy displayed by successive managerial groups in their concentration on the gains of trade rather than of Empire, on defence rather than attack, on security rather than rapid expansion. This meant avoidance of a tactic fatal to the French, namely the attempt to build a new world empire on the unstable and shifting foundations of the fur trade. A policy best described as that of a holding operation made for a rate of advance less spectacular than that of the French, but in the end it contributed much to the stability essential to survival. It was the Company's good fortune that the physical environment of the Bay ruled out any colonising role, that energies could be devoted almost exclusively to a trade which allowed for little diversification in spite of attempts in this direction. This preoccupation with business bore fruit in the progress of the Company from a state of precarious reliance on short-term loans and debentures to one of financial independence reflected in large investment holdings of the closing decades of the period. Professor Rich makes it clear that it was this long-continued interest in building a sound financial and trading position, and not monopoly at home or abroad, nor privileged status, nor importance in the national economy, that accounts for the staying power of the organisation in its first and most difficult phase of development.

Although no substantial revision of the history of the trade is likely to result from the publication of this volume, its findings go far to correct a common bias arising from past emphasis on developments in North America. The Bay, like the St. Lawrence, presented its opportunities and its problems,

but the basic policy decisions were made against the background of European conditions and rivalries, and it is this background which was to be decisive to the final outcome. Professor Rich's evaluation of the old world policies and practices which largely determined the fortunes of trade makes for a balanced presentation of events in which developments in North America are accurately placed in their wider setting. This is a major achievement and one which contributes much to making this work a fitting culmination to decades of publication of the Company's documents by the Champlain Society and the Hudson's Bay Record Society. The volume meets the high standards of the publications of the past, it is competently edited and it contains an adequate index.

W. T. EASTERBROOK

University of Toronto.

The Eastland Trade and the Common Weal in the Seventeenth Century. By R. W. K. HINTON. (London: Cambridge University Press, 1959. Pp. xi + 244. 32s. 6d.)

DR. HINTON has produced a most interesting little volume. It is full of statistics and documents. The figures come in the main from the Danish Sound toll registers and give a comprehensive picture of the extent of the English Eastland Trade during the seventeenth century; they also illustrate the degree of Dutch competition. The documents, reproduced very liberally in the appendices, include lists of members of the Eastland Company, some of its petitions and representations, and two government-inspired pamphlets on trade policy at the time of the Navigation Act of 1651.

Dr. Hinton does more than build up a picture of the extent and nature of the Eastland trade. He sets out to answer four very specific questions about it. Why did the English Eastland trade increase so considerably after 1660? How was English commercial policy formulated throughout the seventeenth century? What was the influence of the Eastland Company on the formulation of that policy? And why did the Eastland Company wither away by the end of the century?

Dr. Hinton stresses the importance of war as an explanation of the trade expansion. Strength at sea was vital for an island trading nation. This was impossible without a flourishing mercantile marine. But, in turn, the merchant navy could not flourish without sea-power. During the interregnum pressure of necessity led to the creation of a large professional navy.

"After three Dutch wars England emerged as the dominant sea power with the safest merchant fleet. Further, by a notable stroke either of luck or policy, she emerged, in 1674, as a neutral sea-power, while the Dutch were still involved in war with France. The result is seen in the history of the Eastland trade, in the sudden and great expansion of the import trade in 1675."

The picture Dr. Hinton paints of the way commercial policy was formulated throughout the century is a fascinating one. Rightly, he dismisses the concept of the Eastland Company as a pressure group. When he goes on to add that "the influence of the Eastland Company on the formulation of (trade) policy appears to have been small," he is perhaps slightly distorting his own picture, though he is right in this connection to stress that the Government never made concessions to the Company unless they were clearly justified on the basis of the general national interest or the "Common Weal." Yet, as Dr. Hinton himself shows, in the first half of the seventeenth century the proposals the Eastland Company made were listened to with respect by the Government and frequently acted upon. As a consequence, the Company enjoyed privileges from the Government so that the cloth trade and the merchant navy could both be developed. In this, of course, the Company was not influencing the twin overall objectives of governmental policy (cloth and ships), but it was certainly influencing the determination of the means by which the Government hoped to achieve those ends.

Dr. Hinton is least convincing in his explanation of the decline of the Eastland Company in the second half of the seventeenth century. His theme here is that in the first half of the century the Company had a real job to perform. It had to maintain and extend the privileges enjoyed by its merchants abroad; and it had to protect their trade against the Dutch. In the second half of the seventeenth century it was no longer so important for the Company to perform these functions. The Navigation Acts took over the function of protecting trade against the Dutch; secondly, the Eastland merchants developed trades in which foreign privileges were unobtainable; and thirdly, the State began to look after the merchants' welfare abroad. Thus, as the "state grew the Eastland Company withered away." This is not as convincing as it might appear. During the same period, another privileged trading company, the Russia Company, was itself the subject of all these forces, yet the Russia Company did not wither away. Indeed, it continued to flourish with renewed vigour until well into the eighteenth century. There must, therefore, have been some very special reason to explain the demise of the Eastland Company, and it is a pity that Dr. Hinton has not been able to reveal what it was.

This criticism, however, must not be allowed to detract from the merits of this volume, which, if at times a little scrappy and disjointed in presentation, provides an abundance of material and interest.

N. C. HUNT

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Oxford.*

Reshaping a City. By T. BRENNAN. (Glasgow and London: House of Grant, 1959. Pp. 221. 25s.)

DESPITE years of intensive building, many of Britain's large industrial cities continue to be faced with major rehousing problems. If high-density redevelopment of their decaying and thickly populated inner belts is to be ruled out for economic or social reasons the solution of the problem will involve either a continuance of the urban sprawl which has produced our conurbations or the dispersal of population to other centres. The development plans of many of these large towns make it clear, however, that there is no longer any possibility of finding enough land within their boundaries to house their present populations if reasonable provision is to be made for schools, open spaces and so on. Hence the problem of overcrowding must be solved by dispersal, for which policy there is, of course, a good deal of official support.

Glasgow's rehousing problem is perhaps more serious than that of any other authority in the country. In the obsolescent central areas the density of development is extremely high on account of the predominance of tenements, and many of these are seriously overcrowded. At the same time Glasgow's site sets narrow physical limits to the amount of land available for development around the fringes of the city on which main reliance has been placed hitherto. During the next twenty years the Corporation is planning to rehouse some 100,000 families from the central areas which are to be redeveloped. If these plans are carried out at the levels of density proposed they will create an overspill of at least 200,000 persons.

This book is concerned with Glasgow's redevelopment policy and its implications. The author, a practised urban sociologist, is already known for a number of notable studies of the Midlands and South Wales. The core of the book consists of an unexceptionable economic and social survey of Govan, one of the areas scheduled for redevelopment. Also included is much information of a similar character on Pollok, one of the city's suburban housing estates which has drawn much of its population from Govan. The emphasis is on the old area, as the new one forms the subject of a separate study.

These surveys are used as a basis for an interesting study of the ways in which the criteria used for rehousing have influenced the economic and social structure of the two areas. They also enable the author to draw attention to a number of difficulties which may be produced when the rehousing problem is considered overnarrowly and is regarded simply as a matter of providing houses. One interesting fact to emerge from the surveys is that the density of occupation in the overcrowded central area examined is now lower than in the new estate.

The book thus represents a useful study of the administration of a housing policy. It is, however, also offered as a critique of Glasgow's over-

spill and dispersal policy, and here it is less satisfactory. Arguing from the facts he has disclosed concerning the density of occupation in the central areas, Brennan suggests the rehabilitation of some of these areas as an alternative to be preferred to their comprehensive redevelopment. This suggestion is supported by an analysis of the relatively small changes in land use which will occur in the central areas if the plans are carried out. Brennan's proposal would, among other things, reduce the magnitude of the overspill, and it merits attention. But its justification must inevitably depend on considerations ranging beyond the factors emphasised by the author and which receive no adequate discussion in the book. One does not get a very clear picture of the plans for rehousing and dispersal which are the subject of criticism, and for this reason the book might well be read with the Corporation's own publication *Industry on the Move*, to which Brennan's study provides a useful corrective.

Whether Glasgow's overspill problem will be at all easily solved on the lines officially laid down is certainly open to doubt, and Mr. Brennan's reservations seem well founded. One major obstacle is, of course, that its solution evidently calls for a dispersal of industry parallel to that of population. Yet Glasgow, unlike other cities confronting a similar problem, is not a growth centre which naturally attracts the kinds of industry which might facilitate this dispersal. One or two more recent developments, such as the city's overspill agreement with the new town of Glenrothes and the new measures for dealing with local unemployment, may help to make the whole matter a little less formidable than it was when this book was written, but the problem remains a major one.

PETER ROBSON

Cambridge.

The Social Evolution of Industrial Britain. By L. G. JOHNSON. (Liverpool: Liverpool University Press, 1959. Pp. 178. 25s.)

It is difficult to know what to say about Mr. Johnson's book, because it is difficult to see what he is driving at. The book seems to be a series of reflective essays, loosely connected by rough chronological succession, about the "integration" of the working class in modern British society. The precise meaning of the term "integration" is by no means clear, as witness such a sentence as "recurrent unemployment showed how loosely integrated society was" (p. 81). Similar difficulties beset us in the understanding of another of Mr. Johnson's key words, "creative." (E.g., "For, as the years moved on, it became clear that working people would have to adjust themselves to technological progress, which meant neither more nor less than adjusting themselves to themselves as the creators of a new material civilisation and to themselves as the citizens of a nation with a past as well as a future. This task offered unique scope for creative action within the

nation," p. 80.) What he seems to mean is: (a) that the working-class did not become revolutionary, but reformist, and (b) that in one way or another individual workers and working-class organisations contributed much to the technical skills and the political development of nineteenth-century Britain.

Both these statements (if they correctly represent the author) are unexceptionable, though they hardly provide an adequate analytical framework likely to interest the economist or the sociologist, and Mr. Johnson's discussion of the problems they incidentally raise will not be of much relevance to the historian. This is partly due to Mr. Johnson's total lack of interest in, or awareness of, what economists and sociologists are thinking about—he appears on at least two occasions to imply that economic fluctuations are capricious—partly to his curious chronological pace, partly to his odd use of terminology. (Is it really useful to describe the sentiments of the Chartists as "feudal"—pp. 45–6?). There are also pages where this reviewer at least is unable to follow the author's train of thought at all.

Though Mr. Johnson is widely read in the publications of the first half of the century, the book is not well documented. Such scattered quantitative statements about economic development as are made are mostly taken from contemporary secondary sources. There is little reference to the works of modern scholars in the relevant fields, and some internal evidence that the book was written several years ago, but not adequately brought up-to-date. It may safely be said that practically no problem of the social evolution of industrial Britain, as the term would be understood by most economists, sociologists and historians at present, is discussed.

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An Economic Survey of the Sisal Industry of Tanganyika. By C. W. GUILLEBAUD. (Welwyn: Nisbet and the Tanganyika Sisal Growers' Association, 1959. Pp. xiii + 119. 15s.)

THIS is a model monograph on an industry on which little has hitherto been known except to those engaged in it and, as Mr. Rowe points out in an Introduction, it is the first up-to-date and comprehensive survey of any of the hard-fibre industries. The idea of the survey was conceived by the Tanganyika Sisal Growers' Association under the leadership of the late Sir Eldred Hitchcock, but the volume which is now available is of interest to many who have no stake in the industry's fortunes. Many surveys are little more than descriptions of the industries with which they deal, but in this case Mr. Guillebaud has provided not merely an adequate account of the sisal industry of Tanganyika as it now is and as it has grown to its present position; he has also given an excellent analysis of its major problems.

The sisal industry of Tanganyika was started in 1892 when a German introduced a few sisal plants from Florida. The period of rapid expansion

started in 1923 when the output was 12,800 tons; in 1956 it was 185,600 tons. The estates are of mixed nationality. About a third of the output comes from Greek estates, with British-owned estates a close second, followed by estates of Asian, Swiss, Dutch, Italian and German ownership, in addition to which there is a small amount of African random sisal. Tanganyika now takes first place among the sisal-producing countries and provides about a third of the world's output. In terms of employment, although only about 5% of the African population in Tanganyika work for wages, including domestic service, nearly a third of the paid labour is employed in the sisal industry. In 1956 about a quarter of the country's exports came from sisal, and a considerable proportion of the country's tax revenue came directly or indirectly from the industry. Hence the importance of the industry to Tanganyika's economy.

The demand for sisal is very inelastic, mainly because the price of sisal enters so little into the costs of the sisal-using industries. The supply of sisal is also very inelastic in the short period, partly because the life cycle of the crop is from eight to twelve years but partly also because the crop is generally grown on land which is not suited to other forms of production. Variations in supply under these conditions can produce violent price fluctuations, and this has in fact been one of the industry's major problems, made even more difficult since the holding of stocks has not been the general practice. The possibility of weak-selling is a further complicating factor.

On the marketing side certain changes have occurred as a by-product of war conditions. Before the War most sisal growers disposed of their output through London finance houses, which in turn made use of merchanting firms to sell to the spinners, and the finance houses made advances to the growers against the ultimate sale of their sisal. The merchanting firms sometimes made advances to spinners, but in general they were unable to do more than act as brokers. In the holding of stocks they played little part, and Mr. Guillebaud is satisfied that their function was of little advantage to the growers.

During the War the disposal of sisal was subject to government bulk purchase arrangements. Since then most of the growers, representing about half of the output, became members of a voluntary Tanganyika Sisal Marketing Association which, by making monthly advances against production, performs a function similar to that previously performed by the finance houses. Many of the members of this Association are the smaller and weaker estates, and to this extent the Association may do something to reduce the influence of weak-selling tendencies. Mr. Guillebaud records his opinion, which seems to be well founded, that "the sisal market is probably too limited to permit the creation of a viable futures market."

In the matter of labour relations the industry has now evolved an elaborate system of joint consultation, with estate committees, regional councils and a central council. The preparation of this scheme was largely the work of

Mr. Guillebaud, though he does not say so, and there is evidence that despite a number of initial teething troubles, largely bound up with questions of union recognition, the scheme will play an important part in the country's structure of industrial relations.

Mr. Guillebaud is to be congratulated for producing so excellent a monograph.

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Forty Years of Foreign Trade: A Statistical Handbook with special reference to Primary Products and Under-developed Countries. By P. LAMARTINE YATES. (London: George Allen & Unwin, 1959. Pp. 255. 40s.)

THIS book is an important contribution to our knowledge of the trends in world trade during the first half of this century. Mr. Yates had originally set out with the intention of studying the economic policies of the more important under-developed countries in order to ascertain whether their policies, taken collectively, might have a significant influence on the character of international trade (p. 18), but found his purpose frustrated by the absence of detailed, comparable and comprehensive statistics of world trade. Consequently, he has devoted his effort to the collection of basic statistical data to fill the gap.

In this more restricted field Mr. Yates has covered a remarkable amount of ground, met most of his difficulties with ingenuity, raised a good number of important questions of policy and yet has produced an interesting and readable text. The statistical framework consists essentially of a detailed comparison of world trade in 1913 and 1953. For in 1913, the author has analysed the foreign trade of practically every important trading country into a large number of commodity groups, and this in itself must have been a major undertaking. For 1953, he used the United Nations' tabulations. He has also managed to "splice" into his series the figures for 1929 and 1937 published by the German Statistisches Reichsamt.

The book is concerned with three main themes: the trends in world trade as a whole and in the two main subdivisions, manufactures and primary products; the trends for each main primary product; and the trends in the trade of the principal countries. The long-term trends in world trade as a whole have already been analysed by F. Hilgerdt in 1945 and Professor W. A. Lewis in 1952. Mr. Yates' new series adds little here, except that he has a useful comparison of the 1953 situation with 1937 and 1913, excluding the present countries of the Soviet bloc. The point is of substantial importance in assessing the trends in trade in primary products and manufactures. Professor Lewis had remarked on the effective stability of the proportion of primary products in total world trade and had even taken this proportion as a constant in one of his equations. Yates shows that if

the present Soviet countries are excluded, the proportion fell from 62% in 1913 to 58.5 in 1938 and 56.1 in 1953.

The new material for 1913 is deployed with good effect in the analysis of changes in the area pattern of trade since that date in primary products and manufactures (Chapter 3). This is the first time that trends in *imports* in these major classes of goods have been analysed for each of the main under-developed areas, and a good deal of the export analysis is also new. On the import side, Mr. Yates shows that—again excluding the Soviet area—the volume of imports of manufactures in 1953 was substantially greater than in 1913 for all the main areas, with one exception: the British Isles, where there was a fall of over 10%. This abnormal development in British imports deserves further study; Mr. Yates by-passes it with the remark that Britain was never a significant importer of manufactures (p. 48), though she took 9% of world imports in this class in 1913, excluding the present Soviet countries, and 16% of imports into North America and Europe.

The chapters dealing with individual primary products, about half the book in length, are generally of a high standard. The analysis revolves round the trend in trade values, unit values and quantum indices, a more valuable approach than the usual one based on tonnage or other quantity units. That Mr. Yates has a mind for policy issues as well as for statistical methodology is apparent. In nearly all these commodity sections he raises questions of policy which clearly could not adequately be discussed within the compass of the present book. For example, will India attain self-sufficiency in rice? why have tea prices been relatively stable while coffee and cocoa prices oscillate violently? what are the long-term demand prospects for this, that and the other commodity? These and numerous similar queries may well irritate some readers, but if, in others, he has stimulated critical thought on what are, after all, vital policy issues for the primary-producing countries, Mr. Yates should be well content.

The final section, dealing with the fortunes of individual countries in foreign trade, contains much that is new and interesting. In 1913, for instance, there were twenty-two primary-producing countries which obtained more than half their export receipts from a single product; by 1953, eight of these had become diversified, but another sixteen entered the group of "one-commodity exporters," making thirty in all. All together, these thirty "exposed" countries account for nearly 40% of the exports of Africa, Asia and Latin America. Apart from a few countries, such as the petroleum exporters, most primary-producing countries are just as vulnerable to shifts in world demand to-day as they were in 1913. This is an important conclusion and underlines recent discussion concerning commodity "stabilisation" schemes. This last section also contains useful information on the commodity pattern of imports in 1913 and 1953 for a large number of countries, both industrial and under-developed.

Several points need to be borne in mind as regards the statistical pre-

sentation. The first is that no adjustments have been made for boundary changes between 1913 and 1953. This particularly affects the figures for Germany, and Mr. Yates meets the problem by submerging the German figures into a miscellaneous group of European countries. However, it might have been more useful for some purposes to have compared the 1953 figures for West Germany with even an approximate estimate for the pre-war trade of the present area of that country.

The second point is that Mr. Yates has presented all his main results in terms of volume as well as value. This is a particularly difficult operation for manufactured goods, and the results are clearly subject to a considerable margin of error. This Mr. Yates recognises, and the risk taken was a conscious one. For reaching broad conclusions about relative volume movements, the resulting figures at "constant" prices may not be very misleading. Unfortunately, the author has not done quite as well as was possible, since he uses Kindleberger's unit value index for Industrial Europe as a whole to deflate the exports of individual countries, even though the corresponding indices for each main European country were available in Professor Kindleberger's book. This leads to some odd results, as, for instance, when comparing the growth in the value (at constant prices) of exports of manufactures from different countries between 1913 and 1953 (p. 173); here one finds that the growth in the Canadian total in this period is given as three times that in the British. Had the respective national unit value indices been used, the differential in Canada's favour would have been substantially smaller.

Other points which might ensnare the unwary reader are the inclusion of "special category" exports from the United States in 1953 (these are essentially military aid and are normally excluded from international comparisons), and the inclusion in the 1913 figures of the Netherlands export totals, in spite of the author's explanation that these were based on inflated price lists and were inclusive of a substantial amount of transit trade. The technical discussion in the Appendix is likely to become standard reading for students and research workers in this field.

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The Economic Development of Communist China, 1949-1958. By T. J. HUGHES and D. E. T. LUARD. (London: Oxford University Press for the Royal Institute of International Affairs, 1959. Pp. viii + 223. 22s. 6d.)

THIS is a valuable book. Of all the dramatic passages in contemporary economic history, none equals in interest and importance the first ten years of development in New China. Since it excites violent prejudices, every witness is suspected of wishful thinking one way or the other. It is for this

reason that a cool, objective, documented account of the story is much to be welcomed.

Prejudice shows itself in adjectives. (We are resolute; they are ruthless. We are enlightened; they are doctrinaire.) By this test the authors are more anti than pro, but they are sparing of adjectives and do their best to let facts speak for themselves; in any case, this bias is a fault on the right side, for an extraordinary tale gains credence when the teller has evidently no preconceived desire to believe it.

The authors tell us that they have taken their material almost entirely from Chinese official publications, and that they have nothing but their own judgment to rely upon to evaluate it. They make use not only of the statistics of programmes and achievements but also of the many exhortations and criticisms of "bad work" that the authorities are continually issuing; from these and other hints they construct a picture of economic policy evolving through successive phases—the initial restoration of order, the quelling of inflation and initiation of the land reform; the inauguration of the first Five Year Plan; the "high tide" of 1956, when the bulk of agriculture was brought into co-operatives and the process of digesting private trade into the state system carried to the half-way stage of "joint state-private enterprise"; the pause in 1957 and the "great leap" of 1958.

Even upon cautious estimates, the rate of growth of industrial capacity is probably the most rapid the world has ever known, but this is only a matter of degree. There are three respects in which Chinese experience appears to differ radically from that of other nations. First, the transition in the space of ten years (except in the "old liberated areas" where experiments were carried out over a long period) from a harsh form of feudalism, through peasant proprietorship, to co-operative farming with an intermingling of industrial and agricultural production. Second, the organisation of labour, working almost literally "with bare hands," over the whole country, to produce capital works, such as the river-control schemes, and social investment, such as the famous annihilation of flies. Third, the absorption by the revolution of the great bulk not only of the old feudal and professional classes but also the mass of small traders.

The witness of this book, brief, factual and deliberately dry, will help to compel acceptance of the story, however improbable it may appear.

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JOAN ROBINSON

Germany's Economic Preparation for War. By B. H. KLEIN. (Cambridge, Mass.: Harvard University Press (London: Oxford University Press), 1959. Pp. xi + 272. 40s.)

THIS is a surprising book. The author is a German, apparently long resident in the United States. The material on which the book is based is derived from the United States Strategic Bombing Survey and from a variety

of official German data recently made available, including memoranda written by German generals and other German V.I.P.s for the Allied Control Commission after the War.

The book purports to be a major debunking operation. According to the author, Germany's preparations for war from 1933 to 1938 were on a much less massive scale, and much less efficiently conducted, than has been generally believed, while the handling of the German War Economy from 1939 to 1944 was also, from the point of view of efficiency, a mediocre performance, falling far short of the high standards commonly attributed to it by non-German commentators.

In particular, the author maintains that in the pre-war period the fear of inflation—Schacht seems to have been obsessed by this—severely slowed down the rearmament programme. Deficit financing was viewed with great apprehension in high places; the raw-material programme was patchy and half-hearted; and so was the mobilisation of man-power.

Nor, after 1939, does the author consider that the Germans came anywhere near achieving an all-out war effort comparable to that of Britain or, in some important respects, of the United States.

Evidence is offered in support of all these conclusions. It is, of course, impossible for a reviewer of this book to check up all this evidence and reassess its value. I can only say that, if these conclusions had come to me through British intelligence reports in 1940–42 when I was Minister of Economic Warfare, or earlier when, though not yet a Minister, I was making a pretty close study of German rearmament, I should have disbelieved most of them. Here, by way of illustration, are just a few of Mr. Klein's surprising statements.

(1) At the beginning of the war, in 1939, British and German aircraft production were about equal, and British tank production exceeded German; German "output of combat aircraft was only sixty per cent of the production rate credited to Germany by British intelligence" (p. 19).

(2) "In the pre-war period Germany produced both 'butter' and 'guns,' much more of the former and much less of the latter than has been commonly assumed. By 1937 German civilian consumption, investment in consumer goods industries and Government non-war expenditures equalled or exceeded previous peak levels" (p. 76).

(3) "In January 1941 Hitler ordered preparations to be made for an attack on Russia. The scale of this was quite modest and entirely consistent with the idea that the conquest of Russia required no more than a blitzkrieg" (p. 189).

The controversies opened up by this book can only, I think, be carried further by a confrontation of rival economic war historians, each soaked in his own national detail.

London.

DALTON

NOTES AND MEMORANDA

HOW LONG IS THE LONG RUN?¹

IN the theory of the firm, the long run is normally conceived not as a fixed time period, but rather as a time period long enough to permit all necessary adjustments required to attain any given level of output. The long-run cost curve is supposedly made up of the various possible plant curves through the ranges of output from the intersection of each plant curve with the one preceding and the one following. It is a curve where the various possible methods of organisation of factors are all given. Other things remaining equal, any point on it can be reached *given sufficient time*. Static theory requires no more than this. Of course, other things *must* remain equal, and this includes technological development.

But something began to trouble me about this definition nearly as soon as I thought about it seriously. Does this long-run cost curve include in its definition an allowance for *expected* technological development, and a risk allowance for "surprises" which can be guessed at with some accuracy? How long would it take to get the new developments into the operative stage? Is a point far out on the curve realisable in the time it takes to build the required plant? How fast can the firm expand, if it is already in existence, and how soon could a firm produce at some selected output if it starts fresh?

Not being able to decide just what the long run was after raising these questions, I went back to Viner to see if he had tightened up Marshall's definition. He repeats Marshall's notion: "... a period long enough to permit each producer to make such technologically possible changes in the scale of his plant as he desires."² And he adds:

"The theoretical static long-run . . . is a sort of 'timeless' long-run throughout which nothing new happens except the full mutual adjustment to each other of the primary factors existing at the beginning of the long-run period. It is more correct, therefore, to speak of the long-run equilibrium in terms of the conditions which will prevail after a long-run rather than during a long-run."³

This way of looking at the long-run seems to exclude the notion that the long-run cost curve is a *planning* curve for the individual firm. Predictable changes in the famous (or infamous) *ceteris paribus* do occur in firms, and other changes are often quantified in risk allowances in long-run

¹ I wish to express my gratitude to the Social Science Research Council for making possible my work on this and related subjects in the theory of the firm.

² "Cost Curves and Supply Curves," *Zeitschrift für Nationalökonomie* (1931), reprinted in *Readings in Price Theory*, p. 205.

³ *Ibid.*, p. 206.

planning. Plans on the drawing-board but not available for production for two years are compared with plans on the board not available for five years. New substitutes which are expected from suppliers in the next year may be integrated into next year's production plan. The trend of "surprises" which have been occurring at fairly regular intervals over the past few years can be projected into the future. Taking these planning problems into account, the long-run cost curve would have to be redefined if it were to be thought of as a *planning* curve. A point at output x would have to be defined according to how long the firm was willing to wait.

That firms would take time to reach various positions on the long-run cost curve is not a new idea. It was implicit in Marshall's definition, and it has been taken up by Shove, Robertson, Andrews and Harrod¹ as an explanation of why some firms faced with long-run decreasing costs in competitive industries did not just leap ahead and capture the whole of their markets. For some reason this point never achieved its just position as an important explanation of firm behaviour in the presence of long-run decreasing costs. Perhaps this is so because no one has taken the pains to point out explicitly that every point on the Marshallian long-run curve has minimum date attached to it. Furthermore, that date will usually be different for each point.

From this stand one might take one further step and say that the rate of growth of output on the long-run curve is limited. This proposal was made by Penrose in theoretical terms.² The argument is that the capacity to reorganise and assimilate new factors is limited in any one period of time. Empirically there seems to be justification for the idea that growth rates are limited.³

Harrod seems to have struck this stone in his recent attempt to clear up some of the excess capacity muddle.⁴ As a result, he suggested that the long-run cost curve should be defined to include only those returns realisable as soon as additional plant is constructed and labour recruited. At first glance this may look the same as the usual interpretation. One might think that the "all necessary adjustments" condition would handle this. But a careful consideration of his suggestion reveals some things which upset the usual convenient qualification. Change takes time, as has been shown. A plant already in existence has a number of commitments which can be changed only over a long period without entailing excessive cost increments. Labour has to be reassigned and retrained, machines have to be rearranged,

¹ Shove's essay in "Increasing Returns and the Representative Firm," a symposium in this journal, 1930; D. H. Robertson, *e.g.*, in *Economic Commentaries*, p. 23; P. W. S. Andrews, "Industrial Analysis in Economics," *Oxford Studies in the Price Mechanism*, p. 162; R. F. Harrod, "The Theory of Imperfect Competition Revised," *Economic Essays*, p. 184.

² E. T. Penrose, "Limits to the Size and Growth of Firms," *American Economic Review*, Supplement, May 1955.

³ Cf. M. K. Wood, "Representation in a Linear Model of Non-linear Growth Curves in the Aircraft Industry," in Koopmans, *Activity Analysis of Production and Allocation* (1951).

⁴ "Theory of Imperfect Competition Revised."

buildings have to be altered or destroyed and others built. Even the firm starting out fresh can choose between plants capable of almost immediate production (perhaps in existing plants sold by other industries) and others capable of production only after a definite delay or waiting period. Harrod asked that the curve be limited to outcomes *immediately realisable* as soon as the physical process of acquiring and organising the factors was finished.

This seems too strict if expected developments are to be considered side by side with currently feasible possibilities. I suggest that we go a little further than Harrod. One long-run cost curve, or planning curve, or whatever you want to call it, ought to be defined in the Harrod sense. But there ought to be a set of other, longer-run, planning curves which take into account the expected changes and the "surprise" projections mentioned earlier. For each date in the future for which a business-man wishes to

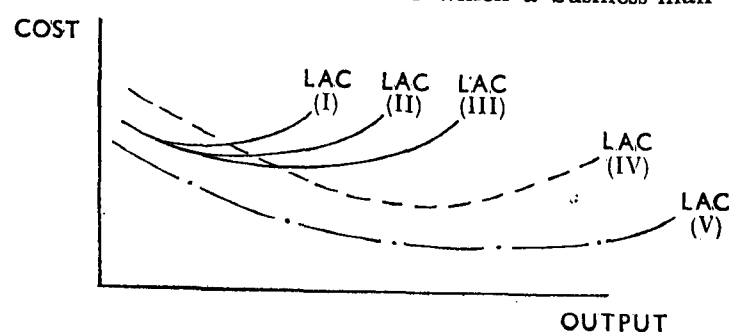


FIG. 1

make a plan a different long-run cost curve applies. In Fig. 1, LAC (Long-run Average Cost) (I) represents the Harrodian long-run. LAC (II) may be the envelope of possible plants in two years time, LAC (III) in three years time, and so on. Some of the LAC curves may lie wholly under the earlier period curves, as in the case of LAC (V). Moreover, on the Harrodian curve each position has a date attached to it also. The Harrodian long-run curve is made up of a series of levels of output, each of which are attainable at some date in the near future, say less than one year, depending on the gestation period and the possible rate of growth. But movements from one plant to another on the Harrodian curve may take different lengths of time up to one year, depending upon how far along the envelope one planned to go from one's initial position.

It could now be proposed that there are an infinite number of LAC curves as I defined them, and this would be correct. In actual planning the business-man may chart curves (at least roughly) for distinct periods, as in the figure, in order to simplify the decision process and in order to provide only a few curves about which information has to be provided. As far as static economic theory is concerned, this is all to the good. Each possible decision period takes on the form of ordinary static theory periods, and a period decision model is provided.

This restatement, if accepted, leads to all sorts of conclusions about possible and planned growth rates of firms, linearity of empirical cost curves, decision variables for maximising profits in a changing environment and so on.

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THE "ECONOMIC EFFICIENCY" OF TAXATION: A NOTE¹

In a recent article Dr. A. Morag² had focused attention on a particular aspect of economic efficiency in taxation. The purpose of this note is to comment on some of the ideas involved.

The starting point of Morag's argument is that if two taxes are similar in all respects except that tax A requires a larger money yield than tax B, then tax B can be defined as more efficient than tax A. This proposition is developed by a comparison between the requirements, from a fiscal policy view-point, of yields under a general sales or expenditure tax, on the one hand, and a personal income tax, on the other. As the former will have substitution effects encouraging more saving than the latter, a lower-yield expenditure tax will have just as strong an anti-inflationary effect as a higher-yield income tax. Therefore it will follow that in the former case the Government can finance a larger proportion of any given level of public expenditure by issuing stock or creating credit. The final link in the chain of reasoning is the assertion that the private sector derives a measure of utility from holding these larger liquid balances.

The first point we shall take up is the linkage between tax-yield requirements and the incurring of a deficit. The second will be to examine the likely size of the permissible annual deficit in the expenditure-tax/income-tax comparison after allowing for all the complications. The third will be to inquire into the advantages and disadvantages of larger private holdings of cash or Government debt. The fourth will be to make a brief observation on the logic of the approach.

It can easily be seen that if tax B does not necessitate as high a money yield as tax A, it is a *non-sequitur* to argue that the Government deficit *must* be greater in the former case. Consider the choice between a general consumption tax and an excise tax on X, the product the Government wishes to buy with its tax revenue. It can then be shown³ that under certain assumptions—and particularly that of production under conditions of increasing costs—the general tax will necessitate a larger absolute yield in money terms and a larger ratio of yield to national income at factor cost than the partial

¹ I am indebted to Mr. M. J. Farrell for helpful comments on an earlier draft of this note.

² A. Morag, "Is the 'Economic Efficiency' of Taxation Important?" *ECONOMIC JOURNAL*, March 1959.

³ Cf. R. A. Musgrave, *The Theory of Public Finance* (McGraw Hill, New York, 1959), pp. 155-7.

tax.¹ However, it does *not* follow that the private sector is left holding more Government debt or cash in the partial-tax case.² It is precisely because the Government has to pay a higher price (net of tax) for X in the general tax case that it then needs to collect more revenue. The proposition that tax B necessitates a smaller money yield than tax A is a necessary but not a sufficient condition for the private sector to acquire more liquid assets in the tax B than in the tax A case.

It must therefore be concluded that there is no identity between tax efficiency in the sense of minimising the ratio of tax to national income at factor cost and in the sense of maximising the excess of Government expenditure over Government revenue. If one compares two taxes with differential substitution effects on saving, such as an expenditure tax and an income tax, the two things may come together. But they will not do so in all circumstances.

Let us now concentrate on the comparison with which Morag is principally concerned, *i.e.*, that between an expenditure or general sales tax and an income tax. His main reason for arguing that a smaller yield will suffice in the former case to secure any given degree of restriction is the substitution effect on personal saving. Only brief reference is made to two other supporting arguments which are sometimes made: that a general sales tax is likely to strike more at lower-income groups and less at upper-income groups than a personal income tax and that money illusion may also lead to greater expenditure restraint in the sales-tax case. As, however, the same author has expressed reservations about these arguments in another context,³ he would presumably not wish to rely heavily on them here. We can therefore simply ask, first, how much weight can be placed on the substitution effect and, secondly, what further considerations have to be borne in mind in estimating the likely increase in the holdings of Government debt and cash by the private sector.

The additional inducement to save if the tax base is changed from income to consumption has been the subject of some discussion in recent years,⁴ and it would seem that the relevant elasticity can take a series of possible values depending on the rate of interest, relative tax rates, the length of time for which it is intended to save any particular sum and whether the change of tax base is temporary or permanent. Therefore the "primary" position

¹ How much larger depends on whether the balanced budget multiplier is deemed to be operating.

² Nor does it follow that the partial tax is more efficient in the sense of minimising excess burdens. The reverse is, in fact, the case, as the very success of the partial tax in minimising yield requirements is due to the stronger substitution effects and the greater loss of surplus than in the general tax case (cf. Musgrave, *loc. cit.*).

³ "Deflationary Effects of Outlay and Income Taxes," *Journal of Political Economy*, June 1959.

⁴ Cf. N. Kaldor *An Expenditure Tax* (Allen and Unwin, London, 1955); Musgrave, *op. cit.*, Chapter 12; A. R. Prest, "The Expenditure Tax and Saving," *Economic Journal*, September 1959.

may or may not be one in which the sum collected in tax can be considerably reduced as a result of the change in tax base, without adding to inflationary pressure. Let us suppose that it can. Is this the end of the story? Obviously not, as we now have to ask how private consumption and investment are likely to be affected as a result of the annual change in the stock of Government securities and/or cash. These "secondary" effects are not considered at all by Morag.

There is an extensive literature on these matters, some of it very recent,¹ and it would be otiose to repeat all the arguments here. But as far as private investment is concerned, one has to ask whether expected returns or interest rates are likely to differ in the two situations. The method of financing the Government deficits (credit creation will tend to keep interest rates lower than debt issues) and the importance of the availability of funds of one's own (*e.g.*, is private investment more likely if people are left with liquid balances than if taxation siphons them off?) are perhaps the main headings to be considered. On the consumption side, one has to know the extent to which the money value of assets increases (partly a function of the *size* and partly of the *method* of Government deficits) and the effects of any given increase on consumption spending. Finally, one must not forget the linkages between investment and consumption; whether for instance, accelerator effects of the latter would promote investment even if wealth effects did not. The most likely guess about all these secondary effects is that they would increase spending, and that therefore the annual gap in tax yield could not be as high as considerations of primary issues alone would allow. But whatever the precise result, there is no excuse for leaving secondary effects out of consideration altogether.

If as a result of this analysis we arrive at the permissible budget deficits in the consumption-tax case, what are the advantages for the community of this state of affairs? We are now at the heart of Morag's argument, and so it deserves our closest attention.

Morag² argues "utilities of individuals are not derived only from real resources," "money gives utility for individuals . . . because it can be held," "money reserves provide security against financial embarrassment." One can agree that there is something in these statements, but one must also say straightaway that any comprehensive analysis must range much further. The heads of the arguments can be listed as follows. The advantages of greater liquid assets will be expressible partly in monetary terms and partly in non-monetary—security, reserve power and so on. The importance of these gains will depend on such factors as the existing ratio of assets to total income, the distribution of assets by income groups and other possibilities of

¹ J. E. Meade, "Is the National Debt a Burden?" *Oxford Economic Papers*, July 1958 and February 1959. J. M. Buchanan, *The Public Principles of Public Debt* (Irwin, Homewood, Illinois, 1958).

² *Op. cit.*, p. 92.

improving the capital market so as to make personal borrowing easier. The possible disadvantages will be an increase in tax rates and greater administrative expenses. How much and how soon tax rates will rise is a complicated matter, depending on, *inter alia*, the method of financing the deficit, but it would seem inevitable that the rate of tax on current expenditure should eventually be greater than that corresponding to the tax rate on income which would be needed in the income-tax case.¹ If this be so, the whole question of incentives to work or to take risks must be looked at. As these matters have recently been explored elsewhere,² it is unnecessary to repeat the arguments here. The simple point is that work-output and/or risk-taking *may* be pushed farther away from the optimum in these circumstances. As far as administrative expenses are concerned, the relevant question is whether a system of more borrowing and a smaller tax yield will involve greater real public expenditure than one of less borrowing and a higher tax yield.³ Obviously one cannot be dogmatic about the answer; but that is no excuse for not raising the matter.

To summarise this part of the argument, one simply cannot say that greater indebtedness of the public to the private sector is *necessarily* an advantage to the latter. Consequently, one cannot accept Morag's argument that the amount of such indebtedness is a fundamental test of the merits of a tax.

Finally, there is a point of logic in this approach which must be examined. If one is positing that two taxes should not have equal yields and that, as a consequence, in one case the volume of cash and/or national debt must be different from the other, it is simply not legitimate to claim that one can then compare the relative efficiency of two *taxes*. All that one can compare is the relative efficiency of one tax system and the set of associated monetary

¹ If 100x% is the income-tax rate, 100e% may be labelled the equivalent rate of expenditure tax where $e = \frac{x}{1-x}$. There are three reasons why the actual rate of expenditure tax may have to be greater than the equivalent rate, if deficits are financed by increases in National Debt. The primary substitution effects in favour of saving may be small in the expenditure-tax case, the secondary ("wealth") effects on spending may be important, and so may spending out of additional interest receipts. Even if the first reason were insufficiently strong to push the actual rate above the equivalent rate, the last two must do so sooner or later.

If deficits are financed entirely by credit creation the private sector suffers neither the advantages of higher interest receipts nor the disadvantages of higher tax payments to offset spending out of interest receipts. Nevertheless, one must still expect the ultimate expenditure-tax rate to be above the equivalent rate in order to offset the wealth effects, which will tend to be greater than in the Debt case.

It should be noted that there are no pronouncements about *absolute* tax rates in this analysis. We are concerned with the *relative* levels of income- and expenditure-tax rates.

² Prest, *op. cit.*

³ The comparison of the relative administrative costs of expenditure and income taxes is of immense importance, but is not relevant here, as we are confining ourselves to Morag's question: the relative merits of two taxes similar in all respects except the money yield required to restrict private spending to a specified level.

conditions with another tax system and its associated monetary conditions. The "economic efficiency" of *taxation* is a misnomer.

A. R. PREST

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THE SHARE OF WAGES IN NATIONAL INCOME AND THE TERMS OF TRADE: A REJOINDER

IN a Note in the December 1959 issue of this JOURNAL Mr. D. T. Healey presents statistics to show that in the period 1870-1957 no consistent association between short-run changes in the terms of trade and short-run changes in the share of wages in national income exists—thereby refuting a proposition that I had tentatively advanced in an earlier article.¹ Whilst I do not hold very firmly to the proposition advanced in this article—namely, that in the short run the share of wages and the terms of trade are inversely related—none the less, I do not think Mr. Healey's statistics successfully disprove it.

Mr. Healey agrees that an inverse correlation seems to exist in the period since 1939 (see his Chart I and the accompanying table), but he notes that there are three years when it does not hold. If, however, instead of using *Personal Income* as the basis for calculations of wage share, Mr. Healey had used home-produced *National Income*, adjusted for stock appreciation, he would have found that the correlation holds almost perfectly. The changes are given in the following table.

	% change in terms of trade	% change in the share of wages in national income.*
1946-7	- 6.4	+7.4 †
1947-8	- 1.7	+1.5 †
1948-9	+ 0.8	-1.3
1949-50	- 6.8	+0.7
1950-1	-11.2	-0.2
1951-2	+ 7.2	-2.5
1952-3	+ 7.8	-0.7
1953-4	- 0.8	+0.2
1954-5	- 1.7	+3.2
1955-6	+ 2.5	-0.1
1956-7	+ 2.5	-0.2

Sources: Terms of Trade: Healey, *op. cit.*

Wage Share: Calculations from Tables I and II, 1956 and 1958 Blue Books on National Income.

* Domestically produced National Income, adjusted for stock appreciation.

† Domestically produced National Income plus Depreciation, adjusted for stock appreciation.

Paradoxically, the only exception to the rule occurs in 1950-51, when the worsening in the terms was very severe. This might be due to the fact

¹ G. Maynard, "Inflation, the Terms of Trade, and the Share of Wages in National Income," *ECONOMIC JOURNAL*, December 1958.

that 1951 was a very transitional year: the terms of trade worsened sharply in the first six months, as against the end of 1950, but improved equally sharply in the last six months.

The question whether *Personal Income* or *National Income* should be used as the basis for wage-share calculations cannot be answered dogmatically: it presumably depends on the purpose one has in mind. But in estimating or using any "national" income concept it is customary to attempt to eliminate capital gains, and to compute all costs in real terms, that is, in terms of replacement rather than original value. In principle, at least, therefore, *stock appreciation* (which measures the extent to which the valuation of stocks used up in current production differs from current replacement cost) should be eliminated. When prices are rising the accounting charge of stocks used up tends to fall short of current replacement cost, so that business profits as computed in accounting records tend to be overstated. They, therefore, should be adjusted downwards by subtracting an estimate of stock appreciation. When prices are falling, of course, the opposite is true. The point is relevant here, since swings in foreign-trade prices, particularly in import prices, are a major cause of discrepancy between original and replacement values so far as stocks are concerned; so that in testing a possible association between foreign-trade prices and the share of wages in national income we must take care to eliminate the effect of the former on "accounting" business profits. No doubt in practice the estimation of stock appreciation is a difficult matter and is not likely to be accurate, but since the Central Statistical Office provides such estimates for the post-war period, they might as well be used.

However, so far as I am aware, estimates of stock appreciation are certainly not available for earlier years back to 1870, so that estimates of national income for these earlier years remain uncorrected. Whilst it may still be the case that no association between the terms of trade and the share of wages in national income would emerge, even if national-income figures could be corrected for stock appreciation, none the less, Mr. Healey has not shown that it would not or could not.

GEOFFREY MAYNARD

University College, Cardiff.

CURRENT TOPICS

THE Annual Meeting of the Royal Economic Society will be held at the London School of Economics on Thursday, July 7 at 5 p.m. After formal business, The Rt. Hon. Reginald Maudling, President of the Board of Trade and Mr. A. C. L. Day will open a discussion on "Problems of European Trade and Relations."

THE editors wish to call attention to the following letter, which has appeared in a number of newspapers and periodicals:

"A CAMBRIDGE APPEAL"

"From Mr. George Rylands and others.

"Sir,—Twenty-four years ago Maynard Keynes built a Theatre at Cambridge at his own expense and soon after presented it in Trust to the University and City. With next to no financial aid the Trustees have carried on his declared intention of making available to a large theatre-less region of England the five arts of drama, opera, ballet, music and film; securing West End products when feasible; welcoming visits from international touring companies and from various repertory companies; sponsoring special Trust productions for presentation in Cambridge and elsewhere; arranging symphony concerts, chamber music, and poetry and music recitals; providing training, experience and opportunity from time to time for the best amateur talent and promise, in acting, direction, music, design and stage management. The success of the Cinema, which the Trust also runs, has kept the Theatre barely solvent. But rising costs and the impact of television compel the Trustees to appeal for a capital endowment fund of £75,000 if standards are to be maintained and activities extended. The provincial theatre today is in a precarious state and there have been many casualties.

"We appeal on behalf of the Cambridge Trust not only to those who may wish to show their admiration and gratitude for Keynes' services at the Treasury and Bretton Woods during the War; not only to the countless friends and lovers of Cambridge throughout the world; but also to those who believe in the value of the living theatre as a cultural asset to be cherished more devotedly and generously in an age of rapid scientific and technical expansion.

"Donations should be sent to the Chairman, Cambridge Arts Theatre Trust. Forms of covenant are available on request.

Yours faithfully,

GEORGE RYLANDS, <i>Chairman</i>	} Trustees
WALLACE COLE, <i>Mayor of Cambridge</i>	
NOEL ANNAN, <i>Provost of King's College</i>	
SYBIL THORNDIKE	R. A. BUTLER
NINETTE DE VALOIS	C. P. SNOW
MARGOT FONTEYN DE ARIAS	ROY HARROD
ADRIAN	PETER HALL"

P.O. Box 17, Cambridge.

The editors would wish to add a special appeal to readers of the *ECONOMIC JOURNAL*, of which Maynard Keynes was editor for 33 years, while contributing to the financial prosperity of the Royal Economic Society by managing its investments. As many of our readers know, Keynes devoted much time and energy to promoting the interests of the Arts, and took some pride in the link he provided in his own person between the business of material production and high cultural values. Of his many projects, the Cambridge

Arts Theatre was especially near his heart. He believed that, with the co-operation of King's College, the owner of the site, he had built a theatre which would carry on in perpetuity the best kind of productions, and that he had established a solid financial basis for the Trust, combining University and City representatives, to which he handed it over. The War and its aftermath produced developments in relation to the finance of theatrical ventures which he could not have foreseen before the War.

We believe that he would have been deeply distressed by the idea that the Theatre, to which he had devoted so much of his care, was falling into financial difficulties that might prejudice it in continuing the achievement of the aims for which he built it. While this may not be judged a proper object for the generosity of the Royal Economic Society itself, which is contributing to the memory of Keynes in other ways, it is hoped that economists who read the JOURNAL may like to express their gratitude to Keynes and their own sense of the importance of the fine arts, by making their own contributions.

R. F. H.
E. A. G. R.

THE British Association for the Advancement of Science will meet this year at Cardiff, August 31–September 7. The following speakers will address the Economics Section (F): Professor R. S. Sayers, Presidential Address, Monetary Institutions and Monetary Policy in Great Britain. The Usefulness of Research Techniques Developed Since the War: Mr. L. A. Dicks-Mireaux and Mr. A. Maizels, National Institute of Economic & Social Research; Mr. A. H. Hazlewood, Mr. Peter Vandome and Mr. T. P. Hill, University of Oxford Institute of Statistics; Mr. W. B. Reddaway and Mr. J. R. S. Revell, Department of Applied Economics Cambridge; Professor A. W. Phillips, London School of Economics. Population: Professor D. V. Glass and Professor Brinley Thomas. Also Professor W. A. Lewis will contribute to a Symposium on World Food and Population.

Inquiries regarding accommodation and other arrangements for the meeting should be addressed to the British Association for the Advancement of Science, 18 Adam Street, Adelphi, London, W.C.2.

THE following have been admitted to Life Fellowship of the Society:

Chuttar, K. D.	Leung Cho-Keung	Moss, R.
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Fee, R. M.	Mehra, K. M.	Wright, J. F.
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Kosloff, I. R.		

THE following have been admitted to Fellowship of the Society:

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RECENT PERIODICALS AND NEW BOOKS

Journal of the Royal Statistical Society

- VOL. 122, PART 3, 1959. *The Comparison of Survival Curves*: P. ARMITAGE. *ERNIE—A Mathematical and Statistical Analysis*: W. E. THOMSON. *Private Motoring and the Demand for Petrol*: J. S. CRAMER. *A Survey of Fellows: II*: K. GALES. *Wholesale Prices in 1958*.
- VOL. 122, PART 4, 1959. *The Economics of Housing and Urban Development*: P. A. STONE. *Simulation Studies of Industrial Operations*: P. V. YOULE, K. D. TOCHER, W. N. JESSOP and F. I. MUSK. *The 125th Anniversary of the Royal Statistical Society. Annual Report of the Council*.
- VOL. 123, PART 1, 1960. *Statistics as a Tool of Management*: SIR HUGH BEAVER. *Practical Experimentation as a Teaching Method in Statistics*: G. H. JOWETT and H. M. DAVIES. *The Critical Community Size for Measles in the United States*: M. S. BARTLETT. *Card-matching Experiments: A Conspectus of Theory*: N. T. GRIDGEMAN. *Business Concentration in the United Kingdom*: P. E. HART. *Comparative Death-rates per Person-mile Associated with Various Forms of Transport, 1952-57*: F. GARWOOD and G. O. JEFFCOATE.

Applied Statistics

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Economica

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The Review of Economic Studies

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The Manchester School of Economic and Social Studies

- VOL. XXVIII, No. 1, JANUARY 1960. *The Restrictive Practices Court on Competition and Price Restriction*: J. B. HEATH. *Patents and Progress in Radio*: S. G. STURMEY. *Lancashire and Latin-America 50/60 Years Ago*: W. H. ZIMMERN. *Mr. Spiegelglas on World Exports*: R. G. OPIE. *Extraneous Estimates and Goodness of Fit: A Problem in Empirical Economics*: S. F. KALISKI. *A Monthly Index of Wage-rates by Industries*: J. R. CROSSLEY. *Wages, Productivity and the Level of Employment: More on the "Wage Drift"*: H. A. TURNER.

Scottish Journal of Political Economy

- VOL. VII, No. 1, FEBRUARY 1960. *The Determinants of Wage Structure*: D. J. ROBERTSON. *The Forestry Commission and the Use of Hill Land*: K. R. WALKER. *Linear Programming and Economics Courses*: D. DOSSER. *Trade Unions and the State*: J. A. MACK.

Yorkshire Bulletin of Economic and Social Research

- VOL. 11, No. 2, DECEMBER 1959. *Some Conditions of Useful Competition*: B. R. WILLIAMS. *The Restrictive Trade Practices Act 1956*: A. BEACHAM. *Public Expenditure on the Arts in Great Britain*: G. MILLS. *The Restrictive Trade Practices Court in Action*: S. R. DENNISON. *A Tribute to the Life and Work of Seebohm Rowntree*: C. H. W. WALLACE. *Progress under the Restrictive Trade Practices Act 1956*: R. L. SICH. *Seebohm Rowntree's Contribution to the Study of Poverty*: R. W. DRINKWATER.

The Economic History Review

- VOL. XII, No. 3, APRIL 1960. *International Trade and the Rate of Economic Growth*: K. BERRILL. *Evidence of Weather in the Account Rolls of the Bishopric of Winchester, 1209-1350*: J. TITOW. *Josiah Wedgwood: An Eighteenth-century Entrepreneur in Salesmanship and Marketing Techniques*: N. MCKENDRICK.

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London and Cambridge Economic Bulletin

- No. 33, MARCH 1960. *The Economic Position. The Problems of Coal and Energy Policy*: E. A. G. ROBINSON. *Research and Development in Britain*: B. R. WILLIAMS. *Prices and Wages*: R. G. D. ALLEN and H. S. BOOKER. *Quarterly Income and Expenditure*: C. H. FEINSTEIN. *International Finance*: A. C. L. DAY. *Home Finance*: R. F. G. ALFORD and H. B. ROSE.

National Institute Economic Review

- No. 7, JANUARY 1960. *The Economic Situation and Prospects*.
- No. 8, MARCH 1960. *The Economic Situation. British Imports of Manufactured Goods*: G. F. RAY. *Calendar of Economic Events, 1955-59*.

The British Journal of Sociology

- VOL. XI, No. 1, MARCH 1960. *What is European Culture?: L. VON WIESE. How Long is a Generation?: B. M. BERGER. The Re-organisation of the Trade Union Congress, 1918-1927: V. L. ALLEN. Genetics, Social Structure, Intelligence and Statistics: J. W. THOMPSON. Determinants of Support for Civil Liberties: H. C. SELVIN and W. O. HAGSTROM. The Relations of Race: A Review of New Writing: M. FREEDMAN. Sociology and Social Pathology: T. H. MARSHALL*.

The Farm Economist

- VOL. IX, No. 6, 1959. *Planning Again: A Study of Farm Size and Layout*: R. N. DIXEY and A. H. MAUNDER. *A Pilot Survey of Herbicide Practice in North West Oxfordshire*: E. K. WOODFORD and B. M. CHURCH. *Short-term Variations in Retailing Margins on Fruits in East Pakistan*: G. R. ALLEN. *Productivity of Concentrates in Feeding Dairy Cows: A Rejoinder*: J. E. BESSELL. *A Comment on J. R. Bellerby's Explanation of the Level of Income in Agriculture*: ANNE MARTIN.

Journal of Agricultural Economics

- VOL. XIII, No. 4, JANUARY 1960. *Agricultural Economics in Retrospect*: SIR KEITH MURRAY. *Agricultural Economics in France*: D. R. BERGMANN. *The Effect of Decontrol on the Grain Trade as it Affects the Country Merchant*: A. R. HEYGATE. *Some Impressions and Observations of an Agricultural Economist in Industry*: O. T. W. PRICE. *Trends in the Consumption of Citrus Fruit in the United Kingdom*: A. D. BAIN and J. A. C. BROWN. *Levels of Feeding and Milk Yields per Cow*: T. W. GARDNER. *The Economic Theory of the Use of Pesticides: I*: P. M. HILLEBRANDT. *An Application of Linear Programming*: G. TYLER. *Hill Farming Subsidies: A Reply*: B. R. DAVIDSON and G. P. WIBBERLEY. *A Comment*: E. A. ATTWOOD.

British Tax Review

- NOVEMBER–DECEMBER 1959. *Surtax Cut by Half?*: G. S. A. WHEATCROFT. *Estate Duty Saving: Sale with Reservation of a Life Interest*: D. J. M. CAMPION. *Retrospective Fiscal Legislation*: E. FLETCHER. *Bargain Pension*: N. D. VANDYK. *European Tax Systems—Can the U.K. Learn Anything?*: E. B. NORTCLIFFE.
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The Banker

- VOL. 110, No. 408, FEBRUARY 1960. *Credit for the Reflation. Dearer Money and the Deutschmark*: R. E. LUKE. *What Flight from Gilt-edged?*: E. V. MORGAN. *The Banks and their Profits. Freer Prices—What Progress?*: J. B. HEATH.
- VOL. 110, No. 409, MARCH 1960. *Railroaded to Inflation? America Recoils from Dearer Money. Development Aid and World Reserves*: F. HIRSCH. *Another Look at "Liquidity"*: H. B. ROSE. *Irish Banking and the Growing Economy*: G. QUINN.
- VOL. 110, No. 410, APRIL 1960. *The Budget and Gilt-edged. The Sick Man of British Transport*: J. E. HARTSHORN. *Testing Britain's Tax Laws. Monetary Policy in Action (The Radcliffe Evidence). American Banks in the Expansion*: F. E. DANIELS. *Staffing the Banks*: W. J. THORNE. *The Changing Face of Scottish Banking*.

The Bankers' Magazine

- VOL. CLXXXIX, No. 1391, FEBRUARY 1960. *Five per cent. Bank Rate. Banking Results for 1959. Trustees and their Investment Powers*: MARGARET RIX. *An Appraisal of Recent Developments in British Banking*: LORD PIERCY. *Survey of Economic Conditions in the U.S.A.: An Economy Poised for Expansion*.
- VOL. CLXXXIX, No. 1392, MARCH 1960. *The Expansion of Share-ownership Mutual Funds and Unit Trusts*: S. WAINWRIGHT. *Business and Uncertainty*: G. L. S. SHACKLE. *Banking and Economic Conditions in the Irish Republic in 1959*: G. A. DUNCAN. *Survey of Economic Conditions in the U.S.A.: Some Curious Gyration in Wall Street. Germany: An End to Illusions*: M. J. BONN.
- VOL. CLXXXIX, No. 1393, APRIL 1960. *The Radcliffe Evidence. Building Society Trends*: M. RIX. *The American Balance-of-payments Problem*: L. R. KLEIN. *Survey of Economic Conditions in the U.S.A.: Some Signs of Weakness in Demand. Banking, Finance and the National Income Accounts*: J. R. WINTON. *New Methods in Banking*: R. HINDLE.

Barclays Bank Review

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- No. 5, 1959. *Decisive Steps in the Planned Construction of Communism. On Certain Problems in the Improvement of Material Incentives in Industry:* Ts. PETROV. *For the Integrated Development of the Building Materials and Components Industry:* V. STALEV. *The Economic Effect Arising from the Improvement in Coal Quality and the Introduction of New Industrial Classifications:* K. BELCHEV and N. KOLEV. *On the Volume and Structure of Our Grain Production:* KH. KUNCHEV. *The Rational Use of Working Capital—an Important Factor in Improving the Financial Situation of Industrial Enterprises:* D. KHRISTOV. *On Some Questions of the Organisation and Remuneration of Labour in Instrument-making:* D. SHOPOV, L. MAIROV and S. DOSEV. *The Reorganisation and Improvement of the State Administration of Socialist Industry in the German Democratic Republic:* G. FRIEDRICH and R. YANAKIEV. *A Jubilee Session of the Higher Economic Institutes:* T. DINKOV.
- No. 6, 1959. *Prospects for Developing the Urban Trade Network and the Introduction of Progressive Methods in Retailing:* G. GEORGIEV. *The Rise in the Needs for Foodstuffs of Animal Origin and Possibilities for Their Satisfaction:* KH. KUNCHEV. *On Cost Prices in the Dairy Farms of Collectives near Sofia:* G. SVINAROV. *On the Introduction of Certain Types of Containers:* T. TODOROV. *On the Index Number of Global Production of Industry:* E. DRAGANOV. *Attempts to Control and Plan Agricultural Development in Capitalist Countries Today:* G. TSIVETKOV. *For the Further Expansion of Building:* I. R. and S. M. *The Common Market and Its Role in the Economics and Politics of Contemporary Imperialism:* V. GEORGIEVA. *A Symposium on Questions of Planning Scientific Research:* N. V.

Finansi i Kredit (Bulgarian text)

- No. 9, 1959. *For Stricter State and Financial Discipline. How to Reduce the Cost of Construction:* I. POPOV. *For a Full Utilisation of Agricultural Techniques:* D. TSONEV and S. TOTEV. *On Some Principles of the Problem of Establishing Depreciation Charges and the Economic Use of*

- Fixed Assets in a Socialist Industrial Enterprise:* V. RANKOV. *The Strengthening and Development of the Financial and Monetary System of the Chinese People's Republic:* D. K. *Is the Dollar Stable?:* B. NIKOLAEV.
- No. 10, 1959. *The Plenum of the Central Committee of the Bulgarian Communist Party on Construction Problems—New Impetus for the Realisation of the Economic Leap Forward. The Role of the Soviet Union in the Socialist Construction of the People's Republic of Bulgaria:* K. LAZAROV. *Some Problems in Strengthening the Revenues of Collective Farms:* M. PETROV. *The Extension of Monthly Advances and New Forms of Labour Remuneration in Collective Farms—an Important Stimulus for Raising Labour Activity in Co-operatives:* N. GUGOVSKI. *Financial Organs and the Control over Inventions, Rationalisations and Organisational-Technical Measures and Propositions for Changing Capital Construction Projects:* I. SHISHKOV. *The Essence and Functions of Savings Deposits Under Socialism:* A. KEK.

Ekonomski Pregled (Serbo-Croat text, English summaries)

- No. 8–9, 1959. *Transformation of the Village and the Increase of Socially-owned Land through Renting and Buying Land from Peasants:* A. STARC. *Investments in Yugoslavia in the Inter-war Period:* I. VINSKI. *A Polish Input-Output Table:* J. WIERZBICKI.

Ekonomist (Serbo-Croat text, English summaries)

- No. 3, 1959. *Three Basic Problems in the Theory of Development of Under-Developed Countries:* N. COBELJIĆ. *The Measurement of the Economic Efficiency of an Enterprise:* S. KUKOLEČA. *The Exchange Rate Problem in the Economic Development of Yugoslavia:* S. OBRADOVIĆ. *The Calculation of Replacement and Gross Investment when the Capacity Needed of Means of Production Is Known:* B. HORVAT. *Tractor and Animal Draught Power in Yugoslav Agriculture:* P. MARKOVIĆ.

Közgazdasági Szemle (Hungarian text, Russian and English summaries)

- No. 8–9, 1959. *Some Economic Aspects of the Emulation Movement in Honour of the Party Congress:* GY. VARGA. *Notes on the Problem of the International Division of Labour:* GY. GÖNCÖL. *Some Organisational Problems of Industrial Management:* S. BALÁSZY and GY. VARGA. *Comparing Industrial Productivity on a World Scale:* Z. ROMÁN. *Development of the Collective-farm System in the Period of Transition to Communism:* L. CSETE. *Income Trimming and the Price System:* A. SCHMIDT. *Population, Manpower, Regional Concentration of Industry and the "Overcrowded" Capital:* J. KÓRÓDY and GY. BORA. *Some Problems of Intensive Farming on Co-operative Farms:* L. MARKÓ. *A Survey of the Independent Population in Large and Small Farms:* P. PILLIS. *The Development of Hungarian Writing on Economics, 1790–1848:* A. MÁTYÁS. *State Interference in Hungarian Agriculture during the Second World War:* M. SZUHAY.
- No. 10, 1959. *The Second Five-year Plan:* I. HETÉNYI. *Some Theoretical Problems of the Struggle Against Revisionism:* Á. HAÁSZ. *Some Problems of the Development of Agricultural Production during the Period of the Second Five-year Plan:* I. DIMÉNY and GY. NAGY. *The International Comparison of Production Costs:* B. CSIKÓS-NAGY. *The "Quantitative" and the "Economic" Approach:* J. KORNAI. *Current Problems of Market Research in Farm-co-operative Trade:* E. KEMENES.
- No. 11, 1959. *New Trends in Our Foreign Trade:* GY. KARÁDI. *Some Methodological Problems in Preparing the Five-year Plan for Engineering:* L. ZIMMERMANN. *Manpower for the Building Industry:* S. FONÁL and J. LÖKKÖS. *Procedures to Determine a Rational Scheme for the Transport and Refining of Sugar-beet:* GY. KONDOR. *New Sales Methods in Retail Trade:* L. SELMEGI. *Some Problems of the Economic Development of the United States:* A. RABA. *The Discussion on Price Formation in The Soviet Union:* Zs. ESZE.
- No. 12, 1959. *The Tasks of Economists in the Light of the VII Congress of the Hungarian Socialist Workers' Party:* M. AJTAL. *Some Problems of the International Comparison of Levels of Living:* E. JÁVORKA. *Problems of Price Determination in the Socialist World Market:* B. CSIKÓS-NAGY. *Trends in the Saving of Labour Embodied in Instruments of Production:* A. VOROBEVA. *The Magnitude and Sources of Investment in Producers' Co-operatives:* J. REISZ. *The Economics of Maize in Producers' Co-operatives and Private Farms:* F. VÁGLI. *The Development of Consumers' Co-operatives in the German Democratic and Federal Republics:* S. POLGÁR. *Complex Mechanisation and Automation in Soviet Industry:* GY. SIMON. *Greetings to Academician E. Varga. A Scientific Conference on Problems of Labour Productivity:* S. B. and A. J.

No. 1, 1960. *Some Characteristics of Technical Progress in the Second Five-year Plan*: A. KISS. *On the Consolidation of Producers' Co-operatives*: J. KESERÜ. *Investment Efficiency and Proportionate Economic Development*: J. SZABÓ. *Some Problems of Commodity Supply and Retail Turn-over during the Period of the Second Five-year Plan*: J. SÓS. *On Socialist Commodity Relations*: R. HOCH. *István Hatvani and the Beginnings of Hungarian Economics*: R. HORVÁTH. *Management of Industrial Branches as Enterprises*: T. BOTKA.

Statistikai Szemle (Hungarian text, English and Russian summaries)

OCTOBER 1959. *The 1959 Soviet Census of Population*: F. GYULAY. *The Development of the Hungarian Petroleum Industry*: L. ORMAI. *Some Experiences of the Enumeration of Surplus Material Stocks*: K. BOGNAR and A. SZOMJAS. *The Reorganisation of State and Economic Management and the Tasks of the Statistical Services in Bulgaria*: S. STANEV. *A Comparison of the National Accounting Systems of Socialist and Capitalist Countries*: A. MÓD. *The Importance of Average Distances Between Stations and Its Method of Computation in Railway Transport*: T. HALÁSZ. *The Activity of the Italian Central Statistical Office*: Z. KENESSY. *Laws and Decrees Relating to Hungarian Censuses*: E. REMETÉY. *Questions of the Production and Consumption of Wine and Beer*: J. FAY.

NOVEMBER 1959. *Towards the Eighth Congress of the Hungarian Socialist Workers' Party*: J. ZALA. *Hungarian Morphine Alkaloid Production and Some of Its Development Problems*: GY. HERCZOG and I. OROS. *Fodder Production in 1955-58*: L. NAGY. *Problems of Retail Trade Statistics*: I. PÁLOS and M. ZAFIR. *The Definition and Trend of Some Important Indicators of Private Building Activity in 1958*: GY. LONTI. *Index Numbers of Volume in Capitalist Countries*: L. HALABUK.

DECEMBER 1959. *The Directives for Our Social and Economic Development. An Input-Output Table of the Hungarian Economy*: Z. KENESSEY. *Some Infectious Children's Diseases in Hungary*: Z. MARTON. *Current Problems of the Catering Network*: M. ZAFIR. *A Study Tour in the Institut National de la Statistique et des Etudes Economiques*: GY. CUKOR and O. LUKÁCS. *The Development of the Book Trade*: E. SZABÓ. *Accident Statistics of the State Insurance Company*: I. GROÓ.

Probleme Economice (Rumanian text, English, French and Russian summaries)

No. 10, 1959. *The Glorious Way of the Communist Party of the Soviet Union*: Z. BRÎNCU. *The Upsurge of Socialist Industrialisation in the Chinese People's Republic*: A. VIJOLI. *Ten Years of Successful Development of the Economy of the German Democratic Republic*: F. MACHER. *On Obsolescence and Its Influence on Amortisation*: S. ZEIGHER. *Some Problems of Saving Material Resources*: I. ITICOVICI. *Development of Industrial Crops in Our Country*: C. COJOCARU. *The Plundering of the Oil of Under-developed Countries—a Source of Enormous Profits for the Monopolies*: I. STOIAN. *Some Important Problems of Agriculture Debated at the Conference of the Representatives of Research Institutes of Socialist Countries. The Foundation of the Economic Sciences Society of the Rumanian People's Republic*.

No. 11, 1959. *A Fundamental Work of Scientific Socialism*: S. EMIL. *The Law of Planned Proportionate Development of the Economy and Its Utilisation by Our People's Democratic State*: I. STROIA. *Development of the Heavy Industry of the U.S.S.R. During the Seven-year Plan*: A. ZAMFIR. *Problems of the Development of the Raw Materials Base for Light Industry*: M. IAROVICI and C. IACOBVICI. *The Economic Efficiency of Irrigation*: V. BAGHINSCHI and N. SIRBU. *The Achievements of the People's Republic of Albania in Building Socialism*: Z. LIKA. *Aspects of U.S. Capital Exports*: I. VESA. *Conclusions of the Debate on the Method of Calculating Cost of Production in Collective Farms. The "Economic Bulletin for Europe" on the Economic Development of the Socialist Countries*: E. BIBIRI.

Ekonomia Popullore (Albanian text)

No. 6, 1959. *Fifteen Years of the Rapid Development of the National Economy. Soviet Aid—the Decisive Factor for the Building of Socialism in Our Country*: H. BANJA. *The Entire Activity of Popular Power is Permeated with Care for the Welfare of the Workers*: P. DODE. *Our Finance During Fifteen Years of Popular Power*: A. VERLI. *Albanian Industry and Its Leading Role in the Development of the Economy*: V. MISJA. *The Path of Fifteen Years in Agriculture*: A. KALLAPODHI. *The Construction Carried Out during the Past Fifteen Years Has Transformed the Face of Our Country*: V. PISTOLI. *Planning and Its Important Role in the Development of the Economy*: B. BARDHOSHI.

NEW BOOKS

British

ANDERSON (N.). *The Urban Community: a world perspective*. London: Routledge & Kegan Paul, 1960 (New York: Holt, 1959). 9". Pp. xv + 500. 35s.

[This is a general survey of the field of urban sociology. It brings together a great deal of information. A considerable proportion of the book is made of quotations from other writers and brief summaries of their findings. As such it may be regarded as a useful guide to the literature of the subject, though it is not arranged in such a way as to be attractive continuous reading and does not do much to dispel the suspicions common among economists as to the platitudinous character of some sociological work.]

BASTER (J.). *The Introduction of Western Economic Institutions into the Middle East*. A Chatham House Memorandum. London: Oxford University Press for the Royal Institute of International Affairs, 1960. 10". Pp. 41. 4s. 6d.

[This is a posthumous work, containing two chapters of what was planned to be a book on its subject. These two chapters deal respectively with the internal and international difficulties of introducing western economic institutions and ideas to Middle Eastern conditions. In the first chapter the author discusses the ambiguities of the notion of private capitalist enterprise as a model for imitation and the difficulties relating to the supply of enterprise, capital, labour and natural resources that limit its applicability in the Middle East. The second chapter is concerned with the ideals of free international movement of goods and capital.]

BEVERIDGE (JANET). *An Epic of Clare Market. The birth and early years of the London School of Economics*. London: Bell, 1960. 9". Pp. xiii + 98. 15s.

[To be reviewed.]

BEVERIDGE (LORD). *The London School of Economics and its Problems, 1919-1937*. London: Allen & Unwin, 1960. 9". Pp. 138. 21s.

[To be reviewed.]

BRIGGS (A.) and SAVILLE (J.) (Eds.). *Essays in Labour History, in memory of G. D. H. Cole*. London: Macmillan, 1960. 9". Pp. vii + 364. 42s.

[To be reviewed.]

CLEGG (H. A.). *A New Approach to Industrial Democracy*. Oxford: Blackwell for the Congress for Cultural Freedom, 1960. 9". Pp. viii + 140. 18s. 6d.

[To be reviewed.]

CONAN (A. R.). *Capital Imports into Sterling Countries*. London: Macmillan, 1960. 9". Pp. x + 107. 18s.

[To be reviewed.]

DEANE (PHYLLIS) (Ed.). *Bibliography on Income and Wealth, Volume VII, 1955-56*. London: Bowes & Bowes for the International Association for Research in Income and Wealth, 1960. 10". Pp. 131. 37s. 6d.

[The latest publication in this useful series follows the general lines of its predecessors. It enumerates over a thousand classified and cross-indexed items with brief but informative annotations on each. The field of income and wealth is interpreted broadly to cover not only statistical contributions but also discussions of concepts and problems of national income policy. Separate correspondents had the responsibility for preparing and annotating the lists of items relating to each country.]

EVELY (R.) and LITTLE (I. M. D.). *Concentration in British Industry. An empirical study of the structure of industrial production, 1935-51*. London: Cambridge University Press for the National Institute of Economic and Social Research, 1960. 9½". Pp. xvi + 357. 55s.

[To be reviewed.]

HUGHES (J. R. T.). *Fluctuations in Trade, Industry, and Finance. A study of British economic development, 1850-1860.* London: Oxford University Press, 1960. 9". Pp. xviii + 344. 45s.

[To be reviewed.]

ILES (D. J.) and TUCKER (C. J.). *Problems of Full Employment.* London: Routledge & Kegan Paul, 1960. 7½". Pp. x + 265. 20s.

[This is designed for the general reader, with some eye also to the candidate for G.C.E. Advanced Level. It provides an introduction to the theory of income determination, and then goes on to discuss most of the other economic problems that have been experienced in Great Britain since the War. The deliberate emphasis on unemployment as the central problem gives the book a somewhat old-fashioned air in places, despite the large amount of up-to-date empirical material included. In some places, too, the link between the discussion of policy and the underlying economic principles is not made quite as clear as might be wished. None the less, much ground is covered in an informative way, and the authors have no axes to grind, so that their book may be added to the rather short list of reading suitable to recommend to prospective students of economics before they come to the university.]

INCE (SIR GODFREY). *The Ministry of Labour and National Service.* London: Allen & Unwin, 1960. 9". Pp. 215. 25s.

[To be reviewed.]

An Introduction to Business Forecasting. London: The Institute of Cost and Works Accountants, 1960. (Distributed by Gee & Co., 27-28 Basinghall Street, London, E.C.2.) 10". Pp. 42. 7s. 6d.

[This provides a practical survey of the considerations involved in preparing forecasts of a firm's sales, output, capital expenditure, trading results and cash position. The purpose is to give a summary enumeration of as many as possible of the relevant factors, rather than to go deeply into the underlying principles. Much ground is covered in a small space. An appendix shows, by way of illustration, the relation between actual sales and forecast sales in the Metal Box Company for the years 1945-46 and 1956-57.]

JOHN (A. H.). *A Liverpool Merchant House, being the history of Alfred Booth and Company, 1863-1958.* London: Allen & Unwin, 1959. 9". Pp. 197. 21s.

[Although Booth and Company's steamers to North Brazil undoubtedly bore no resemblance to Kipling's great steamers white and gold rolling weekly down to Rio, there is more in Latin America of interest to economic historians than is sometimes realised. It is good to see British businessmen operating in this area belatedly getting their share of the glory too often reserved for the great firms trading in the East. Alfred and Charles Booth began as leather merchants and New York agents for Holts' West Indian line. They were also prepared to turn their hand to other business. Thus, between 1864 and 1867, they acted for cotton brokers and cotton spinners. Nevertheless, until 1919, when Alfred Booth and Company acquired the United Construction Company from the Crittall Manufacturing Company, leather and steamships were to remain their principal interests. Having lost the Holt agency when the West Indian line was sold to the West Indian and Pacific Steamship Company, the Booths, in 1865, launched their own first steamer, the *Augustine*, trading between Liverpool and North Brazilian ports. In 1869 another Liverpool firm, R. Singlehurst and Company, entered this trade, and in 1870 Hugh Evans and Company's Maranham Steamship Company provided further competition. However, in 1871 the three Liverpool firms came to an agreement, and for thirty years thereafter had things more or less their own way. An attempted French invasion was defeated in the early 1880s, and a similar thrust by the Italians in the late 1890s was countered by the use of deferred rebates. Nevertheless, in 1902 the Hamburg-America Line succeeded in breaking the Liverpool monopoly, and the Liverpool firms had to come to an agreement with the new-comer. Booth and Company's interest in shipping led to allied activities, such as coal and cement merchanting, and to investment in harbour installations and warehouses. Similarly, their role of leather merchants led to investment in the manufacturing side of the leather industry. It is this multiplicity and flexibility of interests that is one of the most interesting aspects of the Company's history.]

KORTEWEG (S.) and KEESING (F. A. G.). *A Textbook of Money.* London: Longmans, 1960. 9". Pp. xx + 308. 35s.

[To be reviewed.]

LEWIS (P. R.). *The Literature of the Social Sciences. An introductory survey and guide.* London: The Library Association (Chaucer House, Malet Place, W.C.1), 1960. 3". Pp. xx + 222. 28s.

[This is an introduction to the bibliography of the social sciences, written up for the most part into a continuous text. About half of the book is concerned with economics and economic history, and the rest deals with politics, law, international affairs and sociology. It is intended for the use of librarians, the general reader and scholars seeking guidance outside their own subject. The treatment of economics is in general sound and well informed, though the amount of space given to older books in some places seems excessive for the type of reader for whom the guide is intended.]

MOULTON (H. G.). *Can Inflation be Controlled?* London: Allen & Unwin, 1960. 3". Pp. xiv + 302. 21s.

[This book by the President-Emeritus of the Brookings Institution is concerned mainly with the causes of price-rises, and with possible cures only through the implications of the analysis of causes. It is written in a very clear style and moves smoothly to its conclusions. Dr. Moulton devotes a large part of the book to setting forth the grounds for rejecting any sort of monetary theory of inflation. While using only quite simple concepts and tools of analysis, he makes a convincing case. His positive conclusions are of the cost-push type. A fair part of the argument runs along familiar lines, and by concentrating his attack on purely monetary theories Dr. Moulton by-passes much of the recent controversy between the cost-push theory and more sophisticated versions of the demand-pull theory. However, much interesting historical detail is included, especially in connection with the inflation of the First World War and earlier years. A commendable feature of the book is its endeavour to view the problem of inflation all the time in a broad historical context and not simply as a problem of the last fifteen years.]

PRESSNELL (L. S.) (Ed.). *Studies in the Industrial Revolution. Essays presented to T. S. Ashton.* London: The Athlone Press, University of London, 1960. 9". Pp. vii + 350. 42s.

[To be reviewed.]

ROBINSON (E. A. G.) (Ed.). *The Economic Consequences of the Size of Nations. Proceedings of a conference held by the International Economic Association.* London: Macmillan, 1960. 9". Pp. xxii + 447. 50s.

[To be reviewed.]

ROSTOW (W. W.). *The Stages of Economic Growth. A non-communist manifesto.* London: Cambridge University Press, 1960. 9". Pp. xi + 179. 21s.

[To be reviewed.]

STERN (W. M.). *The Porters of London.* London: Longmans, 1960. 9". Pp. xvi + 346. 37s. 6d.

[To be reviewed.]

TAPLIN (W.). *Advertising. A new approach.* London: Hutchinson, 1960. 9". Pp. 208. 25s.

[To be reviewed.]

VAIZEY (J.). *The Brewing Industry, 1886-1951. An economic study for the Economic Research Council.* London: Pitman, 1960. 9". Pp. xxiv + 173. 30s.

[To be reviewed.]

WILK (L. A.). *Accounting for Inflation.* London: Sweet & Maxwell, 1960. 9". Pp. xii + 184. 35s.

[This sets forth and explains in detail an accounting procedure which would achieve the central purpose of accounting, namely to present a "true and fair view" of the financial position of a concern, notwithstanding the effects of inflation. The underlying principle is that profit should be calculated after provision has been made for maintaining the general purchasing power of net assets. The author explains how the principle may be applied to fixed assets, to stocks and to liabilities (the need to make a proper allowance for the reduction in the real burden of liabilities fixed in money terms brought about by inflation is an important element in the argument). Attention is then given to a number of special issues, including the treatment of Preference Shares, and the complications arising in the case of holding companies and nationalised industries. In relation to the question of taxation, the author argues that the object of his proposals is to secure equity between businesses, and not to decide how the tax burden should be divided between businesses and other classes of taxpayers; if the effect of his proposals were to lessen the tax paid by businesses, this could be offset, if desired, by an appropriate alteration in rates of tax.]

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G G

WILLIAMS (H. T.) (Ed.). *Principles for British Agricultural Policy*. London: Oxford University Press for the Nuffield Foundation, 1960. 9". Pp. xiii + 317. 18s.

[To be reviewed.]

New Zealand

New Zealand's Continuing Development. An introduction to the more important aspects of the New Zealand economy. Second edition. Wellington and London: Australia and New Zealand Bank, 1959. 9". Pp. vi + 90.

[This is a popular illustrated introduction to the economic structure and prospects of New Zealand.]

Indian

BAJPAI (O. P.). *Elements of Life Assurance*. Allahabad: Kitab Mahal, 1959. 8½". Pp. 195. Rs. 5.0.

[This is a text-book for Indian students describing the principles and types of life insurance.]

CHATURVEDI (J. N.). *Theory of Marketing in Underdeveloped Countries*. Allahabad: Kitab Mahal, 1959. 8½". Pp. 135. Rs. 7.50.

[Despite its imposing title this slight, ill-produced work will be of little value to the serious student. The author pleads for a new approach to economic theory with the problems of underdeveloped areas in mind, but he fails to produce any consistent, logically argued new theory.]

Indian Economics Year Book 1959-60. Allahabad: Kitab Mahal, 1959. 7½". Pp. v + 266. Rs. 3.0.

[This is the second edition of a book first published in 1957 and the publishers hope to produce further up-to-date editions in the future. It is a useful compilation of Indian economic statistics and potted facts about the plans, agriculture, industry and so on. Students would find it more valuable if the sources of the figures were indicated. The main defect is that the authors seem undecided as to whether to produce a "crammer" for elementary students, with, for example, a list of the reasons for India's nineteenth-century industrial backwardness, or whether to provide simply a work of reference for those who want only the bare facts.]

MUKHERJEE (P. K.) and KANUNGO (K.). *Food Administration in Punjab and U.P., 1946-53*. An analysis of price control, procurement and distribution of food grains. Delhi: Agricultural Economics Research Section, Delhi School of Economics, 1959. 9½". Pp. v + 128. Rs. 5.0.

[This book shows why there has been so much criticism of food administration in India. Controls in the Punjab were evidently more successful than those in Uttar Pradesh, but in both regions smuggling, black markets, bad storage arrangements and inefficient administration were evident. Despite so many serious defects the authors believe that "we cannot afford to leave food prices to the hazards of a market economy."]

NAGPAL (B. D.). *Illustrated Income-tax Law*. Allahabad: Kitab Mahal, 1959. 9". Pp. 380. Rs. 7.50.

[This is an elementary text-book for students in accountancy and commerce. Each chapter contains test questions and answers.]

NATIONAL COUNCIL OF APPLIED ECONOMIC RESEARCH. *Some Aspects of Goods Transport by Road in the Delhi Region*. Bombay: Asia Publishing House, 1958. 9". Pp. 59. Rs. 3.50.

[This is the second of the Council's Occasional Papers and it deals with a subject on which, in contrast to the railways, little has been written. Information is provided on costs, organisation, the problem of co-ordination with other forms of transport and the effect of government restrictions on the movement of goods by road. The authors recommend a modification of these restrictions and the establishment of an inter-state transport commission.]

PAL (B. N.). *Principles of Agricultural Economics*. Allahabad: Kitab Mahal, 1959. 8½". Pp. 751. Rs. 18.0.

[The aim of this long work is to give an elementary introduction to the subject for students and laymen. The matter is not new and the exposition at times, for example on rent, lacks clarity. There is no index.]

RAMADADHAM (V. V.). *The Economy of Andhra Pradesh*. Bombay: Asia Publishing House, 1959. 8½". Pp. ix + 302.

[This regional study of the "linguistic" state created in 1953 from parts of Hyderabad and Mysore provides a great deal of useful information on agriculture, private and public industries, urbanisation, trade and transport. It is profusely illustrated with official statistics. The author admits their dubiety and gives examples of contradictions in official publications. He attempts an estimate of total and sectoral incomes, but this is certainly subject to a wide margin of error. The book is descriptive rather than analytical, and some will doubt the author's concluding statement that "the greatest need of Andhra Pradesh is to devise an appropriate mechanism whereby financial and managerial resources flow into the state from outside."]

RAO (B. S.). *Surveys of Indian Industries*. In two volumes. Volume I: 1957, Pp. 358, 27s. 6d.; Volume II: 1958, Pp. 320, 35s. Bombay and London: Oxford University Press. 10".

[These two volumes contain a brief description of 24 major industries in India, ranging from cotton and iron and steel to ceramics and the film industry. Each account has a short historical section, but the main evidence is from the post-war period. The field covered is too wide to enable other than superficial treatment. As an introductory survey on the lines of G. C. Allen's *British Industries and their Organisation* the book will be useful.]

SOCIETY FOR SOCIAL AND ECONOMIC STUDIES. *Capital for Medium and Small-scale Industries*. Bombay: Asia Publishing House, 1959. 8½". Pp. vii + 144.

[This is the first publication of a new society modelled on the British P.E.P. In this short study the authors provide a brief survey of the growth, organisation, capital requirements and sources of finance of the medium and small industries, excluding the village or cottage industries. The government under the plans has set up a number of institutions to facilitate the financing of these industries, but many of them still rely on loans from money-lenders at high rates of interest. The authors recommend a closer link between the banks and the small industries and more government assistance. They pay insufficient attention to the cost of such State support and scarcely discuss the reasons for subsidising apparently uneconomic small industries.]

TRIPATHY (R. N.). *Fiscal Policy and Economic Development in India*. Calcutta: The World Press, 1958. 8½". Pp. viii + 318. Rs. 15.0.

[The aim of this well-produced, well-written book is to assess how far Indian fiscal policy is conducive to economic growth. The book is the published form of a successful London Ph.D. dissertation. The author first analyses some of the main problems hindering economic growth in India and concludes that the nature of these makes government planning essential. The bulk of this study is concerned with describing and criticising the methods used to finance the plans. In particular, the author is critical of the federal structure of public finance. He recommends, for example, that the agricultural income tax, at present levied at different rates in different states, should be centralised and made uniform. He argues that deficit financing in the second plan led to inflationary pressure which adversely affected savings and warns of the dangers likely to result from further large-scale deficit financing. The policy of prohibition in certain states is regarded by him as an expensive failure. There is a great deal of interesting information and some penetrating discussion in this book.]

VENKATASUBBIAH (H.). *Indian Economy since Independence*. Bombay: India Publishing House, 1958. 9". Pp. ix + 343. 30s.

[This is not a detailed economic history based on original research but a narrative of some selected aspects of Indian development in the decade after 1947. The main subjects discussed are the political framework, the land question, public and private enterprise, foreign trade, public finance and planning. The chapter on foreign trade is the most interesting and useful, but the economic analysis generally is not very penetrating. The book will provide a readable introduction to the layman wishing to know something about the Indian economy.]

American

BOYLE (G. J.). *Use of Service Charges in Local Government*. A monograph on the prevalence and value of nontax revenue. New York: National Industrial Conference Board, 1960. 9". Pp. 56.

[Charges levied for the use of particular local-government services have been the most rapidly expanding source of income for local authorities in the United States in recent years. This informative pamphlet presents some of the leading statistics and considers the general issues involved. Data are given for different cities of the revenue received from different classes of charges, and a comparison is made of the tax and debt positions of cities that make much or little use of charges.]

A study of incidence of service charges in two representative cases suggests that they are markedly more regressive than tax financing, and it is suggested that this is probably the reason why their use so far has been mainly confined to services that have a fairly low cost.]

BULLOCK (H.). *The Story of Investment Companies*. New York: Columbia University Press, 1959 (London: Oxford University Press, 1960). 9½". Pp. xii + 305. 48s.

[The nineteenth-century business and financial world produced a number of men, who, lacking any scholarly pretensions, understood that their work was part of something important and were impelled to write about it. Mr. Bullock is in this tradition. In a disarming preface he protests that his book is neither an exposition nor a treatise but a story. The story begins with a brief treatment of English and Scottish investment companies of the 1870s; continues with a chapter on early American trusts and another on American trusts of the 1920s; and goes into top gear with a discussion of the demoralised 1930s, when revulsion against investment companies in the United States was so strong that, according to the Securities and Exchange Commission, "aggregate market values of shares in investment companies . . . was approximately 35% less than the actual value of the assets of these companies" (p. 47). Subsequent chapters bring the story down to the immediate past in the United States, in Canada and in Great Britain. Besides 179 pages of text, this book includes a glossary, a bibliography, an appendix listing companies according to several classifications and, finally, excerpts from the annual reports of four investment companies. Nevertheless, at forty-eight shillings, it seems over-priced.]

The Business Outlook 1960. A discussion by the National Industrial Conference Board Economic Forum and Guests. *Studies in Business Economics* No. 67. New York: National Industrial Conference Board, 1959. 9". Pp. 106.

[This symposium follows the lines established in previous years. Each participant is given an opportunity to make one major contribution, and it and the interruptions and discussion are given verbatim. The contributions vary in quality, but most of them contain points of interest. Valuable insights into what are substantially the same topics can, in the present state of economics, be given both by such highly informal, though well-prepared, discussions as the present one and by econometric studies of a kind most unsuited for oral presentation; it may be debated whether this is a sign of the many-sidedness of economics or merely of its immaturity as a science.]

CAVES (R. E.) and HOLTON (R. H.). *The Canadian Economy. Prospect and retrospect*. Cambridge, Mass.: Harvard University Press, 1959 (London: Oxford University Press, 1960). 8½". Pp. xxii + 676. 80s.

[To be reviewed.]

CAVIN (J. P.) (Ed.). *Economics for Agriculture. Selected writings of John D. Black*. Cambridge, Mass.: Harvard University Press, 1959 (London: Oxford University Press, 1960). 8½". Pp. xi + 719. 96s.

[This contains twenty-four extracts from the writings of Professor J. D. Black on agricultural economics, classified according to subject. Each section is introduced by an essay by a former student of Professor Black's, who surveys the subject concerned and Professor Black's contribution to it. The volume is opened by a portrait of Professor Black, written by Professor J. K. Galbraith.]

COALE (A. J.) and HOOVER (E. M.). *Population Growth and Economic Development in Low-income Countries. A case study of India's prospects*. Princeton, New York: Princeton University Press (London: Oxford University Press), 1959. 10". Pp. xii + 389. 42s.

[This is another important work from the Office of Population Research at Princeton University, an institute already well known for its excellent demographic studies of Japan and India by Taeuber and Davis. The work of Davis was largely historical, sociological and statistical. This book is more concerned with economic problems and projections. There are five parts. The first contains a brief discussion of the general relations between population growth and economic development. In Part II there is a description of the present size and composition of Indian population. In addition, the trend of population until 1986 is projected under various assumptions of fertility and mortality changes. The longest section is Part III entitled "Factors in Indian Economic Development." The obstacles to progress in the main sectors of the economy are analysed, the development policy of the government is discussed and inspired guesses are hazarded at the likely future course of economic development. For example, the authors see little hope of great increases in agricultural output *per capita*. Part IV considers the prospects of Indian economic development in the future under different courses of fertility and concludes, not surprisingly, that lower fertility would enable a more rapid growth of both aggregate and *per capita* output. In Part V the conclusions reached in the Indian case are applied to Mexico and a similar general result is obtained—namely that there are substantial economic advantages in reducing fertility. This study makes a significant contribution to our knowledge of one of the most vital problems facing the world to-day. It provides more potent ammunition for those who believe that a fall in fertility is essential for economic development in most low-income countries.]

DEBREU (G.). *Theory of Value. An axiomatic analysis of economic equilibrium*. Cowles Foundation Monograph No. 17. New York: John Wiley, 1959 (London: Chapman & Hall, 1960). 9½". Pp. xii + 114. 38s.

[To be reviewed.]

Economics and the Policy Maker. *Brookings Lectures, 1958-1959*. Washington, D.C.: The Brookings Institution, 1959 (London: Faber, 1960). 8½". Pp. xiii + 209. 21s.

[This contains eight lectures, as follows: "Economics and Business Planning," by Sidney S. Alexander; "Economic Stabilisation Policy," by Gerhard Colm; "The Problem of Creeping Inflation," by Neil H. Jacoby; "Taxation Policy," by Louis Shere; "Monetary and Credit Policy," by Robert V. Roosa; "Economics and Collective Bargaining," by Sumner H. Slichter; "Competition and Monopoly," by Mark S. Massel; and "Economics and Economic Development," by Everett D. Hagen. The series was designed to review the uses of economics in private and public affairs. As it turns out, several of the contributors took the opportunity for a general discussion of the aspects of public policy in which they were specially interested, so that their contributions, though of value in themselves, did not cast a great deal of light on the specific question of the role of economics and the economist. The contributors who paid attention to this aspect were Alexander, Shere, Massel and Hagen. Especially notable is Alexander's lively and stimulating discussion of the usefulness of the economist as a consultant to private business.]

EDWARDS (C. D.). *The Price Discrimination Law. A review of experience*. New York: The Brookings Institution, 1959 (London: Faber & Faber, 1960). 9½". Pp. xxii + 698. 72s.

[To be reviewed.]

EZEKIEL (M.) and FOX (K. A.). *Methods of Correlation and Regression Analysis: linear and curvilinear*. Third edition. New York: John Wiley (London: Chapman & Hall), 1959. 9½". Pp. xv + 548. 88s.

[Professor Ezekiel's standard text-book first appeared in 1933, and no new edition has appeared for a good many years. He has now, with a new collaborator, brought out a substantially revised edition, which takes account of recent developments in the subject while leaving unaltered the book's general lay-out and character. The chief innovations are the addition of a chapter on simultaneous equation solutions and a revision of the treatment of error formulae for time series. Account is also taken of the new methods of computation now available.]

FERBER (R.). *Collecting Financial Data by Consumer Panel Techniques. A pilot study*. *Studies in Consumer Savings*, No. 1. Urbana, Illinois: Bureau of Economic and Business Research, University of Illinois, 1959. 9½". Pp. x + 177. \$2.50.

[The survey technique discussed in this volume is that of collecting data about expenditure and saving from the same families over a period of time. This panel technique is capable of yielding information of a type not available from ordinary surveys, but it is also subject to certain special difficulties of a practical kind, notably that of persuading the participants to go on co-operating. Professor Ferber describes the procedures adopted in a pilot panel inquiry conducted in Chicago in 1956 and the methodological lessons learnt from the experiment.]

GREBLER (L.). *Housing Issues in Economic Stabilization Policy*. National Bureau of Economic Research Occasional Paper 72. New York: National Bureau of Economic Research, 1960. 9". Pp. xi + 129. \$1.50.

[This is a detailed study of the effects of United States government policies towards housing credit during the period 1953-57, viewed in relation to the general problem of economic stabilisation. During this period residential construction experienced one complete short cycle, of moderate amplitude, with a peak in 1955 and a recession in 1958. Dr. Grebler finds that building has shown fair responsiveness to official credit policy, though things have not always worked out quite as intended. This has been partly because of lags, and partly because of the unforeseen effects of the upper limit on interest rates payable on government-guaranteed mortgages, which caused the supply of mortgage finance to diminish when the general level of interest rates rose.]

GURLEY (J. G.) and SHAW (E. S.). *Money in a Theory of Finance*. Washington, D.C.: The Brookings Institution (London: Faber), 1960. 9½". Pp. xiv + 371. \$5.00.

[To be reviewed.]

HARTMANN (H.). *Authority and Organization in German Management*. Princeton New Jersey: Princeton University Press, 1959 (London: Oxford University Press, 1960) 9". Pp. xvi + 318. 48s.

[This interesting study is not concerned primarily with the details of German managerial practice still less with its efficiency for productive purposes, but rather with the social relationships involved and the underlying ideologies. Its central theme is that the German conception of management is not a functional one but is based on certain ultimate values, especially the sanctity of private property and the rights and duties associated with its ownership. The traditional German notion of the quasi-divine right of the *Unternehmer* has survived to a remarkable extent the disruptions involved by Nazism and the allied occupation, and has pervasive effects on management practice. Among the more particular topics considered by the author are the relationship between owners and salaried managers and between them and workers and trade unions, the recruitment of management, and associations of business leaders. In stressing the survival of traditional values the author is anxious none the less not to underrate the changes that have occurred since the War and may be carried further in the future. Especially important in this context is the effect of contacts with American firms and the challenge presented by the American functional approach to management.]

HIGGINS (B.). *Economic Development. Principles, problems and policies*. New York: Norton, 1959 (London: Constable, 1960). 9". Pp. xviii + 803. 60s.

[To be reviewed.]

JUSTER (F. T.). *Consumer Expectations, Plans, and Purchases: a Progress Report*. National Bureau of Economic Research Occasional Paper 70. New York: National Bureau of Economic Research, 1959. 9". Pp. xviii + 171. \$2.50.

[In this survey study consumers' stated buying plans for the future are compared with (a) their family financial circumstances, their expectations and their attitudes, and (b) their subsequent actual purchases. The findings are used to assess the reliability of buying plans as a forecasting tool.]

KNEESE (A. V.). *Water Resources. Development and use*. Kansas City, Missouri: Federal Reserve Bank of Kansas City, 1959. 9". Pp. xii + 68.

[This is a lucid general introduction to the economics of water resources. It deals both with the factual outlines of the problem as it exists in the United States and with the issues of economic theory involved in deciding how much should be spent on water-development programmes and how alternative programmes should be evaluated.]

LAMPMAN (R. J.). *Changes in the Share of Wealth Held by Top Wealth-holders, 1922-1956*. National Bureau of Economic Research Occasional Paper No. 71. New York: National Bureau of Economic Research, 1960. 9". Pp. 32. 75c.

[This is reprinted from *The Review of Economics and Statistics* for November 1959. It contains the first attempt that has been made to relate the information on wealth-ownership in the United States derived from estate-tax data (limited to estates above \$60,000) to Goldsmith's national balance-sheet aggregates.]

MACAULAY (H. H.). *Fringe Benefits and Their Federal Tax Treatment*. New York: Columbia University Press, 1959 (London: Oxford University Press, 1960). 9½". Pp. x + 246. 52s.

[In recent years the value of fringe benefits has risen considerably faster in the United States than the wage-bill has. Tax preference has not been the only reason for this—wage-stabilisation policies have also contributed—but it has probably been the chief one. Dr. Macaulay attempts to deal with the problems involved on the basis of a consistent definition of income, though he recognises that no sharp line can be drawn between income, which ought to be taxed, and conditions of employment, which it is certainly not feasible to make a subject of taxation, whatever might be desirable in theory. Having laid down his general principles, he considers the appropriate ways of treating each of the main classes of fringe benefit. This is a useful and well-thought-out survey of an increasingly important topic.]

MASON (E. S.) (Ed.). *The Corporation in Modern Society*. Cambridge, Mass.: Harvard University Press, 1959 (London: Oxford University Press, 1960). 9½". Pp. xv + 335. 54s.

[To be reviewed.]

MEYER (A. J.). *Middle Eastern Capitalism*. Nine essays. Harvard Middle Eastern Studies, 2. Cambridge, Mass.: Harvard University Press, 1959 (London: Oxford University Press, 1960). 8½". Pp. viii + 161. 30s.

[This informative and lively book is addressed to the general reader, but the author's wide knowledge of the area and his sensible approach to its problems provide much of interest to the student of economic development. Formal economic analysis is deliberately avoided, but Mr. Meyer is well acquainted with the recent theoretical and empirical literature. His attitude is an independent one, and his realistic views on such matters as the respective roles of government and private entrepreneurs in the economic development of the region will be uncongenial to extremists of either persuasion.]

NORDSKOG (J. E.). *Social Change*. New York and London: McGraw-Hill, 1960. 9½". Pp. vii + 423. 58s.

[To be reviewed.]

NOVE (A.). *Communist Economic Strategy: Soviet Growth and Capabilities*. Washington: National Planning Association, 1959 (London: Oxford University Press, 1960). 9". Pp. xi + 82. 18s.

[This provides a useful and interesting introduction in both statistical and qualitative terms to the study of the Soviet economy and its growth prospects. It includes a discussion of labour and capital resources, techniques of planning, social and political pressures, and of achievements to date. The context of the discussion is the prospective comparative performance of the Soviet bloc and the Western world, but this competitive approach to the problems of economic growth is not unduly obtrusive.]

Progress against Inflation. A series of talks delivered to sessions of the National Industrial Conference Board in 1959. New York: National Industrial Conference Board, 1960. 9". Pp. 67.

[This contains a group of six addresses on different aspects of the problem of inflation, delivered at a meeting of the National Industrial Conference Board in November 1959. The contributors are economists in academic life and in the public service.]

RAPKIN (C.) and GRIGSBY (W. G.). *Residential Renewal in the Urban Core*. Philadelphia, Pennsylvania: University of Pennsylvania Press (London: Oxford University Press), 1960. 8½". Pp. 131. 30s.

[This is a detailed study of the potential demand for residential accommodation in a run-down central area in Philadelphia. Its object is to cast light on the prospects of carrying out a successful renewal programme. The conclusion is that there is a fair prospect of rising demand from certain types of family but not much prospect of attracting families with children. For this reason there is adequate scope for residential use of the central core itself, but probably not for residential redevelopment of all the surrounding slum area.]

SANNWALD (R.) and STOHLER (J.). *Economic Integration*. Theoretical assumptions and consequences of European unification. Translated by H. F. KARREMAN. Princeton, New Jersey: Princeton University Press, 1959 (London: Oxford University Press, 1960). 9". Pp. xvi + 260. 40s.

[To be reviewed.]

THURSTON (P. H.). *Systems and Procedures Responsibility*. Boston, Mass.: Harvard University Graduate School of Business Administration (London: Bailey & Swinfen), 1959. 8". Pp. x + 110. 20s.

[The subject of this monograph, which is based on a number of case-studies, is how responsibility for planning and installing improved systems of working should be divided between specialists in this kind of work and those who are permanently engaged in the part of the organisation where the improvement is being introduced and will have to operate it when it has been installed. It is argued that both have an important part to play, but the author suggests that ultimate responsibility for leadership in systems work should rest with the operating manager rather than with the systems specialist. In discussing the various difficulties involved in this kind of work the author emphasises the importance of having a trial period for new procedures.]

WARTON (C. R.). *The U.S. Graduate Training of Asian Agricultural Economists*. New York: The Council on Economic and Cultural Affairs (630 Fifth Avenue, New York), 1959. 9". Pp. 57.

[This study is based on an extensive series of interviews with Asian students and graduates and their teachers in American universities. Although it is specifically concerned with agricultural

economics, many of the problems discussed will be familiar to British university teachers who handle Asian undergraduates and research students, and some of the author's suggestions for dealing with these problems have general interest.]

WHITTAKER (E.). *Schools and Streams of Economic Thought*. Chicago, Illinois: Rand McNally (London: John Murray), 1960. 9½". Pp. xvi + 416. \$6.50.

[This incorporates some of the material contained in the author's *History of Economic Ideas*, published in 1940, but the treatment is briefer and the approach somewhat changed. The arrangement is chronological, starting from the earliest times and coming commendably up to date. So many authors and topics are touched on that the pace has to be that of a gallop, but Professor Whittaker is on the whole successful in putting across the important points and placing them in their context of contemporary economic thought.]

Dutch

GOLDBERGER (A. S.). *Impact Multipliers and Dynamic Properties of the Klein-Goldberger Model*. Contributions to Economic Analysis, XIX. Amsterdam: North-Holland Publishing Company, 1959. 9". Pp. 138. 30s.

[This is a further analysis of the properties of the well-known Klein-Goldberger econometric model of the United States economy. It is based largely on the so-called reduced form of this model, in which variables are expressed as functions of exogenous factors only. Use of the reduced form makes it possible to assess the combined consequences of both direct and indirect effects of a given change. In this way the full multiplier effects of exogenous changes are shown. The technique is used, as well, to investigate the most important determinants of economic change during 1929-52, as revealed by the model, and to trace out the dynamic properties of the model. This discussion includes a useful account of the mathematical procedure for analysing the properties of a system of difference equations. A difficulty which emerges at several points is that the real and the monetary aspects of the model turn out to be rather unsatisfactorily related.]

QAYUM (A.). *Theory and Policy of Accounting Prices*. Contributions to Economic Analysis, XX. Amsterdam: North-Holland Publishing Company, 1960. 9". Pp. 123. 26s. 6d.

[To be reviewed.]

THORBECKE (E.). *The Tendency towards Regionalization in International Trade, 1928-1956*. The Hague: Martinus Nijhoff, 1960. 9½". Pp. xiii + 223.

[To be reviewed.]

Finnish

VAIVIO (F. L.). *Liikepankin Likviditeettiongelma koko Pankkijärjestelmää Silmäläpäitään* (The liquidity problem of the commercial bank with regard to the whole banking system). Jakaja: Liiketaloustieteellinen Tutkimuslaitos, 1960. 9½". Pp. 252.

[The author takes as his starting-point a broad definition of liquidity as capacity to pay expected and possible obligations arising within a future period. The application of this principle is stated in balance-sheet terms. In order to consider the liquidity problems of banks, as opposed to other businesses, preliminary discussion is needed of what a bank is and what is the theory underlying its operations. The author therefore sets out a model of the working of a bank, though he feels that more study is still needed on this question. He is then enabled to consider the logical basis of the liquidity rules adopted by commercial banks or imposed on them by central banks.]

Greek

CHOUMANIDIS (L. T.). *The Theory of Wages, from the time of the classics to this date*. Athens: Makropodara, 1957. 9½". Pp. 160.

[This is a painstaking historical survey of wage theory, and covers a wide range of literature, including empirical and sociological studies as well as the literature of economic theory. Most of the book is devoted to summary and criticism of the views of others. In a brief statement of his own views the author emphasises, amongst other things, the disutility of subordinate status as part of the costs for which the worker has to be compensated. The book is in Greek, but a duplicated English translation is available.]

Israel

The Falk Project for Economic Research in Israel. Fourth Report 1957 and 1958. Jerusalem: Falk Project for Economic Research (75 King George Avenue), 1959. 9½". Pp. 198.

[A long essay by Professor Patinkin on the development of Israel's economy during its first decade occupies the greater part of this report. This essay is in macro-economic terms, with practically no discussion of individual industries or their problems. The topics dealt with are, in order, population and labour supply, the growth of national product and income, capital accumulation and inflation. Much interesting analytical material is included on such subjects as absorption of immigrants; the relative contributions to the growth of output made by increases in labour input, capital input and technical improvements; the finance of investment; the balance of payments; and the movements of wage-rates. Professor Patinkin argues that the economy's success in absorbing immigrants and increasing output must be set against its failure to eliminate its dependence on foreign assistance, as reflected in its continuing enormous import surplus. He believes that the reduction of this surplus is essential, both because the sources from which it has been financed are likely to decline and because the reliance on foreign borrowing is already creating a serious burden of interest payments. He regards the import surplus as largely the consequence of excessive domestic expenditure, especially rises in consumption, and as the external manifestation of the inflation shown internally by the rise in the price-level. He believes that retrenchment is needed both in consumption and in investment, and he also favours increased use of the price-mechanism to induce a structural reorientation towards the production of exports and import-substitutes. In the chapter on the inflationary process much space is given to data on money and the velocity of circulation. But the author then goes on to admit that these really prove nothing as to cause. His conclusion (p. 125), that the persistence of an import surplus proves that inflation has in the last analysis been due to excess demand, seems to imply the debatable proposition that import surpluses are always necessarily due to excess demand.]

Official

JAMAICAN

Report of the Commission of Enquiry on the Sugar Industry of Jamaica. Kingston: The Government Printer, 1960. 10". Pp. 93.

[The occasion of the appointment of this Commission was the strike that took place in the Jamaican sugar industry in 1958. The first of the Commission's terms of reference was to consider the causes of the strike, and although their report covers wider ground, including an extensive treatment of the industry's financial results between 1954 and 1958, it is mainly oriented towards the question of labour relations and the industry's capacity to pay wages. It includes much interesting material, presented concisely and clearly. The strike occurred because a sharp decline in profits in 1958 caused employers to refuse to pay the crop bonus which had been customary in previous years. The fall in profits was partly due to a fall in the price fetched by the part of Jamaican sugar output not sold within the Negotiated Price Quota and partly to unfavourable natural conditions. The Commission believes that the poor financial results of 1958-59 are unlikely to continue, and it concludes that, having regard to this and to the high profits earned in previous years, an increase in wages is justifiable. It also finds that the financial estimates used by the employers in the course of wage negotiations contained serious errors due to double counting. These errors in calculation had persisted for a number of years, and were unknown both to employers and to workers' representatives until the estimates were examined by an outside expert shortly before the beginning of the Commission's hearings.]

INTERNATIONAL

INTERNATIONAL MONETARY FUND. Summary Proceedings of the Fourteenth Annual Meeting of the Board of Governors, September 1959. Washington, D.C.: International Monetary Fund, 1959. 9". Pp. 181.

[These proceedings include an address by Dr. Jacobsson and statements by Governors for the member countries. Dr. Jacobsson's address surveys developments during the year and discusses, amongst other things, the movement towards convertibility, the increase in the Fund's resources, the part it has played in the stabilisation policies adopted by certain countries and certain more general issues concerning commodity prices and the importance of monetary discipline.]

UNITED NATIONS. *Economic Survey of Africa since 1950*. New York: United Nations, 1959. 11". Pp. 248. 21s.

[This is primarily a descriptive work, and a large proportion of its space is occupied by tables of statistics drawn from a variety of sources and presented, as far as possible, in comparable form for

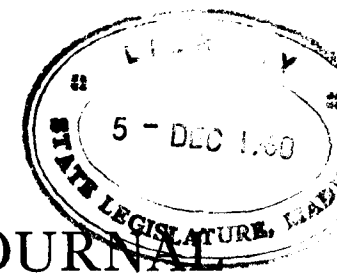
the different countries. Additional material and background discussion is provided in the accompanying text. It constitutes a convenient and compendious work of reference without in itself providing (or seeking to provide) any startlingly new insights. Its four chapters deal in turn with structure, growth trends, external trade and capital formation.]

UNITED NATIONS FOOD AND AGRICULTURE ORGANISATION. *Agricultural Credit in Economically Under-developed Countries*, by H. BELSHAW. Rome: F.A.O., 1960. 9". Pp. 255. 15s.

[This is a general survey arranged on analytical rather than descriptive lines. In Part I Dr. Belshaw considers the relation between agricultural credit and the problem of economic development as a whole and then goes on to review the conditions affecting the supply and demand for agricultural credit. Part II is devoted to questions of policy. It discusses ways of increasing the supply of funds, the conditions attached to loans and the parts that may be played by various organisations, including the government, the banks and co-operatives. Agricultural credit in backward countries is a subject that had already been extensively studied and written about before the great recent growth of interest in problems of these countries, and Dr. Belshaw is at pains to discuss it in relation to modern ideas regarding economic development as a whole. He emphasises the importance of bringing about changes in the attitudes and institutions that affect methods of agricultural production if improvements in the supply of credit are to produce any lasting benefit.]

UNITED NATIONS FOOD AND AGRICULTURE ORGANISATION. *Yearbook of Fishery Statistics*, Vol. IX, 1958. Production and fishing craft. Rome: F.A.O., 1959. 12".

[This contains internationally comparable statistics for the years 1953-58, relating to catch and landings by quantities and values, production of preserved and processed fishery commodities, and fishing craft. A separate section deals with whaling statistics.]



THE ECONOMIC JOURNAL

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SYMPOSIUM ON RESTRICTIVE PRACTICES LEGISLATION¹

I

ECONOMIC ANALYSIS AND PUBLIC POLICY

THE other two papers in our symposium are to give a barrister's view of British restrictive practices legislation and of the functions of economists in relation thereto, and an assessment of some of the consequences of the legislation to date. This introductory and more general paper might be considered as providing some sort of background for these more specific contributions. In it, I shall first discuss the value of economic analysis as a basis for decisions about public policy, with special reference to the control of restrictive practices. Following this, in Section II, I examine the Act itself and the role of the economist in its implementation. This Section is integrated loosely with the preceding one, in that the earlier discussion provides the background argument for the examination of the actual form and economic implications of the legislation, but the second Section also goes beyond the general policy problem, to examine in summary fashion the activities of the economist within the judicial and administrative process actually created by the Act.

I. THE ECONOMIST AND THE POLICY-MAKER

The economist can contribute to policy formation by giving advice as to the likely results of particular measures and so influencing the measures that are decided upon, and by explaining the relationships between specified aims and the possible means that might be used for their achievement. The value of his contribution must depend upon the extent to which his technical skills enable him to improve the policy-maker's appreciation of the issues in either or both of these respects.

In the case of restrictive practices, the body of technical knowledge¹ of most apparent relevance from this point of view is that which concerns itself

¹ The three following papers were delivered at the Conference of the Association of University Teachers of Economics held at Leeds in March 1960.

with the analysis of the logic of choice. This, in the form of welfare analysis, attempts to judge alternative situations by the extent to which they promote a pattern of community resource-use that accords with the Paretian optimum. It is useful, therefore, to begin by examining the value of this analysis for the economist concerned with the guidance of policy in the ways just described. I shall argue that the analysis has two defects which together greatly restrict its value in a policy context. First, the bearing of the analysis upon the policy problem must depend at least in part upon the extent to which the aims of public policy can be identified with the maximising conditions of the Paretian model, and it is open to doubt, to say the least, whether the interest of statesmen in the welfare optimum is as great as that of academic economists. Second, there are strong arguments that the welfare analysis has logical flaws which must make it a dubious guide to public policy, even if we accept achievement of the Paretian conditions as the sole aim of that policy.

I shall discuss these propositions in the next two sub-sections, attempting to bring out the general nature of the criticisms rather than to treat the problems exhaustively. The problems of the welfare analysis *per se* will first be examined briefly, before moving on in the following sub-section to the wider but perhaps less generally appreciated problems generated by the lack of consonance between welfare economics and the actual aims of public policy.

(i) *The Welfare Analysis*

The welfare analysis can and has been used to argue that an "optimum" situation (from the point of view of the "ideal" satisfaction of individual choices) would result from the existence of universal and perfect competition. If creation of such an optimum situation is the aim of public policy, then it follows, if the analysis itself is accepted, that that policy should concern itself with the removal of all restrictions upon the competitive process.

Although few economists would accept this bald statement as a completely satisfactory description of the monopoly problem in its policy context, it nevertheless provides the most reasonable starting-point for our survey. For, while the difficulties and ambiguities of the welfare analysis are widely admitted, there would, I suspect, be less general agreement that these shortcomings invalidate propositions about resource-use and competition of the kind just described. There is a temptation rather to regard them as "technical" difficulties that make the logic of the welfare analysis less tidy but do not falsify the general conclusions for policy that can be derived from it to any very important extent. In my view, the internal weaknesses of the welfare analysis are too fundamental to be dismissed in this fashion. I shall discuss two of them by way of illustration: income-distribution and what has come to be known as the "second best" argument.

The general nature of the income-distribution problem is well known.

Policies affecting resource-allocation must usually affect income-distribution simultaneously. To make clear statements as to which of two situations is "preferable" from a welfare (choice) point of view, it is therefore necessary to assume that income-distribution is irrelevant, or to rely upon not entirely plausible devices such as the compensation principle, and/or to limit welfare propositions to those that can be argued to hold, in some technical sense, for *all* distributions of income. These may be interesting logical exercises, but they must severely curtail the application of welfare analysis to policy problems. In any case, the search for "purity" of this kind is pointless to the extent that policy-makers have positive views about income-distribution, and so assess the value of policies in terms of their effects on income-distribution as well as on choices.

The "second best" argument is essentially the generalisation of a proposition about the optimum welfare conditions which had earlier been put forward in particular contexts, but whose broader relevance had not been fully realised. The core of the argument is the demonstration that, if there is in existence some continuing disturbance of the Paretian optimum conditions (such as a monopoly, or a government that does not obey the "rules of competition"), then there is no general reason why the removal of inhibitions of competition in other markets should produce a factor-allocation that approaches the welfare optimum more closely than would the allocation that results from continuance of those restrictions. Thus, if the sole end of public policy is to bring the community as close as possible to the Paretian "optimum," the economist can suggest removal of restrictive practices as a means to that end only if all other inhibitions of competition are capable of removal and are to be removed. Since the removal of all inhibitions of the competitive process (including those generated within the public sector) must be considered unlikely, the implications of the "second best" argument must be disturbing for those who think it important that economists should have something of a positive and (in some sense) scientifically valid kind to say about policies for the improvement of the conditions of choice. But, in my view, recognition of the "second best" proposition in no way diminishes the potential value of the economist's contribution to policy formation, while failure to recognise it in the past has certainly added nothing to the weight of his policy recommendations. I shall take this point up again later.

(ii) *The Broader Considerations*

The shortcomings of the welfare analysis as a guide to policy, even within its defined limitations, are reinforced by the fact that those limitations themselves leave a considerable gulf between the requirements and interests of the policy-maker and the matters upon which the economist can provide him with technical advice and assistance. The policy-maker has to work within a political environment. He has ideas about policy aims which go far beyond the concept of preservation of individual choice in the economist's

sense, and which indeed may frequently conflict with that concept. His interest in the economist's advice stems from a desire for further elucidation of these ideas and of their implications, and also from the need to decide how to translate aims into legislation and/or administrative action. These requirements the economist has failed to meet satisfactorily in two important respects. In the first place, economists have made little attempt at consistent examination of problems in relation to aims other than choice, and have given even less time to discussion of policy questions in contexts requiring consideration of more than one policy aim at once. Indeed, when faced with a problem involving plurality of aims, their inclination has frequently been to seek ways round it, in order to make "scientifically pure" statements about choice, rather than to accept the need for a wider cast of the net. In the second place, economists have failed to broaden the welfare analysis satisfactorily in a *technical* fashion, so that it might become a more adequate reflection of economic reality, and perhaps to that extent a better guide for policy purposes. The first of these failures needs no further explanation; anyone who has tried to write realistically upon matters of economic policy must be aware that our technical apparatus is unsatisfactorily narrow for the clear discussion of what others consider to be important aims of public policy. The second type of shortcoming requires a little further explanation. We can both demonstrate its nature, and illustrate the difficulties that economists run into once aims other than choice have to be considered, by examining some of the problems raised for the welfare analysis by the introduction of time and uncertainty, and then looking at the ways economists have treated that part of those problems that concerns itself with research and development.

Of the many aspects of economic reality that our simple welfare model fails to deal with, the most important are those concerned with the existence of time and uncertainty. The welfare ideal is concerned with conditions of long-run static equilibrium, and the analysis takes no account of the time-process of change or of the associated questions of decision-taking in conditions of uncertainty about the future. Admission of these considerations introduces a host of new problems, concerned for example with the implications for the choice concept of the possibility that resources may be used to generate, rather than simply to meet, demand, or with such things as the facts and implications of structural change. The need to accept the relevance of real-world phenomena of this kind for his advice upon the implementation of public policy, and the frequent inadequacy of the available economic analysis for such a purpose, provides a severe limitation upon the economist's function in policy formation. Equally important, admission of the existence of time and uncertainty directs attention to the possibility that the *aims* of public policy may take account of such matters: particularly, policy-makers may not be indifferent to the effects of their measures upon economic growth. This is a field in which the economist might be expected to have

something to say, and one which could have some bearing, *inter alia*, upon restrictive practices legislation.

However, the post-war interest in growth problems has resulted in the development, not of more sophisticated models in which growth and choice both have a place, but rather in the creation of two broadly independent analytical approaches, one treating growth by macro-economic techniques, the other concerned with the refinement of Pareto-type welfare systems. Consequently, we can now provide the policy-maker with two sets of broadly unrelated propositions, one dealing with growth and the other with choice, and neither capable of easy application in a context requiring admission of both as policy aims.

This argument can be further illustrated by considering the treatment by economists of that special aspect of the growth problem that concerns research and development. There have been some notable attempts, such as that of Schumpeter, to consider the logic of choice in a dynamic setting in such a fashion as to comprehend the use of resources for such activities as demand-creation and research and development. It is fair to say, however, that in Schumpeter the dynamic aspects of the problem are considered to be of such importance that questions of allocation are dismissed as unimportant rather than incorporated in a general model. Certainly, the work of Schumpeter and of later writers in the same tradition has encouraged economists concerned with research and development, not so much to consider anew the place of research activities in some general allocation (welfare) system, as to adopt a technocratic approach which *begins* from the implicit or explicit postulate that research and development are good in themselves. If it could be shown, for example, that restrictive practices encourage research and development activities, those using this approach would consider this to be evidence supporting the continuance of such practices, given that the aims of public policy include a desire to promote economic growth.

It seems to me paradoxical that this kind of view of research and development appears to be held by economists who in other contexts have shown themselves to be much concerned that the implications of the logic of choice should not be ignored by policy-makers. For if the aims of policy concern *both* growth and choice, then clearly the proposition that encouragement of research and development might be an argument in favour of restrictive practices is so incomplete as to be misleading. It treats of one sector of the economy only, and ignores the implied sacrifice of resources to other (research or current consumption) uses elsewhere in the economy. If a particular sector can devote resources to research *only* if it is able to restrict current competition, might it not equally well be argued that its behaviour in doing so is itself evidence of an inhibition of community choices about resource-use, since it must affect factor-allocation between different current production uses, between current production and research uses, and/or between different sorts of research uses? To put the questions differently, why

should the logic of choice not be applied to research resources in the same way as to other scarce resources? Those using the approach under examination provide no good reason why the opportunity-costs of research resources should be ignored, or why (for example) the devotion of monopoly profits to research should be thought to produce a more "desirable" factor allocation than would be generated by the utilisation of those profits by their earners to drink themselves to death. From the choice point of view, the most that we can say is that the resulting factor-allocation is likely to be different from the one that a competitive situation would have produced.

It is not easy to avoid the conclusion that these confusions about research and development bear a direct relation to the unwillingness of economists to think about their problems in relation to more than one policy aim at once.

The above arguments, though illustrative rather than exhaustive, provide a background against which British restrictive practices legislation can be examined. This is the purpose of Section II. In considering the legislation, we shall need to keep in mind the difficulties created for the policy-maker by the narrowness of the economist's approach to policy questions, by the inconsistency of his treatment of different policy aims, and by the internal difficulties and confusions that arise even in his elucidation of the logic of choice. I do not wish to argue that the economist has had nothing to offer to those responsible for our restrictive practices legislation. What I shall suggest is that deficiencies of the kind so far described have contributed to an important extent to the deficiencies of the Restrictive Trade Practices Act.

II. THE ACT AND ITS IMPLEMENTATION

In this Section I shall first explain and comment upon the form and content of the Act. Following this, I shall turn to its actual implementation and to the role of economists therein.

(i) *The Act*

The Restrictive Trade Practices Act, 1956, provides for agreements with defined characteristics to be registered, and, if not discontinued, referred to the Restrictive Practices Court for a decision as to whether they are contrary to the public interest. The onus is on the parties to an agreement to show why it should not be declared against the public interest, and Sections 21 and 22 of the Act lay down the conditions which have to be satisfied. These are:

- (1) That the restrictions confer certain defined benefits, or that their removal would cause or be likely to cause certain kinds of damage. These "escape clauses" have come to be known as the "gateways."
- (2) That the importance of any benefit or damage at (1), weighed against any detriment resulting or likely to result to the public, to

purchasers of the goods in question, to persons in the industry outside the ring, etc., is great enough for the restrictions to be held on balance to be "not unreasonable." This requirement is referred to as the "tailpiece."

The form of the Act provides an interesting reflection of the attitude of mind of the policy-makers. Its general character clearly derives from a view of aims that is conceptually much wider in its scope than is formal economic analysis, and to that extent the Act provides support for the validity of the criticisms advanced in the last Section. Thus, the Act condemns restrictive practices *in principle*, by placing the onus upon those who wish to continue to pursue them to show why they should be allowed to do so. But the possibility of special cases, in which the general condemnation might have unsatisfactory consequences, is provided for by the "gateways" and the "tailpiece," and by the creation of a judicial process whose purpose is to discover such exceptional cases. Plausibly, this general formulation might be said to reflect a view of society that supports an economic system based on private capitalism, but sees the competitive process and freedom of markets and of economic activities as essential requirements for the successful operation and justification of that system. Such an attitude requires that inhibitions of competition be tolerated only in exceptional circumstances, but reaches that position for broader reasons than those provided by technical economic analysis. Indeed, it is inherent in this view of policy (and in the form of our legislation) that "favourable" economic consequences of particular restrictive practices might be agreed to exist, and the practices yet be condemned on grounds of the general undesirability of restriction *per se*.

For those of us who are interested in problems of economic policy, there may be something to be learned for the development of our discipline from the contrast between the approach to policy just described, which can be inferred from our restrictive practices legislation, and the existing form and content of economists' technical propositions. Consider, for example, the "second best" argument discussed in Section I. The difficulties this generates for propositions about optimum allocation assume much smaller significance once we accept that achievement of the ideal conditions of choice as described in the welfare models is less important for the policy-maker than it has been in recent years for the academic economist. If we want to provide better guidance for the policy-maker our attention needs to be directed, not towards attempts at the "rehabilitation" of welfare economics, but rather to more thorough examination of other, and perhaps more plausible, policy aims in order to put ourselves in a better position to give technical advice (concerning implications or means of attainment) about them. From this point of view, the value of the second best argument lies not so much in its destruction of the possibility of deriving policy propositions

in any simple way from the welfare analysis, as in its positive contribution to our understanding of the resource-allocation problem in its policy context.

When we turn from the general character of the legislation to its more detailed content, another consequence of the gap between the economist and the policy-maker becomes apparent. Lacking satisfactory technical advice of a scope compatible with the breadth of their own approach, those responsible for policy have not tried to give their general conceptions precise legislative form, but have passed the problem on by producing an Act sufficiently vague for its actual operation to depend to an important extent upon the interpretations placed upon it by the judiciary. The most important instance of this impression concerns the requirement placed upon the Court by the Act, to decide whether particular agreements are contrary to the public interest. No precise definition of "public interest" is given in the Act, so that the intention of the policy-makers can be discovered only by study of the detailed terms of the Act (the only method available to the judiciary) and (for example) by such means as examination of the relevant Parliamentary debates. In particular, the relation between the public interest and the maintenance of competition is not referred to in the Act; indeed, the term "competition" occurs only once, in a relatively minor context. Certainly, the Act can plausibly be interpreted (and has been interpreted by the Court) in a fashion that identifies the public interest broadly with the absence of the conditions set out in paragraph 6 of the Act, which defines a registrable agreement. Also, examination of these conditions might well suggest to an economist that the aim of the Act was the maintenance and encouragement of competition, and the Court has itself taken such a view. Nevertheless, it is far from certain that this is the only possible interpretation, or the one that would inevitably have been made by any member of the judiciary.

Similar difficulties arise in the interpretation of other terms of the Act. To take but one example, a plausible interpretation of one "gateway" alone (clause 21 (b)) would cover almost all possible arguments about the economic consequences of restrictive practices. This clause alone has already been used to introduce arguments that particular agreements benefited consumers by (for example) eliminating cut-throat competition, preserving capacity, encouraging research re-equipment and innovation, and stabilising prices.

It is encouraging to be able to observe, in concluding the discussion of the terms of the Act, that deficiencies are also to be found which are quite clearly not the responsibility of economists, and which could surely have been avoided had satisfactory technical advice been obtained. Perhaps the best illustration of this concerns the export "gateway." This provides that a restriction can be supported (subject to the "tailpiece") on the grounds that its removal would cause a reduction in the volume or earnings of export business. Lawyers seem to have found the wording of the clause obscure. But it seems clear that those responsible for it must have been influenced by

Britain's existing balance-of-payments problem. Nevertheless, the wording gives no suggestion that this kind of short-term consideration is what the legislator had in mind; as it reads, the clause can only imply that the encouragement of exports is in itself to be treated as a desirable end of policy. It is hard to avoid the conclusion that there was inadequate consultation with economists in the drafting of this "gateway," since the nature of the error concerned has been widely understood since the time of the Physiocrats.

(ii) *The Process of Enforcement*

It does not follow, from the criticisms that have been advanced of the Act and of the contribution of the economist to its formulation, that the legislation is incapable of implementation, or that economists cannot make a valuable contribution to that implementation. I want in conclusion to discuss the nature of their contribution and the ways in which it might be made most effective within the framework of the Act. I hope that Mr. Lloyd will later be offering some comment upon the same point as seen by a barrister.

If the economist is to provide useful service, as an adviser to the Registrar or to industry and/or as an expert witness in Court, it is essential that he should accept the need to think, and to formulate his arguments, in a fashion that can be effective in a court of law. Lord Justice Harman, pronouncing recently upon methods of costing for valuation purposes, said in his judgment that:

"An English lawsuit was not a debate or moot, but a decision on particular facts. Wide and academic arguments were quite unsuited to the processes of English law. To have decided this case on broad general principles would have led to an absurdity."

The potential conflicts in the approach of lawyers and economists to the operation of the restrictive practices legislation are clearly brought out by this quotation. Thus, the economist is concerned with matters of principle and logic relative to such questions as resource-allocation, and is disposed by interest and habit of mind to consider these things in a fashion that permits discussion with other economists. Such discussion employs a common technical language, but both the nature of the problems and the character of the economist's interest in them makes continuous discussion of problems of terminology likely if not unavoidable. In contrast, the lawyer's interest is litigation. The law provides for a system of adversary proceedings through which a decision is taken about defined issues. While the economist tries, often inconclusively, to test his propositions, the lawyer is told whether he is right or wrong by the decision given by a judge. The lawyer's activities take place within a framework defined for him, through proceedings carried on in accordance with the current state of law (legislation, judicial opinions,

etc.), and obeying technical rules about the burden of proof, the admissibility of evidence and so on. His technical terms have agreed meanings, established by statutes and by past decisions, or capable of definition by such means.

There is no point in treating these differences of methodology and attitude as subjects for controversy or mutual criticism: the problem is not one of who is right and who wrong but one of how to work together to ensure satisfactory implementation of the Act, or, where necessary, to make clear the need for changes in the law. Further, in view of the fact that public policy towards restrictive practices is enforced through the courts (and it is not easy to see how some kind of judicial process could have been avoided), the economist must recognise that it is the lawyer who calls the tune. It is for the economist to adapt the form of his argument and comment to fit the requirements of the lawyer, rather than to expect the lawyer to try to make use of propositions that lie outside his experience or cannot be fitted to his procedures.

Such an adaptation of the economist's approach is less impossible than it might appear at first sight. We can see what is required by considering each of the five stages of the legal process in turn: ¹

The first stage concerns *definition of issues*. Here, it is fair to say that the imprecisions of the Act, described earlier, help make the economist's task easier. The judiciary sees its function as the administration of legislation rather than the making of law, and, in deciding what the law is, judges concern themselves not with what the intentions of the legislators might have been but solely with the "construction" to be placed upon the words actually used in the Act under consideration. From the lawyer's point of view, therefore, a satisfactory law is one whose terms are sufficiently clear and specific to make "construction" easy. For the economist, such specific terminology would be likely to create difficulties, by placing obstacles in the way of introduction of concepts of general principle (in relation, for example, to the meaning of terms such as the "public interest").² As things are, the Act is so broadly conceived, generally speaking, that a wide variety of possible "constructions" is possible, and in these circumstances the difference between trying to define a term such as "public interest" by reference to general principles and by "construction" is more apparent than real. The lawyer is obliged to set out principles without admitting that he is doing so, and the economist can help by offering concepts of principle in a form

¹ The classification is that adopted by Massel in *Economics and the Policy Maker* (Brookings Lectures, 1958-59).

² A colleague has suggested, not entirely cynically, that our restrictive practices legislation might have been more satisfactory if the law had simply declared the defined practices to be against the public interest and illegal, unless those concerned could show good reason why they should be allowed to continue. Such a "find Johnny and ask him why he shouldn't be made to stop it" approach might well have suited economists, by permitting unrestrained argument about both facts and concepts of principle. But it would have found little favour among lawyers, as it would

palatable to lawyers.¹ Given the wide range of possible "constructions" of the terms of the Act, it seems to me that in fact the lawyers and economists concerned in the early cases have succeeded in working together to produce a plausible and consistent view of the general nature and scope of the legislation; that the situation could have been very much less satisfactory is sufficiently demonstrated by the judicial interpretation of the economic issues raised in the *Water-tube Boilers Case*.²

The collection of data and their presentation is an activity in which the function of the economist is fairly clear, but here again the nature of the legal process cannot be ignored; the economist's suggestions about general strategy must be made in a form capable of useful adoption within the rules of evidence and procedure. There is also work to be done in persuading lawyers that it may not be good policy to put everything possible in evidence.³

As well as advising, the economist may himself have to give evidence as an expert witness. That evidence should be related to the general strategy that he has helped devise, and should accept the limitations (upon argument of issues of principle, etc.) already indicated.

Arguments by lawyers on the data and the law takes place primarily during the actual proceedings. The economist can thus make no direct contribution. But, again, his value in ensuring that the lawyer he advises understands the implications of the other side's argument will be increased if his comment is in a form appropriate to court proceedings rather than for seminar discussion.

It remains, in conclusion, to consider the final step: the *judicial sifting and formation of conclusions*. This is in many ways the most difficult problem of all. The judges are faced with a set of complex issues. In principle, they cannot seek outside technical advice; lawyers think it important for the satisfactory

¹ To illustrate this, I have been advised that it would be pointless to put before the Court a proposition that the cost data of a number of firms with different cost conditions could not *in principle* be used to support argument that a common selling price was "fair and reasonable," since judges could not be expected to disbar themselves from accepting such argument in all future cases. But a similar end can be sought by advancing the same objections to such an argument from cost data in more and more individual cases, and so regularly reducing the likelihood of its being accepted in any future case.

² Of course, some of the requirements of the Act are so phrased as to make adaptation of economist's and lawyer's approaches very difficult. The export "gateway," discussed earlier, provides an example. It is not easy, given the terms used, for the lawyer to place any construction upon the clause that economists would think reasonable, and the clause would be unsatisfactory to economists even upon the most plausible (but impossible) interpretation of its intentions. In such circumstances there is nothing to be done but point to the need for amendment of the law, and be thankful that such problems have been avoided elsewhere.

³ It is not a complete objection to an argument, from a legal point of view, that it is in contradiction with some other argument presented to support the same case. It is for the judge to say which argument he accepts. But this approach has great dangers if the case as a whole needs to be logically consistent to be plausible, and this must usually be the case with restrictive practices cases. So far, I have the impression that the Registrar has become persuaded of this, but that much work remains to be done on the industry side. I should also point out that the *Water-tube Boilers* judgment, in particular, goes against my argument. If the Court accepts or overlooks the inconsistencies, the strongest argument against them disappears. But I think (and hope) that it will become increasingly dangerous to rely on this.

administration of justice that the whole of the proceedings should consist of argument, with the possibility of rebuttal of any expert evidence, before a judge. But individual judges, working alone, need not be any more capable of weighing the technical considerations involved in argument about restrictive practices than a magistrate would be to decide whether a man should hang. Our own attempt to solve this problem has been to require that judges sit with lay assessors. I am not clear how far this can provide an adequate substitute for specific advice, and would very much like to hear discussion of this problem, and of the possibilities of further experimentation with a "judge's economist" following upon the one use of this device in the United States.

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II

THE LAWYER'S POINT OF VIEW

EIGHT cases have so far been heard by the Restrictive Practices Court in England and Scotland.¹ In seven of the eight the Court has declared the restrictions in question to be against the public interest.² As a result of these seven cases, and in particular of the judgment of Devlin, J., in the *Yarn Spinners' Case*, many agreements which might otherwise have been defended have now been given up. These facts have suggested to some the possibility that the Court's approach to the Act has been too narrow. It cannot have been intended by Parliament, so the argument runs, that so few restrictive agreements should be saved. Therefore there must have been a fault in the way the Act has been interpreted. I shall attempt to deal with this argument in the first part of this paper. I hope to show that so far from taking a narrow view of its task the Court has on several occasions taken an unusually broad view both in interpreting the Act and in its attitude to the evidence of expert witnesses. In the second part of the paper I shall mention some practical consequences from a lawyer's point of view of the way in which the Act is working. This will, I hope, provide a link between the other two papers in the symposium.

Construction of the Act. The most persistent criticism that has been made of the Court, particularly by certain sectors of industry, is that it has adopted a narrow or "legalistic" approach to the problem of interpreting or construing the Act. I do not know what lies behind this criticism. It is partly, I suspect, the feeling that Parliament could not possibly have intended to produce the present result. Perhaps it is also the idea that "strict" rules of construction are out of place in considering a statute which involves, as the present Act does, an altogether new venture into the realm of economic affairs and a new curtailment on freedom of contract. But the problem of construction does not vary with the statute construed. In all cases the only purpose of construction is to ascertain what Parliament

¹ *Chemists' Federation Agreement*, (1958) L.R. 1 R.P. 75.

Yarn Spinners' Agreement, (1959) L.R. 1 R.P. 118.

Blanket Manufacturers' Agreement, (1959) L.R. 1 R.P. 208.

Water-tube Boilermakers' Agreement, (1959) L.R. 1 R.P. 285.

Wholesale and Retail Bakers of Scotland Association's Agreement } (1959) L.R. 1 R.P. 347.

Scottish Association of Master Bakers' Agreement

Federation of Wholesale and Multiple Bakers (Great Britain and Northern Ireland) Agreement, (1959) L.R. 1 R.P. 387.

Federation of British Carpet Manufacturers' Agreement, (1959) L.R. 1 R.P. 472.

Phenol Producers' Agreement, (1960) 1 W.L.R. 464.

² All except *Water-tube Boilermakers' Agreement*.

intends.¹ The method of construing a statute may be open to question. But the purpose of construing it is beyond doubt.

The method of construction adopted by Courts to-day is the result of many centuries of experiment. The rule is that the intention of Parliament is to be collected—and collected only—from the words that have actually been used. This rule sometimes has disadvantages,² but it has been found to work better than that the Courts should “embark on a voyage of discovery” by guessing at what was intended for themselves or by relying on the opinion of others. Thus the opinion of experts as to the meaning of ordinary words in an Act of Parliament has always been excluded. Indeed, the rule that the Courts will not look beyond the language of the statute where the language is clear has now become so firmly implanted that in one case Lord Halsbury refused to give judgment in the House of Lords on a question involving the construction of a statute on the ground that he had taken a hand in drafting it.

“I have more than once had occasion to say that in construing a statute, I believe the worst person to construe it is the person who is responsible for its drafting. He is very much disposed to confuse what he intended to do with the effect of the language which in fact has been employed.”³

If therefore when the Court is criticised for taking a narrow or “legalistic” view of the Act all that is meant is that it has looked to the words of the Act for the purpose of ascertaining Parliament’s intention, then the criticism is justified. Indeed, the Court stands self-confessed. In the first case to come before the Court, Devlin, J., said:

“But since this is the first judgment delivered under the Act, it is as well that we should make it clear that we are not in our view in any way required to answer the question [whether it is contrary to the public interest that sales of medicines should be effected only through chemists] as a matter of policy. We are not to consider whether competition in the sale of medicines is desirable or undesirable, whether drug stores are a suitable outlet for them or whether chemists should have a monopoly, or whether the Chemists’ Federation is a good or a bad thing. Such questions of general policy are settled by the Act. . . . Our task is the ordinary task of a Court of law to take the words of the Act according to their proper construction and see if upon the facts proved the case falls within them.”⁴

¹ “As is stated in the first sentence of Maxwell on the *Interpretation of Statutes* . . . the fundamental rule of interpretation to which all others are subordinate, is that the statute is to be expounded ‘according to the intent of them that made it.’” *Prince Ernest of Hanover v. Att-Gen.*, [1956] Ch 188 per Evershed, M. R., at p. 201. Affirmed, [1957] A.C. 436.

² As in *Inland Revenue Comrs v. Hinchy*, H. L., [1960] 2 W.L.R. 448.

³ *Hilder v. Dexter*, [1902] A.C. 474 at p. 477.

⁴ *Chemists’ Federation Agreement*, (1958) L.R. 1 R.P. 75 at p. 103.

If, on the other hand, the point of the criticism is not that the Court has been over-concerned with the language of the Act, but that it has taken an unreasonably narrow view in applying that language to the facts of particular cases, then I think that the criticism is not justified. Nearly all the decided cases show the Court’s preference for taking a broad view of the Act wherever possible. A single illustration may be given. It comes from the all important Section 21 (1) (b):

“ . . . a restriction accepted in pursuance of any [registered] agreement shall be deemed to be contrary to the public interest unless the Court is satisfied . . .

“(b) that the removal of the restriction would deny to the public . . . other specific and substantial benefits or advantages enjoyed or likely to be enjoyed by them . . .”

The sub-section is all important because it provides the only “gateway” that has been relied on in each of the cases so far decided. It is the gateway that has been used to let in all the traditional arguments for and against competition. In the *Yarn Spinners’ Case*, Mr. A. A. Mocatta, Q.C., for the Registrar approached the subsection in a way which would have made all such traditional arguments irrelevant. He said that the word “specific” in the phrase “specific and substantial benefit” meant specific as opposed to generic, *i.e.*, that the benefit in question must be peculiar to the particular industry and not common to restrictive agreements in general. His argument is reported as follows:

“Parliament has condemned the whole genus of minimum price schemes, and therefore a benefit or advantage which is inherent in any minimum price scheme is not ‘specific’ within the meaning of the paragraph. The association must show some benefit or advantage which is peculiar to this particular scheme.”¹

Pearson, J., interposed:

“One meaning of ‘specific’ given in the *Shorter Oxford English Dictionary* is ‘of qualities properties effects etc. specially or peculiarly pertaining to a certain thing or class of things and constituting one of the characteristic features of this.’”

Mr. Mocatta promptly adopted this definition, saying that it crystallised the submission of the Registrar. The argument is undoubtedly attractive. A similar argument was advanced in the *Carpet Manufacturers’ Case*.² But in both cases it was rejected. The Court preferred to decide on the broad ground that price stabilisation (as an alternative to free competition) was not a benefit at all. Thus the question whether it had been a benefit it would have been a specific benefit did not arise. The Court reached this conclusion in both cases on a consideration of the Act as a whole and in

¹ L.R. 1 R.P. 118 at p. 155.

² L.R. 1 R.P. 472 at p. 512.

particular on a consideration of the "built-in" presumption against restrictive agreements in general. It affords a good example of what in a later case is called the Court's "realistic approach" to the construction of Section 21 (1) (b).¹ It is also an indication of the true reason why, if it be the fact, the Act is not working as intended. That restrictive agreements have proved hard to justify is clear enough. But if this is contrary to Parliament's intention, then the fault is not due to any narrowness in the Court's approach to the Act, but to the narrowness of the Act itself.

The Role of the Expert Witness. In fulfilling its first function of saying what the Act means the Court proceeds without the help of experts. Its second function is that of applying the Act to the facts of a particular case and deciding whether on the facts proved the case falls within the Act. Here the evidence of experts is essential, and in particular the evidence of those who are fully acquainted with the industry in question. Those economists who have already appeared as expert witnesses may have been puzzled by the Court's attitude to their evidence. It may have seemed to them that they were never asked or had a chance to answer what they regarded as the crucial questions. It may have appeared that, once again, the Court was taking a restricted view of its task and was refusing the help of trained economists at the very point where it was most needed. Again, however, the fact is that the Court's attitude to expert witnesses in the eight cases so far decided has been much the same as it is in any other cases involving expert evidence; and again if there has been any difference it has been in the direction of giving the witnesses greater, and not less, latitude.

For present purposes the two fundamental rules of evidence may be stated as follows: (i) evidence must be confined to answering questions of fact; and (ii) as an exception expressions of opinion may be admissible, but only where necessary to provide the Court with the criteria on which to arrive at a decision of fact. Where the Court is already possessed of the necessary criteria, *i.e.*, where the decision is not one that involves any specialised or technical knowledge of art or science, evidence of opinion is excluded. So long as economists have confined their evidence to (i), *i.e.*, to answering questions of fact, no difficulty has arisen. The difficulty arises under (ii); for expression of opinion is admitted only for a very limited purpose. The rule is that experts may, by expressing their opinion, provide the Court with the *criteria* by which to arrive at a decision of fact. The corollary to this rule is that they are not allowed to express an opinion on the very point in issue. The reason for excluding such evidence was stated in one case as follows: "The parties have invoked the decision of a judicial tribunal and not an oracular pronouncement by an expert."² This distinction may be illustrated by a typical action for negligence against a doctor.

¹ *Federation of Wholesale and Multiple Bakers, (Great Britain and Northern Ireland) Agreement*, (1959) L.R. 1 R.P. 387 at p. 454.

² *Davie v. Edinburgh Magistrates*, [1953] S.C. 34 at p. 40.

In such a case other doctors may not be asked whether they think that the defendant was negligent. But they can (and must) be asked how they would have treated the patient themselves, or what is the common practice.

In the illustration given the distinction is narrow. Indeed, it may often amount to no more than a question of words. But under the Act the distinction is important. Thus the economist will not be allowed to say whether he regards the consequence of a restriction as beneficial to the public, because that is the very point which the Court has to decide under Section 21 (1) (b). All the economist may do is to describe the consequence, and leave the Court to decide whether it is beneficial. Similarly, he cannot give his opinion as to whether terms are fair within Section 21 (i) (d) or unemployment likely to be serious within Section 21 (1) (e)¹ and so on. Above all, he will not be allowed to express his opinion as to the crucial balancing operation at the end of Section 21 (1).

The Court as arbiter in economic affairs. At this point the economist may well retort: It may be that the rules of evidence exclude economists' expressing their opinion on these matters, but in the absence of such opinion, how is the Court equipped to decide for itself?² In what way are judges qualified to balance such diverse considerations as serious and persistent unemployment, on the one hand, against a waste of national resources in the form of excess capacity, on the other, as it did in the *Yarn Spinners' Case*? Or how can they balance a reduction in the earnings of the export business of an industry, on the one hand, against higher prices in the home market, on the other, as it did in the *Water-tube Boilermakers' Case*? Are these not policy decisions of the very kind eschewed by Devlin, J., in the *Chemists' Case*?

It may be that they are; but it does not seem to me to follow that for that reason they are decisions which the Court is incompetent to take. In the first place the Court is not composed solely of lawyers, but sits with a majority of lay members "qualified by virtue of their knowledge of or experience in industry commerce or public affairs."³ A precedent for a mixed Court of this kind is to be found in the Probate, Divorce and Admiralty Division of the High Court, where an Admiralty judge may sit with Elder Brethren of Trinity House to adjudicate on such questions as improper navigation.

Secondly, and more important, the ordinary Courts are in fact performing "balancing operations" of the kind in question, though in other spheres, every day. Take the case of an action for negligence against a motorist. If the defendant is held liable it is because he has fallen short of the required standard of care. But there is no ready-made standard against

¹ He can, of course, give evidence as to the likely *extent* of unemployment.

² "It is not for this tribunal, nor for any tribunal, to adjudicate as between conflicting theories of political economy. Strong views may be entertained on the one side or the other . . ." *Crown Milling Co. v. The King*, [1927] A.C. 394 at p. 402.

³ Section 4 (1).

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which his conduct can be measured. Not even common practice can provide such a standard, though it may be a useful guide. Ultimately the Courts must achieve a standard by a balancing operation—by balancing the risks which motorists create against the cost of avoiding those risks. An example will illustrate this. If all motorists were required to drive at no more than 10 or 20 m.p.h. there would be fewer accidents to pedestrians. But the cost in terms of public convenience would be high. The task of balancing public convenience against the interests of individual pedestrians is not regarded as being beyond the competence of the Courts. I am by no means convinced that the Court is doing anything essentially different when it balances the interests of the country as a whole against those who are likely to become unemployed in Lancashire.

Another example can be taken from the law of restraint of trade. The analogy is even closer here, because this time it calls for an *economic* balancing operation. For many centuries the Courts have been balancing the interest of the purchaser of the goodwill of a business in preserving the value of what he has bought against the country's interest in allowing the vendor freedom to trade. Similarly, they have balanced the interest of an employer in protecting his trade secrets and his trade connections against that of a servant who leaves his employment. These tasks have been performed by the Courts without even the help of lay assessors. They show, I think, that the Court is not so ill equipped to make policy decisions as is sometimes supposed; and that they are not automatically disqualified by the fact that these decisions may involve questions of economic policy.

The legal consequences. I now turn to consider some of the consequences of the way the Act is working from a lawyer's point of view. The most easily foreseen consequence of so few agreements being defensible under Section 21 of the Act was that it would produce a rash of mergers. In this respect the Act is like the marriage service. While discouraging the unlawful affections of business-men it gives its blessing to what are called "inter-connected bodies corporate." A less foreseeable consequence was the shift of emphasis from Section 21 of the Act to Section 6. Section 6 is the section that defines a registrable agreement. If registered agreements can only rarely be defended with success, then the cry is for agreements that need not be registered. Many ingenious schemes have been devised for avoiding the effect of Section 6. By far the commonest are the "open-price" agreements to be considered in the next paper. It has not yet been decided whether, in general, such open-price agreements fall within the Act. If, for instance, it should be held that an obligation to notify prices or changes in prices to a central agency imposes a restriction "in respect of . . . the prices to be charged," then all such agreements would appear to be registrable. Otherwise it will depend upon the drafting of the particular scheme and on the way it works in practice.

The lawyer is well aware of this shift of emphasis from attempting

to defend registrable agreements to attempting to draft unregistrable agreements in their place. So no doubt is the Registrar. It is possible, though unlikely, that the Registrar's successes in the Court will incline him to be lenient in calling for the registration of border-line agreements. It is only on this aspect of the Act that the Registrar is left, in effect, with any discretion. Meanwhile agreements no doubt exist which are by no means on the border line but fall clearly within the Act. It seems to me that the shift of emphasis which I have mentioned now makes it necessary to have a more effective penalty for failing to register such agreements. At present the only penalty is that the parties to the agreement may if discovered be forbidden to defend it for a period of two years, and to enforce it in the meantime.¹ But it will be seen that this is no real penalty where the agreement is one that is known to be indefensible in any case. The position has been compared to that of a child who refuses to come in from the garden at bedtime. It is no good threatening the child that if he does not come in at once he will have to go to bed.

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¹ Section 18 (2) and Section 20 (2) (b).

III

SOME ECONOMIC CONSEQUENCES

ALTHOUGH I am still in the process of investigating the economic consequences of the abandonment of some restrictive agreements that were registered under the 1956 Act, it is already clear that by far the most *significant* change has been the substitution—so far to only a limited extent—of non-registrable agreements to exchange information, principally about prices. This paper will examine the nature and some implications of these “open price” agreements.

THE NATURE OF “OPEN PRICE” AGREEMENTS

The general form is that members notify a central agency of their prices and perhaps other information for circulation to competitors. In Britain usually the trade association is told of the actual prices charged, as well as discounts, rebates and the terms and conditions of sale; frequently firms give the agency their price lists for distribution, and subsequently specify the details of all sales at prices or conditions other than those listed. These price lists and detailed departures from them will then be circulated to members only. The names of sellers as well as their prices are usually divulged together with, in the case of special prices or conditions, the names of customers. Generally members may check with the central agency about the latest prices charged or being quoted to particular customers, and in some cases the agency ascertains competitors' prices or terms and conditions when requested by a member. For a few commodities there is open price leadership in which one firm—not always the dominant one—either publishes its prices in daily or less frequent commercial reports, or makes it known that anyone can ascertain its prices on inquiry; this may or may not be associated with an agreement to exchange information between members. Where orders are placed by contract all firms that tendered may notify the central agency of the prices they submitted *after* the contract has been placed, and these prices are distributed with or without identification of origin to members.¹ A small number of trades circulate average prices over a period, usually every month, but in one case every week, and some circulate

¹ In some cases no prices are exchanged. For example, in one trade a firm notifies the central agency of an inquiry, and learns from it the *names* only of all competitors who have also received inquiries; likewise its name is given to the other interested firms.

turnover or costs.¹ In one case market information is also summarised weekly.²

Not one of these agreements to exchange information *in itself* involves a registrable restriction; there is no required or recommended action to be taken on receipt of the information. Consequently they do not come under the 1956 Act (for technical reasons ³ a dozen or so are on the register, but they will not appear before the Court). Since the beginning of 1959 at least 150 have come into operation or are being formed; a large number are in the electrical and metals-processing trades.

Open price agreements are a recent development in Britain, but experience with them is not lacking elsewhere: they have been familiar in the United States since 1911.⁴ They began in response to the Sherman Anti-Trust Act of 1890; and by 1921 their number was estimated at 150.⁵ Adverse court decisions then reduced their importance, but later their number increased under the relaxation of the anti-trust laws permitted by the National Recovery Act of 1933.⁶ To guide their staff in authorising codes in individual trades the National Recovery Administration in 1934 constructed a “model” ⁷ open price agreement that was based on the

¹ For example, in one trade price lists and departures from them are notified to all members (with customers' names who receive special prices); turnover (in tons for each grade) is notified to the Federation each quarter, and the total turnover indicating only the number of firms is then distributed to members; also, standardised processing costs are collected annually, and the weighted average figure is then distributed indicating only the number of reporting firms. In another trade the arrangements are identical except that the *actual* turnover and cost data are circulated, members' identities being concealed (not very effectively) by code numbers.

² The information consists of:

Remarks.	Number of manufacturers who made particular remark.
Demand good	
Demand improving	
Demand slower	
Demand poor	

³ When an agreement has been varied such that if it had been in its varied form originally it would not have been registrable, subsequent changes of whatever nature have to be notified to the Registrar. A typical variation might read: “*Cancel:* To establish and/or maintain prices, charges and also terms and conditions of trading. *Substitute:* To collect and disseminate statistics and other trading information” On the other hand, where an entire agreement is determined a subsequent new arrangement to exchange information does not have to be notified to the Registrar (although he may be consulted).

⁴ The system was invented by A. J. Eddy, a Chicago lawyer. See his *The New Competition* (Appleton, 1912). Judicial experience with open price agreements in the United States, seen in the light of the British 1956 Act, is well summarised by R. O. Wilberforce, Q.C., A. Campbell and N. P. M. Elles, *The Law of Restrictive Trade Practices and Monopolies* (Sweet and Maxwell, 1957), § 607-11.

⁵ Federal Trade Commission estimate quoted in L. S. Lyon and V. Abramson, *The Economics of Open Price Systems* (1936), p. 16. Another estimate placed the number at 450 in that year. M. N. Nelson, *Open Price Associations* (1923), p. 11.

⁶ It is reported that the National Recovery Administration, which lasted until April 1936, authorised 422 open price agreements, and 29 bid-filling systems. L. S. Lyon and V. Abramson, *op. cit.*, p. 23.

⁷ N.R.A., *Office Memorandum* 228, June 7th, 1934. Quoted in L. S. Lyon and others, *The National Recovery Administration* (1935), p. 677.

principles of an organised commodity exchange and on the ideal of perfect competition, about which more will be said later; subsequently many were found to have involved price restrictions and were forbidden. Nowadays open price agreements that require a "waiting period" between the announcement and the implementation of a price change are likely to be regarded as unlawful, and agreements that do not make the information equally available to all sellers and buyers arouse grave suspicion. Such attitudes clearly reflect the earlier "model" code.

Since it is too soon to be reporting on their manner of operation in Britain, even if it were possible to find out, it may be more useful to discuss what information about competitors it would be most desirable in the light of broad welfare objectives for firms to possess, and in what form it should be presented. With some notion of the ideal, the issues for public policy may become clearer. This paper will suggest rather than examine rigorously some implications of the exchange of price information only; and will be concerned with micro-economic theory of the firm considerations rather than the macro-economic effects of open price agreements. Since generalisation in this field is extraordinarily difficult, the analysis will relate primarily to agreements among the suppliers of industrial materials in which the majority of price restrictions that have already been abandoned is to be found.¹ This implies that buyers are well informed technically, and that the goods are fairly homogeneous.

Until recently, discussion of the role of information in economic theory has been neglected. To summarise the present position: perfect competition and its information requirements² cannot be regarded as relevant guides to public policy; and those who have substituted criteria of "workable competition" as broad objectives have neglected to examine the role of information.³ Several critics⁴ now hold that something less than the information requirements implied by free competition may be desirable; just how much less is a crucial issue. The most developed analyses are given by M. Shubik,⁵ who relates information to oligopolistic competition and the theory of games, and by G. B. Richardson, in his forthcoming book.⁶ However, neither writer

¹ See the author's "Freer Prices—What Progress?" *The Banker*, February 1960, p. 111.

² As in Frank Knight, *Risk, Uncertainty and Profit*, 2nd ed., p. 78. "... perfect, continuous, costless intercommunication between all individual members of the society."

³ Out of eighteen versions of "workable competition" S. H. Sosnik finds only four that even mention information, and in these there is little analysis. "A Critique of Concepts of Workable Competition," *Quarterly Journal of Economics*, August 1958.

⁴ For example, G. B. Richardson, "Equilibrium, Expectations and Information," *Economic Journal*, June 1959; "Demand and Supply Reconsidered," *Oxford Economic Papers*, June 1956; M. Shubik, *Strategy and Market Structure* (John Wiley and Son, 1959), Chapter 8; Almarin Phillips "A Critique of United States Experience with Price-fixing Agreements and the *per se* Rule," *Journal of Industrial Economics*, October 1959.

⁵ *Op. cit.*, Part II.

⁶ *Information and Investment* (Oxford University Press). Unfortunately this work came to my notice too late to take account of its more general implications in this paper. I have, however, benefited from discussion with its author.

discusses the effects of an exchange of price information as described above. Assuming the absence of agreement initially, what are the likely consequences?

THE EXTENSION OF OLIGOPOLISTIC COMPETITION

The most important effect of the complete exchange of price information by sellers is that, by providing firms with information about which they would otherwise have been in doubt, the area of oligopolistic behaviour is extended; and in so far as this form of behaviour would have been present in any case, more exact information makes the "game" more perfect. At the extreme, if a firm believes that its rivals are unaware of its prices, then it will be less likely to consider their reactions to its pricing decisions than if it knows they are fully informed; lack of concern is reinforced if the firm is also ignorant of its rivals' prices. In practice, however, most firms issue price lists that rivals could probably acquire,¹ and for convenience make most sales at list prices. But a proportion of the number of sales will generally be made at special prices² that may account for a substantial part of the turnover; rivals are likely to be ignorant of the details of these sales, particularly if a buyer considers that the special price has given him a relative advantage over his rivals. Moreover, a firm in an industry with a large number of other firms may behave oligopolistically towards a few of its close rivals, and partially or completely ignore the remainder. By providing all firms with price information about which they would otherwise have been in doubt, some firms will be brought for the first time within the sphere of interest of others, and the *effective* number of rivals will be increased. A price change by one firm will now be noticed more widely and the information will be complete instead of partial; some sellers that were previously unconcerned may now react to changes in a particular firm's prices. Atomistic competition or an overlapping of oligopolies present in some situations will therefore become more uniformly oligopolistically competitive.

The full implications cannot be discussed here, but it is relevant to what follows to mention two aspects of oligopolistic behaviour: the circumstances under which prices may change; and the spread of prices for technically equivalent commodities. Recent developments in the theory of oligopoly, which stress the perusal of price stabilisation strategies, and empirical evidence both point to the tendency for rivals' prices to move together once prices move beyond a zone of stability (within which price changes would not invite retaliation), and in general following widely recognised changes in factor prices³ modified by market forces. The degree of implicit regula-

¹ Except of course in the important case where the products are "custom built."

² The "price" must be taken to include rebates, discounts and all types of concealed pricing, such as credit facilities, trade-in-prices and delivery terms.

³ See, for example, J. M. Blair "Administered Prices: a Phenomenon in Search of a Theory," *American Economic Review*, May 1959.

tion may depend partly on the strength of group loyalty, which is determined both by historical events and by the current economic environment.¹ Prices may not, of course, be stable, but there will be a *tendency* for them to be more stable than in the absence of open price agreement. And they are more likely to move together.

It would seem that the spread of prices is likely to be smaller for equivalent grades² than if less complete information were available. The greater the degree of ignorance, the more a firm has to rely on its own costs and appraisal of the market, which are unlikely to coincide with those of other firms. If firms want to charge prices close to their rivals', full price information will enable them to do so. A firm would not charge much above its rivals for fear of losing business—particularly if buyers are also informed. Apart from the usual restraint to cutting below competitors' prices—that they would follow—an open price agreement facilitates coercion, which may inhibit the low-cost firm charging lower prices. Thus a firm may be unwilling to act in a manner that it believes others would regard as unpopular if it fears that it would lose more through retaliation than it would gain by making the move; and there may be other social and political restraints on its willingness to reduce prices. While many open price agreements have the not unreasonable aim of preventing price cutting³ in a recession, they may have the incidental effect of restraining the low-cost firm at other times. It is not being argued, however, that prices will be level under an open price system—a spread of prices may occur where, for example, purchasers disagree in the evaluation of quality, where the bargaining power of purchasers differs widely or in a sellers' market—but simply that the spread of prices will be much narrower where full price information exists than where it is absent.

DECISION TAKING

By providing firms with accurate data about competitors' prices, the outcome of supply decisions may approximate more closely to expectations than with less complete information. But it does not follow that the decisions themselves will be the most socially desirable.

The effects may be more significant in relation to short-period production planning than to long-period investment. To know competitors' prices is

¹ Of course, the strength of group loyalty may be so low that an open price agreement is unworkable. The author has found some trades in which mutual distrust had followed the abandonment of the registered restrictions, and by the time the association had become aware of the possibility of establishing open-price agreements it was too late.

² Indeed, an open price system may narrow the range of prices further than is warranted by the real differences in quality.

³ For example, a resolution establishing an open price system reads: "All members present confirmed their support of the avoidance of price cutting: the proposed scheme was the best means of minimising this danger." Many firms and trade associations told the author that their aim was to keep prices up, "if prices begin to fall there is no telling where they would stop." Their hopes may be frustrated, but their intention is clear.

of limited assistance in making production or investment decisions unless a firm also knows a great deal more; for example, its rivals' costs and market shares.¹ If, however, a firm can be confident that the spread of *future* prices will be narrow and that in general all prices will move together, then one element of uncertainty is reduced, and the predictability of future receipts is increased. With some idea of future overall demand, expectations that market shares will be maintained in the short run are more likely to be realised in the presence than in the absence of an open price agreement.² If short-period expectations are continually fulfilled they may become the basis of long-term planning; the accuracy of investment decisions may be improved, and the level of investment may be different. But business-men's expectations are more likely to be frustrated in the long run because a reduction in price competition may affect competition in other directions, such as advertising, quality and technical change.

Business-men emphasise frequently the stabilising influence of open price systems and the reduction of uncertainty. They say that the market will not be disturbed unnecessarily by the perverse behaviour of competitors, in particular as a result of their inadequate costing or uncertainty about rivals' prices. The motivation may simply be dislike of the individualist who disturbs a stationary state; there is, however, much in the view than an occasional disturbance is desirable *per se*. But providing information may certainly enable firms to plan a more effective overall profit maximisation strategy, and may reduce misdirected competitive effort. Many business-men selling by competitive tender say that access to *ex post* information about rivals' tenders gives them greater confidence in making future assessment of the market, and assists supply decision taking. Indeed, without some exchange of price information competition may be entirely haphazard between firms with high overheads selling non-standardised products by competitive tender. It is also alleged that open price plans promote fair competition; for example, by minimising the likelihood of "phantom competition"³ in which a buyer tries to persuade the seller to reduce his price by reporting untruthfully about offers from competitors.

¹ In many trades turnover data as well as price information are exchanged. It may or may not facilitate investment decision taking if complete knowledge was available of all other investment decisions, as published for the steel industry in the Iron and Steel Board's *Annual Reports*.

² See also G. B. Richardson, 1956, pp. 119–22. The increase in confidence is also likely to be greater where the "degree of attachment" of buyers to particular sellers is low than where it is high. *Ibid.*, p. 120.

Even if market shares are maintained, different estimates of overall demand may lead to frustration of plans.

³ See A. R. Burns, *The Decline of Competition* (McGraw-Hill, 1936), p. 60, and the Monopolies Commission *Report of the Supply and Exports of Electrical and Allied Machinery and Plant*, February 1957, para. 684. The resolution establishing one British open price agreement reads: "To the intent that Members shall not be misrepresented or misled by unscrupulous purchasers, all Members shall send to the Secretaries their Current Price Lists, Terms and Conditions of Sale for the Scheduled Goods, together with the name of persons to whom such Terms and Conditions apply, and shall notify the Secretaries within two days of any changes therein."

However, it does not follow that, because supply decisions taken on the basis of more complete information than would otherwise be available may approximate more closely to expectations, the decisions themselves would necessarily be promoting the social interest: the act of providing information has changed the competitive mechanism itself. But it does not seem implausible that the reduction of waste involved in more informed decision taking would outweigh any welfare detriments that may (or may not) arise owing to changes in the *direction* of the decisions taken which result from the extension of oligopolistic competition—providing restraints on the freedom of individual action are absent. However, it is clear that, as the following discussion shows, this condition may not be satisfied.

COERCION AND COLLUSION

The essence of the open price system, as operated in Britain at any rate, is the absence of formal restriction. The firm that wishes to sell at a price below the general level can do so. However, coercion against decisions that are unpopular in the trade is made easier where firms have full knowledge of their competitors' prices.¹ The under-cutters' prices can be met more readily and with more certain effect: discrimination against him is facilitated. Some firms may try to have the best of both worlds and notify incorrect information to the central agency: for various reasons, however, this may not happen.² A firm may cheat or defy its rivals if it could thereby gain a greater profit than it would lose by reprisals. In general, it will be easier to carry out reprisals against a firm with high fixed costs than where little capital is involved and exit is painless, but it will be more difficult to coerce the dominant firm.³ And the time horizon envisaged may also determine the likelihood of independent action. Now it might be held that this is no serious disadvantage to an open price plan, since a firm could soon be apprehended in any case; there may, however, be a time lag, and the more complex the price, the longer will discovery be postponed: there is no point

¹ Much criticism of American "open price" systems concerns the "waiting period" (see above, p. 476). This interval, usually ten days under the N.R.A., is regarded as a *period of persuasion*, but also as a safeguard against "predatory price cutting" by a would-be-monopolist. The N.R.A. recommended a compromise, that after a price change "such member shall not file a higher price within 48 hours" (Office Memorandum 228). The European Coal and Steel Community, which operates a special form of open price agreement, has a five-day waiting period to prevent temporary price cutting "the purpose of which is to acquire a monopoly." W. Diebold, *The Schuman Plan 1950-1959* (Council on Foreign Relations, 1959), p. 238. Such a restriction would presumably be registrable in Britain.

² In one trade in Britain the resolution establishing an open price plan (previously there had been a collective resale price maintenance agreement) reads: "the main advantages of the scheme were that it would enable members to continue to compete with each other on equal terms, and that a deterrent in cases where the Council had reasonable grounds for believing the scheme is not being observed would be available" (my italics). In another trade the Secretary of the Association pointed out that since the dissemination of information was at his discretion, there was an obvious deterrent to firms that cheated. There seems to be a case that open price agreements should be operated by a "confidential disinterested agent."

³ A more elaborate analysis is given in M. Shubik, *op. cit.*, Chapter 11.

in making coercion easier. So far the author has discovered no trace of actual coercion; but the potential is there, and this alone may be a sufficient inducement to conformity.¹

Although there is much controversy about the economic consequences of open price agreements in the United States,² all observers agree that collusion becomes easier where price or other information is exchanged. Corwin Edwards,³ in particular, has shown how such information may become "signals for concerted action" and how in practice open price systems have frequently been used restrictively; and Arthur Burns⁴ has described how agreements to exchange costs can become implicit agreements about prices.⁵ The effectiveness of these collusive arrangements may be diminished if sellers' price information were made available not only to the contributing members but also to would-be new competitors.

The ease with which a collusive arrangement can result from freely exchanged information is disturbing. It seems likely that in Britain such collusion would become subject to the 1956 Act; exactly at what stage it becomes registrable is a crucial and difficult question. And the problems of detection and control will be formidable.⁶ Most firms and trade associations concerned with open price systems at present feel the closeness of the Registrar and the Restrictive Practices Court⁷—particularly trades that have been subject to a Court Order. (The threat of penalty for non-registration seems a less powerful deterrent than the possibility of being found in "contempt of Court.") But later, perhaps in a recession, and depending on official attitudes meanwhile, collusion may occur.

DISCRIMINATION

So far it has been assumed that sellers but not buyers are parties to open price systems, as usual in Britain. The N.R.A. "model" code provided

¹ "The power to coerce is even more significant than acts of coercion," as Corwin D. Edwards has pointed out, *Maintaining Competition* (McGraw Hill, 1949), p. 128.

² See especially L. S. Lyon and V. Abramsom, *op. cit.*, Chapters 6, 7 and 8. Many of the opinions expressed may be misleading if applied to the British economy to-day. Most of the United States literature of the late 1930s related to the effects of open price systems (a) in a depression, (b) seen as a relaxation from the less permissive anti-trust laws; the opposites are true in Britain.

³ Corwin D. Edwards, *op. cit.*, pp. 25-31.

⁴ A. R. Burns, *op. cit.*, pp. 47-55.

⁵ This likelihood may be diminished if the exchange is confined to the costs of particular processes rather than to total production. Also, "inter-firm comparison" may be a safe and useful way of exchanging cost and financial data.

⁶ Section 6 of the 1956 Act requires registration of an agreement or arrangement between two or more parties "under which restrictions (of certain specified types) are accepted . . . whether or not it is or is intended to be enforceable." Presumably there would be no registrable restriction if individually each firm thought it wise policy to charge the same prices as its rivals, which an open price agreement would facilitate; but it would be registrable if this was agreed over the telephone.

⁷ The initiator of many open price agreements told the author that they had been drafted with an eye to their subsequent public investigation. It was, however, clear that not everyone had had this foresight (see footnote 2, p. 480).

that those who were prepared to pay the expenses involved should also be given complete price information, and the E.C.S.C. rules make it clear that prices should be published in order to prevent "discriminatory practices involving within the common market the application by a seller of unequal conditions to comparable buyers."¹

Although the likelihood of gross discrimination would be reduced by informing sellers alone, if buyers are also informed their power is increased relative to sellers, and the likelihood is further reduced. Pressure for special prices to become generalised would be less where buyers are ignorant than where they are aware of all downward departures from price lists; firms that would be willing to give the occasional special price reduction may be inhibited from doing so if they envisaged strong pressure for that reduction to become general, and competition would be correspondingly reduced. In the latest American phraseology, the absence of discrimination is said to lead to "soft" rather than to "hard" competition.² One cannot, however, conclude that the shift in the distribution of income caused by the redistribution of economic power in favour of buyers is necessarily better from the welfare point of view.

On the other hand, to inform buyers increases the power of the price cutter, since potentially he could win more trade than if buyers were less informed; but because his rivals know this, price reductions are more likely to be met by them. The "threshold" before a price reduction is made may therefore rise, and the likelihood of stable and level pricing is increased. On balance one would probably say that the advantages from informing non-members—easier entry for new competitors and the reduction of discrimination, particularly against small buyers—outweigh the disadvantages, in particular the reduction in competition between sellers; but clearly the subject needs more extensive analysis.

TOWARDS A COMPROMISE

It may be held that the beneficial effects of open price agreements, largely the reduction of ignorance and uncertainty resulting in less wasteful decision taking, are so small in relation to the likely detrimental effects on competition that open price agreements should be prohibited. There is a case, however, for seeing whether an open price agreement can be so arranged that the likelihood of undesirable consequences is removed or diminished without seriously affecting the beneficial effects. There are at least four possible solutions that might be appropriate: to conceal the identity of sellers; to promulgate only a range of prices, say high, mean and low; to

¹ E.C.S.C., *Treaty*, Article 60, 1.

² This is alleged to be one of the consequences of the Robinson-Patman Act. O. D. K. Norbye *Mission Report on Restrictive Business Practices in the United States* (European Productivity Agency, 1959), pp. 65–7.

restrict information to the mean price; and to make the information more widely available.

The concealment of identity may be unsuitable with branded goods, where quality differences are important or where non-standardised products are sold by competitive tender. But where it is suitable the likelihood of coercion is diminished. The probability of a spread of prices more nearly reflecting costs is slightly increased. The disadvantages may be further lessened if information is restricted to the range of prices, high, mean and low, as in *Platt's Oilgram*, the American daily quotation of petroleum product prices.¹ The width of the range would probably vary according to differences in quality, to the dispersion of buyers' power and to market conditions, as mentioned above. Such a system should not reduce the advantages of an open price agreement; ignorance and uncertainty are reduced as much—or almost as much—as if more complete information were available; the problem of "phantom competition" is lessened, which it would not be if average prices only were circulated. None of these solutions remove the possibility of collusion; its effectiveness is, however, reduced if buyers and new competitors are also informed. All four proposals reduce the likelihood of coercion, but more especially where only the range or the average is given. To promulgate only average prices may somewhat reduce the beneficial effects. On the basis of this brief and admittedly very limited analysis, the range of high, mean and low prices which would be available to all without identification of origin would therefore seem to be a fair compromise. But it must be stressed that different economic circumstances require different solutions; in some trades the concealment of identity may be sufficient, in others it might be wise to go further. Moreover, in certain cases the supply of other information, for example about costs, investment plans and technical change, that sometimes accompany open price plans, may be more significant in affecting supply decisions and the likelihood of coercion and collusion than an exchange of prices; thus the present analysis is necessarily incomplete in this respect also. The discussion has shown at least that there are alternative ways of arranging open price agreements that may have different consequences.

PUBLIC POLICY

The task of detecting and of regulating collusive activities based on an exchange of information raises new and difficult issues for public policy. Once the burden of cases still to appear before the Court is reduced the Registrar would have the opportunity to concentrate on the task of detection. But his powers of inquiry are limited. Under Sections 14 and 15 of the 1956 Act he must "have reasonable cause to believe" that a particular agreement should be registered (would "conscious parallelism" be sufficient

¹ See R. Cassady, *Price Making and Price Behavior in the Petroleum Industry* (Yale, 1954), Chapter 9.

evidence?) and the High Court—not the Registrar—may then conduct an examination to determine the issue. Thus in effect the High Court may become the arbiter of what is an acceptable form of open price agreement. A more satisfactory solution might be to require the registration of all trading agreements (whether restrictive or not) and to give the Registrar wider powers of discretion in passing cases to the Court; but the problem of administration would be formidable and perhaps prohibitive. Because of the difficulties of detection that would still remain, it would seem sensible to minimise the likelihood of undesirable consequences by requiring that open price agreements should conform to a set of principles, such as discussed above, that would at the same time permit the useful exchange of information to continue. Where a registrable agreement nevertheless results the Court could deal with it as at present.

The Monopolies Commission might also conduct investigation, but as now constituted to report on a particular agreement the amended requirements of the 1948 Monopolies and Restrictive Practices (Inquiry and Control) Act ¹ would have to be present, and these may be irrelevant to the conditions that would have to be examined. On the other hand, the Commission is still empowered to conduct general inquiries,² and open price systems would seem a useful subject.

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¹ That at least one-third of the goods are supplied, processed or exported by or to one person, or two or more persons who are inter-connected bodies corporate.

² Under Section 15 of the 1948 Act; the 1956 Act, in Section 29 (5) extended the scope of such general inquiries that would, it seems, permit the Board of Trade to require the Commission to report on the general effect on the public interest of open price agreements.

SOME RECENT CHANGES IN FORWARD EXCHANGE PRACTICES

THE resumption of free foreign exchange dealings in London and other European markets during the fifties has been followed by a highly gratifying increase of the active interest of academic economists in some broader aspects of forward exchange. A number of interesting and important articles have appeared in recent years in publications of learned societies, Universities, official institutions and banks, and between them they have thrown much new light on the subject. In particular, the question whether or not monetary authorities should engage systematically in forward exchange operations for purposes of monetary policy has attracted much detailed discussion. Penetrating analyses of the working of Interest Parities, the effects of leads and lags, the reciprocal relationship between speculation, arbitrage, hedging and commercial covering, etc., have yielded some very valuable results. Some useful new terms, such as "intrinsic" premium or discount, and "incoming" or "outgoing" arbitrage, have been added to the vocabulary of forward exchange.

Having thus paid a well-deserved tribute to the post-war generation of writers on the subject, I trust I shall not be considered over-critical if I try to draw attention to a major defect of the post-war literature. It is based to a very large extent on obsolete pre-war information about forward exchange practices and techniques. Yet there have been many changes since the war, and some of them are of considerable importance from a theoretical as well as a practical point of view. Oversight of the development of these new practices, or failure to appreciate their significance, is apt to result in conclusions unsuitable for application to the present-day situation or for serving as a basis for official policies or tactics. It is therefore essential for economists interested in forward exchange to bring themselves up to date in respect of the factual material on which they base their arguments.

The following list of some of the more important post-war changes is based on an exhaustive inquiry I made recently in the City and in some continental financial centres with the object of ascertaining new developments in forward exchange practices since before the war:

- (1) The pre-war rule about a minimum profit margin of $\frac{1}{2}\%$ for interest arbitrage operations no longer exists.
- (2) The relative importance of hedging operations has greatly increased.
- (3) The relative importance of pure speculation by the public has declined.

(4) Banks are now more willing to carry open positions overnight and even for longer periods.

(5) The proportion of outright forward operations in the market has increased, and the practice of banks to cover forward transactions by spot transactions in the first instance is no longer applied quite as generally as before the war.

(6) Buying and selling orders of forward exchange are now "married" by the banks more frequently.

(7) Average amounts of individual commercial forward transactions are now much larger, even in terms of constant prices.

(8) It is now possible to cover commercial transactions for very long periods, in some currencies up to four years.

(9) There is an increase in the relative volume of turnover in forward transactions for very short periods.

(10) The importance of time arbitrage has increased very considerably.

(11) It is now possible to deal in the market in contracts with optional dates, at any rate for standard dates.

(12) Profit margins on arbitrage in space have declined very considerably.

(13) Profit margins on transactions with customers—with the exception of contracts with optional dates or for very long periods—have declined.

(14) There has been a great increase in the use of foreign currency deposits (especially "Euro-dollars") for swap transactions.

(15) The use of overdrafts on current accounts for interest arbitrage has declined.

The importance of these various changes—the list does not claim to be complete—from the point of view of their bearing on forward exchange theory varies widely, but between them they have altered drastically the picture of forward exchange practices and techniques which I tried to present in my pre-war book on the subject.¹ It has been, therefore, somewhat perturbing for me to find my book quoted every now and again as a source of information for factual material which, while it was undoubtedly correct in the thirties, has since ceased to apply. One of my main objects in writing this article is to disclaim responsibility for such facts and for the conclusions based on them.

Outstanding in importance among such instances is the oft-repeated assertion that foreign exchange dealers make it a rule to abstain from interest arbitrage operations unless the discrepancy between forward rates and their Interest Parities—the intrinsic premium or discount—is sufficiently large to ensure a profit of at least $\frac{1}{2}\%$ p.a. on the operations. This rule has

¹ *The Theory of Forward Exchange* (London: Macmillan & Co., 1937).

been presented in recent writings by theoretical economists as something axiomatic, and elaborate theoretical conclusions have been based on it. It is unfortunate that the financial Press does not nowadays take a sufficient interest in the technicalities of forward exchange to make economists realise that the rule about the $\frac{1}{2}\%$ minimum profit margin has long ceased to exist. Any foreign exchange dealer would be in a position to confirm the fact, well known in banking circles, that in our days most banks are very often willing to transfer funds for interest arbitrage for the sake of a profit of $\frac{1}{8}\%$ or even less. Indeed, I understand from a number of independent banking sources that on a great many occasions some banks operate entirely without any profit. They do so for the sake of the prestige value of operating on a large scale, and as a means of attracting other business.¹ The few surviving pre-war dealers may well shake their heads in disapproval of this behaviour of the post-war generation, but very often even they have to act likewise, in order to maintain the standing of their bank as a big operator in the market.

Of course, foreign exchange dealers can only operate without a profit or at a nominal profit so long as their foreign exchange department has funds available for that purpose. If they have to ask the Treasurer of their head office for additional funds the latter is likely to charge them a higher rate of interest than is obtainable in the domestic money market. (It is a perennial complaint of dealers that their head office drives a harder bargain with its own flesh and blood than with outside borrowers.) This means that when they have to use for arbitrage funds borrowed from the head office they are unable to operate unless there is a relatively wide discrepancy. In fact, the minimum discrepancy for such operations has increased since pre-war days. The terms charged by the head office to the foreign exchange department are much stiffer nowadays, because banks find it much easier to employ their money at home more profitably than they did during the lean thirties.

This means that while foreign exchange departments are prepared nowadays to engage in arbitrage for a much smaller profit than before the war, or even without any profit, so long as they can use their own allotted capital, if they have to borrow additional capital from their head office they can operate only when minimum discrepancies are wider than before the war. We must avoid generalising in this respect, for some head offices are more inclined than others to support their dealers in an effort to achieve a large turnover in the market. The policy of head offices follows no uniform rule, and the liquidity position of foreign exchange departments varies widely and is liable to change from one moment to another. It is therefore impossible to establish any rule to take the place of the pre-war rule

¹ This attitude recalls the pre-war practice of London clearing banks to cut their commission on acceptance credits to a figure at which it hardly paid for the clerical work involved, and to pay to foreign banks deposit rates in excess of London bill rates, all for the sake of attracting other kinds of business.

of the $\frac{1}{2}\%$ minimum profit margin. At any given moment various banks follow different rules, and each one of them changes its rule at frequent intervals.

To complicate matters further, head offices borrow from time to time through their foreign exchange departments, authorising the latter to engage in inward arbitrage at a moderate loss, for the sake of tiding over a period of stringency, as an alternative to selling Gilt-edged at a loss or reducing their call loans. This means that profit margins at which banks are prepared to operate are apt to vary between some quite substantial percentage and a negative quantity.

The sooner and the more completely that obsolete pre-war rule about the $\frac{1}{2}\%$ minimum discrepancy is forgotten, the better. That rule bears no more relevance to present-day realities than the ancient practice of transacting all foreign-exchange business at the Royal Exchange on Tuesdays and Thursdays that existed in Goschen's days, or the even more ancient practice of maintaining fast courier services for ascertaining exchange rates in other centres in advance of rival dealers that existed in Gresham's days.

The theoretical importance of the change lies in the fact that it has resulted in the elimination of a frictional influence interfering with the ideal working of Interest Parities in normal conditions. It means an increase in the extent of international movements of funds through interest arbitrage, which means an increase in the dynamic effects of forward exchange. At the same time the static role played by forward exchange in balancing discrepancies between levels of interest rates in various centres has also increased in importance. Progress has been made towards establishing the international unity of all free money markets. During periods when there is no one-sided buying or selling pressure that would exhaust the liquid resources of foreign exchange departments, even a barely perceptible deviation of forward margins from their Interest Parities is now capable of provoking transfers of funds. What is more, owing to the multiplicity of Interest Parities, the paradoxical phenomenon of witnessing inward and outward interest arbitrage between two centres at the same time has become quite a frequent occurrence.¹

The extent to which hedging has replaced pure speculation as the potentially predominant influence in the foreign exchange market does not appear to have been realised sufficiently, judging by the fact that neither the Report of the Radcliffe Committee nor the Evidence contains any reference to it. Post-war literature has failed to appreciate the full significance of the change, even though it calls for a very thorough analysis of the basic characteristics of hedging. Most writers apply the terms hedging and commercial covering very loosely and indiscriminately, as if they

¹ This new situation bears some similarity to the form of gold standard advocated in the late twenties, under which gold clearing would replace gold arbitrage, so that the slightest deviations from mint parities would entail transfers of gold.

were synonymous.¹ Yet so far from that being so, hedging has much more in common with pure speculation than with commercial covering. The basic difference is that, while a covering operation is self-liquidating on maturity, a hedging operation is not. An American exporter to Britain, having sold the sterling he is due to receive in three months' time, simply delivers on maturity the sterling out of the proceeds of his exports. But an American with a branch factory in Britain, having hedged against a depreciation of his asset in terms of dollars by selling sterling forward, is not likely to sell his factory on maturity in order to carry out the forward contract. This may occur on very rare occasions if the cost of a prolonged hedging is found to be prohibitive, but it is very far from being the routine as it is in the case of commercial covering.²

It is important to bear in mind the similarities between hedging and speculation, but also the essential difference between them. An American firm hedging against a depreciation of its branch factory in Britain is confronted on the maturity of the forward contract with the choice between the same alternatives as a pure speculator. He can either close the account by buying spot sterling, or renew the hedge by means of a swap transaction, or borrow sterling and sell the proceeds of the loan. The essential difference is that he finds it usually much easier than a pure speculator to create a short position in sterling either by means of a forward operation or by means of borrowing and selling spot sterling, and that when the forward contract matures he is in an incomparably better position than a pure speculator to pay sterling for the dollars he had brought without first having to buy sterling. Apart from his borrowing facilities on his assets in Britain, his branch or subsidiary may possess inventories of goods which are apt to become reduced during the period of the forward contract, or they can be realised deliberately with the object of meeting the sterling liability arising from the forward contract and taking up the dollars bought.

In the course of my inquiries in the Zürich foreign exchange market last year I was told in more than one quarter that, since most banks have some limit beyond which they become increasingly reluctant to increase their forward exchange commitments, during periods of pressure they prefer to reserve their facilities for customers engaged in hedging against some legitimate interest rather than deal with pure speculators. Those concerned in hedging usually

¹ Mr. S. C. Tsiang goes so far as to apply the term "hedging" to include commercial covering (*The Theory of Forward Exchange and Effects of Government Intervention on the Forward Exchange Market*, International Monetary Fund Staff Papers, March 1959, p. 76). And Mr. A. E. Jasay uses the term with reference to covered bank funds "Forward Exchange: The Case For Intervention", *Lloyds Bank Review*, October 1958, p. 39).

² Covered bank funds in the form of current account balances are not automatically self-liquidating, but their owners are in a position to carry out the forward contract on maturity without having to buy the currency concerned. Covered bank funds in any other form are automatically self-liquidating, and so are all types of covered commercial or financial credit transactions. Covered security holdings with maturity dates are self-liquidating if the forward contract is for the whole period to the maturity date. Otherwise the operation comes under the definition of hedging.

provide the "bread-and-butter" of foreign exchange departments with their regular commercial covering transactions, so that it is only natural that banks should prefer to oblige their regular customers rather than speculators, who usually appear on the scene only when there is abnormal pressure. This attitude is not confined to Switzerland, but, in view of the reputation of Zürich as the main centre for speculative activity, it is interesting to register the fact that even there hedging has largely replaced speculation.

In the London market, on each occasion when sterling came under active pressure in the fifties, operations of the "Great West Road"—the district where many American branch factories are situated—became a prominent feature of the forward exchange market. During the last ten years there has been a remarkable increase in American and other foreign investment in Britain, as a result of the provision made in 1950 to enable overseas owners of approved industrial investment in this country to repatriate at any time the proceeds of their realised capital assets. This trend, which makes for an increase of the potential extent of hedging, is likely to continue, not only in this country but throughout the free world, as a natural consequence of the prevailing liberal trend in trade and finance. Moreover, sooner or later it will become possible to hedge by means of forward operations also against foreign holdings of British securities whose proceeds can, at the time of writing, be sold only in the form of security sterling.

The grand total of actual and potential hedging tends to increase also through the growing practice of "commercial hedging"—to cover an indirect risk arising from a commercial transaction. An American importer of British cars payable in sterling leaves the exchange risk uncovered when sterling is under a cloud, in the hope of benefiting by a devaluation. But once he has paid his sterling debt he is exposed to the risk of a fall in the dollar prices of British cars as a result of a devaluation of sterling. To safeguard himself he sells sterling forward to the value of his unsold stock. Even though this operation arises from a commercial transaction, it is not covering but hedging, because it is not self-liquidating any more than is hedging by an American owner of fixed assets in Britain. As the business community tends to become increasingly forward exchange conscious, such operations are likely to increase in volume whenever a currency appears to be under a cloud.

This increase in the importance of hedging has further accentuated the dynamism of the forward exchange system. Even pure speculation is liable to produce highly disturbing effects, through its influence on the international transfer of funds, gold reserves, interest rates and the volume of credit in both losing and receiving countries. But the change from pure speculation to hedging has made the task of defending a currency even more difficult. After all, as Spraos rightly observed, "speculative forward deals are mere book-keeping entries destined to be rubbed off,"¹ because the speculator does not possess the currency he had sold, so that he has to acquire it on

¹ J. Spraos, "Speculation, Arbitrage and Sterling," *ECONOMIC JOURNAL*, March 1959, p. 14.

maturity in order to be able to deliver it. It is true, technically the hedger is in the same position. But, as I pointed out above, it is incomparably easier for him to meet his forward contract without having first to buy the sterling, especially if he is hedging against easily realisable inventories. Speculators may or may not have assets against which to borrow, but those engaged in hedging necessarily possess the assets they want to secure against depreciation. Nor can the authorities apply official or unofficial restrictions against lending to hedgers to the same extent as against lending to speculators, seeing that the former are entitled to sell out their assets and repatriate the proceeds.

To-day the potential weight of hedging pressure on sterling may be reckoned in hundreds of millions of pounds, but it is necessary to envisage a situation in the not too distant future in which this influence will be reckoned in thousands of millions. It is true in theory there is no limit to speculative selling of sterling. The difference is that when the forward contracts mature hedgers are in a position to meet a much larger proportion of the amounts due by delivering spot sterling they possess.

The realisation of this difference between speculation and hedging, and of the latter's growing importance, is liable to influence the official attitude towards proposals for unlimited support to forward sterling against large-scale attacks. Even if they could afford to engage an amount equal to, or in excess of, their gold reserves so long as they were dealing mainly with speculators, they would run grave risks in doing so now that they have to deal largely with hedgers who may be in a position to deliver on maturity the sterling they sold and to retain the dollars to be received in exchange. Consideration of space prevents me from going into the whole controversy, but I feel this aspect alone should call for some rethinking on the part of those who have been advocating unlimited support. In the absence of official support of forward sterling hedging, through its effect on arbitrage, entails an immediate loss of gold or foreign exchange, and the authorities may feel impelled to take the necessary defensive measures immediately. If, on the other hand, official support of the forward exchange conceals the loss until the forward contracts mature the necessary defensive measures are apt to be unduly delayed, on the optimistic assumption that the official forward sales of dollars are mere book-keeping entries with nothing behind them.

It is arguable that if the cost of hedging is kept artificially low the hedges are more likely to be renewed on maturity. But in practice fears of exchange restrictions or various other considerations are liable to induce hedgers to take up the dollars they had bought forward, regardless of the forward rate. Allowing for this, together with the possibility of gaps in the exchange control and of decisions of Sterling Area countries to secede, the British authorities would run the risk of being unable to meet their forward commitments if they sold forward dollars to an amount in excess of their reserves.

The increased willingness of the banks themselves to carry open positions

is another post-war change making for an increased dynamism of forward exchange. The myth that "respectable" banks, at any rate in the United Kingdom, always cover all their positions every day before the market closes dies hard, but the fact that since 1951 British banks have been officially authorised to carry uncovered balances up to a certain fixed maximum should go some way towards bringing about its demise. In reality, the text-book rule about closing all positions every day has never been applied strictly. Its rigid application would place banks at a disadvantage, since on many occasions they would have to cover during the late afternoon when everybody else is expected to have to cover. Nowadays the rule is interpreted much more liberally than before the war. Dealers may defer the covering till the next day, or till after the week-end, when it can be effected more conveniently. Moreover, many banks apply the rule only in the sense of avoiding obvious major risks they would run by being long in a currency threatened with devaluation or short in a currency threatened with revaluation.

They are often prepared to run the calculated risk of an appreciation or a depreciation of the spot exchange concerned, provided that they feel they can rely upon the maintenance of its support points. For instance, when in 1957 a revaluation of the D. Mark was anticipated, banks strictly observed the text-book rule against leaving a short position open overnight, but did not hesitate to leave a long position open, even though the spot rate was in the vicinity of its upper support point and was liable to depreciate to its lower support point, because they could safely rule out a devaluation of the D. Mark.

Unduly rigid application of the text-book rule would handicap the market in the performance of its task of meeting temporary surpluses or deficiencies in supply and demand. If the banks were forbidden altogether from having open positions the rates would have to fluctuate more widely until they had attracted non-banking speculators to meet the deficiency or absorb the surplus. On the other hand, unduly lax application of the text-book rule is liable to add materially to buying or selling pressure.

Yet another text-book rule which no longer applies to the same extent as before the war is that when a bank transacts foreign exchange with a customer it covers in the market in the first instance by a spot operation, to be followed by a swap transaction. The broader significance of this practice lies in the fact that if a bank covers a sale of forward dollars to its customer by a purchase of spot dollars in the market the result is the acquisition of a covered dollar balance. It may then be worth the bank's while to let this commitment stand instead of undoing it with the aid of a swap transaction, on occasions when the profit margin on interest arbitrage is too small for post-war conditions to make it worth while to operate. In other words, the bank may engage in passive interest arbitrage in circumstances when it would not be worth its while to engage in active interest arbitrage.

Although the large majority of forward transactions are still covered by means of a spot transaction, the proportion of exceptions has greatly increased since the war. During the period of exchange restrictions New York and other free markets got into the habit of transacting much outright forward business, owing to the difficulty of transacting swap operations in currencies subject to restrictions. To some extent this habit continued even after the removal of restrictions, and London receives nowadays many more outright buying and selling offers from abroad than before the war. In any case the main reason for the pre-war practice, that spot rates are liable to fluctuate much more widely than forward rates, no longer exists under the post-war system of stable spot rates and fluctuating forward rates. Moreover, because the banks are now more willing to carry open positions than they were before the war, they can wait till a counterpart for their forward transaction is offered to them on acceptable terms in the forward market instead of rushing to cover immediately in the spot market. They are now also more willing to await a forward transaction in the opposite sense by a customer outside the market, so as to "marry" the two transactions instead of covering the first transaction as soon as possible in the market.

Average amounts of commercial forward transaction are now much larger than before the war, not only because of the all-round increase in prices but also owing to the structural change in British foreign trade. Before the war textiles were the most import exports, and their substantial total was composed of a large number of small individual items. To-day engineering and other capital goods have become the most important exports, and individual contracts are apt to run into six and even seven figures. The size of transactions between banker and customer now very often approximates more closely to the minimum amount of transactions customary between banks in the market.

There has been a revolutionary change in respect of forward facilities for very long periods. Before the war the maximum period for which it was possible to cover commercial exchange risk in the forward market as a matter of routine was six months, though it was possible to negotiate contracts in some currencies up to twelve months. To-day forward exchange up to twelve months can be transacted in the market as a matter of routine, and it is possible for industrial firms, public works contractors, etc. to negotiate with their banks forward contracts in dollars and a few other currencies for periods up to four years. Banks are now able to undo such long commitments in the market for periods up to two years, even though such transactions are always a matter of negotiation.

It is possible and necessary to envisage a further improvement of this new market, both in the sense of increased turnover and of providing facilities for even longer periods and in more currencies. Before many years it will be possible to transact long forward exchange in the market as a matter of routine. It goes without saying that such a development will

greatly increase the dynamism of forward exchange, especially if, as is to be expected, the long facilities will not remain confined to strictly commercial transactions. It is easy to imagine the increase in the potential disturbing effect of forward exchange if it can be used for hedging, arbitrage and speculation for periods of years.

The development of long forward facilities has greatly increased the importance of time arbitrage—the buying and selling of long against short forward exchange. When it is combined with space arbitrage—to take advantage of the differential between Interest Parities and premiums or discounts for various maturities in different centres—it leads to simultaneous international transfers of funds in both directions. Before the war most dealers were too busy with simpler operations to engage in such involved operations, but now they have become a matter of daily routine.

This change was largely due to the narrowing of profit margins on the simpler forms of space arbitrage and on commercial business with customers. The chances of making profits on discrepancies between rates quoted in various centres have virtually disappeared, owing to the improvement of communications since the war. In pre-war days considerable discrepancies were liable to develop owing to delays in getting through long-distance telephone calls. Whichever bank was lucky or clever enough to put its call through first stood a good chance of making a profit on such discrepancies. To-day it is possible to get through to an overseas centre in a matter of minutes, and this, together with the general adoption of “Telex,” resulted in the creation of one large international foreign exchange market in which it is not much more difficult to deal with banks across the Atlantic than with banks just across the street. Yet another friction tending to interfere with the ideal working of the system is now a matter of the past, but so is yet another source of profit for foreign exchange departments.

Profit margins on deals with customers have contracted because of keen competition and because business firms have become much more forward exchange minded. They know more about it than before the war and ask for several quotations before giving their order to the bank that quotes the best rate. It is largely because it is now more difficult to make a profit on such business that banks have developed new and more profitable lines. One of them is forward contracts with optional delivery dates. This type of transaction existed before the war, but it has become much more popular owing to the post-war uncertainty about being able to deliver goods on the date prescribed by the contract. While before the war such forward transactions were concluded only between banks and customers, nowadays it is possible to undo them in the market, at any rate for standard dates—for instance for the last month or the last fortnight of a three months' period.

Improved forward exchange facilities have stimulated the use of the forward exchange market as an alternative to the local money markets. Progress in that direction has been greatly facilitated by the increased

practice of dealing in deposits in terms of foreign currencies. London banks now hold substantial amounts of dollar deposits owned mostly by continental holders—they have come to be known under the name of “Euro-dollars”—and they often swap into sterling if this is a cheaper or more convenient way of covering their requirements of funds. Until the popularisation of foreign currency deposits they were only able to go up to the amount of their own foreign balances, less the indispensable minimum they had to keep for current requirements, plus any overdraft they obtained from foreign banks. To-day they can operate on a much larger scale and at a lower cost. This is one of the reasons for the increase in the turnover in short forward exchange. The use of foreign currency deposits provides a much more convenient and much cheaper alternative.

Considerations of space make it necessary for me to oversimplify many of the above points for brevity's sake, and to omit others.¹ My aim has been merely to draw attention to the extent and importance of the post-war changes, both from the point of view of the present position and because some of these changes foreshadow even more important changes in the future.

Admittedly, some of the changes have tended to reduce the dynamism of forward exchange. For instance, should the decline in the practice of covering forward transactions in the spot market continue it would relieve the spot rate from the impact of direct pressure resulting from that practice. But, taken as a whole, the post-war changes have undoubtedly tended to increase the dynamism of forward exchange, and they point towards the possibility of further considerable increase in the potential disturbing effect of the system. Barring international political troubles, it seems highly probable that the next few years will witness a progress towards the liberalisation of trade, the removal of remaining exchange restrictions and the expansion of international investment. All this will tend to increase the power of forward exchange for good or evil.

The problems we had to face in recent years are likely to recur on a much larger scale, and we are likely to be faced with additional problems. It is all the more important that those qualified for studying the broader aspects of forward exchange should do so with the full knowledge of the facts of the post-war situation.

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¹ For more detailed treatment I must refer the reader to my forthcoming book *A Dynamic Theory of Forward Exchange*.

THE THEORY OF CUSTOMS UNIONS: A GENERAL SURVEY¹

THIS paper is devoted mainly to a survey of the development of customs-union theory from Viner to date; since, however, the theory must be meant at least as an aid in interpreting real-world data, some space is devoted to a summary of empirical evidence relating to the gains from European Economic Union. It is necessary first to define customs-union theory. In general, the tariff system of any country may discriminate between commodities and/or between countries. Commodity discrimination occurs when different rates of duty are levied on different commodities, while country discrimination occurs when the same commodity is subject to different rates of duty, the rate varying according to the country of origin. The theory of customs unions may be defined as that branch of tariff theory which deals with the effects of geographically discriminatory changes in trade barriers.

Next we must turn our attention to the scope of the existing theory. The theory has been confined mainly to a study of the effects of customs unions on welfare rather than, for example, on the level of economic activity, the balance of payments or the rate of inflation. These welfare gains and losses, which are the subject of the theory, may arise from a number of different sources: (1) the specialisation of production according to comparative advantage which is the basis of the classical case for the gains from trade; (2) economies of scale;² (3) changes in the terms of trade; (4) forced changes in efficiency due to increased foreign competition; and (5) a change in the rate of economic growth. The theory of customs unions has been almost completely confined to an investigation of (1) above, with some slight attention to (2) and (3), (5) not being dealt with at all, while (4) is ruled out of traditional theory by the assumption (often contradicted by the facts) that production is carried out by processes which are technically efficient.

Throughout the development of the theory of customs unions we will find an oscillation between the belief that it is possible to produce a general conclusion of the sort: "Customs unions will always, or nearly always, raise welfare," and the belief that, depending on the particular circumstances present, a customs union may have any imaginable effect on welfare. The

¹ An earlier version of this paper was read before the Conference of the Association of University Teachers of Economics at Southampton, January 1959. I am indebted for comments and suggestions to G. C. Archibald, K. Klappholz and Professor L. Robbins.

² Points (1) and (2) are clearly related, for the existence of (1) is a *necessary* condition for (2), but they are more conveniently treated as separate points, since (1) is not a *sufficient* condition for the existence of (2).

earliest customs-union theory was largely embodied in the oral tradition, for it hardly seemed worthwhile to state it explicitly, and was an example of an attempt to produce the former sort of conclusion. It may be summarised quite briefly. Free trade maximises world welfare; a customs union reduces tariffs and is therefore a movement towards free trade; a customs union will, therefore, *increase* world welfare even if it does not lead to a world-welfare *maximum*.

Viner showed this argument to be incorrect. He introduced the now familiar concepts of trade creation and trade diversion¹ which are probably best recalled in terms of an example. Consider the figures in the following Table:

TABLE I
*Money Prices (at Existing Exchange Rates) of a Single
Commodity (X) in Three Countries*

Country	A	B	C
Price	35s.	26s.	20s.

A tariff of 100% levied by country A² will be sufficient to protect A's domestic industry producing commodity X. If A forms a customs union with either country B or country C she will be better off; if the union is with B she will get a unit of commodity X at an opportunity cost of 26 shillingworth of exports instead of at the cost of 35 shillingworth of other goods entailed by domestic production.³ This is an example of trade creation. If A had been levying a somewhat lower tariff, a 50% tariff, for example, she would already have been buying X from abroad before the formation of any customs union. If A is buying a commodity from abroad, and if her tariff is non-discriminatory, then she will be buying it from the lowest-cost source—in this case country C. Now consider a customs union with country B. B's X, now exempt from the tariff, sells for 26s., while C's X, which must still pay the 50% tariff, must be sold for 30s. A will now buy X from B at a price, in terms of the value of exports, of 26s., whereas she was formerly buying it from C at a price of only 20s. This is a case of Viner's trade diversion, and since it entails a movement from lower to higher real cost sources of supply, it represents a movement from a more to a less efficient allocation of resources.

¹ Jacob Viner, *The Customs Union Issue* (New York: Carnegie Endowment for International Peace, 1950). See the whole of Chapter 4, especially pp. 43–4.

² In everything that follows the "home country" will be labelled A, the "union partner" B and the rest of the world C.

³ This argument presumes that relative prices in each country reflect real rates of transformation. It follows that the resources used to produce a unit of X in country A could produce any other good to the value of 35s. and, since a unit of X can be had from B by exporting goods to the value of only 26s., there will be a surplus of goods valued at 9s. accruing to A from the transfer of resources out of X when trade is opened with country B.

This analysis is an example of what Mr. Lancaster and I have called "The General Theory of Second Best":¹ if it is impossible to satisfy *all* the optimum conditions (in this case to make all relative prices equal to all rates of transformation in production), then a change which brings about the satisfaction of *some* of the optimum conditions (in this case making some relative prices equal to some rates of transformation in production) may make things better or worse.²

Viner's analysis leads to the following classification of the possibilities that arise from a customs union between two countries, A and B:

1. Neither A nor B may be producing a given commodity. In this case they will both be importing this commodity from some third country, and the removal of tariffs on trade between A and B can cause no change in the pattern of trade in this commodity; both countries will continue to import it from the cheapest possible source outside of the union.

2. One of the two countries may be producing the commodity inefficiently under tariff protection while the second country is a non-producer. If country A is producing commodity X under tariff protection this means that her tariff is sufficient to eliminate competition from the cheapest possible source. Thus if A's tariff on X is adopted by the union the tariff will be high enough to secure B's market for A's inefficient industry.

3. Both countries may be producing the commodity inefficiently under tariff protection. In this case the customs union removes tariffs between country A and B and ensures that the least inefficient of the two will capture the union market.³

In case 2 above any change must be a trade-diverting one, while in case 3 any change must be a trade-creating one. If one wishes to predict the welfare effects of a customs union it is necessary to predict the relative strengths of the forces causing trade creation and trade diversion.

This analysis leads to the conclusion that customs unions are likely to cause losses when the countries involved are complementary in the range of commodities that are protected by tariffs. Consider the class of commodities produced under tariff protection in each of the two countries. If these classes overlap to a large extent, then the most efficient of the two countries will capture the union market and there will be a re-allocation of resources in a more efficient direction. If these two classes do not overlap to any

¹ R. G. Lipsey and K. J. Lancaster, "The General Theory of Second Best," *Review of Economic Studies*, Vol. XXIV (1), No. 63, 1956-57.

² The point may be made slightly more formally as follows: the conditions necessary for the maximising of any function do not, in general, provide conditions sufficient for an increase in the value of the function when the maximum value is not to be obtained by the change.

³ One of the two countries might be an efficient producer of this commodity needing no tariff protection, in which case, *a fortiori*, there is gain.

great extent, then the protected industry in one country is likely to capture the whole of the union market when the union is formed, and there is likely to be a re-allocation of resources in a less-efficient direction. This point of Viner's has often been misunderstood and read to say that, in some general sense, the economies of the two countries should be competitive and not complementary. A precise way of making the point is to say that the customs union is more likely to bring gain, the greater is the degree of overlapping between the class of commodities produced under tariff protection in the two countries.

A subsequent analysis of the conditions affecting the gains from union through trade creation and trade diversion was made by Drs. Makower and Morton.¹ They pointed out that, *given that trade creation was going to occur*, the gains would be larger the more dissimilar were the cost ratios in the two countries. (Clearly if two countries have almost identical cost ratios the gains from trade will be small.) They then defined competitive economies to be ones with similar cost ratios and complementary economies to be ones with dissimilar ratios, and were able to conclude that unions between complementary economies would, if they brought gain at all, bring large gains. The conclusions of Viner and Makower and Morton are in no sense contradictory. Stated in the simplest possible language, Viner showed that gains will arise from unions if both countries are producing the same commodity; Makower and Morton showed that these gains will be larger the larger is the difference between the costs at which the same commodity is produced in the two countries.²

We now come to the second major development in customs-union theory—the analysis of the welfare effects of the substitution between commodities resulting from the changes in relative prices which necessarily accompany a customs union. Viner's analysis implicitly assumed that commodities are consumed in some fixed proportion which is independent of the structure of relative prices. Having ruled out substitution between commodities, he was left to analyse only bodily shifts of trade from one country to another. The way in which Viner's conclusion that trade diversion necessarily lowers welfare depends on his implicit demand assumption is illustrated in Fig. 1. Consider the case of a small country, A, specialised in the production of a single commodity, Y, and importing one commodity, X, at terms of trade independent of any taxes or tariffs levied in A. The fixed proportion in

¹ H. Makower and G. Morton, "A Contribution Towards a Theory of Customs Unions," *Economic Journal*, Vol. LXII, No. 249, March 1953, pp. 33-49.

² Care must be taken to distinguish between complementarity and competitiveness in costs and in tastes, both being possible. In the Makower-Morton model these relations exist only on the cost side. An example of the confusion which may arise when this distinction is not made can be seen in F. V. Meyer's article, "Complementarity and the Lowering of Tariffs," *The American Economic Review*, Vol. XLVI, No. 3, June 1956. Meyer's definitions, if they are to mean anything, must refer to the demand side. Hence he is not entitled to contrast his results with those of Makower and Morton, or of Viner, all of whom were concerned with cost complementarity and competitiveness.

which commodities are consumed is shown by the slope of the line OZ , which is the income- and price-consumption line for all (finite) prices and incomes. OA indicates country A's total production of commodity Y, and the slope of the line AC shows the terms of trade offered by country C, the lowest cost producer of X. Under conditions of free trade, country A's equilibrium will be at e , the point of intersection between OZ and AC . A will consume Og of Y, exporting Ag in return for ge of X. Now a tariff which does not affect A's terms of trade and is not high enough to protect a domestic industry producing Y will leave her equilibrium position unchanged at e .¹ The tariff changes relative prices, but consumers' purchases

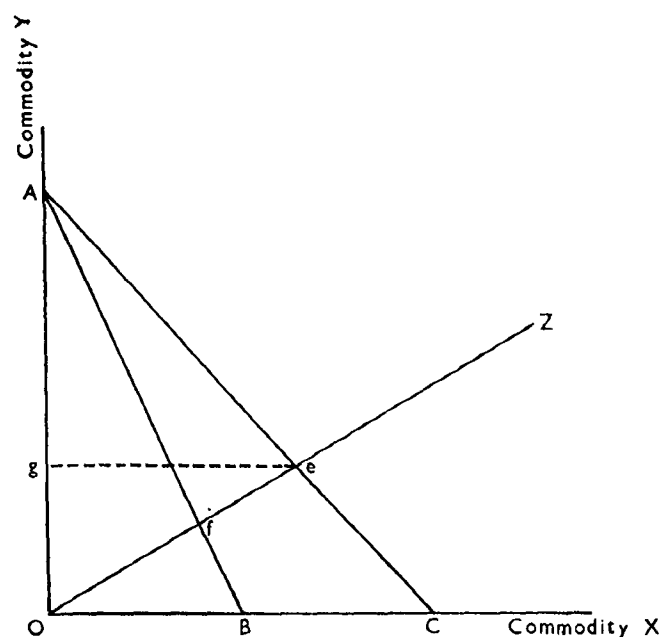


FIG. 1

are completely insensitive to this change and, if foreign trade continues at terms indicated by the slope of the line AC , the community must remain in equilibrium at e . Now consider a case where country A forms a trade-diverting customs union with country B. This means that A must buy her imports of X at a price in terms of Y higher than she was paying before the union was formed. An example of this is shown in Fig. 1 by the line AB . A's equilibrium is now at f , the point of intersection between AB and OZ ; less of both commodities are consumed, and A's welfare has unambiguously diminished. We conclude therefore that, under the assumed demand conditions, trade diversion (which necessarily entails a deterioration in A's terms of trade) necessarily lowers A's welfare.

¹ It is assumed throughout all the subsequent analysis that the tariff revenue collected by the Government is either returned to individuals by means of lump-sum subsidies or spent by the Government on the same bundle of goods that consumers would have purchased.

Viner's implicit assumption that commodities are consumed in fixed proportions independent of the structure of relative prices is indeed a very special one. A customs union necessarily changes relative prices and, in general, we should expect this to lead to some substitution between commodities, there being a tendency to change the volume of already existing trade with more of the now cheaper goods being bought and less of the now more expensive. This would tend to increase the volume of imports from a country's union partner and to diminish both the volume of imports obtained from the outside world and the consumption of home-produced commodities. The importance of this substitution effect in consumption seems to have been discovered independently by at least three people, Professor Meade,¹ Professor Gehrels² and myself.³

In order to show the importance of the effects of substitutions in consumption we merely drop the assumption that commodities are consumed in fixed proportions. I shall take Mr. Gehrels' presentation of this analysis because it illustrates a number of important factors. In Fig. 2 OA is again country A's total production of Y, and the slope of the line AC indicates the terms of trade between X and Y when A is trading with country C. The free-trade equilibrium position is again at e , where an indifference curve is tangent to AC . In this case, however, the imposition of a tariff on imports of X, even if it does not shift the source of country A's imports, will cause a reduction in the quantity of these imports and an increase in the consumption of the domestic commodity Y. A tariff which changes the relative price in A's domestic market to, say, that indicated by the slope of the line $A'C'$ will move A's equilibrium position to point h . At this point an indifference curve cuts AC with a slope equal to the line $A'C'$; consumers are thus adjusting their purchases to the market rate of transformation and the tariff has had the effect of reducing imports of X and increasing consumption of the home good Y. In these circumstances it is clearly possible for country A to form a trade-diverting customs union and yet gain an increase in its welfare. To show this, construct a line through A tangent to the indifference curve I'' to cut the X axis at some point B. If A forms a trade-diverting customs union with country B and buys her imports of X from B at terms of trade indicated by the slope of the line AB , her welfare will be unchanged. If, therefore, the terms of trade with B are worse than those given by C but better than those indicated by the slope of the line AB , A's welfare will be increased by the trade-diverting customs union. A's

¹ J. E. Meade, *The Theory of Customs Unions* (Amsterdam: North Holland Publishing Company, 1956).

² F. Gehrels, "Customs Unions from a Single Country Viewpoint," *Review of Economic Studies*, Vol. XXIV (1), No. 63, 1956-57.

³ R. G. Lipsey, "The Theory of Customs Unions: Trade Diversion and Welfare," *Economica*, Vol. XXIV, No. 93, February 1957. My own paper was first written in 1954 as a criticism of the assumption of fixed ratios in consumption made by Dr. Ozga in his thesis (S. A. Ozga, *The Theory of Tariff Systems*, University of London Ph.D. thesis, unpublished).

welfare will be diminished by this trade-diverting union with B only if B's terms of trade are worse than those indicated by the slope of AB .

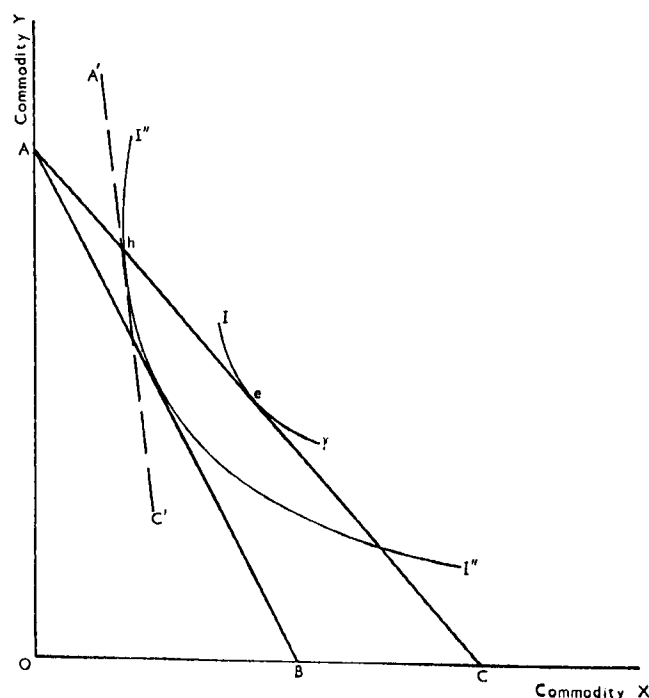


FIG. 2

The common-sense reason for this conclusion may be stated as follows:

"The possibility stems from the fact that whenever imports are subject to a tariff, the position of equilibrium must be one where an indifference curve [surface or hyper-surface as the case may be] cuts (*not* is tangent to) the international price line. From this it follows that there will exist an area where indifference curves higher than the one achieved at equilibrium lie below the international price line. In Fig. 2 this is the area above I'' but below AC . As long as the final equilibrium position lies within this area, trade carried on in the absence of tariffs, at terms of trade worse than those indicated by AC , will increase welfare. In a verbal statement this possibility may be explained by referring to the two opposing effects of a trade-diverting customs union. First, A shifts her purchases from a lower to a higher cost source of supply. It now becomes necessary to export a larger quantity of goods in order to obtain any given quantity of imports. Secondly, the divergence between domestic and international prices is eliminated when the union is formed. The removal of the tariff has the effect of allowing . . . consumer[s] in A to adjust . . . purchases to a domestic price ratio which now is equal to the rate at which . . . [Y] can be transformed into . . . [X] by means of international trade. The final welfare effect of the trade-diverting customs union must be

the net effect of these two opposing tendencies; the first working to lower welfare and the second to raise it."¹

On this much there is general agreement. Professor Gehrels, however, concluded that his analysis established a general presumption in favour of gains from union rather than losses. He argued that "to examine customs unions in the light only of *production* effects, as Viner does, will give a biased judgment of their effect on countries joining them,"² and he went on to say that the analysis given above established a general presumption in favour of gains from union. Now we seemed to be back in the pre-Viner world, where economic analysis established a general case in favour of customs unions. In my article "Mr. Gehrels on Customs Union"³ I attempted to point out the mistake involved. The key is that Gehrels' model contains only two commodities: one domestic good and one import. There is thus only one optimum condition for consumption: that the relative price between X and Y equals the real rate of transformation (in domestic production or international trade, whichever is relevant) between these two commodities. The general problems raised by customs unions must, however, be analysed in a model containing a minimum of three types of commodities: domestic commodities (A), imports from the union partner (B) and imports from the outside world (C). When this change is made Gehrels' general presumption for gain from union disappears. Table II

TABLE II

Free trade (col. 1)	Uniform <i>ad valorem</i> tariff on all imports (col. 2)	Customs union with country B (col. 3)
$\frac{P_{Ad}}{P_{Bd}} = \frac{P_{Ai}}{P_{Bi}}$	$\frac{P_{Ad}}{P_{Bd}} < \frac{P_{Ai}}{P_{Bi}}$	$\frac{P_{Ad}}{P_{Bd}} = \frac{P_{Ai}}{P_{Bi}}$
$\frac{P_{Ad}}{P_{Cd}} = \frac{P_{Ai}}{P_{Ci}}$	$\frac{P_{Ad}}{P_{Cd}} < \frac{P_{Ai}}{P_{Ci}}$	$\frac{P_{Ad}}{P_{Cd}} = \frac{P_{Ai}}{P_{Ci}}$
$\frac{P_{Bd}}{P_{Cd}} = \frac{P_{Bi}}{P_{Ci}}$	$\frac{P_{Bd}}{P_{Cd}} = \frac{P_{Bi}}{P_{Ci}}$	$\frac{P_{Bd}}{P_{Cd}} < \frac{P_{Bi}}{P_{Ci}}$

Subscripts A, B and C refer to countries of origin, d to prices in A's domestic market, and i to prices in the international market.

shows the three optimum conditions that domestic prices and international prices should bear the same relationship to each other for the three groups of commodities, A, B and C.⁴ In free trade all three optimum conditions

¹ R. G. Lipsey, "Trade Diversion and Welfare," *op. cit.*, pp. 43-4. The changes made in the quotation are minor ones necessary to make the notation in the example comparable to the one used in the present text.

² Gehrels, *op. cit.*, p. 61.

³ R. G. Lipsey, "Mr. Gehrels on Customs Unions," *Review of Economic Studies*, Vol. XXIV (3), No. 65, 1956-57, pp. 211-14.

⁴ If we assume that consumers adjust their purchases to the relative prices ruling in their domestic markets, then the optimum conditions that rates of substitution in consumption should equal rates of transformation in trade can be stated in terms of equality between relative prices ruling in the domestic markets and those ruling in the international market.

will be fulfilled. If a uniform tariff is placed on both imports, then the relations shown in column 2 will obtain, for the price of goods from both B and C will be higher in A's domestic market than in the international market. When a customs union is formed, however, the prices of imports from the union partner, B, are reduced so that the first optimum condition is fulfilled, but the tariff remains on imports from abroad (C) so that the third optimum condition is no longer satisfied. The customs union thus moves country A from one non-optimal position to another, and in general it is impossible to say whether welfare will increase or diminish as a result. We are thus back to a position where the theory tells us that welfare may rise or fall, and a much more detailed study is necessary in order to establish the conditions under which one or the other result might obtain.

The above analysis has lead both Mr. Gehrels and myself¹ to distinguish between *production effects* and *consumption effects* of customs unions. The reason for attempting this is not hard to find. Viner's analysis rules out substitution in consumption and looks to shifts in the location of production as the cause of welfare changes in customs unions. The analysis just completed emphasises the effects of substitution in consumption. The distinction on this basis, however, is not fully satisfactory, for consumption effects will themselves cause changes in production. A more satisfactory distinction would seem to be one between *inter-country substitution* and *inter-commodity substitution*. Inter-country substitution would be Viner's trade creation and trade diversion, when one country is substituted for another as the source of supply for some commodity. Inter-commodity substitution occurs when one commodity is substituted, at least at the margin, for some other commodity as a result of a relative price shift. This is the type of substitution we have just been analysing. In general, either of these changes will cause shifts in both consumption and production.

Now we come to Professor Meade's analysis. His approach is taxonomic in that he attempts to classify a large number of possible cases, showing the factors which would tend to cause welfare to increase when a union is formed and to isolate these from the factors which would tend to cause welfare to diminish.² Fig. 3 (i) shows a demand and a supply curve for any imported commodity. Meade observes that a tariff, like any tax, shifts the supply curve to the left (to $S'S'$ in Fig. 3) and raises the price of the imported commodity. At the new equilibrium the demand price differs from the supply price by the amount of the tariff. If the supply price indicates the utility of the commodity to the suppliers and the demand price its utility to the purchasers, it follows that the utility of the taxed import is higher to purchasers than to suppliers, and the money value of this difference in utility is

¹ Gehrels, *op. cit.*, p. 61, and Lipsey, "Trade Diversion and Welfare," *op. cit.*, pp. 40-1.

² The point of his taxonomy or of any taxonomy of this sort, it seems to me, must be merely to illustrate how the model works. Once one has mastered the analysis it is possible to work through any particular case that may arise, and there would seem to be no need to work out all possible cases beforehand.

the value of the tariff. Now assume that the marginal utility of money is the same for buyers and for sellers. It follows that, if one more *unit of expenditure* were devoted to the purchase of this commodity, there would be a net gain to society equal to the proportion of the selling price of the commodity composed of the tariff. In Fig. 3 the rate of tariff is $\frac{cb}{ab}$ %, the supply price is ab and the demand price is ac , so that the money value of the "gain" ("loss") to society resulting from a marginal increase (decrease) in expenditure on this commodity is bc .

Now assume that the same *ad valorem* rate of tariff is imposed on all imports so that the tariff will be the same proportion of the market price of

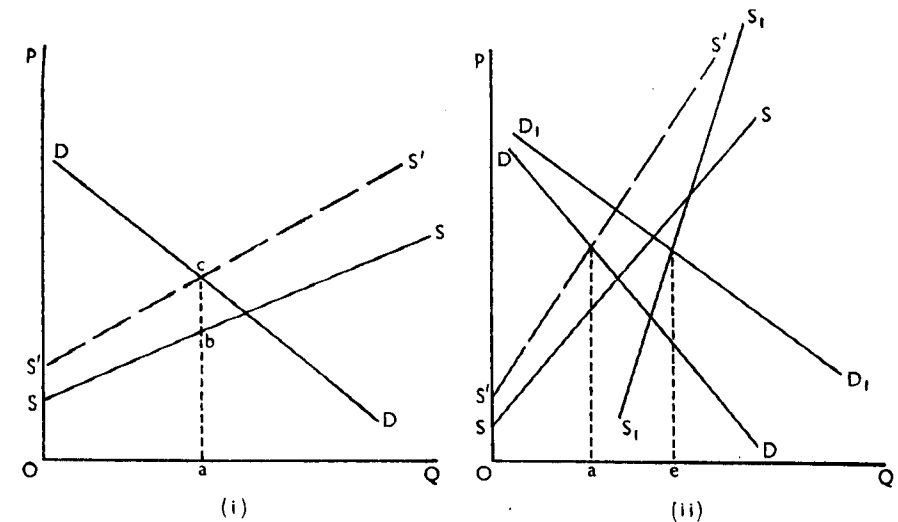


FIG. 3

each import. Then the gain to society from a marginal increase in expenditure (say one more "dollar" is spent) on any import is the same for all imports, and this gain is equal to the loss resulting from a marginal reduction in expenditure (one less "dollar" spent) on any import. Now consider a *marginal reduction* in the tariff on one commodity. This will cause a readjustment of expenditure, in the various possible ways analysed by Meade, so that in general more of some imports and less of others will be purchased. Since, *at the margin*, the gain from devoting one more unit of expenditure to the purchase of any import is equal to the loss from devoting one less unit of expenditure to the purchase of any import, the welfare consequences of this discriminatory tariff reduction may be calculated by comparing the increase in the volume of imports (trade expansion) with the decrease in the volume of other imports (trade contraction). If there is a net increase in the volume of trade the customs union will have raised economic welfare. A study of the welfare consequences of customs unions

can, therefore, be devoted to the factors which will increase or decrease the volume of international trade. If the influences which tend to cause trade expansion are found to predominate it may be predicted that a customs union will raise welfare. The main body of Meade's analysis is in fact devoted to a study of those factors which would tend to increase, and to those which would tend to decrease, the volume of trade. Complications can, of course, be introduced, but they do not affect the main drift of the argument.¹

Meade's analysis, which makes use of demand and supply curves, suffers from one very serious, possibly crippling, limitation. It will be noted that we were careful to consider only *marginal reductions* in tariffs. For such changes Meade's analysis is undoubtedly correct. When, however, there are *large* changes in many tariffs, as there will be with most of the customs unions in which we are likely to be interested, it can no longer be assumed that the demand and supply curves will remain fixed; the *ceteris paribus* assumptions on which they are based will no longer hold, so that both demand and supply curves are likely to shift. When this happens it is no longer obvious how much welfare weight should be given to any particular change in the volume of trade (even if we are prepared to make all of the other assumptions necessary for the use of this type of classical welfare analysis). In Fig. 3 (ii), for example, if the demand curve shifts to D_1D_1 and the supply curve to S_1S_1 , what are we to say about the welfare gains or losses when trade changes from Oa to Oe ?

There is not time to go through a great deal of Professor Meade's or my own analysis which attempts to discover the particular circumstances in which it is likely that a geographically discriminatory reduction in tariffs will raise welfare. I shall, therefore, take two of the general conclusions that emerge from various analyses and present these in order to illustrate the type of generalisation that it is possible to make in customs-union theory.

The first generalisation is one that emerges from Professor Meade's analysis and from my own. I choose it, first, because there seems to be general agreement on it and, second, although Professor Meade does not make this point, because it is an absolutely general proposition in the theory of second best; it applies to all sub-optimal positions, and customs-union theory only provides a particular example of its application. Stated in terms of customs unions, this generalisation runs as follows: when only some

¹ For example, the same rate of tariff might not be charged on all imports. In this case it is only necessary to weight each dollar's increase or decrease in trade by the proportion of this value that is made up by tariff—the greater is the rate of tariff the greater is the gain or loss. It is also possible, if one wishes to make inter-country comparisons, to weight a dollar's trade in one direction by a different amount than a dollar's trade in some other direction. These complications, however, do not affect the essence of Meade's analysis, which is to make a *small change* in some tariffs and then to observe that the welfare consequences depend on the net change in the volume of trade and to continue the study in order to discover in what circumstances an increase or a decrease in the net volume of trade is likely.

tariffs are to be changed, welfare is more likely to be raised if these tariffs are merely *reduced* than if they are completely *removed*. Proofs of this theorem can be found in both Meade¹ and Lipsey and Lancaster,² and we shall content ourselves here with an intuitive argument for the theorem in its most general context. Assume that there exist many taxes, subsidies, monopolies, etc., which prevent the satisfaction of optimum conditions. Further assume that all but one of these, say one tax, are fixed, and inquire into the second-best level for the tax that is allowed to vary. Finally, assume that there exists a unique second-best level for this tax.³ Now a change in this one tax will either move the economy towards or away from a second-best optimum position. If it moves the economy away from a second-best position, then, no matter how large is the change in the tax, welfare will be lowered. If it moves the economy in the direction of the second-best optimum it may move it part of the way, all of the way or past it. If the economy is moved sufficiently far past the second-best optimum welfare will be lowered by the change. From this it follows that, if there is a unique second-best level for the tax being varied, a small variation is more likely to raise welfare than is a large variation.⁴

The next generalisation concerns the size of expenditure on the three classes of goods—those purchased domestically, from the union partner, and from the outside world—and is related to the gains from inter-commodity substitution. This generalisation follows from the analysis in my own thesis⁵ and does not seem to have been stated in any of the existing customs-union literature. Consider what happens to the optimum conditions, which we discussed earlier, when the customs union is formed (see Table II). On the one hand, the tariff is taken off imports from the country's union partner, and the relative price between these imports and domestic goods is brought into conformity with the real rates of transformation. This, by itself, tends to increase welfare. On the other hand, the relative price between imports from the union partner and imports from the outside world are moved away from equality with real rates of transformation. This by itself tends to reduce welfare. Now consider both of these changes. As far as the prices of the goods from a country's union partner are concerned, they are brought

¹ *Op. cit.*, pp. 50–1.

² *Op. cit.*, Section V.

³ A unique second-best level (*i.e.*, the level which maximises welfare subject to the existence and invariability of all the other taxes, tariffs, etc.) for any one variable factor can be shown to exist in a large number of cases (see, for example, Lipsey and Lancaster, *op. cit.*, Sections V and VI), but cannot be proved to exist in general (*ibid.*, Section VIII).

⁴ This may be given a more formal statement. Consider the direction of the change—towards or away from the second-best optimum position—caused by the change in the tax. Moving away from the second-best optimum is a *sufficient*, but not a necessary, condition for a reduction in welfare. Moving towards the second-best optimum is a *necessary*, but not a sufficient, condition for an increase in welfare.

⁵ R. G. Lipsey, *The Theory of Customs Unions: A General Equilibrium Analysis*, University of London Ph.D. thesis, unpublished, pp. 97–9, and Mathematical Appendix to Chapter VI.

into equality with rates of transformation *vis à vis* domestic goods, but they are moved away from equality with rates of transformation *vis à vis* imports from the outside world. These imports from the union partner are thus involved in both a gain and a loss and their size is *per se* unimportant; what matters is the relation between imports from the outside world and expenditure on domestic commodities: the larger are purchases of domestic commodities and the smaller are purchases from the outside world, the more likely is it that the union will bring gain. Consider a simple example in which a country purchases from its union partner only eggs while it purchases from the outside world only shoes, all other commodities being produced and consumed at home. Now when the union is formed the "correct" price ratio (*i.e.*, the one which conforms with the real rate of transformation) between eggs and shoes will be disturbed, but, on the other hand, eggs will be brought into the "correct" price relationship with all other commodities—bacon, butter, cheese, meat, etc., and in these circumstances a customs union is very likely to bring gain, for the loss in distorting the price ratio between eggs and shoes will be small relative to the gain in establishing the correct price ratio between eggs and all other commodities. Now, however, let us reverse the position of domestic trade and imports from the outside world, making shoes the only commodity produced and consumed at home, eggs still being imported from the union partner, while everything else is now bought from the outside world. In these circumstances the customs union is most likely to bring a loss; the gains in establishing the correct price ratio between eggs and shoes are indeed likely to be very small compared with the losses of distorting the price ratio between eggs and all other commodities. If, to take a third example, eggs are produced at home, shoes imported from the outside world, while everything else is obtained from the union partner, the union may bring neither gain nor loss; for the union disturbs the "correct" ratio between shoes and everything else except eggs, and establishes the "correct" one between eggs and everything else except shoes. This example serves to show that the size of trade with a union partner is not the important variable; it is the relation between imports from the outside world and purchases of domestic goods that matters.

This argument gives rise to two general conclusions, one of them appealing immediately to common sense, one of them slightly surprising. The first is that, *given a country's volume of international trade*, a customs union is more likely to raise welfare the higher is the proportion of trade with the country's union partner and the lower the proportion with the outside world. The second is that a customs union is more likely to raise welfare the lower is the total volume of foreign trade, for the lower is foreign trade, the lower must be purchases from the outside world relative to purchases of domestic commodities. This means that the sort of countries who ought to form customs unions are those doing a high proportion of their foreign trade

with their union partner, and making a high proportion of their total expenditure on domestic trade. Countries which are likely to lose from a customs union, on the other hand, are those countries in which a low proportion of total trade is domestic, especially if the customs union does not include a high proportion of their foreign trade.

We may now pass to a very brief consideration of some of the empirical work. Undoubtedly a serious attempt to predict and measure the possible effects of a customs union is a very difficult task. Making all allowances for this, however, a surprisingly large proportion of the voluminous literature on the subject is devoted to guess and suspicion, and a very small proportion to serious attempts to measure. Let us consider what empirical work has been done on the European Common Market and the Free Trade Area, looking first at attempts to measure possible gains from specialisation. The theoretical analysis underlying these measurements is of the sort developed by Professor Meade and outlined previously.

The first study which we will mention is that made by the Dutch economist Verdoorn, subsequently quoted and used by Scitovsky.¹ The analysis assumes an elasticity of substitution between domestic goods and imports of minus one-half, and an elasticity of substitution between different imports of minus two. These estimates are based on some empirical measurements of an aggregate sort and the extremely radical assumption is made that the same elasticities apply to all commodities. The general assumption, then, is that one import is fairly easily substituted for another, while imports and domestic commodities are not particularly good substitutes for each other.²

Using this assumption, an estimate was made of the changes in trade when tariffs are reduced between the six Common Market countries, the United Kingdom and Scandinavia. The estimate is that intra-European trade will increase by approximately 17%, and, when this increase is weighted by the proportion of the purchase price of each commodity that is made up of tariff and estimates for the reduction in trade in other directions are also made, the final figure for the gains from trade to the European countries is equal to about one-twentieth of one per cent of their annual incomes. In considering this figure, the crude estimate of elasticities of substitution must cause some concern. The estimate of an increase in European trade of 17% is possibly rather small in the face of the known fact that Benelux trade increased by approximately 50% after the formation of that customs union. A possible check on the accuracy of the Verdoorn method would have been to apply it to the pre-customs union situation in the Benelux countries, to use the method to predict what would happen to

¹ T. de Scitovsky, *Economic Theory and Western European Integration* (Allen and Unwin, 1958), pp. 64-78.

² Note also that everything is assumed to be a substitute for everything else; there are no relations of complementarity.

Benelux trade and then to compare the prediction with what we actually know to have happened. Whatever allowances are made, however, Scitovsky's conclusion is not likely to be seriously challenged:

"The most surprising feature of these estimates is their smallness. . . . As estimates of the total increase in intra-European trade contingent upon economic union, Verdoorn's figures are probably underestimates; but if, by way of correction, we should raise them five- or even twenty-five-fold, that would still leave unchanged our basic conclusion that the gain from increased intra-European specialisation is likely to be insignificant."¹

A second empirical investigation into the possible gains from trade, this time relating only to the United Kingdom, has been made by Professor Johnson.² Johnson bases his study on the estimates made by *The Economist* Intelligence Unit of the increases in the value of British trade which would result by 1970, first, if there were only the Common Market and, second, if there were the Common Market and the Free Trade Area. Professor Johnson then asks what will be the size of the possible gains to Britain of participation in the Free Trade Area? His theory is slightly different from that of Professor Meade, but since it arrives at the same answer, namely that the gain is equal to the increased quantity of trade times the proportion of the purchase price made up of tariff, we do not need to consider the details. From these estimates Johnson arrives at the answer that the possible gain to Britain from joining the Free Trade Area would be, *as an absolute maximum*, 1% of the national income of the United Kingdom.

Most people seem to be surprised at the size of these estimates, finding them smaller than expected. This leads us to ask: might there not be some inherent bias in this sort of estimate? and, might not a totally different approach yield quite different answers? One possible approach is to consider the proportion of British factors of production engaged in foreign trade. This can be taken to be roughly the percentage contribution made by trade to the value of the national product, which can be estimated to be roughly the value of total trade as a proportion of G.N.P., first subtracting the import content from the G.N.P. This produces a rough estimate of 18% of Britain's total resources engaged in foreign trade. The next step would be to ask how much increase in efficiency of utilisation for these resources could we expect: (1) as a result of their re-allocation in the direction of their comparative advantage, and (2) as a result of a re-allocation among possible consumers of the commodities produced by these resources. Here is an outline for a possible study, but, in the absence of such a study, what would we guess? Would a 10% increase in efficiency not be a rather conservative

¹ Scitovsky, *op. cit.*, p. 67.

² H. G. Johnson, "The Gains from Free Trade with Europe: An Estimate," *Manchester School*, Vol. XXVI, September 1958.

estimate? Such a gain in efficiency would give a net increase in the national come of 1.8%. If the resources had a 20% increase in efficiency, then an crease in the national income of 3.6% would be possible. At this stage ese figures can give nothing more than a common-sense check on the more tailed estimates of economists such as Verdoorn and Johnson. Until rther detailed work has been done, it must be accepted that the best esent estimates give figures of the net gain from trade amounting to some- ing less than 1% of the national income (although we may not, of course, ve a very high degree of confidence in these estimates).

When we move on from the possible gains from new trade to the question the economic benefits arising from other causes, such as economies of scale enforced efficiency, we leave behind even such halting attempts at easurement as we have just considered. Some economists see considerable onomies of scale emerging from European union. Others are sceptical. what what follows, I will confine my attention mainly to the argu- ents advanced by Professor H. G. Johnson.¹ His first argument runs follows:

"It is extremely difficult to believe that British industry offers substantial potential savings in cost which cannot be exploited in a densely-populated market of 51 million people with a G.N.P. of £18 billion, especially when account is taken of the much larger markets abroad in which British industry, in spite of restrictions of various kinds, has been able to sell its products."²

Let us make only two points about Professor Johnson's observation. st, many markets will be very much less than the total population. What, example, can we say about a product sold mainly to upper middle-class les living more than 20 miles away from an urban centre? Might there : be economies of scale remaining in the production of a commodity for h a market? Secondly, in the absence of some theory that tells us the tement is true for 51 and, say, 31, but not 21, million people, the argument st remain nothing more than an unsupported personal opinion. As other argument, Professor Johnson asks, "Why are these economies of le, if they do exist, not already being exploited?"³ It is, of course, well own that unexhausted economies of scale are incompatible with the tence of perfect competition, but it is equally well known that unex- isted economies of scale are compatible with the existence of imperfect ppetition as long as long-run marginal cost is declining faster than

In singling out Professor Johnson, I do not wish to imply that he is alone in practising the of economics which I am criticising. On the contrary, he is typical of a very large number onomists who have attempted to obtain quantitative conclusions from qualitative arguments. H. G. Johnson, "The Criteria of Economic Advantage," *Bulletin of the Oxford University ute of Statistics*, Vol. 19, February 1957, p. 35. See also "The Economic Gains from Free e with Europe," *Three Banks Review*, September 1958, for a similar argument.

Johnson, "Economic Gains," *op. cit.*, p. 10, and "Economic Advantage," *op. cit.*, p. 35.

marginal revenue. Here it is worthwhile making a distinction, mentioned by Scitovsky,¹ between the long-run marginal cost of producing more goods, to which the economist is usually referring when he speaks of scale effects, and the marginal cost of making and selling more goods (which must include selling costs). This leads to a distinction between increasing sales when the whole market is expanding and increasing sales when the market is static, and thus increasing them at the expense of one's competitors. The former is undoubtedly very much easier than the latter. It is quite possible for the marginal costs of *production* to be declining while the marginal costs of *selling* in a static market are rising steeply. This would mean that production economies would not be exploited by the firms competing in the market, but that if the market were to expand so that *all* firms in a given industry could grow, then these economies would be realised.

Let us also consider an argument put forward in favour of economies of scale. Writing in 1955, Gehrels and Johnson argue that very large gains from economies of scale can be expected.² In evidence of this they quote the following facts: American productivity (*i.e.*, output per man) is higher than United Kingdom productivity for most commodities; the differential is, however, greatest in those industries which use mass-production methods. From this they conclude that there are unexploited economies of mass production in the United Kingdom. Now this may well be so, but, before accepting the conclusion, we should be careful in interpreting this meagre piece of evidence. What else might it mean? Might it not mean, for example, that the ratios of capital to labour differed in the two countries so that, if we calculate the productivity of a factor by dividing total production by the quantity of one factor employed, we will necessarily find these differences? Secondly, would we not be very surprised if we did not find such differences in comparative costs between the two countries? Are we surprised when we find America's comparative advantage centred in the mass-producing industries, and, if this is the case, must we conclude that vast economies of mass production exist for Europe?

Finally, we come to the possible gains through forced efficiency. Business firms may not be adopting methods known to be technically more efficient than those now in use due to inertia, a dislike of risk-taking, a willingness to be content with moderate profits, or a whole host of other reasons. If these firms are thrown into competition with a number of firms in other countries who are not adopting this conservative policy, then the efficiency of the use of resources may increase because technically more efficient production methods are forced on the business-man now facing fierce foreign competition. Here no evidence has as yet been gathered, and, rather than report the opinions of others, I will close by recording the personal guess that thi

¹ Scitovsky, *op. cit.*, pp. 42 ff.

² Gehrels and Johnson, "The Economic Gains from European Integration," *Journal of Political Economy*, August 1955.

is a very large potential source of gain, that an increase in competition with foreign countries who are prepared to adopt new methods might have a most salutary effect on the efficiency of a very large number of British and European manufacturing concerns.¹

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¹ Milton Friedman's argument that survival of the fittest proves profit maximisation notwithstanding (see *Essays in Positive Economics*, Chicago: University of Chicago Press, 1953). What seems to me to be a conclusive refutation of the Friedman argument is to be found in G. C. Archibald, "The State of Economic Science," *British Journal of the Philosophy of Science*, June 1959.

THE EFFECTS OF ACCUMULATION ON THE TERMS OF TRADE¹

THE effects of the process of accumulation (as distinguished from those of completed accumulation) on the terms of trade are analysed in this paper. The analytical device employed is to regard a rise in the rate of accumulation as a shift of demand from consumer goods to capital goods at constant prices. The effects of completed accumulation on the terms of trade if accumulation continues at a steady rate are also considered.

Model One. Assumptions: Two countries (Mancunia and Agraria), two products (engineering products and food), two factors (capital and labour), constant returns to scale in engineering, diminishing returns to scale in agriculture, production of both commodities in both countries, a higher capital-labour ratio in engineering than in agriculture at all product price ratios, given production functions and no "inferior" product in consumption.

We suppose that engineering products can be used both for consumption and as capital goods, while food is only a consumer good.

Initially there is equilibrium in production, consumption and trade with no investment in either country; engineering products are used only as consumer goods.

It is assumed that Mancunia's exportables are engineering products, while Agraria exports food.

The citizens of Mancunia now decide to raise their stock of capital by installing part of the output of engineering products in new factories. If at the same time they reduce their use of engineering products for consumption by an equal amount without requiring any change in the relative prices of engineering products and food to induce them to do so, the terms of trade will be unchanged.

It is, however, unlikely that Mancunians will reduce their consumption of engineering products alone at unchanged prices, to finance the investment they wish to undertake. It is reasonable to suppose that the cut in consumption will be divided between the two consumer goods, if prices remain the same. But if the reduction in the quantity of engineering products used for consumption in Mancunia is less than the quantity of these products diverted to investment, there must be a fall in the volume of engineering products offered to Agraria at constant prices. The terms of trade of Mancunia will improve, the change in relative prices resulting in increased output of engineering products and reduced use of these products for consumption in both countries.

¹ I am indebted to Mr. T. Balogh, Mr. J. Black, Mr. P. P. Streeten and Mr. J. Bhagwati for comments on a first draft.

Conversely, an attempt by the citizens of Agraria to raise their stock of capital must worsen that country's terms of trade, unless the reduction of consumption required to finance the investment is confined to engineering goods.

After the process of accumulation has been completed the terms of trade will be less favourable to Mancunia than in the initial situation. Professor Johnson¹ has developed this point in his article on "Economic Expansion and International Trade," his argument being on the following lines. Suppose the product price ratio to remain the same after accumulation has taken place in (say) Mancunia. As the product price ratio is unchanged, factor proportions must be the same as before in each use. But this must mean a reduced output of the labour-intensive product, for an increased stock of capital can be employed with a given labour force and unchanged techniques only by a transfer of labour to the capital-intensive use. If the labour-intensive product is not an "inferior" good in consumption its relative price must rise. The labour-intensive product being Mancunia's importable, Agraria's terms of trade must improve.

As accumulation proceeds, the level of food output in the two countries taken together at any given product price ratio will fall steadily. Mancunia's terms of trade must therefore deteriorate and those of Agraria improve. But this trend may be slowed down or even reversed for a time as a result of increased levels of investment in either country.

Model Two. Assumptions: Two countries (Mancunia and Agraria), two products (engineering products and food), two factors (capital and labour), constant or diminishing returns to scale in both engineering and agriculture, specialisation by Mancunia in engineering and by Agraria in agriculture, and no "inferior" product in consumption.

We suppose once more that engineering products can be used both as capital goods and as consumer goods, while food is used for consumption alone.

The effect of completed accumulation in Mancunia while Agraria remains stationary is to worsen Mancunia's terms of trade, as has been shown by Professor Johnson.² For, by assumption of the absence of "inferior" goods, the citizens of Mancunia will want more importables at constant prices. Similarly, completed accumulation in Agraria will worsen that country's terms of trade if Mancunia has remained stationary.

The process of accumulation must improve Mancunia's terms of trade and worsen those of Agraria. For, at constant prices, Mancunia will offer less exportables if accumulation is undertaken in that country and the

¹ H. G. Johnson, *International Trade and Economic Growth* (London, 1958), Chapter III, pp. 65-93. This is a revised version of his article on "Economic Expansion and International Trade," *Manchester School of Economic and Social Studies*, Vol. XXIII (1955), pp. 95-112.

² *Ibid.*, Chapter IV, pp. 94-119. This is a reprint of his article on "Increasing Productivity, Income-Price Trends and the Trade Balance," *Economic Journal*, Vol. LXIV (1954), pp. 462-85.

reduction in consumption is not confined to engineering products; while Agraria will offer more exportables at constant prices if accumulation is undertaken there and the use of both products for consumption is sought to be reduced.

Thus in this specialisation case both the process of accumulation and completed accumulation in Agraria tend to worsen that country's terms of trade, while Mancunia's terms of trade tend to improve as a result of the process of accumulation there and to worsen when the accumulation is completed.

Model Three. Assumptions: Three countries (A, B and C), three products (tools, cloth and food), two factors (capital and labour), constant returns to scale in the making of tools and cloth, diminishing returns to scale in agriculture, production of all three products in all three countries, the capital-labour ratio higher in the tools industry than in the cloth industry and lowest in agriculture, no "inferior" goods in consumption.

We suppose that tools are capital goods alone while food and cloth are used only for consumption purposes.

The products in which each country will have a comparative advantage will be determined by relative cost conditions. We suppose that country A's exportables are tools and cloth and its importable food, that country B's exportable is cloth and its importables tools and food, and that country C's exportable is food and its importables tools and cloth.

Three questions may be considered. First, what is the effect of completed accumulation on the terms of trade of each country, if no further accumulation is undertaken? Secondly, what is the effect of the process of accumulation on the terms of trade of each country? Thirdly, what is the effect of completed accumulation on the terms of trade of each country, if tools continue to be made at a given rate to be used for further investment?

The answer to the first question is that with only cloth and food being made and a higher capital stock in at least one country, cloth must be cheaper in terms of food. The terms of trade of country A and country B will have deteriorated and those of country C will have improved.

The second question is the effect on the terms of trade of each country of a shift in demand from cloth and food towards tools at constant prices. Tool-making being the most capital-intensive industry, the ratio of capital to labour is reduced in all uses. Wages fall relative to the rate of interest. Cloth will be dearer in terms of food, and tools will be dearer in terms of cloth. Country A's terms of trade will improve, those of country C will worsen and the effect on country B's terms of trade is uncertain.

With regard to the third question, we must conclude that country A's terms of trade will deteriorate and country C's terms of trade will improve, while the effect on country B's terms of trade is uncertain. The reason is that the ratio of capital to labour must be raised in all uses if the output of food or cloth is not to be reduced, and the consequent rise in wages relative to the rate of interest will cheapen products in order of capital intensity.

Model Four. Assumptions: As in Model Three, except that the capital-labour ratio is now assumed to be always higher in the cloth industry than in the tool industry, and higher in the tool industry than in agriculture.

Once more, tools are capital goods and food and cloth are consumer goods.

We continue to assume that relative cost conditions are such that country A's exportables are tools and cloth and its importable food, country B's exportable is cloth and its importables tools and food, and country C's exportable is food and its importables tools and cloth.

As in Model Three, completed accumulation must cheapen cloth in terms of food if no further accumulation is undertaken. The terms of trade of country A and of country B will deteriorate, while those of country C will improve.

We cannot now indicate the directions of change in relative prices as a result of the process of accumulation, irrespective of the relative declines in the demands for food and cloth at constant prices. The making of tools being intermediate in capital intensity, the capital-labour ratio in each industry may either rise or fall as a result of a diversion of demand to tools at constant prices. The greater the fall in cloth consumption relative to food consumption at constant prices in order to buy tools, the more likely it is that the capital-labour ratio in each industry will rise, and vice versa. Let us call a rise in capital-labour ratios case X, and a fall in capital-labour ratios case Y. Under case X, cloth becomes cheaper in terms of tools, and tools fall in price relative to food. The terms of trade of country A and of country B deteriorate, while those of country C improve. Under case Y, cloth is dearer in terms of tools and tools rise in price in terms of food. The terms of trade of country A and of country B improve, while those of country C deteriorate.

Completed accumulation will reduce the price of tools in terms of food when tools are produced at a given rate, and the relative price of cloth in terms of tools will also fall. The terms of trade of country A and of country B will deteriorate and those of country C will improve.

The effects on the terms of trade of each country of the process of accumulation and of completed accumulation with tools being produced at a given rate may be summarised as follows, *I* denoting an improvement, *D* a deterioration and *U* an uncertain effect:

	Effect of process of accumulation.			Effect of completed accumulation.	
	Model Threc.	Model Four Case X.	Model Four Case Y.	Model Threc.	Model Four.
Effects on the terms of trade of:					
Country A . .	<i>I</i>	<i>D</i>	<i>I</i>	<i>D</i>	<i>D</i>
Country B . .	<i>U</i>	<i>D</i>	<i>I</i>	<i>U</i>	<i>D</i>
Country C . .	<i>D</i>	<i>I</i>	<i>D</i>	<i>I</i>	<i>I</i>

While in Model One the process of accumulation improved the terms of trade of Mancunia and worsened those of Agraria, we now have the interesting possibility, due to the introduction of a third country and commodity, that the terms of trade of country A (which corresponds to Mancunia) may worsen and those of country C (which corresponds to Agraria) improve both as a result of the process of accumulation and of completed accumulation.

Relatively little can be said regarding the direction of change in country B's terms of trade on the basis of this taxonomic approach, which does not take into account the relative quantities of tools and food imported into that country. On the Model Three assumption that tool-making is more capital intensive than cloth-making, the process of accumulation will tend to worsen country B's terms of trade if it is itself accumulating rapidly and therefore importing mostly tools and little food. On the other hand, completed accumulation abroad will, on these assumptions, be beneficial to country B. If country B is growing slowly, and therefore importing mostly food and few tools, it will benefit from the process of accumulation abroad, but will be worse off when the new equipment comes into use. On the Model Four assumption regarding relative factor intensities, the direction of movement of the terms of trade of country B as a result of the process of accumulation and of completed accumulation is, of course, determinate without reference to the relative importance of tools and food in the country's imports.

Model Five. Assumptions: Three countries (A, B and C), three products (tools, cloth and food), constant or diminishing returns to scale in each industry, specialisation by country A in tools, by country B in cloth and by country C in food.

The process of accumulation must improve country A's terms of trade, for more of its product will be demanded at constant prices. The effect on the terms of trade of country B and of country C is uncertain, and will depend on the changes in demand for food and cloth at constant prices.

Completed accumulation must worsen the terms of trade of the country in which accumulation has taken place, if the other two countries have remained stationary. The only exception is when the country whose output has risen wishes to raise its consumption of the commodity in which it specialises by as much or more than the increment in output, at constant prices. For this to happen in country B or country C, the imported consumer good must necessarily be inferior in consumption; while in country A the resources devoted to investment at constant prices must rise by at least the same extent as the increase in output.

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BUILDING CYCLES: A REGIONAL MODEL AND ITS NATIONAL SETTING¹

I

IN recent accounts of economic growth considerable prominence has been given to the building cycle,² but in the twenty years that have elapsed since H. W. Robinson³ attempted to examine its mathematics, and Derksen published his econometric model,⁴ there has been no attempt to treat the cycle to a rigorous examination similar to that which has so often been accorded to the more famous (but perhaps less important) trade cycle. This paper is intended as a first step in that direction.

The comparisons of investment in Britain and the United States made by writers such as Thomas and Cairncross⁵ were hampered by the rather inadequate British data. In 1955 Bernard Weber reduced this inadequacy by publishing an index of building activity based on house-plans approved in thirty-three large towns.⁶ Shortly afterwards an index of house-building activity in the South Wales coalfield, based on data collected for thirty-seven towns by Hamish Richards appeared,⁷ and in presenting this the authors pointed out that for a considerable period the South Wales index was moving inversely to Weber's index. A more careful examination of the data for the

¹ Parts of this paper have benefited from criticisms by Professors C. F. Carter, H. G. Johnson, J. Johnston and Brinley Thomas, and by the members of the Advanced Economics Seminar at Manchester University and the Joint Oxford-London-Cambridge-Manchester Economics Seminar.

² See, for example, Brinley Thomas, *Migration and Economic Growth* (1954), in which the inverse fluctuations in British and American growth are related to building cycles and population movements, and R. C. O. Matthews, *The Trade Cycle* (1959), which places these ideas in the setting of economic fluctuations more generally. The idea of inverse building cycles was, I believe, first pointed out by E. W. Cooney, "Capital Exports and Investment in Building in Britain and the U.S.A.," *Economica*, N.S., Vol. XVI, No. 64, November 1949, pp. 347-54, but it was left to Thomas to develop an adequate theory, of which the main parts appeared in "Migration and the Rhythm of Economic Growth, 1830-1913," *The Manchester School of Economics and Social Studies*, Vol. XIX, No. 3, September 1951, pp. 215-71. See also D. J. Coppock, "The Causes of Business Fluctuation," Manchester Statistical Society, 1959.

³ H. W. Robinson, *The Economics of Building* (1939).

⁴ J. B. D. Derksen, "Long Cycles in Residential Building: An Explanation," *Econometrica*, Vol. 8, April 1940, pp. 97-116.

⁵ A. K. Cairncross, *Home and Foreign Investment 1870-1913* (1953).

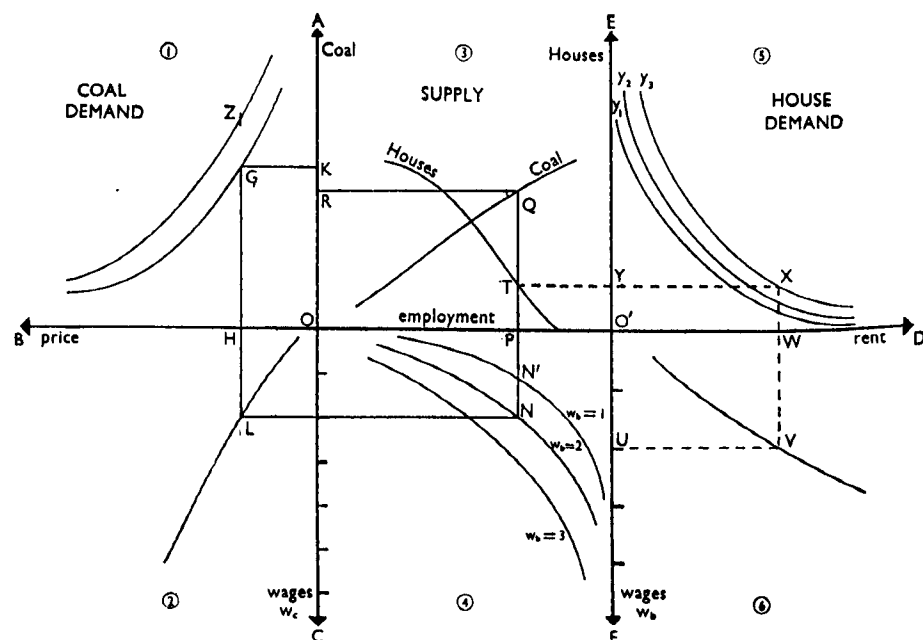
⁶ B. Weber, "A New Index of Residential Construction and Long Cycles in House-Building in Great Britain, 1838-1950," *Scottish Journal of Political Economy*, 1955, pp. 104-32.

Unfortunately, Weber died before he was able to complete his very important work. Professor Cairncross has placed his papers at my disposal, and a selection from them is appearing in the *Scottish Journal of Political Economy*. Much of the argument in this first section of the paper is based on an analysis of Weber's unpublished data, and there are suggestions here and there that he himself was about to study the local and regional variations more closely.

⁷ J. Hamish Richards and J. Parry Lewis, "House-Building in the South Wales Coalfield 1851-1913," *The Manchester School*, September 1956.

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various Welsh towns and for Weber's large towns¹ has convinced me that unless attention is paid to the local origins of a building cycle, the conclusions reached through arguing in aggregative terms may be quite invalid. This is not a new point; with varying degrees of emphasis it has been made by Buckley,² Bowen,³ Bowley,⁴ Derksen,⁵ and Cairncross,⁶ to name only a few, but some of those who have made it have proceeded to ignore it, or to minimise its importance. The comparison of aggregates is always tricky, and it is easy for a comparison of a national rent index with a national building index to suggest a relationship quite different from that existing in



any of the towns included in these indices, but there is a more empirical reason for examining the cycle regionally, or even locally, and that is that the course of house building differed tremendously from town to town. There were, of course, some towns in which building behaved in much the same way as in others. London and Liverpool, for example, revealed much the same cyclical pattern from about 1870 onwards; but between other

¹ These overlap slightly. Sixty-seven different towns had been examined when this paper was written. During the last few months I have obtained series for several more towns in the Manchester area. An analysis of them supports the conclusions of this paper.

² K. Buckley, *Capital Formation in Canada, 1896-1930* (1955), pp. 37-9.

³ I. Bowen, "Building Output and the Trade Cycle (1924-38)," *Oxford Economic Papers*, No. 3, February 1940, p. 110.

⁴ M. Bowley, "Some Regional Aspects of the Building Boom, 1924-36," *Review of Economic Studies*, Vol. 5, 1938.

⁵ Derksen, *loc. cit.*, p. 100.

⁶ Cairncross, *op. cit.*, p. 11.

towns there were marked contrasts. From 1875 until 1908 there was an almost perfect inverseness between Liverpool and the South Wales coal and iron port of Newport. Coventry had a major upswing from 1892 until 1908, while Gloucester had a major downswing from 1895 to the First World War. Glasgow had a large uninterrupted upswing from 1865 until 1876, followed by a downswing which was almost at bottom in 1879 and then a trough of five years before a slow upswing; but Burton on Trent fell from 1866 until 1870, and in 1873 rose to peak in 1879, followed by a downturn that reached bottom in 1885. The list could be continued,¹ but enough has already been said to demonstrate the existence of important local variations, which were more marked at some times than at others.

The model presented in this paper has arisen out of this examination of local data. Its relevance to a national model, and some reasons for the regional differences we have just described, will be discussed in the final section of the paper. The section about to follow presents the model in terms of comparative statics, and the third section develops a dynamic version of this. Throughout, the mathematics has been reduced to a minimum, although a great deal of it lies behind the analysis.

II

The basic idea in the model is a simple one. We imagine a coal-mining region in which everybody is engaged either in mining coal for export or in building houses. Food and other goods and services are imported. Because of a large external demand for coal, there is full employment. For the time being we shall assume that the population is fixed and that the general price level of goods other than coal remains constant. These assumptions will later be relaxed. We may think of the houses as being built by an absent landlord for non-philanthropic motives.

Although it is not necessary to do so, we may start from an equilibrium position in which the rate of supply of coal matches the rate of demand and there are no vacant houses. Some builders are engaged on repairs, and there is a steady supply of new houses just sufficient to meet the demands arising out of ageing families and similar factors.² Suddenly a change in external factors, such as a technical revolution abroad, results in an increased demand for coal. This can be met only by employing more colliers, and these can be attracted only by offering higher wage-rates. Because there is full employment, an increase in the number of colliers causes a decrease in the number of builders, and hence in the supply of new houses; but at the

¹ The differences will be discussed in more detail in a book embodying Weber's researches and my own which will appear over our joint authorship.

² It is possible to specify a more satisfactory equilibrium growth line, rather than an equilibrium level, but since the purpose of this comparative statics model is to provide an introduction to the dynamic model that follows, there is little point in doing so.

same time the increased wage-rates stimulate the demand for houses, for now people can afford better accommodation, families living together can afford houses of their own and young men can afford to get married. Thus, the attempt to meet the increased demand for coal decreases the supply of house at a time when it also increases the demand for them. We now consider more precisely how this happens, and whether equilibrium will be restored.

We shall suppose that the demand for coal (D^c) is a function of its price (p) and some external conditions which may be summarised by the variable X . The demand curves relating D^c to p for various external conditions (X_1 , X_2 , etc.) are shown in the first part of the diagram, in which demand is measured along OA and increasing prices in the (backwards) direction OB .

Without inquiring into the precise mechanism relating the price of coal (p) and miners' wage rates (w^c), we may suppose that the actual relationship between them is one such as that shown in the second part of the diagram, in which increasing coal wages are measured down OC . This, of course, assumes that all other factors (such as profits and overhead costs) either remain constant or bear a simple functional relationship to wage-rates. We may think of wages and prices as being pegged to each other.

The supply of coal depends on the number of miners, and is shown in the third part of the diagram. Supply (S^c) is measured along OA , and the number of miners along OO^1 , where the length OO^1 represents the total (fixed) labour force.

The number of miners forthcoming out of a fixed population will depend on the wage-rates offered in the two industries. For any given level of wage-rates in building (e.g., w^b_1) there can be drawn a curve such as the uppermost of those in the fourth part of the diagram, relating the number of miners to the variable coal wage-rate (w^c) measured down OC . For a higher wage-rate in building (w^b_2) the same number of miners will be forthcoming only if a higher coal wage-rate is offered, and so we may have a family of curves, as shown.

At any instant the position in the coal market may be read off from the diagram. When external conditions are at the level X_1 there is a demand for an amount OK of coal, at a price OH . The point on the demand curve is G . When the price is OH the point on the price-wages curve is L , and this shows the corresponding wage along OC . At this wage the number of miners forthcoming if the building wage is w^b_2 will be prescribed by the point N , and will be OP . The amount of coal supplied will thus be given by PQ , which is equal to OR . Since R is lower than K , there is excess demand. To reduce this the coal-owners put up the price of coal and G slides downwards to the left. K becomes lower. But the point L also moves to the left, indicating an increase in the coal wage-rate. Consequently N slides downwards to the right, and the point P , moving along OO^1 , indicates an increasing number of miners. The point Q moves to the right and upwards. Thus the point K falls, while R rises, and there is a movement towards equilibrium.

Yet, as we have seen, this movement is not independent of the housing market, which we must now consider. The number of builders is easily obtained, since it is the total labour force (OO^1) less the number of miners (OP)—i.e., it is O^1P . If we consider a fixed number of builders to be engaged on repairs we can draw a supply curve for new houses as shown in the third part of the diagram.

Although it is possible to draw another family of curves in the fourth part of the diagram to show the relationship between builders' wages and supply of builders, it is unnecessary, since the existing curves already show this. The point N corresponds to two wage-rates, w^c_2 (measured along OC) and w^b_2 (associated with the curve on which N lies), and defines both the number of miners (OP) and the number of builders (O^1P). No more is necessary. We may also note that a point such as N^1 , corresponding to a quite different pair of wage-rates (both lower than at N) has the same effect on the distribution of the labour force.

The demand for new houses, with a fixed population, will depend on incomes¹ and on rents. At any given rent the demand will increase with income, and so we may have a family of demand curves as shown in the fifth part of the diagram, in which rent is measured along $O'D$. The incomes (Y) will, of course, depend on the wage-rates and the distribution of the labour force between the two industries.

Finally, we consider the relationship between rents and building wages. Grebler, Blank and Winnick have pointed out that it was partly because wages formed such a high proportion of total costs in building that building prices rose twice as much as average wholesale prices during the period 1890–1950 in America.² Buckley has analysed the position in Canada for 1926–30 and found that “about 50% of the expenditure on structures emerged as direct income widely dispersed among domestic factors.”³ The rest of the expenditure went on raw materials and supplies, and after examining the labour costs in these he concluded that in all, about “85 to 90% of a dollar spent on structures from 1926 to 1930 became domestic factor income.”⁴ In this model we are going to assume, for the moment, that building wage-rates completely specify rents by a curve such as that shown in the sixth part of the diagram.⁴ Here the building wage-rate is measured down O^1F . To each point on O^1F there corresponds a complete curve of the family in the fourth part of the diagram. (The intersection with any of these curves of a line

¹ In strict terms we should consider not the regional income but the incomes of those people who require new houses. Buckley has emphasised that a sharp recession in national income may leave the incomes of the house-demanding group unaffected (*op. cit.*, p. 51). This is one of the many important points in which a national model must differ from the regional model here presented; indeed, even here this point is not irrelevant.

² L. Grebler, D. M. Blank and L. Winnick, *Capital Formation in Residential Real Estate* (1956), pp. 126–8.

³ Buckley, *op. cit.*, p. 36.

⁴ Those who feel unhappy about this may think of all the houses being built out of local stone and timber obtained by “builders” who are paid the same rate as those who use it.

drawn to the left from U would have no meaning. Since we have decided to have a separate curve for each w^b , the scale marked on O^1F is relevant to only the sixth part of the diagram.)

We may now complete our examination of the comparative statics model. When the supply of coal is OR there are OP miners and O^1P builders. These builders supply PT new houses. The existing wage-rates, specified by N , are w^c_3 and w^b_2 . At a wage-rate w^b_2 , which may be represented by O^1U , the rent is specified by the point V , and is OW . At this rent, and at the income corresponding to these wage-rates (say Y_3), the demand for new houses is WX , which may be compared with the supply PT .

Now it is quite easy to draw this diagram in such a way that both the coal and the house market are in equilibrium, but we must then consider what happens when external circumstances change and X jumps from X_1 to X_2 . The new demand at the existing price becomes HZ , instead of HG , and this far exceeds supply. The mechanism just described starts to reduce demand and to increase supply; but it puts up the coal wage-rate, and this shifts the demand curve for new houses. One repercussion of this is that landlords put up builders' wages in an attempt to prevent the exodus into mining, or even to attract miners into building. Rents rise with building wages, but so do incomes, and so there are forces at work both to decrease and to increase the demand for houses. It is possible that there will be some distribution of wages that will restore equilibrium in both sectors of the economy; but this may involve either more or fewer miners than previously. It is quite possible to adjust the slopes of the curves, or to work it all out in quite general terms mathematically, when certain conditions under which equilibrium can be restored will be obtained, but it is unnecessary to do this in order to see the truth of assertion that a second equilibrium position may not be possible without adjustments of a kind we have temporarily assumed away. As a step towards the dynamic model we now consider three of these.

One possible way of restoring equilibrium in the housing market when the main consideration is to meet the increased demand for coal is to adjust other prices upwards, so that demand for new houses falls. This can be shown in the diagram either by thinking of Y as a measure of real income,¹ or by thinking of another axis through O^1 perpendicular to the plane of the paper, with other prices measured along this. The Y curves then become surfaces. It would be possible to relate price changes to the level of incomes, or to any other factor.

There are, however, two rather more important possibilities to be considered. One of these is that landlords' profits, or perhaps the rate of interest, may rise, so that any given building wage-rate now corresponds to a higher rent (and therefore a lower demand). This can be shown by shifting the curve in the sixth part of the diagram to the right.

Another possibility is that there will be immigration. This is also shown

¹ *I.e.*, monetary income deflated by a price index that excludes rent.

very easily in the diagram. Instead of letting OP represent the number of miners, let it represent the *proportion* of the total labour force (OO^1) engaged in mining, so that O^1P represents the proportion engaged in building. Then the effect of immigration on supply (under the assumption of continued full employment) will be simply to lift the supply curves, so that the points Q and T corresponding to a fixed proportion OP of miners will rise. We may assume that, say, a 10% increase in population will lift both of the supply curves by approximately this same percentage; but the demand for new houses will go up by much more, since most of the immigrants will now need them, whereas most of the original population was already housed. Thus the immigration, vastly increasing the demand for houses, may result in a tendency for P to shift to the left, so that a greater proportion of the total population become builders, to satisfy this great demand; but the increase in population more than makes up for the fact that a smaller proportion of it is engaged in mining, and total coal supply will be higher than before, possibly, even at a lower wage-rate and price. All of this may be worked out diagrammatically or mathematically. The immigrants, of course, may be thought of as coming from an adjacent region which has, say, only cotton and building industries; and now a second diagram may be envisaged, similar to the one we already have, in which the supply curves have fallen because of the emigration. The magnitude of the migration could be related to wage differences between the two regions fairly easily by making the diagram three dimensional.

At this stage, however, we have reached the useful limit of our model and, having demonstrated the kind of mechanism we have in mind, turn to a dynamic version of it embodying lags and slightly different assumptions.

III

The broad ideas of our dynamic model are similar to those we have just discussed, although the detail of the assumptions will be rather different. In particular, we shall assume the existence of a number of linear relationships in place of the more general curves illustrated in the diagram. Towards the end of this section we shall briefly examine how the solution will be affected by departures from linearity.

We shall suppose that the rate of (export) demand for coal (D^c) is a linear function of its price (p) and of an external variable X , given by

$$D^c = ap + bX \quad . \quad . \quad . \quad . \quad . \quad (1)$$

In this and all subsequent equations we are considering dated variables, which should be written as D^c_t , X_t , etc., but are presented without their subscripts for ease of reading. The coefficients a and b are constant, a being negative but b positive. This equation corresponds to the first part of the diagram where the curves are replaced by straight lines.

By assuming constant marginal and average productivity we may write the rate of supply of coal (J^c) as a constant multiple of the number of miners (n^c):

$$S^c = cn^c \quad . \quad . \quad . \quad . \quad . \quad . \quad (2)$$

This corresponds to the third part of the diagram.

An increase in demand can be met only by increasing the number of miners. We shall suppose that wages and total population are always adjusted in such a way that the rate of increase of the number of miners ($\dot{n}^e$) is proportional to the difference between the existing number (n^e) and the number required to produce coal at the target rate, which will be some multiple of current demand. This required number will be denoted by gD^e ($g = \text{constant} > 0$). Mathematically this may be put as

$$\dot{n}^c = -d(n^c - gD^c) \quad . \quad . \quad . \quad . \quad . \quad (3)$$

where d is a numerical constant, and indicates the speed of response of the number of miners to demand for coal. It is such that in a time of $\frac{1}{d}$ the necessary adjustment in the number of miners has been about two-thirds completed.¹ There is no equivalent of this dynamic equation in the static diagram.

This adjustment depends on the wage-rates and on the way in which the total labour force (P) is behaving. We may think of the rate of increase in the number of miners as being some multiple ν of the rate of increase of the labour force ($\dot{P}$), plus some weighted difference of the wage-rates in the two industries:

$$\dot{n}^c = (\mu w^c - \lambda w^b) + \nu \dot{P}$$

This may be re-written as:

$$w^c = (\dot{n}^c + \lambda w^b - \nu \dot{P})/\mu \quad . \quad . \quad . \quad . \quad (4)$$

which shows the level at which the coal wage-rate must be set in order to produce a given rate of increase of miners when the building wage-rate and the level of population increase are given. It is equivalent to the fourth part of the diagram.

Both wages and the state of the market are assumed to affect the coal price (p). We write

$$\dot{p} = f(D^c - S^c) + h\dot{w}^c \quad (5)$$

where f and h are numerical constants. An excess demand will cause a price increase; so will increasing coal wages. The wage part of this relationship is indicated by the second part of the diagram.

¹ See R. G. D. Allen, *Mathematical Economics* (1956), pp. 26–8.

The approach to housing must be slightly different, for here our assumption implicit above that coal stocks¹ can be disregarded has no justifiable parallel. We have to consider the total demand for houses (D^b). This will be related to population, rents (R) and incomes. Chiefly for mathematical convenience we are going to identify income fluctuations with changes in the coal wage-rate, and write our total demand for housing as

$$D^b = \alpha P + \beta R + \gamma w^c. \quad (6)$$

This is not a gross violation of the truth. We can expect building wages to be pretty highly correlated with coal wages, and most of the labour force to be miners. Alternatively, we can suppose the new builders are always old miners who are already adequately housed, and that the incomes of the people who seek new houses are derived from coal. This is not a thoroughly satisfactory approach, but it is a reasonable way of avoiding the complicated income term $(n^b w^b + n^c w^c)/(n^b + n^c)$ which we would otherwise have to consider. We can expect α and γ to be positive but β to be negative. This relationship corresponds to the fifth part of the diagram.

Since S^b denotes the total stock of houses, the rate of supply must be $\dot{S}^b$, and we assume that this is a constant multiple of the number of builders:

$$\dot{S}^b = \delta n^b \quad . \quad . \quad . \quad . \quad . \quad . \quad (7)$$

This assumes that a constant proportion of the total number of builders is engaged on repairs. The third part of the diagram corresponds with this equation.

As in the case of coal, we shall assume an exponential lagged response of building employment to current needs, which are here given by the excess demand $D^b - S^b$, i.e., we assume that

$$\dot{n}^b = -\theta(n^b - \phi(D^b - S^b)) \quad . \quad . \quad . \quad . \quad (8)$$

where θ is the speed of response and ϕ is related both to the productivity of a builder and to the relationship of the target programme to current excess demand.

The wage-rate necessary to attract this rate of increase of n^b is given by an equation similar to equation (4), namely:

$$\lambda w^b = \dot{n}^b + \mu w^c - (1 - \nu) \dot{P} \quad . \quad . \quad . \quad . \quad (9)$$

where, of course, equations (8) and (9) combined satisfy the requirement that $n^b + n^c = P$.

Wage-rates in building affect rents. So does excess demand or supply. We shall represent this relationship by the equation:

$$\dot{R} - \sigma \dot{w}^b = \rho(D^b - S^b) \quad . \quad . \quad . \quad . \quad . \quad (10)$$

¹ If coal stocks are taken into account the main form of the solution is only slightly different; but in the kind of economy we are considering there is no harm in treating them as more or less constant.

In this equation the left-hand side may be taken as representing the rate of increase of landlords' profits. The coefficient σ may embody the rate of interest, and $R - \sigma w^b$ will be the difference between current rents and some multiple of current costs.¹ This equation, then, says that the rate of increase of landlords' profits is proportional to excess demand, and so seems to ignore the well-known stickiness of rents. It will be modified later. It replaces the relationship in the sixth part of the diagram.

We thus have ten equations. Our variables are twelve:

$$D^c, \rho, X, S^c, n^c, w^c, w^b, P, D^b, R, n^b, S^b$$

We take X and P to be exogenously determined, leaving ten equations and ten endogenous variables. Later we shall add another equation and give P an endogenous component.

By successive elimination of the endogenous variables it may be shown that these equations lead to a single equation expressing house-building as a function of population and the exogenous factor in coal demand, viz.,

$$\frac{1}{8} [G\ddot{S}^b + H\dot{S}^b + K\dot{S}^b] = L\ddot{P} + M\dot{P} + NP + T\dot{X} \quad (11)$$

where G, H, K, L, M, N, T are algebraic functions of the coefficients $a, b, c, \dots, \alpha, \beta, \gamma, \dots$, and are given in the Appendix. In interpreting this equation we should note that $\dot{S}^b$ is the current rate of supply of houses. It will be simpler if we replace this by δn^b and think, instead, of employment in building rather than of rate of supply. We then have the equation

$$G\ddot{n}^b + H\dot{n}^b + Kn^b = L\ddot{P} + M\dot{P} + NP + T\dot{X} \quad (12)$$

whose solution we may now examine.

This equation is a second-order differential equation with constant coefficients. Its solution falls into three parts.² There is a component arising out of the characteristic equation obtained by writing the left-hand side equal to zero. To this must be added two other components, one arising out of the P terms and one out of the X term. Before considering the

¹ Originally I used a different form for this equation, involving historic cost, but Mr. W. Peters convinced me that the formulation I have used is economically defensible as well as mathematically easier. The introduction of historic cost consisting of $\int w^b dt$ over the period of building leads to a mixed differential-difference equation as a solution. The characteristic equation of this is identical with that of Minorsky's equation. (See N. Minorsky, "Self-excited Mechanical Oscillations," *Journal of Applied Physics*, Vol. 19 (1948), pp. 332-8.) The last chapter of E. Pinney, *Ordinary Difference-Differential Equations* (1958) is devoted to a partial solution of the characteristic equation, which may be written in its general form as

$$\ddot{y}_t + 2r\dot{y}_t + w^2y_t + 2q\dot{y}_{t-1} = 0$$

where r, w and q are not to be confused with anything in the above text.)

² The reader who is unfamiliar with differential equations may nevertheless be able to follow the argument if he takes a little on trust. He may also consult R. G. D. Allen, *op. cit.*, Chapter V, or my own book, *An Introduction to Mathematics for Students of Economics* (1959), Chapter XXV.

characteristic equation we may look briefly at the components arising out of the exogenous variables P and X .

Let us suppose that the population P consists of a fixed element Π and an element that grows sinusoidally in waves of period $2\pi/p$. Then it may be represented by

$$P = \Pi + ab^t \sin(pt - \epsilon)$$

It can be shown by the usual operational methods that in this case the value of n^b obtained by solving the above equation will contain a similar growth term, also exhibiting sinusoidal fluctuations of period $2\pi/p$, although the amplitude and phase may differ.

A similar point may be made about the factor X .

We thus have the important result that if, for example, conditions abroad cause the demand for coal at a given price to oscillate sinusoidally, or to grow in either a smooth or oscillating exponential growth, then the cycles and growth exhibited by X will be reflected in building, although possibly other parts of the solution will tend to obscure these movements. If, in addition, population pressure abroad causes waves of emigration whose causes are nothing to do with the region we are studying, then these waves will cause a wave of the same period in building. It may here be pointed out that if the population has a natural growth of the form qp^t as well as a superimposed oscillatory growth $ab^t \sin(pt - \epsilon)$, then the same features will again be reflected in building. The timing and amplitudes of these movements will depend upon the values of G, H, K, L, M, N and T , and therefore on the values $a, b, c, \dots, \alpha, \beta, \gamma, \dots$.

Before examining what happens when immigration is related to wage-rates we may look at the characteristic equation

$$G\ddot{n}^b + H\dot{n}^b + Kn^b = 0$$

This equation will give a component of n^b whose nature will depend on the roots of the equation

$$Gp^2 + Hp + K = 0$$

If these roots are real, i.e., if $H^2 > 4GK$, then there will be no oscillations in this part of the solution. Instead there will be (in general) two exponential terms which may be damped or explosive. On the other hand, if $H^2 < 4GK$ the solution will produce oscillations. Before examining these further we may sum up the course of building given by the complete solution of the equation (12). Building will have three additive components:

- (1) A component due to population movements, which will reflect both growth and cycles, the latter with unchanged period.
- (2) A component due to external demand factors, of which the same can be said.

(3) A component arising out of the internal structure of the economy, which may be damped or explosive, and which may be cyclical.

The question that immediately occurs is whether the cycles that may arise out of the internal structure of the economy are likely to be of a period similar to that of observed building cycles, *i.e.*, around 18 or 20 years. Just to see what does happen we may give $a, b, c \dots \alpha, \beta, \gamma \dots$ numerical values that seem to be fairly plausible. By defining our units correctly we may conveniently put several of these constants as unity. Others can be guessed from general considerations. It seems reasonable, for example, to put $\sigma = 1.05$ if wages are the only building cost, for σ is clearly related to the rate of interest. Other constants, such as ρ , are less easy to guess, but they must at least have values that are tolerably compatible with each other. The values put forward very tentatively were

$$\begin{aligned} a = -0.5, b = 1, c = 1, g = 1, \mu = 1, \lambda = 1.25, \nu = 0.75, f = 0.2, \\ h = 0.6, \alpha = 0.75, \beta = -0.25, \gamma = 0.5, \delta = 0.2, \phi = 0.2, \sigma = 1.05, \\ \rho = 0.025. \end{aligned}$$

Two parameters, the speeds of response, d and θ remain. We may define our time unit so that the speed of response in the coal industry is unity. A factor often put forward as a partial cause of the length of the building cycle is the sluggishness of the industry, and the slowness of its response to demand. Taking this into account, we will assume that $\theta = 0.25$ —*i.e.*, that the industry responds to change only a quarter as fast as does coal. If we insert these guesses in the characteristic equation we will obtain a cycle of period 224 time units, where the time unit, defined by $d = 1$, is two-thirds the time taken by the coal industry to adjust its labour force to demand. If we hazard the further guess that this is one month we find that there is a cycle whose period is 18.7 years.

It cannot be claimed that the possibility of a regional building cycle arising quite independently of population changes and external factors has been proved by this piece of lucky guessing; but at least it gives us something to think about. There appear to be grounds for testing the validity of our basic equations econometrically, and for estimating the parameters involved in them. If, however, these guesses happen to be true, then it is equally true that this endogenous cycle is heavily damped, being prefaced by a term $e^{-0.107t}$. After a complete cycle lasting 224 units the amount of building is of the order of 10^{-10} of the amount at the same stage of the previous cycle.¹

There are three further points to be made. One is that an examination of the detailed solution shows that the smaller is θ (*i.e.*, the more sluggish is building), the longer does this endogenous cycle become. Eventually, by becoming infinitely long, it ceases to be a cycle and passes into an explosion.

¹ This is in broad agreement with Derksen's finding that an autogenerated building cycle would be heavily damped in the absence of shocks.

This brings us back to the previously mentioned possibility of an explosive solution. It is one that need not worry us, for, since it arises out of the characteristic equation (with the right-hand side replaced by zero), it is also part of the solution that would arise if there were a stationary population and external demand, and in such a case an explosion in building would clearly be impossible. The point is that once building absorbs the major part of the labour force, the representation of income by w^e can no longer be justified. Furthermore, even if the linearity of the equations is accepted, it is likely that under the extreme conditions that would arise the parameters would change their values from the constant ones we have assumed; and these new values would be such as to prevent the explosion from continuing. There is a ceiling imposed by physical limitations.

The remaining point concerns the stickiness of rents, so often produced as a partial explanation of the cycle. These can be introduced into the model by altering the value of ρ , and even making it zero or negative when supply exceeds demand. The exact effect of this will depend on the values of the other coefficients, but in all the cases I have examined it has had the effect of lengthening the cycle.

The guesses made at the various coefficients have given the endogenous cycle a period that agrees well with observations, but, as we have seen, it is very quickly damped out of existence and cannot, even if it is right, be seriously considered to have any importance beyond the first few years. On the other hand, it is possible that some other choice of coefficients, supported by sticky rents, may produce a cycle of similar period that is much less heavily damped. Despite this, heavy damping seems to be a more plausible course of events in an economy of the kind we are considering when looking at this characteristic equation. With a constant population and external demand it does not seem likely that workers will move to and fro from coal to building without settling down to some approximate equilibrium long before eighteen years have passed.

Thus, unless a closer examination of this model reveals a greater likelihood of undamped cycles than I have yet found, it seems that if the region is to have a long cycle in its building activity, then that must come from fluctuations in P or X .

Now clearly immigration is likely to be related to wage-rates, and we can work this into the model by writing, as a simple case

$$\dot{P} = \dot{\Pi} + \bar{w}w^e$$

This stipulates that the rate of increase of total population ($\dot{P}$) is given by an exogenous rate ($\dot{\Pi}$) plus an amount that is proportional to the coal wage-rate. It could be argued that we should consider the difference between the coal wage-rate and the wage-rate in the country of emigration, but this can be allowed for by incorporating this other (exogenous) wage-rate in $\dot{\Pi}$. The

point is that part of $\dot{P}$ has an exogenous cause (including foreign wage-rates), and part an endogenous cause.

If we now rework our solution we obtain a fifth-order differential equation. The left-hand side is the sum of the n^b and its first five derivatives, with coefficients that are highly complicated algebraic combinations of our basic parameters. The right-hand side consists of a linear combination of the second, third, fourth and fifth derivatives of Π and of the second, third and fourth derivatives of X . Although this equation is highly complicated, certain conclusions can be drawn from it with little trouble. The quintic characteristic equation is bound to have at least one real root; possibly there will be three or five. This real root may be explosive or damped. I see no economic or mathematical reason why explosions should not occur in this solution that involves an endogenous immigration. A quintic is unlikely to have all five roots real, and so cycles once again seem likely. Whether they will be heavily damped is a problem I have not yet examined; but, once again, the endogenous immigration would seem to be a factor that reduces the degree of damping. I am hoping to examine a number of typical solutions with the aid of a computer.

The remaining conclusions concern the right-hand side of the equation. This shows that a wave in the exogenous population growth ($\dot{\Pi}$) or in X will be echoed in building; but the phase and amplitude will be different, and will depend on the various parameters, including $\tilde{w}$. I suspect that there are results of some interest obtainable here, relating the amplitude of the building "echo" of the "push" element in immigration to the strength of the "pull" element (indicated by $\tilde{w}$) and to the period of the "push" element. These points are being tentatively examined for the special case in which

$$\Pi = \Pi_0 + \theta \sin (pt - \epsilon)$$

IV

We may now consider the relevance of this model to a theory of national building cycles and their international setting.

The existence of considerable regional differences in the course of house building pointed out in the first section of this paper indicates the dangers of attempting to explain the behaviour of an aggregative index without examining its components. It is possible, for example, that an extensive plateau in a national index may consist of two or more regional wave patterns that are out of phase. One of these regional patterns may have an explanation in terms of the national demand for coal; another in terms of cotton exports; and so on. But although a multiple regression analysis might succeed in producing the right explanation, the natural inclination would be to seek an explanation in some more obvious similarities between the

building aggregate and other aggregates, and so, perhaps, to reach utterly erroneous conclusions.

This is not to say that the use of national building data necessarily leads to wrong conclusions. Whatever may be happening in individual towns, it is still true that in certain years the national total of building was higher than in other years, and that therefore the drain on national resources was high, and so on. But the mechanism of the building cycle can be properly determined only by thinking of regional or local cycles in their natural setting. There can be no national building boom without there being at least one local boom, and the justification for a local boom must lie in local need. There are times when national conditions so affect local ones all over the country that similar movements may be expected in building; but at other times one part prospers while another languishes, and national aggregates fail to indicate either.

I think that the downturns in a national building cycle must be divided into two kinds. Suppose that several regions exhibit building cycles of various phases, amplitudes and periods. This can be done either by giving every region a set of equations of the above kind, with different values for the parameters and (sometimes) different equations, or by assuming a generalised form of the above solution. We may suppose that in each region building proceeds according to an equation such as

$$S^b = f_1(t) + f_2(P) + f_3(X)$$

where $f_1(t)$ corresponds to the endogenous part of the solution (derived above from the characteristic equation) and $f_2(P)$ and $f_3(X)$ show the parts due to population and external demand factors. These will not be unrelated, because even if there is little inter-regional migration, there is almost bound to be some; and the flow of goods between the regions will constitute further links. Nevertheless, it is still possible for us to think of them as being fluctuations governed, in each region, by the amount of local demand, however it may arise. At times we can expect to find several regional building booms coinciding, either through pure chance or because of the impact of a phase of national prosperity (such as a favourable turn in the price of imported food). When this happens there will be a national building boom; but it can reach its national peak in two distinct ways. It may be simply that in several of the regions the various local demands become quickly satisfied so that there are fewer and fewer regions of high activity. Total demand falls because local demands have become exhausted for quite natural and possibly different reasons. On the other hand, there may be so many local booms of intensity that eventually the strain on national resources becomes too great. There are not enough men, materials or credit to allow the boom to continue. Scarcities develop, prices (including perhaps the price of credit) rise and, according to the intensities of their needs, the various regions

eventually refuse to keep up their high demands. A few that are very prosperous or very overpopulated may persist with increasing building despite the high costs; but most withdraw from the struggle for over-priced resources. The usual factors of sticky rent and sluggish response play their inevitable and important parts; but the cause of the national downturn will be that a national ceiling imposed by scarcities has been hit. Here are two fundamentally different reasons for a national downturn, the one arising from the exhaustion of demand in many localities, and the other from the scarcity of national resources. If we consider this ceiling to have a steady value, or a steady trend, then we may imagine a series of building oscillations in which the peaks that lie below this ceiling are likely to have "local" origins, while those that touch the ceiling have origins in national scarcities, and it may be possible to obtain some further insight into a national series by examining it with this idea in mind. The national ceiling may be brought into the local model by increasing the values of σ , which is the ratio of building costs to building wage-rates, in so far as it is made felt through the rate of interest and materials prices. This will cause rents to increase more rapidly, and for demand to fall. The possibly associated increase in builders' wages, and in mining wages, will exert a contrary effect, increasing demand; but it is likely that other prices will also be rising and this will diminish the demand increase.¹ Eventually, as demand becomes less than supply, stickiness of rents, and sluggishness of response, become evident, and the explanation of the cycle can now proceed on its usual lines.

This is inevitably a rough sketch of the national model that I propose to develop. Inter-regional migrations may cause inverse cycles to appear in the P -parts of the solutions of the regional equations. International migration may superimpose cycles of possibly greater amplitude in some or all of the regions, and in so doing tend to synchronise some of the regional movements and so to make the national ceiling effect more likely. The broad mechanics of this have already been explained by Brinley Thomas, who has also written of a regional aspect of this behaviour.² It is a mistake to attempt to apply the same kind of explanation to every major downturn of the national series; those that have regional or local origins need to be considered separately at least in so far as their causes are concerned, and possibly in relation to their consequences as well.

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¹ This is a possibility that is easily worked into the local model. We can simply add a term to the demand for houses to allow for the exogenous price level (*i.e.*, for the prices other than coal, in the region we are considering). How this behaves must be determined by a consideration of a set of national equations which will be different from the local sets.

² Brinley Thomas, *op. cit.*, and "Wales and the Atlantic Economy" in the *Scottish Journal of Political Economy*, Vol. VI, pp. 169-92.

APPENDIX

The coefficients G, H, K, L, M, N, T of equation (11) are given by

$$G = ZA - \frac{\theta\phi\beta\sigma}{\lambda} + 1$$

$$H = ZB + \theta - \beta\rho$$

$$K = ZC + \theta(\delta\phi - \beta\rho)$$

$$L = ZA - \frac{\theta\phi\beta\sigma}{\lambda}(1 - \nu)$$

$$M = ZB + \theta\phi\alpha$$

$$N = ZC$$

$$T = ZE$$

and

where

$$A = \frac{1}{gdah}, \quad B = (d - af)A$$

$$C = daf(cg - 1)A, \quad E = -bgdA$$

and

$$Z = \theta\phi\left[\gamma + \frac{\beta\sigma\mu}{\lambda}\right]$$

KEYNES' AGGREGATE SUPPLY FUNCTION: A SUGGESTED INTERPRETATION

THE purpose of this paper is to develop an aggregate supply function along the lines indicated by Keynes in Chapters 3 and 20 of his *General Theory*.¹ Although a number of economists, D. Patinkin, F. J. de Jong and H. Vandenborre among others, have recently devoted a good deal of attention to this important, but previously much neglected concept, their results have not been altogether satisfactory.² Rather than take the space necessary to justify this conclusion we shall immediately turn to the subject of our investigation. Section I of this paper develops an aggregate supply function that relates *employment* to *aggregate demand*. Several of the more important properties of this function are briefly examined in Section II, while Section III demonstrates how this relation fits into a simple but complete short-run Keynesian model.

I. THE AGGREGATE SUPPLY FUNCTION

Following Keynes we shall define the aggregate supply function to be a relation between the level of employment, N , and aggregate demand, D , that states the equilibrium level of employment corresponding to any given value of aggregate demand.³

¹ *The General Theory of Employment, Interest, and Money* (London, 1936), pp. 23-34 and 280-91.

² Cf. D. Patinkin, "Involuntary Unemployment and the Keynesian Supply Function," *ECONOMIC JOURNAL*, September 1949, Vol. LIX, pp. 360-83, and *Money, Interest, and Prices* (Evanston, Illinois, 1956), pp. 214-24; F. J. de Jong, "Supply Functions in Keynesian Economics," *ECONOMIC JOURNAL*, March 1954, Vol. LXIV, pp. 3-24; S. Weintraub "A Macroeconomic Approach to the Theory of Wages," *American Economic Review*, December 1956, XLVI, 836-56; and H. Vandenborre, "An Integration of Employment Economics Within the Keynesian Theory of Money Flows," *Oxford Economic Papers*, June 1958, Vol. 10, pp. 205-19.

The paper by de Jong elicited response by R. G. Hawtrey, "Keynes and Supply Functions," *ECONOMIC JOURNAL*, December 1954, Vol. LXIV, pp. 834-9, and "Keynes and Supply Functions: A Further Note," *ECONOMIC JOURNAL*, September 1956, Vol. LXVI, pp. 482-4; D. H. Robertson, "Keynes and Supply Functions," *ECONOMIC JOURNAL*, September 1955, Vol. LXV, pp. 474-7, with a mathematical appendix supplied by H. G. Johnson, pp. 477-8; and "Keynes and Supply Functions," *ECONOMIC JOURNAL*, September 1956, Vol. LXVI, pp. 485-7. In reply de Jong published "A Rejoinder," *ECONOMIC JOURNAL*, December 1954, Vol. LXIV, pp. 835-42; "Keynes and Supply Functions: Second Rejoinder With a Note on the Concept of Monetary Equilibrium," *ECONOMIC JOURNAL*, September 1955, Vol. LXV, pp. 479-84; and "Keynes and Supply Functions: Third Rejoinder and Final Observations," *ECONOMIC JOURNAL*, September 1956, Vol. LXVI, pp. 488-92.

On the subject of this paper the reader may also be referred to L. Klein, "Theories of Effective Demand and Employment," *Journal of Political Economy*, April 1947, Vol. LV, pp. 108-31; and F. Modigliani, "Liquidity Preference and the Theory of Interest and Money," *Econometrica*, January 1944, Vol. XII, pp. 48-88 (reprinted as Chapter 11 in *Readings in Monetary Theory*, ed. by F. A. Lutz and L. W. Mints (Philadelphia, 1951), pp. 186-240).

³ In Chapter 3 Keynes defined the aggregate supply function in the following way: "Let Z be the aggregate supply price of the output from employing N men, the relationship between Z

To develop this relation we need the following assumptions and definitions:

1. The economy produces a single commodity, X , measured in real terms.
2. The analysis is confined to the short-run so that neither the size of the labour force nor society's stock of capital equipment change.
3. Labour is the only variable factor of production. This means that output is a unique function of the input of labour and that the aggregate production function may be written as $X = X(N)$. In addition, we shall make the usual assumptions concerning the shape of this function that $X' > 0$, $X'' < 0$ and $X''' = 0$.
4. A given money wage rate, w , obtains as long as there is any unemployment.
5. Perfect competition prevails.¹

Under conditions of perfect competition firms adjust their rates of output until marginal cost equals price, P . Since marginal cost equals the money wage-rate divided by the marginal physical product of labour, we may write the following micro-equilibrium condition:

$$(1.1) \quad \frac{w}{X'} = P$$

Multiplying both sides of this equation by X yields

$$(1.2) \quad \frac{w}{X'} X = PX$$

However, in equilibrium PX equals D , aggregate demand. Thus equation (1.2) may be written as

$$(1.3) \quad \frac{w}{X'} X = D$$

This equation states that if firms maximise their profits a level of production will be established at which aggregate output valued at marginal cost equals aggregate demand. If this were not so, price would not equal marginal cost, and firms would either increase or decrease their rates of production. As a result, price and marginal cost would move toward one another and eventually equation (1.3) would be satisfied.

and N being written $Z = \phi(N)$, which can be called the *Aggregate Supply Function*," *op. cit.*, p. 25. In Chapter 20, however, where Keynes discusses the economic content of this function, he deals with its inverse and names it the *employment function*, *op. cit.*, p. 280. In this paper we are concerned with what Keynes calls the *employment function*. In accordance with the literature cited in footnote 2 we shall call this relation an "aggregate supply function."

¹ Keynes assumed neither a fixed money wage-rate nor perfect competition, *op. cit.*, pp. 282-90. Thus the supply relation developed in this paper will not, perhaps, be quite as general as Keynes'.

The relation we seek to formulate, however, is not one between aggregate demand and output, but between aggregate demand and the level of employment. To obtain this relation from the foregoing equation let us denote the average product of labour by $\bar{X}$. Substituting $\bar{X}N$ for X in equation (1.3) yields

$$(1.4) \quad D = \frac{w}{\bar{X}} \bar{X}N$$

Because N is the dependent variable and D the independent variable in our analysis we transpose (1.4) to obtain

$$(1.5) \quad N = \frac{X'}{w\bar{X}} D$$

This is the long-sought-after aggregate supply function: it states an equilibrium value of employment for any given value of aggregate demand. Furthermore, this relation states the exact manner in which the employment of labour is related to the level of demand.

II. THE RESPONSE OF EMPLOYMENT, OUTPUT AND PRICE TO CHANGES IN DEMAND

Now that we have derived the aggregate supply function let us find expressions for the change in employment, output and price that a change in aggregate demand would produce. Differentiating equation (1.5) with respect to D yields the following equation:¹

$$(2.1) \quad \frac{dN}{dD} = \frac{1}{w} \frac{(X')^2}{(X')^2 - XX''}$$

Since X and $(X')^2$ are positive and X'' negative, dN/dD is positive; just as we should expect. Additionally, though, d^2N/dD^2 is negative. This means that the slope of the aggregate supply function, though positive, decreases as demand increases. Accordingly, the aggregate supply function is drawn convex to the abscissa in Fig. 1. A further property of the supply function is that it becomes perfectly horizontal at point g (Fig. 1). This reflects the fact that employment cannot be expanded beyond N_f , the size of the labor force. Thus equation (2.1) states that short of full employment successive increments in demand would produce successively smaller increments in employment.

The change in output produced by a change in aggregate demand is

$$(2.2) \quad \frac{dX}{dD} = \frac{dX}{dN} \frac{dN}{dD} = \frac{1}{w} \frac{(X')^3}{(X')^2 - XX''}$$

¹ The reader is referred to Appendix A for the details of the mathematics found in the following two paragraphs.

Again, this function is positive and its derivative, d^2X/dD^2 , is negative. Therefore successive increments in demand would produce successively smaller increments in output short of full employment.

The derivative of price with respect to demand is

$$(2.3) \quad \frac{dP}{dD} = \frac{dP}{dN} \frac{dN}{dD} = \frac{-X''}{(X')^2 - XX''}$$

Both this function and its derivative, d^2P/dD^2 , are positive. This means that a given increment in demand would produce a larger increase in price the higher the level of employment.

In summary our macro-supply function states that as long as unemployed labor is available, employment, output and price will all rise as demand

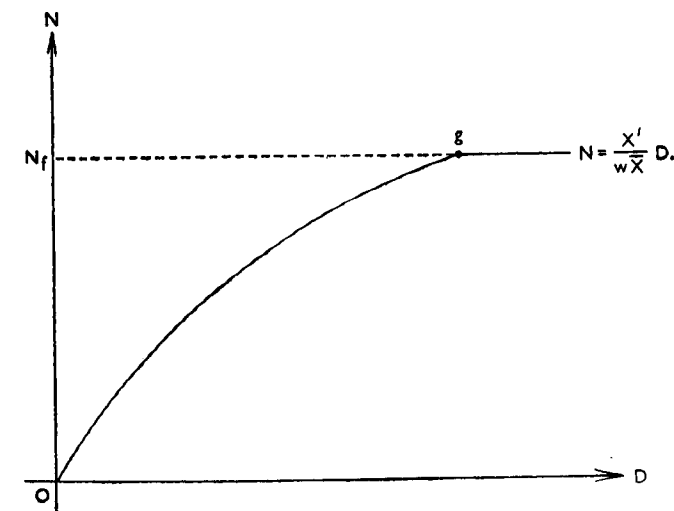


FIG. 1

increases, but that the increase in employment and output will be smaller and the rise in price larger, the higher the level of employment. Beyond full employment we may expect prices and wages to rise proportionately.

These conclusions recall Keynes' assertion that the sum of the elasticity of price and the elasticity of output equal unity, and that the higher the level of employment, the larger the elasticity of price and the smaller the elasticity of output.¹ These two properties hold true for the supply function developed in this paper.² This leads us to believe that our function corresponds rather closely to the aggregate supply relation discussed by Keynes in Chapter 20 of his *General Theory*.

¹ *Op. cit.*, pp. 284-6.

² The reader is referred to Appendix B for the proof of this statement.

III. THE PLACE OF THE AGGREGATE SUPPLY FUNCTION IN A KEYNESIAN MODEL

Borrowing partly from the work of J. R. Hicks¹ we shall represent the *monetary subsector* of Keynes' system by the following set of equations:

$$\begin{aligned} (3.1) \quad & M = L(r, D) \\ (3.2) \quad & I = I(r, D) \\ (3.3) \quad & S = S(r, Y) \\ (3.4) \quad & C \equiv Y - S \\ (3.5) \quad & D \equiv C + I \\ (3.6) \quad & Y = D \end{aligned}$$

In this set of equations M represents the given supply of money; r , the rate of interest; D , aggregate demand as defined by the identity of equation (3.5); I , investment; S , saving; C , consumption; and Y , income or output valued at market price. All variables except the rate of interest are measured in money terms.

Our equation system differs slightly from those of other writers in that it explicitly recognises the distinction between aggregate demand and income or output valued at market price. Equations (3.2) and (3.3) determine demand, while equation (3.6) explains the value of output. This latter equation simply states the long-familiar, though not so helpful, proposition that in the aggregate firms establish a rate of production at which output valued at market price equals aggregate demand. The advantage of introducing the additional variable D and equation (3.6) into the system is that it helps centre attention on the aggregate supply behaviour of firms. However, equation (3.6) does not deal with the problem of supply in a very meaningful fashion because it does not disclose the commutuality between aggregate demand, employment, real output and price. In order to bring these variables into the system, three additional equations are needed. They are: an aggregate supply function, (3.7); a production function, (3.8); and a price determining function, (3.9).

$$\begin{aligned} (3.7) \quad N &= \frac{X'}{w\bar{X}} D \\ (3.8) \quad X &= X(N) \\ (3.9) \quad P &= \frac{D}{\bar{X}} = \frac{w}{\bar{X}}. \end{aligned}$$

Equations (3.1) through (3.9) represent what may be called a version of the complete Keynesian system. We call this set complete because it simultaneously determines the equilibrium value of the real variables N , X and P as well as the monetary variables Y , D , C , I , S and r . We call them

¹ "Mr. Keynes and the 'Classics'; A Suggested Interpretation," *Econometrica*, April 1937, Vol. V, pp. 147-59 (reprinted as Chapter 24 in *Readings in the Theory of Income Distribution*, ed. by W. Fellner and B. F. Haley (Philadelphia, 1946), pp. 461-76).

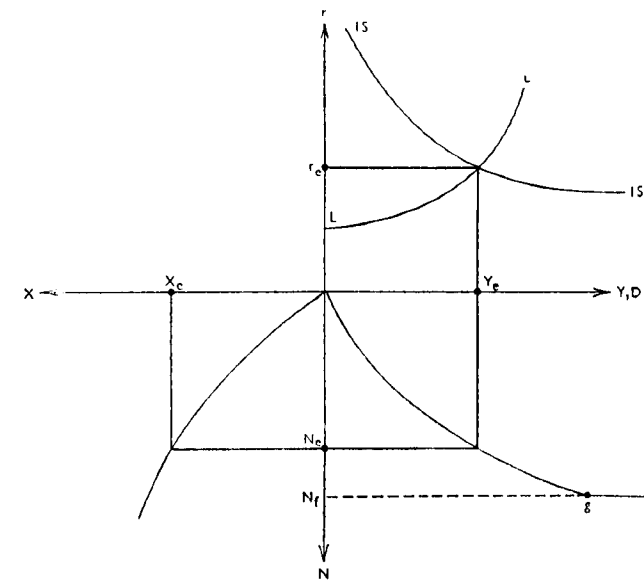


FIG. 2

Using Hicks' well-known inventions, the *LL* and *IS* curves, we may draw a graph of the above system. Equations (3.1) through (3.6) produce the two relations shown in the first quadrant, while equations (3.7) and (3.8) are plotted in the fourth and third quadrants respectively. As this diagram shows, the aggregate supply function forms a logical connection between the intensively studied monetary sub-sector and the largely overlooked real sub-sector of Keynes' *General Theory*.

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APPENDIX A

The derivative of the aggregate supply function, equation (1.5) of the text, is found by differentiating its inverse. The inverse of equation (1.5) is

$$(A.1) \quad D = \frac{w}{X}, \bar{X}N = \frac{w}{X}, X$$

This equation has as its derivative

$$(A.2) \quad \frac{dD}{dN} = w \frac{(X')^2 - XX''}{(X')^2}$$

Equation (2.1) of the text, dN/dD , simply is the reciprocal of (A.2).

On the assumption that $X''' = 0$ the second derivative of the aggregate supply function is

$$(A.3) \quad \frac{d^2N}{dD^2} = \frac{1}{w} \left[\frac{-2XX'(X'')^2 + (X')^3X'''}{(X')^2 - XX''^2} \right]$$

Inspection shows this equation to be negative.

Because $dX/dN = X'$, the derivative of equation (2.2) is

$$(A.4) \quad \frac{d^2X}{dD^2} = \frac{1}{w} \left[\frac{2(X')^4X'' - 3X(X')^2(X'')^2}{(X')^2 - XX''^2} \right]$$

Again, this function is negative.

To find dP/dD from $dP/dN/dN/dD$ we note that

$$(A.5) \quad \frac{dP}{dN} = \frac{-wX''}{(X')^2}$$

Multiplying equations (A.5) and (2.1) produces equation (2.3) of the text. Its derivative is

$$(A.6) \quad \frac{d^2P}{dD^2} = \left[\frac{X'(X'')^2}{(X')^2 - XX''^2} \right]$$

which inspection shows to be positive.

APPENDIX B

The elasticity of price is

$$(B.1) \quad e_p = \frac{dP}{dD} \cdot \frac{D}{P} = \frac{-X''}{(X')^2 - XX''^2} \cdot \frac{D}{P}$$

However, $D = PX$, so we may rewrite the above equation as

$$(B.2) \quad e_p = \frac{-X''X}{(X')^2 - XX''^2}$$

The elasticity of output is defined to be

$$(B.3) \quad e_x = \frac{dX}{dD} \cdot \frac{D}{X} = \frac{X'}{w} \cdot \frac{(X')^2}{(X')^2 - XX''^2} \cdot \frac{D}{X}$$

This expression reduces to

$$(B.4) \quad e_x = \frac{(X')^3}{(X')^2 - XX''^2}$$

The sum of (B.2) and (B.4) is unity.

WAGES POLICY AND PRICE STABILITY IN AUSTRALIA, 1953-60¹

I

In September 1953 the Commonwealth Court of Conciliation and Arbitration terminated the system of automatic adjustments of the federal Basic Wage. Award wages under federal and most state determinations have two components: the Basic Wage and margins granted in recognition of the nature of the work performed. Each part is determined separately, and a Basic Wage variation is a money change applied equally to all award rates. Since 1921 the federal Basic Wage had been subject to quarterly alteration, without any review by the Court, in proportion to the variation of the retail price index published by the Commonwealth Statistician. Between the end of the War and the 1953 decision the average Basic Wage for the six capital cities increased from £4 16s. to £11 16s. Of this increase of £7, all but £1 7s. resulted from the operation of the automatic adjustment provision. From 1953 no variation was to be made without a deliberate decision.² The possibility of planning wages policy to achieve various economic objectives was thereby greatly increased, and the principal purposes of this article are to examine the extent to which the use made of this opportunity by the federal tribunal has been consistent with the achievement of price stability and to consider whether the principles upon which the tribunal has proceeded justify any confidence that such consistency will exist in future.

Since 1953 seven important decisions affecting wages generally have been given by the Arbitration Court and its successor, the Commonwealth Conciliation and Arbitration Commission.³ There have been five Basic Wage inquiries, the first two arising from ordinary applications by the unions, while the remainder were conducted as regular annual reviews under a procedure defined by the Commission in 1957. In each of these cases a union application for the restoration of automatic adjustments was rejected.

¹ The writer is indebted, for discussion of questions raised in this article, to Dr. J. E. Isaac, of the University of Melbourne, Professor H. W. Arndt, of Canberra University College, Mr. R. J. Hawke, of the Australian Council of Trade Unions, and members of the Department of Economics in the University of Adelaide. No responsibility attaches to any of these persons for the opinions expressed in the article.

² Certain state authorities have failed to adopt the federal decision, and the adjustment system is still effectively operating under state awards in New South Wales, Queensland and Western Australia. The Commonwealth tribunal has regarded the payment of cost-of-living increases under state awards as a "using up" of capacity which diminishes its ability to increase federal award rates.

³ A decision of the High Court of Australia made it necessary, in 1956, for the Arbitration Court to be reconstituted. Two new tribunals were established. The interpretation and enforcement of awards and certain other aspects of industrial law became the province of the Commonwealth Industrial Court, while the Commission inherited the Arbitration Court's arbitral functions.

The Basic Wage was increased in 1956 by 10s.; in 1957 by 10s.; in 1958 by 5s.; and in 1959 by 15s. In 1960 the Commission refused to grant any increase. The total increase granted since September 1953 is therefore £2, raising the six capitals average to £13 16s.

Comprehensive reviews of margins, based formally upon applications relating to the metal trades, were made in 1954 and 1959. Hearings in the former case began in October 1953. In February 1954 the Court stated that it was satisfied that higher differentials for skill were desirable, but found that capacity to pay the increases contemplated did not then exist. The case was therefore adjourned in the hope that economic conditions would improve, and a decision was finally announced in November 1954. The Court wished to redress what it considered to be distortions in the wage structure which had arisen from certain decisions of a Conciliation Commissioner over whom, at the relevant times, the Court had possessed no appellate jurisdiction. These decisions had had the effect of awarding margins to workers who had not previously received them and of granting larger relative increases to workers whose margins were small than to more skilled workers, with the result that rewards for skill were relatively lower than before the War. The Court therefore adopted the general principle of raising margins to $2\frac{1}{2}$ times the level which resulted from a 1937 review, provided that margins which were already at or above that level were not to be altered.¹ The aggregate cost of the decision is difficult to estimate. By March 1939 the 1937 revision would have permeated the wage structure, and at that time average award rates exceeded the Basic Wage by 18s. 10d. $2\frac{1}{2}$ times that amount is 47s. 1d. In September 1954, allowance being made for the payment of automatic adjustments under certain state awards, the average margin was a little over 44s., so that a thorough application of the $2\frac{1}{2}$ times formula might have raised the average rate per adult male by about 3s. Since, however, the formula was not applied where it would have involved wage reductions, the cost was somewhat greater. In the twelve months following the Court's decision average award rates increased by 11s. 9d., and, having regard to the contribution of state Basic Wage increases to that figure, we may perhaps estimate the cost of the margins decision at about 10s. per adult male worker.

In November 1959 the Commission refused to reconsider the pattern of relativities established in 1954. Instead, it decided that in general margins resulting from the previous decision should be raised by 28%. The reason for the choice of this specific percentage is not apparent from the judgment. The Commission thought it proper to increase margins

“by an amount which exceeds the loss in purchasing power of the 1954 margins which excess we consider has been earned by the contribution

¹ The Court felt that it had made a sufficient concession to the secular reduction of inequalities in that if margins were to retain their 1937 real value the multiplying factor should have been nearer to 3.

of the employees to productivity increases and made possible and proper by the additional strength of the national economy.”¹

In September 1955, by which time the effects of the 1954 decision should have been registered in the wage structure, the average margin was about 54s. 28% of 54s. is a little over 15s., and this may be a reasonable approximation to the amount by which the average margin resulting from the 1959 decision will exceed that resulting from the 1954 decision. Various increases had, however, been made by Conciliation Commissioners, state authorities and registered agreements, and by September 1959 the average margin was already about 4s. above the September 1955 figure. A proportion of this amount will be absorbed by the 1959 decision, but in some cases earlier increases will be considered to be warranted by changed work values, so that the average increase resulting from the 1959 review should be within the range 11s. to 15s.

Assuming that the principle formulated in the 1959 margins decision will be fully applied by the last quarter of 1960, the writer therefore estimates that the total effect of the seven decisions is to add between 61s. and 65s. to average award rates for adult males in the course of seven years. As the average rate in September 1953 was 279s. 6d., this represents an increase of about 3% per annum. The increase has not, however, been evenly applied. In the five years ending September 30, 1958, the increases granted by the full benches of the Court and the Commission amounted to about 35s. In 1959, however, the Commission awarded increases which averaged between 26s. and 30s. per adult male. It must be an important part of this article to discover why the Commission's decisions acquired such an inflationary bias in 1959. This will be attempted in Section III.

II

This section is devoted to a discussion, in the light of the available evidence, of the possibility of influencing the behaviour of the price level by wages policy. The discussion relates to the economic aspects of the question rather than to associated problems of industrial relations, about which something will be said in the concluding section of the article. The essence of the economic problem is the relative significance of cost and demand pressures in the generation of inflation. Demand pressure may be effective in either the product market or the factor market. The work of Messrs J. C. R. Dow and L. A. Dicks-Mireaux in the United Kingdom suggests that changes in product prices in that country are attributable to changes in production costs to a greater extent than to the degree of scarcity in the product market, and that changes in wages costs are due predominantly to negotiated changes

¹ The judgments in cases including and since the 1957 Basic Wage case are not yet available in the *Commonwealth Arbitration Reports*. For these judgments the writer is dependent upon roneoed copies issued by the Commission. No good purpose would be served by giving page references to these copies.

in wage-rates and only to a small extent to employers' competition for scarce labour.¹ Detailed studies of the type undertaken at the National Institute have not yet been made for Australia. There is, however, some reason to believe that the position may not be very different.

Mr. Bruce Cheek undertook a study of the distribution of income in Australian manufacturing industry between 1945 and 1955.² His findings regarding the size of profit mark-ups are summarised in Table I, where Mr. Cheek's calculations are extended by the writer to the year 1957/58.³ Over

TABLE I
Gross Profit Margins in Australian Manufacturing 1945/46 to 1957/58

Year.	Overheads and net profit before tax as percentage of value of output.
1945/46	19.5
1946/47	19.8
1947/48	19.4
1948/49	18.8
1949/50	19.5
1950/51	19.1
1951/52	18.2
1952/53	19.2
1953/54	19.4
1954/55	19.3
1955/56	19.5
1956/57	20.4
1957/58	20.8

the whole period the percentages exhibit considerable stability and so long as fluctuations in mark-ups are confined within the range encompassed in the table they should not have a profound effect on the price level. The manifest tendency for mark-ups to increase towards the end of the period, however, gives ground for some anxiety that the efforts of firms to increase their profits may be giving an independent stimulus to inflation. Such a development might be fatal to any policy of wage restraint, not because it is within the capacity of the Arbitration Commission to reduce profit margins by

J. C. R. Dow, "Analysis of the Generation of Price Inflation. A Study of Cost and Price Changes in the United Kingdom, 1946-54," *Oxford Economic Papers*, Vol. VIII, 1956, pp. 252-301; J. C. R. Dow and L. A. Dicks-Mirreux, "The Excess Demand for Labour: A Study of Conditions in Great Britain, 1946-56," *Oxford Economic Papers*, Vol. X, 1958, pp. 1-33; "Price Stability and the Policy of Deflation," *National Institute Economic Review*, No. 3, May 1959, pp. 16-29. In another paper the same writers have argued that the behaviour of negotiated rates in the U.K. may itself be sensitive to variations in demand. See "The Determinants of Wage Inflation: United Kingdom, 1946-57," *Journal of the Royal Statistical Society*, Vol. CXXII, 1959, pp. 145-174.

² B. M. Cheek, "Profit Margins and Wage Shares in Australian Manufactures, 1945-55," *Economic Record*, Vol. XXXIII, August 1957, pp. 191-215.

³ In the calculation of the percentages constant weights are assigned to the fifteen industry groups by which the manufacturing statistics are classified. The 1957-58 percentage involves some extrapolation in that the proportion of salaries to wages is assumed to be the same as in 1956/57.

granting wage increases, but because the trade unions, in formulating their demands, are very sensitive to suggestions that employers are lining their own pockets. Figures for later years must therefore be awaited with great interest.

Following his article in *Economica* on the relationship between money wage changes and the level of unemployment in the United Kingdom since 1861,¹ Professor A. W. Phillips attempted to establish a relationship between unemployment and money wage changes in Australia during the period 1947-58.² The validity of his procedures in the United Kingdom study, which yielded the remarkable implication that developments in industrial relations have had little impact upon wage settlements, has been subjected to penetrating criticism by Dr. Guy Routh.³ In his Australian study, Professor Phillips offered a regression equation relating the unemployment percentage (seasonally adjusted) to the rate of increase of money wage-rates as measured by the Nominal Weekly Wage Rate Index, which is an index of rates that are legally binding under federal and state awards. Subsequently, the wage index was completely revised, but it cannot be said that the resulting changes would of themselves destroy the analysis. The more fundamental objection is that the regression equation is moulded to fit the data to such an extent that it is hardly more than a descriptive summary, quite devoid of predictive value.⁴ This is not surprising, for an accurate but more general regression equation explaining the behaviour of the Nominal Wage Rate Index predominantly in terms of unemployment would have been a remarkable achievement. There are a few registered agreements voluntarily entered into, but the great majority of changes in legal minima represent determinations by federal and state tribunals. Is it likely that the decisions of arbitrators, who entertain a wide and varying range of preconceptions and who attempt to evaluate many different considerations, could be accurately predicted on Professor Phillips's basis? A perusal of arbitral decisions suggests that, even when the influence of export and import prices is neutral, the tribunals dance to far less predictable patterns than an unemployment slow-step.

Evidence of any direct impact of demand pressure on the labour market

¹ *Economica*, Vol. XXV, November 1958, pp. 283-99.

² "Wage Changes and Unemployment in Australia, 1947-1958," Economic Monograph No. 219 of the Economic Society of Australia and New Zealand (Victorian Branch).

³ "The Relation Between Unemployment and the Rate of Change of Money Wage Rates: A Comment," *Economica*, Vol. XXVI, November 1959, pp. 299-315.

⁴ The regression equation ultimately propounded is as follows:—

$$W'_t = 0.570W'_{t-1} + 0.932 \frac{1}{U_{t-1} - 0.26} + 0.0489X'_{t-1} + 0.0222M'_{t-1} + 0.295$$

where

$$X'_t = 50.0(\exp 0.02X'_t - 1)$$

W' is the rate of change of wage-rates, U the unemployment percentage, X' the rate of change of export prices and M' the rate of change of import prices. It appears that the rates of change are measured as percentages. The time period to which t refers is a quarter.

should be sought in the "wage drift." Employers cannot be said to be competing for scarce labour unless they offer something more than the legal minimum and if the market is sensitive to labour scarcity the amount of the extra inducement should vary considerably as demand fluctuates. As a measure of the effect of demand upon rates offered, the "earnings drift" is deficient, because it is also affected by factors other than non-obligatory offers by employers, including changes in the amount of overtime and short-time, changes in piece-rate exertion and results, and changes in the age and skill composition of the work-force. No statistical information exists, however, which would permit the elimination of these extraneous elements.¹ Some inferences must therefore be attempted from the earnings drift itself.

The post-war earnings drift in Australia is summarised in Table II. Between the years 1945/46 and 1958/59 there was a total drift of some 18.7%.

TABLE II
*The Earnings Drift in Australia, 1945/46 to 1958/59**

Year.	Index of average weekly earnings.	Index of nominal weekly wage-rates (adult males).	Percentage excess of earnings index over rates index.
1945/46	1,000	1,000	—
1946/47	1,037	1,057	-1.9
1947/48	1,212	1,168	3.8
1948/49	1,374	1,296	6.0
1949/50	1,513	1,398	8.2
1950/51	1,816	1,633	11.2
1951/52	2,221	2,001	11.0
1952/53	2,428	2,251	7.9
1953/54	2,553	2,322	9.9
1954/55	2,682	2,374	13.0
1955/56	2,863	2,465	16.1
1956/57	3,015	2,586	16.6
1957/58	3,097	2,638	17.4
1958/59	3,191	2,689	18.7

* Sources: Earnings Index from *Monthly Bulletin of Employment Statistics*, November 1959. Wage-rate index calculated from circular entitled "New Indexes of Minimum Weekly Wage Rates—Adult Males and Adult Females," issued by the Commonwealth Statistician on February 19, 1960.

To put this in another way, if the whole of the earnings drift were the result of over-award payments it could be said that some 77% of the increase in wage-rates paid was due to changes in award rates. On closer examination the drift may be seen to have four distinct phases. Between 1946/47 and 1950/51, there was a considerable increase in the margin of earnings over award rates. Undoubtedly the principal cause of this was the Arbitration Court's decision to reduce the standard hours of work in industry from 44 to 40 as from January 1, 1948. One of the results of that decision was a considerable increase of overtime, as businesses endeavoured to maintain

¹ It is perhaps desirable to point out specifically that no statistics of average hours worked are published in Australia.

their levels of output. The inevitable consequence was an increase in earnings. For example, if it is assumed that overtime was paid at time and a half the cost of employing a worker for 44 hours would have risen by 15%. It may be that there was some degree of demand pressure in the 1950/51 drift, but during this phase demand effects were obviously of secondary importance. The second phase was a substantial reversal of the drift as a result of the 1952/53 recession. It is certain that at this time there was widespread curtailment of overtime as well as some working of short-time, but whether these account for the whole of the reversal is impossible to say. In the third phase, between 1952/53 and 1955/56, there was an earnings drift of about 7.6%. There was some recovery of overtime after the recession, but it almost certainly did not increase to a level greater than that which prevailed in 1950/51, and it is fairly clear that in these years there was a considerable increase in over-award payments. Since demand was not greatly excessive, the most plausible explanation of this phenomenon may be that the abolition of automatic adjustments of the Basic Wage was so radical a departure in industrial relations that it stimulated the trade unions to unprecedented activity outside the arbitration system. The employers may have been somewhat more ready to make concessions than normally because of their relief at the refusal of a Basic Wage increase in the 1953 inquiry (the first refusal since the War) and at the elimination of automatic adjustments. By the beginning of 1956, however, the new departure was an accepted fact of industrial life and the impact effect of the 1953 decisions was nearly exhausted. The final phase was the period from 1955/56 to 1958/59, when there was a slow drift, which may have been the result of any of the factors which contribute to the drift. Over the whole period there was probably some increase in overtime, but the drift of 18.7% points, first, to the attainment by the work-force of higher skill classifications and, secondly, to some increase in over-award payments. It is therefore likely that the proportion of wage rises due to award variations was greater than 77%, but somewhat less than 100%. It is not at all clear that the element of over-award payments is sensitive to variations in demand. In particular, the tendency for the earnings margin to increase suggests that the wage drift may involve a ratchet effect—that over-award payments do not readily contract in response to reductions of demand. The fundamental conclusion remains intact, however, that wage rises since the War have been primarily the result of increases in federal and state awards, which between them govern about 90% of the work-force, and to only a small extent of additional baits held out by anxious employers.

It is not the writer's contention that award changes have been in no way influenced by the state of demand. He does wish to emphasise, however, that demand has been influential only because the determination of award rates has been guided by criteria which make it so. Of all the criteria which are likely to translate excess demand into award increases, provided that

some disturbance to the price level is initiated by a rise in profit margins, an increase in over-award payments or the working of additional overtime (since overtime labour is more expensive than normal labour), the most potent is probably the cost of living. Next in importance may be the level of unemployment, since the Arbitration Commission regards a low level of unemployment as an argument in favour of wage increases. A high level of retail trade is also regarded as a favourable sign. The point to be emphasised is that there is no economic reason why award rates should respond to changes in demand. It may be, of course, that a tribunal which failed to regard developments such as those mentioned as favourable to wage rises would lose its control over industrial relations, as it would be obvious to the unions that they could get larger increases from collective bargaining. Some of the problems in industrial relations which would arise from an economically sound wages policy are discussed in the final section of the article. These problems being neglected, the conclusion to be derived from this section is that the behaviour of wages and prices is predominantly, though not entirely, the result of the decisions of the tribunals.

III

Appraisal of the decisions of the federal Arbitration Court and its successor, the Commission, would be much easier than it is if the judges applied unambiguous criteria capable of being translated into quantitative decisions. According to the judgments, the criterion applied is the capacity of the economy to pay. In the early thirties this phrase, despite its imprecision, did convey an important meaning, for it characterised the determination of the Court to depart from the tradition originated by Higgins, J., in the famous *Harvester Case*, that the Basic Wage should be derived from an assessment of human needs. From 1931 onwards the Court was determined to base its decisions upon the prevailing state of the economy. Once his elementary distinction is established, however, the phrase "capacity to pay" lacks content. Its use in present circumstances is to be deprecated, because it serves as an unhelpful substitute for an examination of basic principles. What we now need to know is not that the Commission has regard to the state of the economy, but how it may be expected to react to various economic situations.

It is suggested that the principal economic objective should be to award such increases in wages as are consistent with the maintenance of full employment and a stable price level. This objective should be qualified by reference to the overseas trading position. The attainment of stable prices requires that the rate of increase of money wages should approximate to the rate of productivity increase. If there is any variation of profit margins, some adjustment of wage increases may be warranted, while any tendency for over-award payments to expand relatively to award rates reduces the increases which may safely be granted in the latter. For these reasons wage-

rates may perhaps be increased a little more rapidly when the level of demand is relatively low than when it is relatively high. In so far as improvements in productivity are associated with the attainment by labour of superior job classifications, the scope for wage-rate increases is, of course, reduced. For the sake of brevity it is the writer's intention to assume the desirability of economic stability in the senses mentioned above rather than to argue its merits in comparison with other objectives which are not consistent with it.¹ It is from this point of view that the Commission's recent behaviour has attracted most interest. It is now proposed to consider whether the tribunal's procedures are consistent with the objectives postulated.

In 1953 the Court set out a list of indicators which it considered germane to its inquiries: employment, investment, production and productivity (rural and otherwise), overseas trade, the competitive position of secondary industry and the state of retail trade. These indicators were adopted by the Court and the Commission in their inquiries between 1953 and 1959. Their relevance to the determination of wages with a view to economic stability is limited, and it was minimised by the failure of the judges to state what significance was attached to them. The levels of employment and unemployment are relevant only if there is a possibility of their being affected by the decision. There could be some effect through the competitive position of domestic industry or the balance of payments, but these are already comprehended under other headings. It has been the assumption of the Court and the Commission that a low level of unemployment is propitious for relatively high wage increases, a form of reasoning which is very difficult to reconcile with the pursuit of price stability. The level of investment has relevance to the rate of productivity increase, but it has not been examined in that light. Production might be an indicator of the utilisation of capacity or a substitute for a measurement of productivity: if the former, its relevance to wage determination is slight; if the latter, its usefulness is somewhat vitiated by the judges' reluctance to make assessments of productivity. Some attention to rural production is, of course, justified by the necessity to anticipate the balance-of-payments position in the near future. Productivity is clearly germane; reference is made to it subsequently. Overseas trade is indubitably relevant; so also is the competitive position of secondary industry, provided that a careful distinction is drawn between a general embarrassment of industry arising from excessive costs and difficulties experienced by particular industries as a result of changing patterns of trade. The relevance of retail trade is slight; a low level of retail trade might indicate that award wages could be increased a little more than otherwise in the absence of upward pressure on profit margins and over-award payments, but the judges, on the

¹ At a time of rising export prices the writer would advocate increasing wages to an inflationary extent so as to effect a redistribution of real income away from exporters. This contingency does not apply to any significant extent during the period 1953-60.

contrary, have regarded a high level of retail trade as more propitious for wage increases than a low level.

Apart from these approved indicators, the Court and the Commission have entertained discussion of company profits. First, there has been an underlying assumption that the level of profits determines the ability of employers to pay higher wages without raising product prices. Since the tribunal has no capacity to compress profit margins, this is a very dubious approach. Secondly, the employers have in several cases called as a witness a Sydney accountant who is an expert on the cash position of companies. His evidence has generally been to the effect that higher wages would create difficulties for companies in raising funds for both short- and long-term purposes. This is in reality advocacy of "monetary management by the trade unions"—or, more accurately in this case, by the judges. The witness was heard sympathetically until 1958, but in the 1959 Basic Wage case he succumbed to cross-examination; this unhelpful type of argument may therefore be less important in future.

Productivity, unquestionably, is an essential consideration, but the judges have been reluctant to reach any conclusions about it. All of the attempts to assess productivity changes have been made for the unions, who have claimed compensation for previous price increases *plus* allowances for higher productivity. The employers endeavoured, with success, to discredit a number of relatively crude studies involving the deflation of various components of the Gross National Product by more or less appropriate indices. In the 1959 Basic Wage hearing Dr. W. Salter, an expert on productivity measurement who was called as a witness by the unions, calculated ranges for the increases of productivity in various sectors since 1953. Foster, J., found these estimates acceptable, but his two brother judges, though impressed by Dr. Salter's work, could not accept his ranges with any confidence. They were, however, prepared to agree, on more general grounds, that there had been a considerable, though indefinite, increase in productivity since 1953. Each judge said that he took this improvement into account, but no indication was given of the degree to which the respective decisions were affected. Both the Bench and the parties have been guilty of considerable confusion of thought about the significance of productivity. The fact that productivity has increased since some point of time in the past does not of itself warrant a wage increase which is to operate in the future. Given constant profit margins, these past improvements in productivity have already manifested themselves in the real wage level. Even if the assumption does not hold, there is little that the Commission can do to compensate the wage-earner for the diminished wage share. On the other hand, calculations of previous productivity changes may give some approximation of the rate at which productivity is currently increasing, and hence of the extent to which it is possible to increase wages without endangering price stability. It is obvious that if assessments of past productivity increases are to have this

significance they must be given a numerical dimension. There is simply no evidence that the judges have appreciated the true significance of productivity.

Prior to the 1960 Basic Wage case, the procedure of the Court and the Commission was to hear a very detailed survey of the economy in the light of the indicators and to reach a decision on the basis of the impression thereby gained. This procedure involves two problems for which no convincing solution has yet been found: how to weigh the various aspects of the economy against each other and how to translate an impression of the economy into a money decision. The fact is that the approved indicators, when taken together and treated as they have been treated, yield answers in terms of the economy's overall health and not in terms of money wage changes. Consequently, the decision rarely appears to flow with any satisfying logic from the reasons adumbrated. If the Basic Wage is increased by 15s. it is difficult to see why this figure rather than 10s. or 20s. is considered appropriate. In the 1954 margins judgment the Court first decided what adjustment of differentials was intrinsically desirable and then considered whether the capacity to sustain the increases existed. All that was established, in the latter respect, was that by November 1954 the economy was in a rather better condition than at the time of the 1953 Basic Wage decision: there was nothing to show that it was better by a degree in any sense appropriate to the decision contemplated. In 1956 the Court accepted as its starting-point the 1953 Basic Wage adjusted by the retail price index, decided that the economy's progress was not satisfactory and awarded a smaller increase—10s. The 1957 judgment was a very optimistic one owing to an improvement in wool prices, but the award was again 10s. At the time of the 1958 decision the economic situation was found to have deteriorated, principally in the respects of drought, export prices and unemployment. Kirby, C.J., and Gallagher, J., felt that no more than 5s. could be afforded, whereas Wright, J., considering that earlier increases had been too conservative, was in favour of a substantially greater increase. In the 1959 Basic Wage case all judges agreed that the economic situation had materially improved, but whereas Gallagher, J., thought the improvement warranted an increase of 10s., Kirby, C.J., was in favour of 15s., while Foster, J., would have granted 20s., though he formally concurred with Kirby, C.J., to constitute a majority in favour of 15s.

Since the indicators give no clear guide to the appropriate order of wage changes, it is necessary that the judges should either simply think of a figure or invoke additional principles to which to anchor their deliberations. The 1957, 1958 and 1959 Basic Wage decisions are examples of the former, while in the two margins decisions and the 1956 Basic Wage judgment other principles were introduced.

The principal additional criterion has been the cost-of-living. Actually, there has been some reference to the cost-of-living as a principle for wage

determination in all of the Basic Wage judgments since 1953, because the system of automatic adjustments has been at issue on each occasion. Until 1958 the reason given for rejecting the system was that it was inconsistent with the criterion of capacity to pay, in that some price increases might indicate rises in real costs or in import prices rather than higher Australian incomes. This reasoning invited the reply that logical possibility is not synonymous with normal reality, and in 1959 and 1960 the judges (apart from Foster, J., who would have restored the system) retreated to the safer ground that it is better for the wage level to be subject to the informed discretion of the Commission than for it to be at the mercy of an uncontrollable creature like the retail price index. On either ground, the antagonism to the automatic cost-of-living adjustment system is founded upon its automatic character and not upon the cost-of-living principle, which has not yet been discredited as an argument for wage increases.

It cannot be said too clearly that the cost-of-living principle is inconsistent with the pursuit of price stability. When a wage increase is granted on a cost-of-living basis the wage-earner should not be regarded as receiving a dividend out of higher receipts by industry. Price increases reflect either higher real costs or increased money receipts. In the former case there is no justification for money income increases, as the loss of real income has to be endured. In the latter case the increased prices have already flowed to income, including (subject to any variation of profit margins) wages, and there is no logic in duplicating the process. In the period under review higher prices have been associated with higher incomes in the form of higher Basic Wages, higher award margins, larger over-award payments and possibly higher profit mark-ups. Cost-of-living increases are a device which transmits the inflation of one period into the future. The fact that they are not generally recognised as such does not make them any less so.

It is one of the great weaknesses of the arbitration system in Australia that the principal tribunal has not arrived at a firm and consistently applied conception of its responsibility in the control and prevention of inflation. No other judge has manifested the same concern about it as the late Chief Justice, Sir Raymond Kelly. In the 1950 case he dissented from the majority decision raising the Basic Wage by £1. He was disturbed by the prevailing inflation and he felt that the failure of other authorities to pursue appropriate policies did not absolve the Court from doing all within its power to combat it. It was fairly obvious at the time, and was confirmed by Foster, J., in his 1959 judgment, that the termination of automatic adjustments was largely due to Sir Raymond Kelly, who had conceived an antagonism to the system well before the Court delivered its judgment. Concern with inflation played a much greater part in that antagonism than appeared from the 1953 judgment, in which it was explicitly stated that the automatic adjustment system was abolished not because of its inflationary effects but because of its

inconsistency with the capacity to pay criterion.¹ As the inflationary consequences of the automatic adjustment system appear to be a very valid objection to it, it must be surmised that some doubt was entertained about the propriety of this argument. Certainly the judges were not unaware of it, because, having stated that it was not their reason for ending the system, they pointed out that the decision would nevertheless be conducive to a greater degree of price stability. The first of the cases discussed in this article in which Sir Raymond Kelly did not participate was the 1956 Basic Wage case. The Court rejected a union submission that inflation was not a subject with which it should be concerned. Otherwise the judgment in this case contained very little discussion of inflation, although there was the statement (by no means an accurate summary of the judgment) that "it is because of both these fears—of high price inflation and unemployment—that the Court thinks it dangerous to increase the Basic Wage by more than 10s. per week."² In so far as the Court was then concerned about inflation, its anxiety was primarily derived from the balance-of-payments position. In 1957, when the overseas trading position was better, the Commission was prepared to leave the control of inflation to other authorities:

"Although the influence of the supply of money, even when directly affected by increase of funds overseas, is of paramount importance, it is controlled by governmental and banking policy. There is nothing to suggest to this Commission that the wage increases to be prescribed cannot be accommodated within that policy. The problem of inflation needs no further mention."

In 1958 inflation was hardly mentioned. In the 1959 Basic Wage case Kirby, C.J., virtually ignored it except in so far as it was indirectly raised by the competitive position of secondary industry; Foster, J., was convinced that there would be inflation whatever the Commission's decision and that the only thing to do was to protect the Basic Wage-earner against it; while Gallagher, J., took substantially the same attitude as the President.³ In its 1959 margins decision the Commission dealt very cursorily with the important economic question:

"We are conscious of the desirability of attempting to maintain the economic stability which this country has achieved. We are also conscious of the desirability of ensuring that wage justice should be done to workers under this award. We have looked at the increases which we propose to grant in this case in the light of the submissions about

¹ At a conference of union and employer representatives held on November 21, 1951, Sir Raymond Kelly asked whether agreement could be reached for a discontinuation of adjustments. There was no reference to any inconsistency between the adjustment system and the capacity principle.

² 84 *Commonwealth Arbitration Reports* 157 at p. 223.

³ The 1959 Basic Wage Inquiry was the only case, of those under review, in which individual judgments were given.

economic stability and we do not consider that such increases are so likely to affect that stability that the economy will be adversely affected. If marginal increases cannot be granted in times of prosperity such as the present, it is difficult to imagine when they can be granted."

In reality, the issue examined in this case should have been not so much whether the economic climate was propitious for wage increases as whether the Commission, having increased the Basic Wage by 15s. only five months previously, had left itself scope for the increases in margins which it awarded.

The 1959 decisions were the denouement of the confusion which has attended the treatment of economic questions in recent years. Not only, indeed, is it impossible to justify these decisions under the criteria which have been postulated in this article, but there is more than a suspicion that the two decisions are mutually contradictory. The Basic Wage decision purported to increase the wage bill by the maximum amount that the economy could afford, as did the preceding Basic Wage decisions. Did the capacity of the economy increase so much within the succeeding five months that it could then afford the increases granted in the margins case? This, surely, was the test which the Commission's principles demanded. But the Commission proceeded to justify its decision on the basis of changes in Australia's economic fortunes since 1954 (the date of the previous margins decision), apparently oblivious of the fact that four Basic Wage decisions had professedly used up the capacity which had been generated in all but one-twelfth of the intervening period. Implicitly conceding that the increases granted in 1959 were excessive, the Commission in its 1960 Basic Wage decision defends its 1959 decisions on the ground that it is required by law to hear Basic Wage and margins applications separately, and therefore could not integrate the decisions to produce a satisfactory total result. This defence would be more persuasive if there were the faintest recognition in the margins judgment that the increases granted, though perhaps necessary for the restoration of differentials, were an undesirable addition to wages costs. Furthermore, another course was available to the Commission. The writer respectfully suggests that for the sake both of economic stability and of self-consistency between the decisions, the correct decision in the margins case was an adjournment *sine die*. The Australian Council of Trade Unions might then have been invited to choose in 1960 between a Basic Wage application and an increase in margins. This procedure would have had the additional merit of requiring the unions to face squarely the choice—to date evaded by common enthusiasm for wage increases of all kinds—between conventional relativities and a more egalitarian pattern of wages and salaries. If the former choice had been made, the margins hearing might have been resumed towards the end of 1960. A good precedent for such an adjournment may, of course, be found in the 1954 margins inquiry.

The lack of precise criteria capable of yielding results in terms of money wages and the substitution for them of indicators giving at best only a general

impression of the nation's economic health; ambiguity about the place of productivity in wage determination; uncertainty about the role of the tribunal in combating inflation; acceptance in some cases of the cost-of-living principle; and a general absence of the logical rigour needed to preserve consistency: these are the principal deficiencies to be discovered in the judgments of the Court and the Commission between 1953 and 1959. Their effect was to make the decisions unpredictable. Even when the right decisions were made the reasons were generally wrong. As the 1959 experience shows, the Commission's procedures were apt occasionally to throw up decisions which were highly inflationary. It is therefore pertinent to inquire whether the 1960 decision portends the adoption of more satisfactory principles. The Commission's refusal to grant an increase is, of course, to be welcomed. But what of the reasons?

The union advocate based his case upon the approved indicators, and this seemed to make a refusal very difficult, since the indicators gave an extremely satisfactory picture of the economy. The Commission declared that neither it nor the Court before it had ever stated that the indicators were the *only* criteria which it would consider. This is true, although the significance attached to the indicators in some of the judgments perhaps made a contrary inference excusable. From this point the Commission then took the radical step (unavoidable if the result desired were to be reached) of ignoring the indicators entirely. It was then free to adopt two grounds for refusing the application: first, that a wage increase would impose a severe strain on State Government budgets; secondly, that an addition to last year's increases would endanger economic stability. The former ground is a regrettable one, and it is to be hoped that the Commission will not in future refuse a wage increase which is otherwise justified in order to redress the anomalies of federal-state financial relations.¹ The latter is, of course, very much to the point, and it raises the question whether the Commission will henceforth be more sensible of its role in preventing inflation than it has been to date. It is necessary to recognise that the decision which price stability demanded was, in 1960, exceptionally clear, and it was made even clearer by a persuasive submission against any increase on behalf of the Commonwealth Government, which normally supports neither side in Basic Wage inquiries. How will the Commission behave when the issue is not so clear? In particular, when some increase is warranted, will the increase be of the right order, even though the Commission refuses to make any assessment of the rate of increase of productivity? The future of the indicators is obviously of great importance, and at this stage we can only wonder whether the Commission will rehabilitate them to justify decisions whose appropriateness is a matter of chance, or whether it will quietly relegate them to

¹ State governments raise no income tax and do not generally impose commodity taxes. Their revenues (other than grants from the Commonwealth) are therefore unresponsive to increasing income.

oblivion without actually admitting that they were an unhelpful implement from the beginning. The 1960 decision, then, leaves the future of wages policy in Australia in a condition of uncertainty. It is not at all clear whether order will emerge from chaos or whether, in more normal circumstances, the Commission will revert to its old habits—refined, but not essentially altered. Because the maintenance of price stability requires Basic Wage increases (or equivalent increases in margins) averaging somewhat less than 10s. per annum, the writer is inclined to be pessimistic.

IV

Having subjected the tribunal's behaviour to criticism of an economic nature, we must consider briefly the problem of reconciling the conscious and informed pursuit of economic stability with the Commission's role in industrial relations. There is, apparently, no decisive legal difficulty for although, as the Constitution requires, the formal task of the Commission is the prevention and settlement of industrial disputes, the High Court will not review the formulæ with which the Commission seeks to resolve disputes. Furthermore, the judicial interpretation of an industrial dispute is so wide that the Commission is by no means restricted to the role of a fireman dealing with conflagrations when they occur. The only real difficulty of a legal nature is the Commission's inability to impose its decisions on state tribunals, but it cannot be said that those tribunals would generally behave in such a way as to frustrate completely the Commission's policies. The fundamental problem is not legal but industrial. Could the Commission make decisions which, while consistent with economic stability, would not seem to be so unreasonable to either of the parties as to cause it to attempt to move outside the arbitration system? Two considerations may be thought to justify doubt on this score.

First, the problem of over-award payments: If rates offered in industry diverged increasingly from the Commission's awards, discontent must almost certainly arise, partly because it would appear that the Commission was less generous than employers themselves, and partly because those employees, such as workers in government enterprises, who remained dependent upon award rates would have a very justifiable grievance. There has been some dissatisfaction for these reasons in recent years. It is traceable to the wages drift of 1953–56. It is not yet clear whether this will be a recurring phenomenon, since it was probably due in the main to the special circumstances arising from the termination of automatic adjustments. If it does not recur, it would be best to let bygones be bygones. In the 1959 margins case the Commission accepted the argument that the existence of over-award payments demonstrated the capacity of the economy to sustain award increases of the same order. This was an unfortunate argument, for it presupposed that employers paying more than the award would absorb the award increases, and there is no evidence to justify that assumption. If, on

the other hand, there is to be a further wage drift, a remedy for the second grievance mentioned above may be the creation of special tribunals, along the lines of Britain's Wages Councils, to give special consideration to those who, for reasons of convention or poor organisation, do not participate in it. Certainly it is not a case for general award increases, for in that event the workers who have done well ride to yet higher money wages on the backs of the economically weak. Only experience can show whether the former grievance would be decisive, but there is no doubt that employers' organisations would make the role of wages policy more certain and secure if they could acquire some of the discipline associated with trade unionism to ensure that their members do not frustrate the Commission's decisions.

Secondly, great difficulty arises from the fact that although the Commission legislates prospectively, the claims made before it are generally based upon past occurrences. In particular, if the cost-of-living has risen considerably the Commission is placed in an invidious position: to attempt to combat the inflation by refusing a wage increase is to court condemnation by the trade unions, who would, on this issue, enjoy much public sympathy. Yet at some stage the break must be made. For this reason it is very necessary that the recent exhortations of the Governor of the Reserve Bank of Australia (Dr. H. C. Coombs) against the dissipation of productivity increases in advertising or superfluous improvements of quality should receive more than polite agreement.¹ The more that firms translate productivity improvements into their price decisions, the less will be the injustice apparently inflicted upon the wage-earner by a conservative wage increase. At the same time the Commission itself can make its task easier, first, by avoiding decisions, like those of 1959, which unnecessarily increase the cost-of-living and, secondly, by setting an example of arguing prospectively. Its guiding question should be: "What will be the effect of this decision over the next twelve months?" rather than "What has happened in the economy in the past twelve months?" It hardly needs to be said that it would be of great assistance if the state tribunals concerned terminated their adherence to the cost-of-living adjustment system.

The Australian experience of centralised administration of wages policy since 1953 cannot be regarded as a fair test of the possibility of using wages policy to preserve economic stability. The fact is that the procedures of the Court and the Commission could not be relied upon to produce the appropriate decisions. Any country which wished to experiment with a centralised wage policy could draw some inferences from the Australian story which would help to ensure that the experiment was a reasonable test of the possibilities. It seems to be elementary that the authority appointed would consist at least partly of persons with economic training. It would have in

¹ See, for example, his presidential address, "A Matter of Prices," delivered to the Australian and New Zealand Association for the Advancement of Science in August 1959. Printed in *Economic Record*, Vol. XXXV, December 1959. See especially pp. 345–6.

view in all its deliberations both the size of the wage bill and the problem of differentials, so that a general wage increase either would be a deliberate alteration of relative differentials or would be sufficiently conservative to permit the consequent increases in margins. It would discount criteria, such as the cost-of-living, with inflationary bias. It would treat the special problems of the economically weak for what they are and not as a justification for general wage changes. And it would recognise that the possibilities of transferring real income from profits to wages by money wage changes are very slight. Whether a wages policy administered in this way would founder on the rocks of industrial discontent is an open question.

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ERRATA

ECONOMIC JOURNAL, JUNE 1960

P. 307. Footnote to Fig. 2, line 5. For *supply* read *demand*.

P. 307. Footnote to Fig. 2, line 6. For *demand* read *supply*.

These errata do not affect the argument of the text.

B. R.

REVIEWS

The Investment Decision. An empirical study. By J. R. MEYER and E. KUH. Harvard Economic Studies, Volume CII. (Cambridge, Mass.: Harvard University Press (London: Oxford University Press), 1957. Pp. xv + 284. 48s.)

THE purpose of this book is to test various theories of investment behaviour. The chief method used is correlation analysis of cross-section data, but the authors also bring to bear on the problem the findings of other empirical investigators of investment behaviour and their knowledge of the workings of the economy in general.

A sample of nearly 500 American firms quoted on stock exchanges is taken, and variables derived from accounts are analysed for each year from 1946 to 1950. The sample is stratified into fifteen industry-groups, within which there is some homogeneity of capital intensity. An analysis is made of the relationship between investment (purchases of capital goods), on the one hand, and sales (representing output); net profit; annual depreciation; assumed capacity utilisation (based on change in sales-asset ratios); change in sales; accumulated depreciation (representing age of assets); liquidity stock (including trade debtors less creditors); and the dividend-profit ratio, on the other hand. All variables are deflated by the size (represented by undepreciated fixed assets) of the firm. The relationship between investment and the dividend variable is irregular. The other variables are incorporated in two models, including, alternatively, profits or sales but not both variables, since they are strongly intercorrelated. Partial correlation and regression coefficients are calculated for each explanatory variable for each industry-group and each year; the emphasis throughout is on the pattern of correlations rather than on average relationships.

Theories of investment behaviour fall into three classes: the profit motive or marginalist theories; the accelerator principle or technical capacity theories; and institutional and empirical generalisations which emphasise preference for internal financing and trade position. The trouble is that these theories are not mutually exclusive but rather that they underline different aspects of business-man's behaviour. In order to achieve realism, each of these theories is necessarily complicated, and none of them is in a form in which it could be readily subjected to empirical testing.

According to some theories, investment is influenced by the age of assets. The data tend to show the opposite: firms with older assets invest less. This suggests that firms behave in a continuous manner. Aged firms also tend to like liquidity (Chapter 6).

Annual depreciation and net profit or sales (throughout, there is little

to choose between the profit and the sales models) tend to correlate with investment but mainly in 1948–50. Liquidity stock, however, does not correlate with investment. Assumed capacity utilisation and change in sales also correlate with investment; the correlation is stronger in capacity utilisation, especially in 1946–47. These (Chapters 7 and 8) are the central findings of the book. The interpretation put on the correlations is that in a sellers' market (1946–47) the acceleration principle tends to operate and in a buyers' market (1948–50) liquidity restraint operates, profits and depreciation representing liquidity flow.

In the subsequent chapters additional material is brought in to argue that firms were strongly reluctant to use external finance (Chapter 9); that small firms did about as well as large firms but were perhaps more dependent on internal finance (Chapter 10); and that interest rates do not, but share prices do, exercise an influence on investment (Chapter 11).

All this builds up, in the last chapter, to the authors' own "residual funds" theory. This theory is meant to apply to the modern industrial corporation with separation of management and ownership, and imperfections in the markets for product, money and capital. In the short run—the theory argues—dividend payments are conventional (and made grudgingly), and what is left over of cash flows is invested. In the long run the profit motive is closely linked to a desire to retain market shares.

The authors display a vast knowledge of the economic literature on the subject and brilliance in statistical techniques. Each sentence is written with scholarly precision and cautionary qualification. Yet their own thesis, which gradually emerges as the argument proceeds, does not appear to be adequately supported by evidence. There is a tendency to squeeze the last ounce of conclusion out of the data. But the same statistical results could also be explained by different theories.

The survey of modern theories of investment in Part I is excellent and should be read by students. (Indeed, these theories are shown to be so inadequate that one wonders why the authors proceeded to test them.) Part II gives an account of the statistical techniques. This is in places difficult to follow and appears over-ambitious, as in the end the authors adopted the simplest techniques and the most obvious variables.

Of the variables considered correlations are shown for four: the two liquidity-flow variables (annual depreciation and profits or sales, whichever is preferred) and the two accelerator variables (change in sales and assumed capacity utilisation). Each of these correlations passes the standard tests of significance, but none of them is strong. The relatively strongest is that for the variable *assumed* to represent capacity utilisation. But even here, out of 75 coefficients (5 years *times* 15 industries) 19 have the theoretically "wrong" negative sign. In the case of the other accelerator variable, change in sales, out of 75 coefficients 5 are significantly positive and 36 have the wrong sign.

The emergence of liquidity as an explanatory factor is a matter of inter-

pretation. The obvious variable, liquidity stock, refuses to behave as it should, but this is ignored by the authors. Profits may be taken to represent either liquidity flow or the anticipation of future profits; the authors adopt the first position which may be indirectly supported by the correlation between annual depreciation and profits. But this is the most curious correlation. Its interpretation depends on a complex argument, and it is doubtful to what extent profits and depreciation are independent, since often the division of gross profits into depreciation and net profits is arbitrary.

Altogether one wonders whether short-period changes in investment can be explained by cross-section data. The fact that the age of assets correlates with investment negatively, the fact that liquidity stock correlates similarly, and the fact that variables on a five-year average basis give better results than annual data would suggest that firms' behaviour is determined by longer-term considerations.

However, the chief drawback of the type of analysis which Meyer and Kuh have undertaken is that it prejudges the issue in favour of theories which regard the entrepreneur as a species of thermostat. His assigned role is to react to quantitative stimuli. In practice this boils down to the question whether he reacts more to internal liquidity or to capacity utilisation. (Unfortunately the data do not permit a distinction to be made between extension and replacement investment.) The fact that in certain circumstances he appears to react to the liquidity variable and in other circumstances to the capacity variable is taken to mean that different theories are applicable in different circumstances.

The models tested leave no room for the imaginative entrepreneur who is forward looking, who persuades his banker and the public to lend him funds, who breaks into new markets and who is aggressive rather than defensive. And here we have the basic difficulty: that in identical economic situations different entrepreneurs behave differently, and hence it is not at all certain that the variables of investment theory are independent variables rather than mere reflections of entrepreneurial character.

The limitations to the use of time series in a study of investment behaviour were demonstrated by Keynes in a review of Tinbergen's celebrated work in the September 1939 issue of this JOURNAL. The "slippery problem of passing from statistical description to inductive generalisation" is not fundamentally different if, instead of time series, cross-section data are used. The fault, however, is inherent in the subject matter. The authors have shown great enterprise and immense labour, ingenuity and candour; the book deserves thorough study, provided only that the reader keeps an open mind as to the ultimate explanation of the investment decision.

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International Economic Papers, No. 9. Translations prepared for the International Economic Association. (London: Macmillan; New York: The Macmillan Company, 1959. Pp. 248. 21s.)

As in previous years, this issue of *International Economic Papers* will mark the occasion of some private lamentation among those of us who are for the most part confined to the Anglo-Saxon literature in our subject. Like previous issues, the ninth is something of a pot-pourri, with the criteria for selection still remaining something of a mystery. For all that, there is hardly an economist who will not be interested in at least one of the six main articles which comprise this collection. Four of them were written in the 1950s, one in 1914 and the other, though published in 1849, harks back to the early sixteenth century.

This last-mentioned piece, "Two Discourses on Progressive Taxation of Land Incomes," written by one Francesco Guicciardini of Florence, is, for every professional economist, a genuine collector's item. It proffers two essays in persuasion: one for and one against progressive taxes. These essays, a far cry from the condensed and laboured style of so much of current economic analysis, can be read with ease and enjoyment. In favour of progressive taxes are arguments not dissimilar to those associated with the older school of Cambridge economists, following which there is a good deal of drubbing of idle landlords; their monopoly of grain, their improvidence, corruption, conspicuous consumption and so forth, all of which must be taken with a pinch of salt, since we are to be told, in the next page or two, and in the coolest fashion, that such allegations are all too obviously the stuff of demagoguery; indeed, that such taxes are tantamount to robbery, an invitation to evasion, a provocation to civil strife and much more tending to the same foreboding. It is great fun while it lasts, and though inevitably it leaves matters hanging in the air, it does make one look back wistfully on an age of sturdy amateurs, in which the educated man might, as the fancy took him, and without the tedium of prolonged research, put pen to paper and launch his opinions into the world on any topic of the day.

Following this comes a chapter, "Basic Principles of the Money Economy," from Karl Schlesinger's *Theorie der Geld- und Kreditwirtschaft*, published in 1914, and we are back in the familiar world of relentless abstraction. Schlesinger, a banker, begins by constructing a sort of Cambridge monetary equation which is interesting in that the amount of money the community wishes to hold, as a proportion of its income, is not a constant, but varies inversely both with money income and with the rate of interest. This looks very promising, but the reasons given for the inverse income relation rest on a probability argument which would be valid if when real income increased an unchanged number of firms grew merely by acquiring additional plant-units of the same type—as in an extension of branch banking. As for the response of the demand for money to changes in interest rates, this he deems

to be "very weak"—and in doing so misses the approach to a liquidity-preference theory. Throughout, the banker's view of things is well to the fore. There is nothing about employment (which is not surprising, considering that the date is 1914), but a lot about money flows, wave movements of cash holdings, bimetallism and the level of prices which, following his proposition about the inverse income relationship, changes more than proportionately to changes in the supply of money. Though the style is difficult and, perhaps inevitably, in an analysis undertaken about a half century ago, nothing very novel emerges, this piece of writing does bear testimony to a remarkably original mind.

The article that comes next, on Pareto regions, was worked out by Professor Frisch in 1950 and was presented as an appendix to a paper read in 1953 before a meeting of the International Association for Research in Income and Wealth. This appendix, originally written in English, was first published in French in *Économie Appliquée*, 1954.

Here we have some fifty-four pages of extended formalised argument, bristling with definitions, propositions and mathematical manipulations. And, though there is an occasional lapse into non-mathematical prose, and a reference here and there to things of this world, on the whole it has the hallmarks—in the parlance now become popular on the other side of the Atlantic—of "a workmanlike job." Its focus is narrow; its style frigid; its treatment exhaustive.

Frisch has taken his inspiration from the appendix to the French edition of Pareto's *Manuel* (1909), in which Pareto was under the illusion that he had demonstrated mathematically that free competition leads to a maximum of social satisfaction. There is some speculation on the last page of Frisch's paper whether Pareto came to realise that his demonstration was unacceptable. At all events, it follows obviously enough from Frisch's argument, if that were necessary, that this simple view is untenable.

Accepting the definition that a Pareto Optimal region is a set of efficient points in the sense that any movement from one of such points makes at least one person in the community worse off, Frisch elaborates the necessity of specifying the sorts of constraints, political and economic, within which the maximising process must operate. To illustrate the relevance of political constraints in an extreme case, Frisch gives the example of a regime which exacts obedience from each person under threat of execution. If, then, each individual "freely" chooses to obey, is he not maximising satisfaction under the constraints imposed by this régime?

After minting some new terms, and after much discussion of the problem in the abstract, it transpires that Professor Frisch's particular concern is with the problem posed by admitting a distribution constraint in addition to the inevitable production constraint. He demonstrates that a point which is Pareto optimal under both a production and a distribution constraint is not necessarily optimal under the production constraint alone.

He follows this with an analysis of seven special simplified cases to conclude that "contrary to what is commonly believed" an optimal point cannot be reached under a system which levies income or profits taxes, though it can if only *per capita* taxes are levied.

Other than a reference to Scitovsky's survey of welfare economics in the *American Economic Review*, 1951, there is no mention of the work of other writers in this field. This is a pity, for, on the surface of things, and despite his remark that they are contrary to the common belief, his conclusions will come as no novelty to any economist with the most casual interest in welfare economics. His translation of the problem of multiple constraints into an exercise in the calculus of Lagrange multipliers is fairly standard technique. Indeed, the key notion that emerges from his manipulations—that the conditions associated with any optimal point must vary according to the nature of the constraints imposed on the system—has already been fully exploited in the Lipsey and Lancaster generalised second-best theorem. In a narrower context, Professor Frisch's paper, which was worked out in 1950, may have adumbrated the idea which was to blossom into that theorem in 1957. But appearing in English two years later, it is something of an anti-climax.

Though the chief purpose of Professor Villey's discourse on "The Market Economy and Roman Catholic Thought" is, apparently, to convince his fellow Catholics that economic liberalism is consistent with their faith, he devotes three-quarters of his paper explaining to liberals why Catholics so readily take up an anti-liberal position. It might be thought that such an address would be more in place in an anthology on Catholicism than in one on economics, but such a view could be upheld only by invoking the staidest of criteria. True, there is little exposition of economics, and what there is bespeaks a faith in the virtues of the market mechanism which would be hard to match outside the precincts of Chicago University, but the historical analysis of the inveterate hostility of Catholics toward all things liberal is wholly absorbing. One wonders, however, to what extent educated Catholics will be wooed from their antagonism by his arguments. His most telling point is the incompatibility of support for the political freedom and tolerance of the West with a rejection of the free working of the market economy. On the other hand, his attempt to reconcile Catholics to capitalism by suggesting it be regarded as a game, the game of markets, played with fairness and detachment according to the rules, tends to convey a picture of the modern business-man as a breezy sportsman more concerned with the play of the game than with the outcome. Perhaps that is how it ought to be. But there is weighty evidence to suggest that it is the stakes, and not the love of play, that draws them into the game. Capitalism, no less than Communism, leads to an obsessive concern with material rewards. However that may be, the essay is of high intellectual quality, something to be read more than once, both for its lucidity and learning and for its manifest sincerity.

Though not an unusual approach to the problem of underdeveloped areas, the paper on the efficiency of investment by Professor Lombardini is of topical interest. About half the paper is devoted to a general analysis of the criteria for investment in underdeveloped countries. In the part remaining, a linear programming model is discussed and is illustrated with a specimen having sixteen constraints and nineteen activities, in which, among other things, capital stock is transformed into capital services, labour is trained, goods are imported and exported, and allowance made via disposal activities for unemployment of labour and capital. The thing is neatly done and is no doubt instructive, even though he is vague on the objective function to be maximised. But after the model is started in a simple way by a set of difference equations with a single time lag, Lombardini takes another look at the real world and tells us, in effect, not to expect too much. We then have some technical hints on how to make the model more elaborate, though not without a word of warning on its limitations and the continued need for flexibility. He winds up with a masterpiece of understatement, that: "The construction of the system of equations . . . for the entire economy and the solution of the overall problem may come up against some serious practical difficulties."

If we are to plan in the large, then, indeed, the attempt must proceed on something like these principles. Only, once we admit the need for flexibility, owing to changes in tastes, techniques and supply conditions, we find ourselves facing an almost impossible number of problems of adjustment. The sophisticated planner will invariably wish to compare this quantitative planning with the efficacy of the market, allowing, of course, provision for government intervention whenever there appears to be marked divergencies between private and social interests. There is a vast literature on just such issues in the classic controversies on socialist planning, and Professor Lombardini's views in this respect are doubtless contained elsewhere in his book, of which this paper is but a chapter.

Finally, there is an empirical study by Professor Hoffmann on relative changes over time as between various branches of manufacturing industry. Building on the studies sponsored by the National Bureau of Economic Research, the author—after spending several pages discussing the difficulties of measurement—provides us with several tables summarising his conclusions for the United States. Only after warning us of the very tentative nature of the figures does the author allow himself to interpret the tables as disclosing that, between the years 1860 and 1947, there was a rough constancy in the structure of productivity (measured in terms of value added per employee), of the wage structure and of the capital structure (measured in terms of capital stock per employee), notwithstanding marked differences among the various branches of industry. All of which leads to some interesting theoretical conjecture.

The last seventy-three pages are devoted to translations of reviews by
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Scandinavian authors of twelve recent Scandinavian works of some importance, an average of six pages per review, considerably longer than reviews in the English journals and considerably more informative. This innovation is a most welcome one, and enhances the value of an already valuable survey.

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Money in a Theory of Finance. By J. G. GURLEY and E. S. SHAW. With a Mathematical Appendix by A. C. ENTHOVEN. (Washington, D.C.: The Brookings Institution (London: Faber), 1960. Pp. xiv + 371. \$5.00.)

THIS is an interesting and important book, the main theme of which is indicated in the title. Money in a modern economy does not just appear. It is a form of debt which is created either to finance Government expenditure or in exchange for some asset. This in itself is hardly a new idea, but what is relatively novel in the authors' contribution is that they actually take account of it in the development of their monetary theory! They argue that existing monetary theories tend to ignore the asset counterpart of money. These theories use a "quantity of money" and a "rate of interest," but contain no adequate analysis of the demand and supply of financial assets other than money.

Another fault that the authors see in some monetary theories might be called the "vice of consolidation." Because one man's debt is another man's asset, and because very often one man's liabilities are backed by his assets, a large part of these assets and liabilities is cancelled out when the accounts are consolidated. Such consolidation, however, precludes any proper analysis of the role of financial intermediaries in the economy.

The authors' programme is therefore to build up a theory of money and finance which takes account of the ways in which money is created and which is free from the "vice of consolidation." They develop their theme with very great skill and clarity by the use of models of gradually increasing complexity; and the book serves, among other things, as a useful introduction to the problems associated with the name of Professor Patinkin, to whom the authors owe much. As the reader progresses, however, he becomes aware of an idiosyncrasy in the choice of models. In no case is the Government allowed to issue bonds to the private sector, and although this omission is recognised late in the book, it is hardly made good. The explanation of this neglect of Government debt other than money is obscure, but the clue is to be found in Dr. Enthoven's mathematical appendix (the greater part of which this reviewer is competent only to admire and not to appraise). There it is made explicit that the accounts of the Exchequer and of the Monetary Authority are *consolidated*. Now, so long as the Exchequer does not issue bonds to the private sector, this consolidation is not "vicious."

The Authority can create money either by buying private bonds ("inside" money) or, for example, by financing Government expenditure ("outside" money, which also represents the Government's net indebtedness to the private sector). If, however, the Exchequer were to issue bonds to the private sector, these would have to be cancelled out against the Authority's holding of private bonds. Faced with the prospect of this departure from their own principles, the authors have apparently preferred not to allow the Exchequer to issue bonds to the private sector; but they would obviously have done better to drop the consolidation of the accounts.

Indeed, the very concepts "inside" and "outside" money are a hang-over from the "vice of consolidation." After all, it is not really the money that is "inside" or "outside" but rather the asset counterpart of the money. As a result of the authors' use of these concepts, the theorems they establish concerning the neutrality of money are of insufficient generality. Thus they argue that, on the usual neo-classical assumptions, a change in the quantity of money is neutral if either all money is "inside" money or all money is "outside" money, but non-neutral if it is a combination of both. While this is perfectly correct in the context of their particular models, it obscures the main point, which is that, for a change in the quantity of money to be neutral the different forms of asset held by the monetary system and the different forms of Government debt held by the private sector must all change in the same proportion as the quantity of money.

If Occam's razor is to be brought into use against the notions of "inside" and "outside" money it might at the same time be employed against another of the authors' concepts, namely the "implicit" deposit rate on holdings of money. In order to explain why it is that people want to hold money, it is surely not necessary to enlist the help of this mythical rate of return, which mystifies more than it elucidates. It could be discarded without difficulty, since it appears to play no essential part in the analysis, but for this very reason it is a minor matter compared to the consolidation of the accounts of the public sector, which actually inhibits the proper development of the authors' ideas.

The reader of this review, however, would be wrong to conclude that the inadequate treatment of Government debt seriously detracts from the positive contribution made by the book. While it is certainly a weakness, it is one that could easily be remedied; and if it were, the authors could justly claim to have laid the foundations of a definitive general theory of money and debt.

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Commodity Reserve Currency. By E. M. HARMON. (New York: Columbia University Press (London: Oxford University Press), 1959. Pp. 140. 28s.)

THE sub-title of this book is "The Graham-Goudriaan Proposal for Stabilising Incomes of Primary Commodity Producers." The proposal is to establish a buffer stock of standard storable commodities in prescribed physical proportions, and to stabilise the price of a composite unit into which all the commodities would enter in the same proportions:

"Units would be purchased (sold) in unlimited amounts should the price of the unit fall (rise) a given amount below (above) a stated stabilisation level" (p. 40).

Mr. Benjamin Graham, in his book *Storage and Stability* (1937), contemplated a composite commodity reserve as the basis of a monetary system designed to stabilise the wealth value of the money unit. A commodity reserve currency would be issued in payment for the units, and would be withdrawn through the sale of the units. This currency would be interchangeable with gold or United States dollars through the International Monetary Fund (p. 68), and would in effect provide the basis of a monetary system. Dr. Harmon has misgivings as to the possibility of co-ordinating "the objectives of monetary-fiscal-wage policy . . . with the additional objective of keeping the stockpile within limits" (p. 43). He does not consider the possibility of so regulating the flow of money as to conform to the requirement of a fixed money value of the commodity-unit, but concludes that the commodity-unit must on occasion be revalued.

He thus abandons the idea of regulating the value of money by a commodity standard. He quotes Mr. M. K. Bennett in favour of varying the price of the commodity-unit in proportion to a fifteen-month moving average of the general price level, but prefers an automatic system for adjusting the price to the state of the reserve. He proposes an ingenious mathematical formula (p. 48) to this end.

The plan therefore loses its monetary character, and becomes one more buffer-stock proposal for affording producers of primary products some relief from the excessive fluctuations of prices. It deals with the primary producers as a group, and protects them in some degree against a general expansion or contraction of demand for their products.

But among the commodities composing the unit the plan has the disadvantage of causing a "mutual destabilising of prices" (p. 54). The wide fluctuations of prices of primary products are attributable to inelasticities both of demand and of supply combined with big variations in production arising from causes beyond human control. The commodity reserve withholds a stock of each commodity from the commercially necessary stocks and intensifies the scarcity of any that are in short supply. If the rise of the prices of these increases the price of a unit, units are sold. But then, to the

extent that the scarcity of some commodities is relieved, the markets for the others have to absorb excess supplies, even though some may be already suffering from redundant supplies. If each commodity had a separate buffer stock, sales of those in short supply would be accompanied by purchases of those in excess supply. Dr. Harmon fails to find any remedy or palliative for this disadvantage. His conclusion (p. 61) is that "the mutual destabilisation of prices could be troublesome—but only for commodities price inelastic in both demand and supply and subject to erratic change in either." Unfortunately those are the characteristics of most primary products, and are the root cause of just those troubles which buffer stocks are designed to cure.

The fact is that the composite commodity reserve, once it is dissociated from the idea of stabilising the wealth-value of money, has lost the reason of its being. The very title "Commodity Reserve Currency" becomes inappropriate. And anyhow Mr. Graham's conception of a stable money is not very satisfactory. The ideally stable money would be stable in terms of the wage-level. A stable price-level would be a second best, but a fixed price level of primary products alone would be very imperfect indeed.

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The Income of Nations. Theory, measurement and analysis, past and present. By PAUL STUDENSKI. (New York: New York University Press, 1958. Pp. xxii + 554. \$25.00.)

WHEN in the middle thirties Professor Studenski started work on the present volume about two dozen countries were on record as having had their national income measured at one time or other. When he finished his manuscript, some twenty-five years later, the total number of countries for which national-income estimates were prepared—in many cases on a continuing basis—was approaching the one hundred mark. Also, in the meanwhile, estimating techniques had become much more refined and a wide literature on the subject had grown up. Thus, as time moved on, the author's project to survey the history, theory and practice of national-income estimates on a world-wide scale assumed tremendous proportions. That, none the less, he succeeded in bringing it to a successful conclusion by producing this very readable, well-presented and truly encyclopædic account of the income of nations must be considered a great achievement, which commands respect.

In all likelihood Professor Studenski's study on the income of nations will be considered for many years as the standard reference book on the history of national-income estimating. To do the author justice it is, I think, in this light that we should view his work. In the field of theory and methodology he does not have anything to offer that is really new; it is in the recording of the history of the subject that his strength lies. Actually the part of his

book that specifically deals with problems of theory and methodology reflects more or less the state of thinking on the subject round about, say, 1950, when national accounting was still in its infancy. All the main problems from housewife services to the treatment of government are taken up, but no new light is shed upon them. There is, of course, nothing wrong with this as long as we consider this part of the book not as a separate piece of work but rather as an integral part of the historical survey. As such it provides the theoretical background against which the author must have evaluated the various estimates made over the course of three centuries right up to the date that the manuscript was sent to the printers. Presumably this is the way the author himself has looked at it too. At least that is what I am inclined to think, judging by his candid remark with respect to national accounts, a subject which presently dominates the field: "The simultaneous presentation of so many different phases of the same transactions in the form of debits and credits is, to any person not fully conversant with accounting techniques, difficult to follow." From this it will be clear that Professor Studenski's volume does not go beyond the history of national-income estimating and that the history of national accounting still remains to be written.

The book is divided into four parts: I. History; II. Theory and Methodology; III. Estimates for Selected Countries; and IV. Developments in Sixty-six Other Countries. Parts I, II and III cover some 150 pages each and Part IV some fifty pages. The remainder of the volume is taken up by a statistical appendix, some forty pages of footnotes and an index.

Part I starts off with a very instructive chapter on the development of concepts, which actually provides a bird's eye view of the whole development of the subject. This is followed by six chapters reviewing the successive individual estimates in the two pioneering countries, England and France, starting with William Petty's first estimate of 1665, and one lengthy chapter on "three lost Russian estimates of the end of the eighteenth century." In these chapters Studenski sketches the background of the early estimators, explains the circumstances that caused them to make their estimates and tells us how they set about the job. In fact, he does more. He attempts throughout this part of the book to examine each new idea and each new major estimate as it relates to the political, social, economic and cultural conditions, and to the state of development of economics and statistics of its country at that time. This broad conception of the historian's task and the skill with which it is executed make these chapters fascinating reading. This part of the book concludes with two chapters which are devoted to the first developments outside England and France, and the universalisation of national-income estimating in the twentieth century.

In Part II Professor Studenski deals with basic concepts, the area of production, final *vs.* intermediate products, the treatment of government, social accounts, intertemporal and international comparisons and the three

estimating methods: net output, income-distributed and final expenditure. Some of the ideas he expresses in this part are a little outmoded. Thus, for instance, the identification of the results of these three estimating methods with productivity, equitableness of the existing social and economic order, and economic welfare is highly debatable and will find few, if any, supporters to-day. Also on some points I found Professor Studenski distinctly obscure. Thus, for instance, while he starts off with the correct definition of net income from abroad on p. 173, he claims on the same page that it becomes negative "when a country imports more than it exports," and later on, *e.g.*, in the chapter on France, again identifies income from abroad with the export surplus.

Part III, which in a sense carries on the historical survey by describing in more detail the set-up of the estimates and the methods employed in thirteen selected countries, although less readable than the rest of the volume, I found very valuable. The selection is well done. Most estimators will be able to pick up some hints from it. As examples I may mention the heavy reliance on sampling and residual estimating of aggregates in Ireland and the ingenious methods applied by Benham for the West Indies and Malaya and Rao for India, both of whom filled in gaps by making personal inquiries. Also the realisation that the first national-income estimates for countries, which by now are among the most advanced in this field, were extremely crude, may give some encouragement to those still in the initial stages of development. A note of warning should be sounded, lest the reader should think that the state of affairs as described in these chapters reflects the position as it is to-day. This is far from true. National income and national accounting is a lively field. Countries are improving their estimates of the various aggregates very rapidly, and most of them are by now well ahead of the situation of round about 1955 which Professor Studenski describes in these chapters.

Finally Part IV is a most useful source of reference for the many countries not covered in the earlier parts of the volume. Particularly the bibliographies, which cover years prior to those available in the extensive bibliographies of the International Association for Research in Income and Wealth, should prove helpful to the student who wishes to acquaint himself more fully with the development of national-income estimating in one of the countries covered in this part.

This book, which represents a unique contribution to the literature on the subject, can be recommended to all libraries specialising in economics and statistics. One would also like to see it on the shelves of individual scholars, but its high price will presumably deter many from buying it. The publishers might do well to consider issuing Part I separately at a lower price.

Paris.

G. STUVEL

Determinants of Consumer Demand for House Furnishings and Equipment. By V. G. LIPPITT. Harvard Economic Studies, Vol. 110. (Cambridge, Mass.: Harvard University Press (London: Oxford University Press), 1959. Pp. xvi + 172. 48s.)

ONE of the major decisions a demand analyst must take concerns the choice of variables to be included in his analysis. On the one hand, the omission of a variable which has a real influence on demand will at best reduce the predictive power of his analysis and at worst bias his estimates of the influence of other factors; while, on the other, the number of variables whose influence he can measure with any accuracy in time-series analysis is severely limited. However, the danger of bias can be reduced by the injection of the results of a cross-section study into the time-series analysis. The principal concern of Dr. Lippitt's investigation of the determinants of consumer demand for house furnishings and equipment is the integration of these two types of analysis.

The main interest of the study lies in the use of analysis of variance techniques to estimate the influence of income, family composition, occupation and location on the proportion of a family's income which is devoted to furnishings; and in the method by which the results obtained can be aggregated to form a variable suited to time-series analysis. In estimating these effects Dr. Lippitt makes the hypothesis, which is tested and found satisfactory, that they can be treated as additive and independent. Then to combine the effects in aggregate it is only necessary to know the distribution of income by each characteristic separately: knowledge of the joint distribution is not required. For each of six "bench-mark" years income distributions are estimated, and a "combined distributional effect" on the proportion of expenditure is calculated. From this it is easy to obtain an annual series showing the changes in expenditure on furnishings which might have been expected to result from changes in the characteristics of the population.

The distributional series is used as one variable in a time-series analysis in which an equation to predict expenditure on furnishings is developed. An iterative procedure is adopted, the estimates of some parameters being held constant while others are evaluated. Although in the later stages of this iteration only data for the years 1929-41 are used, the final equation gives fairly accurate predictions for the post-war years.

The analysis of variance has one great advantage over regression analysis as an instrument for investigating cross-section data: it permits the data to determine the influence of each variable without any bias from the investigator's preconception of the correct functional relation. This is especially valuable when a non-parametric effect, such as family composition, is being determined, since in this case it is usually impossible to specify a functional relation with any confidence. However, when the effect of a

continuous variable which has been arbitrarily grouped into class intervals is to be considered, the analysis of variance may not be appropriate. For, first, some preconception of regularity is justified—a condition which does not seem to be satisfied by the income effects obtained for clerical workers. (Chart VI (a), p. 48.) Secondly, the analysis of variance is not itself sufficient when it is necessary to extrapolate beyond the range of the available data, a situation which arises with regard to high incomes. In Table 34, for instance, the range of income is extended beyond that previously considered. The income effects for high values have not been entered from Table 28, and there is no indication how they have been obtained. Since the fall in the proportion of total income accruing to families with very high incomes is responsible for two-thirds of the income distributional effect in Table 34, it is somewhat unfortunate that so much is left to the imagination.

The survey data used in the analysis present many problems. An ingenious method is adopted to estimate within-cell variances, and the distribution of the observations is certainly contrary to the theoretical assumptions of the analysis of variance. In these circumstances Dr. Lippitt is careful to support his statistical significance tests with other evidence. Nor is the coverage of the survey really adequate, particularly with regard to young families to whom special treatment is given in the time-series analysis.

In view of the deficiencies of the data, it is unlikely that this book will be of great value as a practical study: its value lies rather in the method by which cross-section variables are included in a time-series analysis. By his use of the analysis of variance the author has drawn attention to a technique which may be of considerable importance in the development of an understanding of consumer demand.

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Elementary Mathematics in Economics. By W. T. DOWSETT. (Nedlands, Western Australia: University of Western Australia Press (London: Pitman), 1959. Pp. xxi + 250. 30s.)

An Introduction to Mathematics for Students of Economics. By J. PARRY LEWIS. (London: Macmillan, 1959. Pp. x + 394. 40s.)

WHAT is the best way for an economics undergraduate to learn elementary mathematics? Experienced teachers are implicitly committed to differing views. Mathematics can be taught briskly and in outline after the steady absorption of economic theory taught in the literary manner over a prolonged period. The student is shown that many elementary mathematical ideas are already in fact reasonably familiar to him, although he has thought of them in a peculiarly economic context without regard to their

nore general applicability. He can acquire insight by being guided from one theoretical problem to another using the same general mathematical groundwork.

The advantage of such an approach is that undue time is not spent dealing with bits of elementary mathematical bookwork that have no obvious relevance to the economist. However, I suspect that the benefits of this kind of treatment are certainly limited to students of high intelligence, and may be restricted to those who possess an innate, even if uncultivated, ability for mathematical thought at the appropriate level. Those for whom the process of learning is a slower, more painful, but no less effective, process are in danger, I think, of being left to limp home alone virtually from the start.

If it is desirable, as I am certain that it is, for those who can benefit from mathematical training to receive it in doses which they can swallow with comparative ease, then we must accept the fact that many students will have to be taught elementary mathematics in a manner which traditionally, at any rate, has been thought more appropriate to school than to university. Such instruction will not suit the impatient, who are reluctant to acquire knowledge that does not possess any immediate or obvious connection with their main field of study. In the long run, however, the man who has pursued a longish course in mathematics in parallel, rather than in series, with his economics may well have acquired the firmer springboard for later profitable work.

The two books listed at the head of this review are both excellent works of their kind. Mr. Dowsett has written for the intelligent and sophisticated economist who wishes to thicken up his mathematics quickly. Mr. Parry Lewis' book is designed for those who want to learn mathematics with a view to its possible use in economics, which presumably they have simultaneously started to study, but who mostly wish to be taught mathematics *as well as* economics. If anything, Mr. Dowsett seems to have made things look easier than they really are, while Mr. Parry Lewis has not been able to resist the temptation to include interesting things which he thinks any educated man ought to know, even if the topics concerned are neither particularly elementary nor of even indirect application to economics.

The two authors have reacted in different ways to an important need. Their differences in treatment will become unnecessary if and when any school boy, who can benefit from further training in mathematics, is provided with such training after "O" level, irrespective of his main field of specialisation.

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The Price Discrimination Law. A review of experience. By CORWIN D. EDWARDS. (Washington, D.C.: The Brookings Institution, 1959 (London: Faber, 1960). Pp. xxii + 698. 72s.)

THERE is no British equivalent of the Robinson-Patman Act "to restore, so far as possible, equality of opportunity in business by strengthening antitrust laws and by protecting trade and commerce against unfair trade practices and unlawful price discrimination." Nor, to the best of my knowledge, is there any serious pressure to create one. Apart from a limited amount of unrest about multiple shops, interest in monopsonistic or monopolistic discrimination is here confined largely to academic specialists in the subject. This being so, many people will be tempted to think that they can safely pass by Professor Edwards' review of American experience; all the more so, in view of the 700 pages which are needed to summarise the findings of his precise and detailed scholarship.

Those who take the easy option will be making a mistake. For I think that his examination of this special case has very important general lessons for all who are concerned with the statutory regulation of economic conditions; whether they are concerned merely to promote such regulation or have the difficult job of administering it. In particular, the book is required reading for anyone who is concerned with the development of restrictive-practices legislation in this country. The fact that perhaps only a lawyer could properly appreciate the nicer points does not gainsay this; indeed, this in itself carries a significant moral.

Many interests are concerned in any piece of statutory regulation; the original promoters, the Government and legislature which bring it into being, the agency which applies it, the judicial body before which it pleads and the parties whose conduct is the subject of regulation. Each interest will have its own ideas of natural justice and economic sense. Hence the question of what a regulation is trying essentially to do does not find an easy answer for either the regulated or the regulator. The first cause of the Robinson-Patman Act was pressure from small distributors for protection against chain stores and the belief that this could best be secured by preventing the chains from securing favourable terms from their suppliers, whatever might be the reason why such terms were granted. But the Act in its outcome has proved to be much more pervasive, with unexpected side-effects, not all of which can have been welcome to those whose efforts brought it into being.

It is no idle metaphor to speak of the living body of the law. Laws do indeed seem to take on a vigorous life of their own, evolving to a maturity very different from their natal state, to a degree which might give cause for reflection to the more enthusiastic protagonists of detailed regulation. Nor can this be attributed simply to the particular prejudices of the agencies which administer them. The Federal Trade Commission, which was

charged with applying and enforcing the Robinson-Patman Act, had to take the strategic decisions about what to prosecute and on what grounds; and doubtless its decisions were influenced by its own views on the general philosophy of anti-trust and the more mundane administrative consideration of not making life too difficult for itself. But it had to have regard also to the intent of Congress, the language of the Statute, general and changing public attitudes, and, not least, judicial tradition. Perhaps I betray only the innocence of an economist in being surprised by the judgment of the Fifth Circuit Court in the Webb-Crawford case. It is nevertheless a striking illustration of the power of the Courts to mould a new law in their own image. "The punctuation as published is confusing," they said, "We think the true meaning is better indicated by taking the comma out after 'thereof,' and inserting it after 'rendered.' Commas are not to be suffered to defeat the legislative meaning."

It is too early in the history of the Restrictive Practices legislation here to be able to generalise about how the Registrar and the Courts are approaching their problem. But Professor Edwards' analysis provides a sobering warning against any belief that all is over bar the shouting.

Indeed, his account suggests that it might be very dangerous if this were so. He comments on the infrequency with which the Commission's complaints have resulted in judicial decisions and points out that this has reduced the pressure on it for clarity, accuracy and substantive adequacy in its findings and orders.

"The judicial process is based on the presumption that substantial justice will emerge from the clash of opposing contentions. Where that clash has been sporadic, as in proceedings under the Robinson-Patman Act, it is not surprising that the findings and orders have been sometimes vague, sometimes perfunctory, and sometimes unusually broad in scope. The Commission has been forced to substitute for the pressures of litigation a control exercised through its own administrative processes of surveillance and review. The decisions justify doubt that these processes have been adequate to the task that has been imposed on them."

There are stronger reasons than the material interests of lawyers and expert witnesses for wishing a long and active life for the Restrictive Practices Court.

There is food for thought also in Professor Edwards' remarks about the infrequency of efforts to ascertain the extent of compliance with the Commission's orders and the effectiveness of those orders in accomplishing their intended results. This is a problem which has arisen already from the activities of the Monopolies Commission, and it may assume increasing importance as the law on Restrictive Practices becomes better defined. In all departments of social affairs the effectiveness of regulation depends ultimately on public acceptance of the virtue of the regulation and the

development of some sense of shame at being found in breach of the law. It remains to be seen how far public attitudes on the issues covered by legislation about competition will develop in the required direction.

After dealing with the legislative history of the Robinson-Patman Act, Professor Edwards goes on to a systematic and detailed examination, on a case-by-case basis, of the application of its injunctions against brokerage, the requirement of proportionality in payments and services, quantity, volume and functional discounts, and the attempts to justify price differences on cost grounds. His extensive discussion of territorial discrimination and the Robinson-Patman Act is set in its proper context, as only one element in the complicated basing-point controversy which ranged well beyond this particular Act. The book ends with an appraisal of the effectiveness of the Act as a whole. Professor Edwards' conclusion is that its benefits in fostering competition on balance have probably outweighed the disadvantages of its side effects, but that the balance of advantage could be tilted much more decisively by amendments to the Statute which he suggests.

I would not be so bold as to challenge Professor Edwards' judgment. But I must say that this examination of American experience is unlikely to inspire people with a degree of enthusiasm, for either stopping discrimination which damages competition or preserving equality of opportunity in the market for goods, sufficient to move them to missionary work in the United Kingdom. Doubtless, a certain amount of pettifogging interference is inherent in all regulation, and we need not take it too tragically that, as an unexpected by-product of the Act, Elizabeth Arden lost her freedom of choice in stationing "cosmeticians," or Luxor its freedom to sell cosmetics in 10-cent packages. Nevertheless, Professor Edwards has displayed a daunting vista for any would-be regulator.

To suggest that it will make few converts is not to condemn but to commend this book. It is a genuine and serious question for consideration in any particular case, and one perhaps insufficiently recognised by academic observers, whether the benefits which may be expected to flow directly from Government regulation of a particular activity will or will not be outweighed by the damage flowing from side-effects which may be as unavoidable as they are unintended. Professor Edwards' whole discussion illuminates this central question in a most penetrating fashion. I may perhaps display some professional bias in commending as the most distinctive feature of his book the extremely practical spirit in which the subject is approached and the wide administrative experience which informs it. Be that as it may, if his book does no more than bring home to its readers both the importance and the difficulty of knowing precisely what you want to do, and of being as sure as human fallibility will allow that the action you propose will do just that and no more, he will have performed a very valuable service.

JACK DOWNIE

London.

The Corporation in Modern Society. Edited by E. S. MASON. (Cambridge, Mass.: Harvard University Press, 1959 (London: Oxford University Press, 1960). Pp. xv + 335. 54s.)

AMERICAN economists are fortunate in having colleagues in political science and law who are interested in the economic aspect of industry and, in particular, business organisations. In this study of the large company ("so much our most important economic institution" as Professor Mason says on the very first page), two political scientists, Professors Latham and Long, and three lawyers, Professors Chayes, Brewster and Eugene Rostow, co-operate with four economists, two professors of business administration and one of social research, in almost a model ensemble. The plan of co-operation is most admirably set forth by Professor Mason; and his fellow economists Professors Kaysen and Schmookler deal respectively with "How Much Power? What Scope?" the Corporations possess and "Technological Progress and the Modern American Corporation." Professor Schmookler sums up comprehensively on the amounts spent in research and development by corporations of various sizes. He thinks "the corporation, not the woodshed or basement, has become the major seedbed where new ideas sprout" (p. 165), but he quotes figures (pp. 161-3) to show that it is not necessarily the largest corporations that spend the highest proportion of their assets or sales on research and development.

Co-operation does not entail agreement, and there is a refreshing argument between Professor Lintner, of the Harvard School of Business Administration, and Mr. Berle (the lawyer), who writes a foreword. Professor Lintner indeed attacks the main positions of the very book which in 1932 initiated this line of study—Berle and Means' *Modern Corporation and Private Properties*. In his chapter on the "Financing of Corporations" Professor Lintner makes so bold as to question (pp. 170-1) Berle and Means' "three basic propositions. The first affirmed increasing concentration in the economic and financial structure of the American economy. The second emphasized progressive separation of control from ownership in nonfinancial corporations and . . . power . . . free from shareholders' influence. . . . The third . . . asserted major changes in corporate behavior and performance," particularly lower dividend payments. It is a pity that Gardiner Means does not contribute any chapter in this book, particularly since the facts are now much more accessible than in 1932. But in any case the majority of contributors to this book seem to assume that the last two propositions are valid. In England certainly, the trend seems to have gone more according to Berle and Means than according to Lintner. It is true that Evelyn and Little have shown in commendable detail that almost as many industries experienced between 1935 and 1951 a fall as a rise in the largest firms' concentration of output. But, on the other hand, the large companies' assets appear to have risen more than the smaller companies'; within the

company the proportion of votes held by the largest twenty holders has diminished, and with it, presumably, the controlling influence of such concentrated ownership, and the proportion of profits paid out in dividends fell heavily about 1947, and has on the whole stayed down when compared with the pre-war period. In England, if not America, a managerial evolution, at least, seems on the way.

This controversy over the manager's independence raises the question of the mobility, provenance and training of managers and their outlook, and it is here that social research is called upon to co-operate. Professor Lloyd Warner, in his chapter on the "Corporation Man," compares his findings with those of Taussig and Joslyn a generation earlier. He points (p. 110) to the "enormous increase in the proportion of executives of big business who attended college" and holds this increase to contradict the current thesis of organisation man, "the corporation robot." This view seems to put a somewhat inflated value on what a university, let alone an American college, does for a man's character!

If managers are not entirely independent the question arises in whose interest they should work: the shareholders; their employees; or perhaps the consumer and the general community. Usefully different answers again appear in these pages; this time varying between lawyer and lawyer. Professor Rostow sticks to the manager's responsibility to the shareholders; obviously maximisation of profits to capital is otherwise meaningless as an objective. But Professor Chayes argues for the work-force as "a constituency of the corporation, requiring representation in its government" (p. 43). Professor Norton Long deals with the interests of the local communities in which Corporations maintain factories, and Professor Brewster thinks of corporations as sub-sovereigns to be federated into the general government of the country. His chapter is a sketch for a political science applied, as I have long hoped it would be, to economic institutions and organisations, and he makes fruitful use of political concepts, for instance that the corporation is as a rule a one-party state which, with its proxy voting, shows a refinement of machine politics. The exception to the rule occurs as a take-over bid looms up, when the electorate organised in two parties may overturn the legislative directorate. Certainly the problems of representative government, bureaucracy, decentralisation and the succession are all immensely important to the economic efficiency of the large company, and more help should be looked for from a political science accustomed to tackling these problems elsewhere. It is even possible, and useful, to think with Professor Brewster of trade unions as a Second House modifying the Board's legislation. The arena of conflict between trade unions and corporation is considered in a separate chapter by Neil Chamberlain.

International interests are catered for in the last three chapters. Raymond Vernon writes on the "American Corporation in Underdeveloped Areas," C. A. R. Crosland on the "Private and Public Corporation in Great

Britain" and Professor Gerschenkron on "Industrial Enterprise in Russia Mr. Crosland rightly stresses the newly acquired sensitivity of the English business-man to public opinion and the pressure government can bring bear (p. 263) since "the 'Old-Boy net' operates strongly between industry and Whitehall." Nationalisation, he concludes, should be kept as a reserve power of last resort, and he quotes from the Labour Party's *Industry and Society* that "under increasingly professional managements large firms as a whole serving the nation well." The Party, however, did not have much enlightened evidence to go on. Let us hope that an enlightened book of this sort will, sooner rather than later, be written for this country.

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Principles for British Agricultural Policy. Edited by H. T. WILLIAMS. (London: Oxford University Press for the Nuffield Foundation, 1960. Pp. xiii + 317. 18s.)

THIS book has suffered from too long a gestation period and too many authors. It began by the Nuffield Foundation deciding in 1945 that it would be useful to look deeply into the facts of British agriculture, and bringing together a group of experts representing farming, agricultural science, sociology and economics, and human nutrition to direct the investigation. In January 1948 the late Mr. T. Eastwood was appointed to collect information, to compile the records of the committee's discussions and to prepare drafts for discussion by the committee. His first draft was completed when he gave up this work on October 1951, and it was not until July 1956 that Mr. H. T. Williams undertook to prepare the report for publication. The final form is his work, undertaken in consultation with the chairman of the committee, Sir Frank Engledow; the remaining members of the committee saw the final report only in proof and were not asked to give their assent to it.

Thus the first draft was prepared when food was short and when the case for an agriculture which could expand to feed more of this country's population in time of war appeared stronger than it does now. Both the change in the world demand and supply situation and the changed strategic outlook due to the development of thermo-nuclear weapons are allowed for in parts of the report. But only, it seems to me, in parts. Other parts still read as though they were based on the world as it appeared before 1951. The Summary, basically, does not. I say basically; for I feel the strategic arguments for a more flexible agriculture are overstressed even there.

The aim of the committee was "not to advocate policy" but "to adduce a body of principles on which long-term policy might be based for such use of the land as would serve the enduring general interest of the country. These principles it was decided should be derived from a study

of economics, agricultural science and practice, nutritional science, military strategy and sociology" (p. v).

Apart from a brief summing up, the book is divided into parts dealing with principles of policy derived from each of these disciplines, except from economics. (Nutrition has only a chapter.) For principles based on economics are substituted principles derived from, in Part I, an historical review and, in Part V, the demand and supply of farm products. These, particularly Part I, are the least satisfactory parts of the book. Part I is unfortunately riddled with inaccuracies. Thus, on p. 15 it is said of the Greene Committee set up in 1934 to inquire into the condition of the sugar industry in the United Kingdom that "some members were for the abandonment of the subsidy, some for its gradual elimination over a period of three years . . . and others for a continuance of the subsidy." In fact, the Committee had three members, not three views; the Chairman and one of his colleagues took, together, the second of the views set out above; the remaining member took the third of them. Again, it is surely controversial whether, on balance, "the marketing schemes . . . resulted in some rationalization of distribution" (p. 18). What is the evidence for the statement that "in 1840 almost the whole of Britain's food supply was home produced" (p. 32)? More serious, the tables of production and net output in the United Kingdom on pp. 24 and 26 give no indication that the United Kingdom included Eire up to and including 1920-22 and excluded it from 1926 to 1929. (The source of the figures, E. M. Ojala, allows a break in his tables, as this Report does not.) Consequently the conclusions in several places on the movement of output are erroneous. And does post-war experience really suggest "that it is easier to stimulate general rather than selective expansion of production" (p. 68)? When price incentives were adjusted sufficiently selective expansion was surely secured.

Part V is sketchy and inconclusive. It could not have been definitive; but surely rather more could have been made of probable movements in population and in the terms of trade.

I am not complaining that no principles for policy were derived from economics alone. For economic principles, without the facts provided by the other disciplines, can only give very general principles. I feel, however, that economic factors could, throughout the book, have been given more weight and treated rather more adequately than they are. Too many views are mentioned, without being sufficiently digested.

The longest section (128 pages out of a total 307) deals with the principles for agricultural policy deriving from agricultural science and farming experience, and reaches the clearest conclusion, that "as a measure for adaptation to the physical conditions of this country, to its economic circumstances and its nutritive needs, a system of mixed farming, particularly ley farming, has substantial advantages" (p. 196). This is, indeed, the keynote of the book, and is made convincingly.

The other main point dealt with in this section is the possibility of increasing output and the effect of so doing on agricultural efficiency. This is a difficult subject, to which the report does not fully attempt an answer but presents some calculations, which, when put together in the summary and conclusions to this section (pp. 197-8), seem somewhat like adding apples to oranges. For it is calculated, first, that to change to ley farming should increase the output of agriculture (in terms of the energy value of the product if fed to animals) by about 8 or 9%, worth about £113 million to farmers at the 1955-56 level of purchased feed prices. These were unsubsidised world prices. Secondly, it is guessed (for the report very rightly emphasised that no more than a guess can here be made) that to apply the best-known methods of improving farming practice might increase output by 30%, or about £400 million. But this calculation is based on farm sales at subsidised prices—and subsidies on commodities in 1955-56 amounted to about £175 million and production grants to close on £60 million. One should at least take off 30% of £175 million, or just over £50 million, from the £400 million to compare with the first calculation. In fact, the two are added together to produce a possible increase in output of £500 million, or, it is said, rather more than 35% above recent levels. It is emphasised that this is a "potential increase arrived at on purely agricultural and scientific grounds. It does not take into account the implications of such an increase on price and marketing problems or the problem of capital requirements, and so on." What, then, is its value?

At times the report seems to assume that British agriculture should be at least as large as at present, though in the summing-up it is stated that the report does not presume to give an answer to this question (p. 303). In Part III, on principles derived from a review of farming life (the sociological section), an interesting and sensible section, no case is made out for special help on these grounds; and in Chapter XXVII no special claim is made for it on nutritional grounds. The special case for assistance, in the summing-up, is said to rest on strategic grounds, though "the report does not attempt to judge whether the present level is above, at, or below the level that strategy seems to require" (p. 303). As I have already suggested, this case now seems to me weak.

The real case for a flexible agriculture, as the report points out, is the danger of the terms of trade moving against us.

"The principle that emerges is that if quick expansion is to be achieved in times of emergency, there should always be enough skilled farmers employing properly equipped and experienced workers capable of producing what cannot be imported from land that has been kept in good heart. What this means in the simplest terms is that land that is worth ploughing should be ploughed regularly" (pp. 304-5).

True, but, as indeed the report generally recognises, rather vague.

I have touched only on a few of the points raised in this somewhat

episodic book. I wish that time had really been allowed to bring the different points together and to bring out more fully the basic economic considerations which should guide policy.

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Agricultural Marketing Policies. By G. R. ALLEN. (Oxford: Blackwell, 1959. Pp. xii + 336. 42s.)

THIS is not, as might be concluded from the title, a comprehensive study, from the economic point of view, of public policies in agricultural marketing. Its avowed purpose is, rather, to "record the results of original study into meat and fruit and vegetable marketing." This being so, it consists largely of a series of statistical and analytical treatments of specific fields of marketing, linked together by theoretical discussions of the economic principles affecting public policy in relation to two main sets of marketing problems: the elimination or reduction of economic uncertainty and the limitation of costs.

This method of approach inevitably leads to a somewhat unbalanced, partial and untidy treatment of the subject, in spite of (or perhaps, to some extent, because of) an attempt to tie up loose ends and rectify omissions by means of a concluding chapter, into which, as into a kind of rag-bag, such topics are lumped as the operation of Agricultural Marketing Boards in Great Britain and the provision of market intelligence. The specific aspects of marketing in operation which are selected for study are not always particularly relevant to the discussions of theoretical principles which they are presumably intended to illustrate. There are important omissions, to some of which the author refers in the opening chapter. For example, the relationship between price-support policy and agricultural marketing methods is largely ignored, as are also the efforts by Governmental and other semi-public agencies to influence demand for agricultural produce by propaganda; even in his brief description of the activities of the Milk Marketing Board, the author appears to be oblivious of the Board's efforts to induce him to "Drink a Pinta Milka Day."

As regards those topics to which substantial attention is devoted, a good deal of important material is sometimes neglected. Although the chapter on fatstock marketing, for example, contains fairly lengthy discussions of the possibilities of direct marketing from farm to slaughterhouse and of the structure of the abattoir industry in Great Britain, there is no reference to the war-time experience of the Ministry of Food, which drastically altered pre-war practice in both these fields. This same chapter, on the other hand, devotes as much as ten pages to the relatively minor topic of live versus dead-weight grading of fatstock. One cannot help feeling that the contents of the book were too largely dictated by the material which happened to be already available to the author.

A considerable amount of statistical and graphical material is presented which will be of value to specialist students. Here and there, however, the author seems to be endeavouring to answer by means of global statistics questions which can only be satisfactorily solved by *ad hoc* investigations in the field. A typical example is the attempt to estimate the present extent of unnecessary reconsignment of horticultural produce between wholesalers in this country by comparing the total value of wholesalers' purchases, as given in the Census of Distribution, with a theoretical estimate of what their purchases should have been, arrived at by doubling the value of imports (on the assumption that, on average, imported produce needs to be reconsigned once), and adding on the probable value of purchases of home produce plus estimates of certain wholesale distribution costs. The author himself recognises the weakness of this particular use of statistics containing very wide margins of error, and one is therefore left wondering why he felt it worth while to include such a shaky calculation.

In his conclusions regarding public policy towards agricultural marketing Mr. Allen, in general—and probably rightly—favours measures designed to encourage rather than to limit competition. Where his proposals involve the exercise of controls, however, they do not always show a sense of what would be politically acceptable, nor does he always face up to the practical difficulties of putting them into operation. With regard to potatoes, for example, he develops a theory—not strongly confirmed by the statistical data he gives—of a two-yearly yield cycle, and is prepared to back this theory to the extent of recommending that the Potato Marketing Board should replace its present method of regulating supplies marketed by means of minimum riddle sizes by a system of control of the acreage planted, in the light of forecasts of the probable national yield. The record of attempts to control production in agriculture is, of course, one of almost unredeemed failure; and one would hardly expect the Potato Board to commit suicide by trying to carry out such a policy on the basis of advance estimates of yield made even before the crop was sown. It is particularly unfortunate that the season immediately following that in which this proposal was originally made, 1958, which, according to the two-year cycle theory, should have been one of surplus production, turned out to be the very opposite, with short supplies and prices considerably above average. In view of this, Mr. Allen is surely a little unfair in castigating the Board as he does for “dodging all responsibility for stabilizing gross production.”

Existing text-books on agricultural marketing are, in many cases, so largely descriptive and concentrate so much on technical efficiency that one which sets out, as this book does, to apply economic principles to agricultural marketing problems is a welcome addition to the literature on the subject. But one could wish that, in some respects, the results had been a little more convincing.

C. H. BLAGBURN

Reading.

Farm Rents. A comparison of current and past farm rents in England and Wales.
By D. R. DENMAN and V. F. STEWART. (London: Allen & Unwin, 1959. Pp. 206. 27s. 6d.)

THIS book presents the results of a survey of farm rents in England and Wales carried out by the Cambridge Department of Estate Management between 1956 and 1958. It covers a sample of over 10% of all tenanted holdings of 15 acres and above, and provides the fullest information on this topic which has been available since the War. Apart from a slight bias towards the inclusion of larger farms, the sample is a representative one. The presentation is exclusively factual and could usefully be supplemented by J. T. Ward's study, *Farm Rents and Tenure*, which is more concerned with assessing the significance of the present situation.

The survey is of particular value in providing some hard facts about the results of different methods of determining rents, and, in particular, of the arbitration procedure between a landlord and his sitting tenant. (These effects can be expected to change as the provisions of the 1958 Agriculture Act become operative, since arbitrators are now instructed to assess a rent “properly payable” by the criteria of the free market.) The study was based on holdings rather than estates, since our knowledge of the distribution of estates is inadequate for the selection of a representative sample. The disadvantage of this method is that landlords' expenses are commonly expressed in estate totals, so that only on an estate basis can we obtain information on landlords' *net* returns. A further deficiency of the survey, of which the authors perhaps make unduly light, is that it ignores any informal agreements as to the incidence of expenditure on maintenance and repairs. The traditional apportionment of responsibility between landlord and tenant appears to be changing rapidly; in the Eastern Counties, for example, tenants' expenditure per acre on drainage and building seems to have averaged over five times the pre-war figure, at constant prices, in 1957. It would have been of great interest to know the extent and effects of changes of this type.

The relative decline of the landlord's reward since pre-war is a well-known phenomenon, and its consequences have been much discussed. The *net* return on landlords' investment in 1957 has been estimated as 2½%, and while net income from farming rose by 461% between 1938 and 1957, rents rose by only 83%. Certainly the movement towards owner-occupancy has proceeded apace since the War, and by 1956 about 44% of farms of 15 acres and above were farmed by their owners. The decline of rents in the farming income cannot, however, be attributed solely to war-time regulations and post-war legislation, since it is both a long-term and a world-wide phenomenon. As agriculture makes technical progress both land and buildings contribute relatively less to the final product, and much more of the recent increase in farm incomes is due to the investment of “tenant's” than of

"landlord's" capital. Farmers' expenditure on fertiliser alone is, in Britain, now higher than the total payments imputed as rent and interest combined. Although the higher level of rents which we may now expect will blunt the land-owner's incentive to sell, it will sharpen the tenant's incentive to buy, and he will often be helped to do so by capital accumulated during the long period of low rents. It is by no means certain, therefore, that the movement out of tenancy will be checked and, well as our traditional system of tenure has served us in the past, this is a tendency not necessarily to be deplored. Requirements of tenant's capital per acre are already so high as to be a formidable barrier to entry into farming, and the problem of the able potential entrant can perhaps no longer be solved by reliance on a tenurial system suited to an earlier technological age.

A few of the major conclusions of the survey are: average rent per acre was 38s. 9d. in 1957, varying from 69s. 2d. for market gardens to 12s. 2d. for upland mixed livestock holdings; since 1945 rents have increased most on arable farms, least on grassland; both size and type of farm affect rents, but the method of rent determination has been a stronger influence than either; "open market" rents have been on average some 11% higher than those negotiated with sitting tenants and nearly 14% higher than those assessed by arbitration; in under 4% of the negotiations to which the arbitration procedure was applicable was it actually invoked; variations in rent between counties are greater than can be explained by differences in farm size, type or equipment—perhaps emphasising the extent to which the determination of agricultural rents is influenced by a concept of "the just price." The full results are presented in great detail and with statistical rigour, and the authors manage to combine compactness with elegance in their presentation.

ANNE MARTIN

London School of Economics.

Agriculture and Urban Growth. A study of the competition for rural land. By G. P. WIBBERLEY. (London: Michael Joseph, 1960. Pp. 240. 21s.)

THE steady loss of agricultural land in this century, mostly to urban uses, is a problem which arouses much topical comment, generally anxious rather than informed. Dr. Wibberley would earn our gratitude for his detailed description of the size and nature of the problem alone. While mercilessly exposing the inadequacies of the statistics of British land use, he shows great ingenuity in using the existing data to present a more complete overall picture than any which was available before.

About four-fifths of the total land area of Britain are still in agricultural use, and between 1900 and 1950 the loss of farmland has been only 7% of its total, over three-quarters of this having been usurped by urban uses. The problem is, therefore, smaller than visual impression might suggest, although agricultural land diverted to urban use tends to be of above-

average productivity. The author expects the further loss to agriculture between 1950 and 1970 to be from 500,000 to 700,000 acres, *i.e.*, at most 2.3% of the total agricultural area of 1950. Detailed and interesting figures of non-agricultural land use are also given, and it is striking that, for example, about one-fifth of all urban land is devoted to the provision of open space, excluding private gardens.

The author considers that something like the present volume of British agricultural output is likely to be also the desirable level for the future. He is not, then, unduly concerned over the absolute size of the probable loss of land to agriculture, considering that this is likely to be compensated by increased productivity per acre. (The increase necessary over twenty years is of the order of £1 net output per acre, or about 4% of to-day's net output.) The emphasis of the book, therefore, is rather on the discussion of the least costly way to satisfy urban demands than on the broader issue of whether the sum of these demands should be resisted. The present methods of assessing the merits of competing claims for land, under the Town and Country Planning Act, appear to be thoroughly unsatisfactory from the economist's point of view, and, in particular, to make no use of the concept of opportunity costs. The author suggests a method whereby a decision might be made between different sites which have differing values to agriculture but are each suitable for urban development. This consists in comparing the net agricultural product of the sites concerned, finding the difference between their capitalised value and comparing this with the difference between the costs of developing the urban use in each case. (In general, poorer agricultural land involves higher urban development costs.) The case is put for using a low rate of interest to convert the annual agricultural output to a capital sum. Perhaps this case can best stand on the grounds that a change of land to urban use is irreversible; and that this method of calculation is a safeguard lest some of our judgments about the needs of the near future should turn out to be inappropriate on a longer view. Detailed examples of the use of the suggested method are given (pp. 92-100 and 202-14). Ideally, of course, one would wish also to make some comparison of the "productivities" of the different sites in urban use and, although this is obviously difficult, Dr. Wibberley perhaps treats this aspect a little cavalierly. Where, for instance, one urban site would involve higher transport costs to its residents than another, this difference should surely also be taken into account.

Nearly half the book consists in a detailed discussion of the various possible methods of replacing the production of the acreage which agriculture will lose. These are treated under the main headings of replacement from abroad, from the domestic garden, from new and improved land in hill areas, and from new and improved land in lowland areas. Much information is presented on the costs and likely results of different kinds of land reclamation and improvement. One interesting conclusion is that,

assuming an urban density of twelve houses to the acre, the value of domestic food production amounts to some £12 wholesale, or £21 retail, per urban acre. In comparing the merits of different methods of food replacement, the author stresses the great advantages of adding new land to existing farms rather than creating new ones. He considers that to invest in additional agricultural land which can be incorporated in an existing farm may often be more rewarding than to intensify production on the existing acreage, because of the greater demands which the latter method makes on the severely limiting factor of the farmer's managerial skill.

This book contains a great amount of relevant information, much of it the result of the author's own research or that done under his direction; although its presentation is somewhat unwieldy, it is of the greatest value to anyone concerned with the question of competing uses for Britain's land.

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The Strategy of Economic Development. By A. O. HIRSCHMAN. (New Haven, Connecticut: Yale University Press (London: Oxford University Press), 1958. Pp. xiii + 217. 36s.)

The Struggle for a Higher Standard of Living: The Problem of the Underdeveloped Countries. By W. BRAND. (Glencoe, Illinois: The Free Press; The Hague: W. Van Hoeve, 1958. Pp. ix + 438. \$7.50.)

✓ *Public Enterprise and Economic Development.* By A. H. HANSON. (London: Routledge & Kegan Paul, 1959. Pp. xiv + 485. 42s.)

ONE of the more efficient methods of teaching a man how to swim is to throw him into water so that he may learn the technique in a desperate attempt to save his life. What looks like an immediate peril may, thus, contribute to one's long-run development. If we translate all this into economics we get one of the main themes of Professor Albert O. Hirschman's extremely interesting book on the strategy of economic development. In his system even the growth of population pressure is creative; its effect on living standards "will lead to counterpressure . . . to activity designed to maintain or restore the traditional standard of living of the community," which will cause "an increase in its ability to control its environment and to organize itself for development," and "the community will now be able to exploit the opportunities for economic growth that existed previously but were left unutilized" (p. 177).

Economic growth, Professor Hirschman argues, is not a smooth process, and an attempt to make it smooth and balanced might, in fact, reduce the possibilities of growth. People act in response to disequilibria. (Entrepreneurial action resulting from the creation of a high profit opportunity is a special case of this type of response.) In choosing strategies for economic development one should choose those policies that lead, through the creation of disequilibria, to an expansion of the scope for further economic action.

Professor Hirschman applies this basic strategy to different spheres of policy-making.

Professor Hirschman is particularly critical of the well-known doctrine of balanced growth," which claims that a simultaneous and balanced expansion of the different branches of the economy is necessary for economic development. Not merely does he "heartily disagree" with the "balanced-growth" doctrine; "it was the experience of finding myself instinctively so much at variance with this theory that made me aware of having acquired a distinct outlook on development problems" (p. 50). Professor Hirschman holds that the creation of imbalances provides opportunities for economic action, opens up further possibilities of investment and in general stimulates economic growth. Far from wanting a "balanced" dose of investment, he recommends the creation of planned imbalances.

Controversies on "balanced" versus "unbalanced" growth tend to leave our readers—at least, one reader—a little puzzled. Put in their native terms, both the doctrines look right; examined from the other's point of view, each looks totally inadequate. In sorting out the issues involved in this debate, two considerations strike me as important. First, the "balanced" and the "unbalanced" growth doctrines have a considerable amount of common ground, which becomes clear when they are contrasted with certain other approaches. If economic activities in different branches were independent of each other, then both the "balanced" and the "unbalanced" growth doctrines would collapse. On the one hand, it will not be necessary to develop sectors B, C and D for the expansion of sector A, thus contradicting the theorem of "balanced" growth. On the other hand, an unmatched growth of sector A will not set any force in action to lead the expansion of sectors B, C or D. In this situation it will be possible to have "unbalanced" growth, but there will be no particular advantage from it. Thus, both the "balanced" and the "unbalanced" growth doctrines are based on the assumption of complementarity between different branches of economic activity, and in this respect both differ from the traditional assumptions of "partial" analysis. The contrast between the two seems to lie in the degree of interdependence they assume. We can illustrate this by taking a particular example of interdependence, say, that of supply. Motor-car production requires steel. If it is assumed that it is impossible, or very uneconomic, to produce motor cars without domestic production of the required quantity of steel, then we recommend balanced and simultaneous growth of the two. If, however, we assume that the production of motor cars can be started with imported steel, but once it starts there will be considerable incentive for the growth of steel production within the economy, then we come closer to Hirschman's position. Thus, both the doctrines assume interdependence, but of different degrees. As far as this aspect of the controversy is concerned, the answer will, therefore, depend on the actual extent of the rigidity of technical and economic interdependence.

A second difference can be observed in their assumptions regarding the scarcity of productive resources. The traditional approach is to take a certain supply of resources as *given*, and to discuss how to allocate them in the most efficient manner. Professor Hirschman, on the other hand, assumes that the supply of resources will vary with the "inducement mechanisms." He does not, therefore, worry about the problems of inflation, or of balance of payments, arising from a high level of induced investment and activity, for he assumes a high elasticity of the supply of productive factors with respect to economic incentives. This emphasis on the variability of the supply of productive factors seems to me to be an important criticism of traditional thought in this field. One cannot, however, help feeling that Professor Hirschman is overstating his case, and that the limits of productive capital equipment and of foreign exchanges deserve more attention than he seems prepared to give. Professor Hirschman himself seems to recognise this overemphasis (see p. 208), but retains it, perhaps as a piece of "planned imbalance." I have no doubt that this is how economic thought progresses: we discover a hitherto concealed aspect of the problem, and make it the *essence*, if not the *whole*, of the problem. Judging the book in this perspective it is undoubtedly an extremely valuable contribution to the subject.

We have no space here to discuss the many policy problems that are studied in the book. I shall refer only to two specific observations made by Professor Hirschman that seem to me to deserve a good deal of attention. First, the choice of a high or low average degree of capital-intensity of investment arising from the selection of the pattern of products is to be distinguished from the choice of capital-intensity within a sector. In many discussions on the subject the former problem seems to be identified with the latter, and the case for a low degree of capital-intensity arrived from a one-commodity model is applied to the choice of the *pattern* of output. As Professor Hirschman points out, "the most efficient use of capital in underdeveloped countries is not in capital-intensive industries *qua* capital-intensive; it is in industries that open new product horizons for the economy and these industries are likely to be more capital-intensive . . ." (p. 131).

Another important section consists in a comparison of production and administration. The clear-cut manner in which a production target can be formulated, and the existence of objective tests of success, mean that poor performance can be immediately checked and penalised. The same cannot be said of administrative tasks, which makes them inherently more difficult than actual production.

"Seldom is it realized [writes Professor Hirschman] that these [administrative] processes are intrinsically harder to master than production jobs. On the contrary, amazement is expressed that a country pretends to set up modern industries when basic problems of public administration have not yet been solved. But this is only one of the many instances where what seems a cart-before-the-horse sequence

turns out to be the efficient one in underdeveloped countries: efficient public administrators, admittedly so much needed, can perhaps best be trained in the arts of management by being first exposed to the powerful 'teaching aids' which are standard equipment in any industrial production process" (pp. 154-5).

In view of the popularity of the orthodox argument that Professor Hirschman criticises here, this observation deserves considerable attention. Throughout the book, Professor Hirschman's obvious experience of practical problems (mainly in Latin America) provides an insight that is extremely rare in this cliché-ridden branch of economics. This is indeed a very important contribution to the theory of economic development.

The Struggle for a Higher Standard of Living is a somewhat modified version of a study published in Dutch in October 1954 by Professor W. Brand of the University of Leyden. The book "attempts to give a comprehensive review of the many aspects of the problem of development in the economically backward countries" (p. v). This is a formidable task, but Professor Brand succeeds in summarising the existing literature almost exhaustively, and a very long list of economists are quoted to express all possible views that can be quoted on the subject. The first part deals with "the process of economic development," the second with "domestic financial resources" and the last with "international financial resources." It should not be assumed from the last two names that Professor Brand commits the not uncommon mistake of identifying a scarcity of means of production with the scarcity of finance. In fact, when Professor Brand says "financial resources" he seems to mean no more than "resources"; only he prefers to talk in terms of "the stream of money" that is "parallel to the stream of goods and services" (p. 141).

Professor Brand is *not* an extremist. Given an opportunity, he recognises elements of truth in all types of theories. This makes his book fair, useful and rather unobjectionable. Unlike Professor Hirschman, who usually quotes to refute, Professor Brand tends, by and large, to approve of the literature he reviews with so much care in his 438 pages and 668 foot-notes. One of the few exceptions is his spirited refutation of J. Romein's theory of the "handicap of an early start." Professor Brand adds, however, that what he says "is not to deny that there is a kernel of truth hidden in Romein's trend of thought." (The expression actually used is "kennel of truth" (p. 80), which, with some hesitation, I take as a misprint.)

Professor Brand's treatment of the problem is not unconventional. (Part I includes four chapters on "Land," "Capital," "Labour" and "Leadership and Organization.") He does not pretend to provide a new theory of economic development, and, indeed, does not provide anything like that. Looked at in the light of the professed intention of the work, it is an evident success.

Public Enterprise and Economic Development is a much more ambitious book. It is described by its publisher as "the first full-scale attempt to define the

ways in which [public enterprise] may be used and to discuss the problems of its organization in the context of 'underdevelopment.' " In the first part of the book the problems of fostering economic growth are discussed with general observations on the role of public enterprises. In the second, specific problems of organisation and control are studied. Mr. Hanson quotes conflicting views on almost all the questions, and in the light of the data he quotes, he gives his support for one side, or the other, or withholds it altogether. There is a wealth of material in the book, especially in the comparative study of Turkey, Mexico and India. Mr. Hanson leaves out the Communist countries from his study, which restricts the variety of public enterprise discussed in this book. He shows, however, that there are significant differences between the role of public enterprises in the different parts of the non-Communist world.

Though nothing very new is said in the first part, the different aspects of the problem of economic development are discussed with considerable lucidity. However, the second part of the book is the more interesting. It provides a very useful study of the working of public enterprises in various parts of the world. Mr. Hanson is really at his best when he discusses the *details* of organisation. In a field where vague generalisations are so much in vogue, it is refreshing to find a book that actually goes into specific organisational questions that public enterprises involve. This preoccupation with the details means, however, that the interesting question posed at the end of Part I of the book, a discussion on which is promised, is not given any general answer. "Can the government," Mr. Hanson had asked, "substitute for the private entrepreneur, either generally or in certain fields which the latter is reluctant to enter?" While we are given a lot of information on the factors that affect "the government's capacity to cope with certain structural and organisational problems," the author does not answer the question directly. In fact, no general picture seems to emerge from his study, and what we have is a series of propositions on a number of separate aspects of public enterprises. This should not, however, be held against the author, for those propositions are valuable.

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Capital Imports into Sterling Countries. By A. R. CONAN. (London: Macmillan, 1960. Pp. x + 107. 18s.)

MR. CONAN has now published in detail the results of his study of post-war investment in the sterling Commonwealth, a pre-view of which he gave several years ago in the Princeton series of Essays in International Finance. The statistics are of public and private long-term capital. Only incidental reference is made to donations and to drawings on external assets. The book

does not claim, therefore, to be a full survey of sterling-area finance. It deals with one important part of the whole.

Investigation of the direction and volume of the flow of capital leads to the conclusion that it has not been to the countries which need it most, but rather to those which have already achieved a relatively high level of development. South and Central Africa has become a major investment field, while Asia has been neglected. Mr. Conan estimates that one-third of the total investment has been in South Africa and Rhodesia, and one-quarter in Australia and New Zealand. India, Pakistan and Ceylon together have received only one-fifth of the total, and the same amount has gone to the Colonies.

Although the capital inflow into both Australasia and South-Central Africa has been large, the contribution of external capital to total investment finance has been very different in the two areas: less than 10% in Australia compared with 20% in South Africa and 45% in Rhodesia. But in some ways these averages are misleading, because capital from abroad has accounted for as much as one-third of all investment in Australian manufacturing.

Analysis of the composition of capital imports shows a fall in the importance of public capital, and within the total of public capital a decline in the relative contribution of stock-exchange flotations. For example, before the War two-thirds of Australia's external indebtedness was on public account. Only 20% of the post-war capital inflow has been through public borrowing, and over 80% of that came from the International Bank.

The nature of private capital inflow has also changed, with a marked rise in the importance of direct investment, particularly through the re-investment of profits. Mr. Conan makes some interesting points about the effects of this change. The switch towards equity investment means that a gradually rising price level will bring little relief from the real burden of service payments. Secondly, because the investment is often in industries producing for the home market, and because of the pursuit of domestic full-employment policies, the remittance of profits abroad will be maintained during a slump in export earnings. The balance-of-payments burden is likely to become serious. Further, a country whose development is based on external equity capital with substantial reinvestment of profits is less likely ever to emerge from its indebtedness than where the foreign investment is in the form of loans.

There are also statistical problems caused by the changed character of private investment. Direct investment easily escapes the statisticians' net. In Rhodesia and South Africa reinvested profits are treated as domestic saving. Mr. Conan believes that the official statistics therefore understate the dependence of these countries on foreign capital.

Comparable reasoning leads Mr. Conan to oppose the view that the United Kingdom balance-of-payments surplus has been too small to allow her to make a big enough contribution to sterling-area development. The

balance-of-payments statistics do not include all profits of United Kingdom companies which are reinvested abroad. If all reinvested profits were included as current receipts, offset by a capital export, the current-account surplus would be far bigger than the surplus shown in the official estimates. In 1956-57 Mr. Conan estimates that the surplus computed in this way would have been about £400 million instead of £250 million.

Mr. Conan also contests the view that the United Kingdom has merely been relending the proceeds of borrowings from the United States and the Colonies. United Kingdom dollar imports, he argues, were largely the result of the import of dollar capital; if the capital had not been available the dollar imports would have been reduced correspondingly, so that the reserves would not have suffered. There was no borrowing from the Colonies, Mr. Conan argues, because there is no evidence that they were running a current-account surplus. However, this does not meet the point that the rise in their sterling balances shows that the Colonies refrained from converting their nominal capital imports into a demand on United Kingdom resources.

Mr. Conan has contended with great statistical difficulties to produce a valuable survey.

Oxford.

ARTHUR HAZLEWOOD

African Economic Development. By W. A. HANCE. (New York: American Book-Stratford Press for the Council on Foreign Relations (London: Oxford University Press), 1958. Pp. viii + 307. 30s.)

MOST of the nine chapters of this book originated as papers provided for a discussion group on economic development in Africa which met in the United States from 1955 to 1957. The scope is narrower than the title suggests. Attention is focused on the tropical territories, excluding both Mediterranean Africa and the Union of South Africa. The opening chapter gives a broad survey, and there is a brief concluding discussion of potentialities and needs. Transport facilities are generally described in a middle chapter, and the remaining six sections give accounts of particular regional schemes of development or commission findings. The author's approach is that of a geographer, and the treatment is generally suited to the needs of those who still need to be warned that the African territories and the African peoples are by no means all alike. "Tremendous cultural, physical, economic, and political variation and contrast exist within tropical Africa. The variety is greater than on any continent but Asia." Perhaps so.

The regional studies open with a summary account of the Gezira scheme of agricultural development in the region above the confluence of the Blue Nile and the White Nile in the Sudan, irrigated by the Sennar Dam, and of the three-way partnership arrangement comprising the Government, the managing board and the tenants. The discussion of developments follows

the authoritative reports which have already been well publicised, but a useful description is added of the subsequent attempts to inaugurate similar projects in other African regions, the Niger scheme in French West Africa, the Gonja scheme in the Northern Territories of Ghana, that at Mokwa on the Niger in Nigeria and other projects in the Sudan. Next follows a well-balanced account of the Volta River proposals in Ghana, based on the Jackson Report of the Preparatory Commission and the ensuing negotiations. A review of the territories of the Central African Federation concludes that they enjoy "excellent potentialities for economic expansion." British East Africa is covered by an appreciative and well-deserved commendation of the 1955 Report of the East African Royal Commission. These are followed by a descriptive survey of Madagascar and a chapter entitled "Liberia: American Investment and African Development," which opens with a salutary quotation from *The New York Times*, March 24, 1957: "The Liberian representative here declared this week that his country lagged materially behind the new nation of Ghana because it had always been independent and had never reaped the advantages of colonialism."

The broadly optimistic conclusion which Mr. Hance reached concerning subsistence farming rests on faith rather than proof. Although "even if the most modern techniques could be applied . . . the larger part of the continent would still have a low productive capacity," nevertheless "very great potentialities" do exist for African agriculture, but their realisation must await "the development of new techniques not known at present." "Great as the potentialities are, they are nearly matched by the scope and difficulty of the problems requiring solution." Readers with an appetite for more comprehensive information about research and development in Africa than is provided in this book will find it in Lord Hailey's *African Survey, Revised 1956*. It finds a place in Mr. Hance's bibliography, but must have reached him too late for effective use before sending his manuscript to press.

ARNOLD PLANT

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Canada in the World Economy. By J. A. STOVEL. Harvard Economic Studies, Vol. 108. (Cambridge, Mass.: Harvard University Press (London: Oxford University Press), 1959. Pp. xiii + 364. 60s.)

THIS book is an extended and reorganised version of a doctoral dissertation accepted at Harvard University in 1948. It is primarily concerned with the analysis of the mechanisms of adjustment which have been at work in the balance of payments of Canada during the period 1850-1957, but in an economy such as that of Canada this choice of subject necessarily entails the study of the entire course of the country's economic development.

A largish section of the discussion takes the form of a protracted series of criticisms of Professor Viner's pioneer attempt at testing the classical theory

of the adjustment mechanism of capital transfer on Canadian data, and a chapter is devoted to criticising Professor Viner's (other) critics. This part of the work appears, perhaps understandably, to have meant much to the author in bygone days, but it will be ignored in what follows, as being unlikely, nowadays, to interest the great majority of the many readers who could profit from reading this book. (The chapters concerned with this quarrel are Part I, Chapter 3, and all those in Part III of the book.)

Part I of the book is described as "an eclectic theory of balance of payments equilibrium." It is, in fact, a shrewdly annotated survey of the literature of the concepts useful in the analysis of balance-of-payments adjustment, along modern lines. Interspersed with this are a number of broad judgments concerning the historical importance or unimportance of various possible adjustment mechanisms in Canada and elsewhere. Mr. Stovel seems to me to be often right, if rarely original here, both in respect to what he denies (for instance, the importance of the Gold Standard in producing smooth international adjustments in the pre-First World War era), and in what he asserts (for instance, "the fact of the extreme importance of interdependence between economic growth, cyclical fluctuations, and capital movements"). He is surely right, also, in concluding that there is no analytical ground for expecting such equilibrating mechanisms as can exist to bring about full adjustment, that the forms taken by the various outcomes which are possible in practice are so numerous that no single theory can encompass them all, and that any balance-of-payments equilibrium which may tend to become established may be so unsatisfactory as to warrant interference with the equilibrating process.

Parts II and IV of the book set out to describe and analyse the salient features of Canadian economic development, especially in relation to the foreign transactions of the country, which have, in fact, dominated its progress in the past. Mr. Stovel gives one the impression of having read everything that has ever been said on this subject, and his copious but unobtrusive references to the literature will place many students in his debt.

A bald statement of the upshot of Mr. Stovel's empirical investigations into balance-of-payments adjustment might run as follows: When Canada enjoys a strong boom—as in 1900–13 or in the 1950s—she typically runs a current-account deficit, except during wars, and in their immediate aftermath, when she runs a current surplus. During peace-time booms foreign funds (British in 1900–13, American in the 1950s) flow in and cover the deficit. The current deficit is *not* to be regarded, in the main, as the *consequence* of the inflow of funds. Rather, the inflow of funds and the current deficit are *both interdependent consequences* of the underlying historical situation which gives rise to the strong boom. (Mainly development of wheat production for British and European markets in 1900–13, and development of petroleum, iron ore, newsprint, other forest products and non-ferrous metals production for U.S. markets in the 1950s.) War-time and

post-war surpluses are used to repatriate capital, to make loans and gifts and to build up reserves, and economic development proceeds apace at the same time. During weak booms, and recoveries from slumps, the accelerator does not function, and Canada runs a surplus (as in most years in the inter-war period), and the same tends to happen—sometimes after a lag—in downturns and slumps, when the accelerator does function. During periods of the latter kind, *net* "long-term" funds have moved about in rather unpredictable ways, and tend, except when they are accidentally equilibrating, to give rise to offsetting movement in reserves, and in short-term capital. Compared to the foregoing, the effects of associated price and tariff-changes have had very little influence on Canadian balance-of-payments developments, at any rate over shortish periods.

The foregoing account does much less than justice to the very wide range and sophistication of Mr. Stovel's discussion. In one respect, however, it perhaps flatters him: the empirical part of the book, which is organised along chronological lines, suffers from a certain descriptive diffuseness. It also has a tendency to dwell more on controverting other authors (not merely Professor Viner) than on establishing the validity of the eminently plausible interpretations offered by Mr. Stovel. These criticisms should not put anyone off. Mr. Stovel's subject is fascinating, he makes a large number of stimulating points, and he stresses that "there is a tremendous amount of theoretical and empirical work yet to be done in this field" (p. 73). Future students of the balance-of-payments problems of Canada will, I think, find that Mr. Stovel has cleared a good deal of the ground for them.

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Portrait of a Modern Mixed Economy: New Zealand. By C. WESTSTRATE. (Wellington: New Zealand University Press (London: Cambridge University Press), 1959. Pp. x + 310. 22s. 6d.)

New Zealand in the Making. By J. B. CONDLIFFE. Second edition. (London: Allen & Unwin, 1959. Pp. 316. 30s.)

The Welfare State in New Zealand. By J. B. CONDLIFFE. (London: Allen & Unwin, 1959. Pp. 396. 35s.)

THERE is no better documented case of regional economic development than that of New Zealand, which since 1840, when it became a Crown Colony, has drawn its labour force and initial capital from the other British Isles, and has become a specialist pastoral producer alongside the growth of the United Kingdom market for wool and dairy products. In the late 1950s New Zealand sold in the United Kingdom about 60% of her exports. This was equal to 20% of the national income. The United Kingdom correspondingly relied heavily on New Zealand for butter, cheese, mutton and lamb imports. Of course, the Australian connection was important in the early days; American companies have invested in their New Zealand

subsidiaries in the last decade; and New Zealand wool is sold on an international market: nevertheless, it remains true that New Zealand is an off-shore British farm.

This single, simple feature can explain most that is important in the New Zealand economy until at least the early 1930s: the construction of overhead social capital (from cheap London loans in the 1870s and later) and the establishment of a wealthy grassland economy in a land not well endowed with natural resources (even the grasses were imported); the predominance of British and Australian trading companies and banks in the provision of rural credit and marketing facilities; the early emergence of the Government as entrepreneur, bearing the risks of the small-scale farmer, but pandering to his extravagances because of his political power; the periodical radicalism of the farmer, who was almost entirely dependent upon markets 14,000 miles away, and the sense of social responsibility this lonely radicalism created—witnessed by the two heroic periods of progressive social legislation in the 1890s and 1930s; and the uncultured, materialistic Calvinism typical of isolated farming communities.

In 1930 Professor Condliffe told this story in the first edition of *New Zealand in the Making*, which has always been recognised as authoritative. Recent work, particularly that of C. G. F. Simkin and W. P. Morrell, has supplemented rather than replaced it. In the new second edition Professor Condliffe has not attempted to bring the story up to date in one volume but instead, recognising that the early 1930s mark the end of an era, has written another book—*The Welfare State in New Zealand*—mainly on the New Zealand of the last thirty years. The division of subjects between the books is not entirely chronological—Maori affairs are brought up to date in *New Zealand in the Making*, while the early history of industrial relations is recounted in *The Welfare State*. The author of the third book reviewed here was, until he became Professor of Economics at the University of Canterbury, a professor at Leyden. Professor Weststrate is concerned with the economy at the present time, and examines in considerable detail the forms and functioning of government enterprise and corporativism, and the institutions and legislation aimed at stabilisation. Full-scale studies of New Zealand economics have become rare: these three books, together with Simkin's *The Instability of a Dependent Economy*, are indispensable for serious study.

The New Zealand story of the last thirty years shows evidence of a tendency towards introversion latent from the start. From the 1890s until the late twenties New Zealand had ridden one long export boom. The depression of the thirties left a psychological scar on New Zealand much deeper than that on industrial and other primary producing countries, not so much because it was severe, as because it was so frighteningly abnormal (oddly enough neither Condliffe nor Weststrate emphasise this). There was mismanagement: "immobilised cash assets were piled up in London while budgetary deflation ground an already impoverished economy into further

bankruptcy and unemployment" (*Welfare State*, p. 47); farmers were thoroughly bogged down in debt following the collapse of a very lengthy speculative land boom; and sterling interest payments were both a bogey and a problem. Recovery had to wait for a rise in wool prices in 1934, the reassurance given by a confident new Government in 1936 and a series of measures to cancel the farmers' debts. But in the process old idols were smashed, and no one has been prepared to fit properly together again the pieces—large-scale fixed-interest government borrowing in the United Kingdom, free trade and the independence of the overseas based banks. They were replaced by "insulation" and full employment (the latter defined by one Cabinet Minister as more jobs than men).

Primary industry now absorbs only 145,000 people out of a total labour force of 850,000. With farming productivity so obviously dependent upon capital-intensive investment, labour-intensive manufacturing and services have expanded rapidly in recent years. Yet, as Professor Condliffe emphasises, the pre-eminence of grass remains: for machinery, raw materials and fuel the new hot-house industries are dependent upon imports; and the predominance of sterling persists: no policy of internal stabilisation and full employment can be maintained without adequate overseas credit facilities or exchange reserves. New Zealand indulges in a curiously *ad hoc* policy in this respect. The exigencies of development caused the Government to borrow abroad on a small scale in 1953 and 1954, and falling export prices made short-term credits inescapable in 1957 and 1958. The elaborate stabilisation schemes described in detail by Professor Weststrate do not involve holding sterling balances for counter-cyclical purposes; while New Zealand Governments will not join the I.M.F.

Beginning with the Second World War, New Zealand has been riding another export boom. The rate of population growth has been one of the highest in the world, and although it has been accompanied by a rate of domestic saving of over 20%, the country has not escaped an unsettling inflation. Both Professor Weststrate and Professor Condliffe point out the stagnation of indexes of productivity in recent years. Their treatment of this problem is unsatisfactorily slight and shallow. Professor Condliffe suggests (with only slight evidence) that productivity has fallen off in periods of rapidly rising Government expenditure—in the Vogel period, in the years after 1910 and in the period immediately following the First World War. It may be true that rising Government expenditures result in reduced effort and a transfer of resources to less-productive manufacturing and services but Professor Condliffe's view needs supplementing by the fact that the boom periods of the past have been followed by periods of rising productivity. Presumably investment in a developing farming community has a lengthy gestation period. The subject requires more detailed investigation. In *The Welfare State* Condliffe argues the case for industrial development which should supplement not burden the exporting industries. He describes it

some detail the recent development of a forest-products industry, contrasting it with the "multiplication of small scale workshops fabricating imported materials" fostered by the policies of selectively restricting imports. He suggests that as a short-term objective full employment may have to be dropped, for he appears to accept an official bureaucratic view that employment is a function of import controls. This fundamental issue of full employment in a dependent economy is not seen by Professor Weststrate in quite the same light. Full employment in New Zealand, he says, is the unintentional effect of inflation. The latter is due to cheap money, a strong investment demand and insufficient savings. He concludes that inflation is both a cause and a result of the urge to grow, and believes "that there is no real evidence for the opinion that the maintenance of full employment requires strong protection"—citing a calculation that in 1954 no more than 11,000 jobs depended directly upon import and exchange controls.

The earlier generation of writers on New Zealand—such as Reeves and Siegfried—were naturally interested in telling the story of the pioneer radicalism, and the early attempts to establish a welfare state and a harmonious system of industrial arbitration. Modern writers still find these subjects of primary interest: five out of the sixteen chapters in Professor Condliffe's two volumes, and at least three of Professor Weststrate's chapters, are devoted to them. Professor Weststrate concludes that the system of compulsory conciliation and arbitration "works because of acceptance, not because of compulsion which has remained, on the whole, a dead letter." He also considers that the wage increases given by the Arbitration Court's general orders in recent years "were the outcome of an inflation with which the Court had nothing to do." This view would not be generally accepted in New Zealand, where at times the extreme view has been expressed that the Court has supplanted the Government and the Reserve Bank as the manager of the value of money. Professor Condliffe thinks that the system in 1956 was functioning efficiently, but significantly refers to the breaking by the Government in 1951 of the militant waterside workers' union, and some dissatisfaction with the "personality" of one of the judges.

Inevitably both these authors verge on the sociological, the political and the journalistic in their wide coverage. It is not a fundamental criticism of such primary sources to say that it appears that their treatment is at times cursory.

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American Business Cycles, 1865-1897. By RENDIGS FELS. (Chapel Hill, North Carolina: University of North Carolina Press (London: Oxford University Press), 1959. Pp. viii + 244. 48s.)

DR. FELS approaches his subject from the point of view of the student of modern cycle theory seeking evidence bearing on the validity of various

theoretical models. He begins with a discussion of methodology in which he reaches the conclusion, probably correct but not very helpful, that, "Each has something to contribute. The greatest hope for a satisfactory theory lies in pursuing all approaches at once" (p. 21). He then proceeds to discuss the three sets of hypotheses with which he is principally concerned—those of Schumpeter, Hicks and R. A. Gordon—providing an interesting analysis of the similarities and differences between them, and emerging with a synthesis of the three. Unfortunately, however, the hypotheses are not formulated precisely enough to enable the reader easily to check the synthetic system for internal consistency or to relate it closely to the historical evidence. The author is conscious of this himself, for he comments, "It would have been better to develop it fully and rigorously, since rigor is a valuable safeguard against error. But in view of the purposes of this study, such an undertaking hardly seems worth the space. I shall leave theory to the theorists, and do no more work with it than my task requires" (p. 42). Dr. Fels does not do quite as much work with his theory as his task requires and, in consequence, he does not always safeguard himself against error when applying his historical tests. For example (on p. 78), he discusses the "Pigou effect" (the increase in the propensity to consume arising from the effect of falling prices in increasing the real value of money and government bonds) and quotes as evidence against it Kuznets' estimate that consumption fell from 88% of national product in 1869-78 to 86% in 1889-98. Quite apart from their effect on interest rates (which Dr. Fels goes on to mention), falling prices raise the real value of money and bonds in the hands of business as well as of consumers, and there is no *a priori* reason at all why they should necessarily stimulate consumption more than investment.

After a theoretical discussion of price and wage flexibility, and some comments on external events, Dr. Fels reviews his historical evidence, first discussing the long-wave depression as a whole and then describing briefly the individual cycles. This section is very useful, particularly to the British reader, who is not likely to have easy access to the many sources on which Dr. Fels draws. My main regret here is that the statistics were not presented in tables as well as charts.

Dr. Fels finds that external events (in which he includes crop yields, the level of foreign demand for United States exports and the fiscal and silver policies of the government) often modified the amplitude or timing of cycles, but that none of the major cycles can be explained without reference to internal factors. This seems to be supported by an overwhelming body of evidence. For his explanation of the long-wave depression, Dr. Fels, rejects the hypothesis of a scarcity of money—because of the behaviour of interest rates—and accepts that of a gradual decline in investment opportunities in the downswing of a Kondratieff cycle. The argument here is not entirely impervious to attack by neo-classical monetary theorists, but will probably

command a wide measure of acceptance. For the major cycles (Schumpeter's Juglars) the author finds that the theories of Schumpeter and Gordon can be reconciled both with one another and with his evidence, but he is able to say very little about the Hicks model. This is not surprising in view of the nature of the evidence; there is not nearly enough detailed information about investment to permit of even an intuitive impression of how much was autonomous and how much induced; there is no real evidence that could be used to test a model of the accelerator; and there is virtually no information about either employment or industrial capacity to help with the problem of the ceiling. Finally, Dr. Fels is able to say very little about the minor cycles, partly because these must inevitably be more distorted by external factors and partly because of the lack of evidence about inventories.

To conclude, Dr. Fels has produced a useful and interesting study, but it is far from being a definitive one. Before any definitive study can be made, there must be far more detailed historical research and a rigorous formulation of hypotheses in a form most suitable for checking by reference to the material that is available.

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Studies in Elizabethan Foreign Trade. By T. S. WILLAN. (Manchester: Manchester University Press, 1959. Pp. vi + 349. 35s.)

THE story of Elizabethan trade and traders, so long dominated by the great Companies, is developed in new directions in Dr. Willan's latest book. Three important essays deal with matters upon which many scholars have felt the need for further knowledge. His description of the role of the factor or agent, of such great importance in the development of techniques for the delegation by the merchant of his function abroad, has called into play a wide range of sources, few if any of which are of a kind that would come to the notice of a less-seasoned scholar. From surviving accounts of real transactions we learn how the job was done. Suits and recriminations reveal how lengthy was the process involved in the growth of law and convention. The perils of factorship, including imprisonment and even death, make the reader marvel that men sought such responsibility. Though Dr. Willan is not explicit, it would appear that the task was undertaken as the necessary preliminary to merchant status by men beginning from scratch, often country boys from provincial towns. Some, such as John Swinnerton and his issue, might move from "Oswestry to opulence," but some failed to rise above factorship. The author, incidentally, discounts the view that successful merchants were consumed with the urge to make themselves country gentlemen.

The study of the "free traders," dealing within areas ostensibly monopolised by the Charter Companies (and including men who were members

of such companies), reveals how difficult it was for a regulated company to regulate. Not only was a staple the point through which English exports were funnelled into continental markets, it was also the point through which the return goods were to come; interlopers were a constant embarrassment in both respects.

The extent and diversity of the national trading initiative in the sixteenth century is shown in the study of the provincial ports. They were busy exporting cloth, minerals and agricultural products, and importing a wide range of miscellanies, most of them manufactures, wine and raw materials. We read (p. 89) that: "Elizabethan England was not so much an industrial country importing its raw materials as an agricultural country importing many of the manufactured goods that it needed." This statement suggests a starkness of antithesis that is somewhat at odds with the sophistication of the author's historical picture, and perhaps reminds us of the difficulties that attend the summing-up process.

The principal essay deals with Morocco. Here we see English trading initiative carried beyond the fringe of Christendom—to an area whose rulers were uninhibited by whatever sense of brotherhood the Church may have been able to induce. Jewish middlemen had long ago preceded them and had become precariously powerful. Here the Elizabethans, "incorrigible liars" as Dr. Willan describes them, pitted themselves against no less accomplished opponents: Jews, the Sultan and his servants, and their own rival countrymen. It is not surprising to learn that the rate of interest in Morocco was 36%. Here, as in so many areas of trade, the question whether a monopoly company should be formed was elaborately debated and the highly involved complex of arguments and interests typical in such cases were mustered. The Barbary Company was chartered in 1585, largely under the ægis of the Earl of Leicester; we are introduced to the charter members, and a fascinating crew they make. The student of the evolution of business behaviour and outlook will find here an extraordinary picture. But he must have the historian's patience and be prepared to immerse himself in the intimacies of the business, for it is largely through such close reporting that Dr. Willan constructs his account.

The Moroccan Trade of the sixteenth century was mainly based on the exchange of woollen cloth for sugar. In this way it was the chief source of one of the compulsive semi-tropical products, the taste for which was to become so important for the rise of plantation economies and the extension of trade to the West and East Indies. A concluding essay describes how, in the sixteenth century, the supply of sugar increased, and consumers began to demand more of this exotic article.

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The Spare Chancellor. The life of Walter Bagehot. By A. BUCHAN. (London: Chatto & Windus, 1959. Pp. 287. 25s.)

THE appeal of Bagehot has increased in recent years. In a sense, this is because he left no school of thought to interpose between himself and the reader. A second and more substantial reason is that his acutely perceptive mind and brilliant and memorable style of exposition win greater sympathy in mid-twentieth-century Britain than highly systematic argument and weighty means of propounding it. Mr. Alastair Buchan has written a lively and stimulating life of Bagehot, which reflects some of Bagehot's own qualities. It is not based on any "golden harvest of new material," least of all about Bagehot's life, it ranges very widely—but often sensitively and with insight—over literature, politics, economics and sociology, and it is graced by an occasional sentence which is worthy of Bagehot himself. "The High Tory dreams of a new alliance between the aristocracy and the working class had for him the grotesque quality of a nightmare." "*Lombard Street* is one of the ablest pieces of special pleading ever written—the more so for being in a good cause."

One chapter is concerned with Bagehot as a country banker, one on Bagehot as a writer on "men and money." The two pursuits were connected. "To work in the hard office of a country bank was probably the soundest and most thorough way in which a young man could learn banking, but it was not the most enlivening." Yet Mr. Buchan's picture of the country banking phase in Bagehot's life is very sketchy indeed. Bagehot's meeting with James Wilson in 1837 was an event of supreme importance in his life. It provided him with his wife (*via* a stately Victorian engagement) and an *entrée* into business and economic life. Moreover, Wilson's death in 1860 turned him inescapably into a professional journalist, and it was as editor of *The Economist* that he influenced one group of his generation. He had no illusions about the extent of his influence. "The politics of the paper must be viewed mainly with reference to the tastes of men of business. It is among them and among them only that *The Economist* will ever circulate."

Bagehot accepted his father-in-law's rigid Liberalism, as Mr. Buchan points out, on only one point of economic policy—free trade against protection. It is important to bear in mind, however, that his empiricism rested on an initial acquaintance—through experience as well as reading—of what the "liberalism of principle" stood for. In this sense Bagehot's own evolution mirrors the evolution of mid-Victorian thought as a whole. The "liberal-conservatism" of the middle century—Mr. Buchan does not quite get to the heart of this—is only intelligible if it is seen in relation to the quite different mood of the 1840s. Bagehot has no respect for the "enthusiasms" of liberalism, but he had even less respect for the "intricacies" of sophisticated conservatism. "The true conservatism of Great Britain, the con-

servatism, for example, of the City, and of most cautious country gentlemen is of a very much more moderate and cautious kind than party Conservatives always allow—is a stab of feeling rather than a passion, a sense of content with what is rather than apprehension of what is to come."

What Mr. Buchan says about Bagehot's mature approach to economics will be familiar to students of nineteenth-century thought and practice. He was primarily concerned with observing and understanding practice: the observation and the understanding depended both on "informal knowledge" and on insights, insights both into individuals and groups. The frontier between economics and psychology was the strategic one, not the frontier between economics and mathematics. The psychology of bankers and business-men fascinated him. "Business is really a profession often requiring for its practice quite as much knowledge, and quite as much skill as law and medicine . . . he [the businessman] has a revenue from talent as well as from money." It is necessary to relate Bagehot's emphasis on the art of economic decision making to the prejudice of the academic political economists of the day (echoed by politicians such as Robert Lowe) that all the laws of economics had been discovered and that the only task still confronting the political economist was to ensure that knowledge of them was adequately diffused. Bagehot's *Economic Studies* (1875–76) was an attempt to explore economic territory not to stake bold intellectual or methodological claims. It is still worth reading as an antidote to other kinds of economic writing to-day.

Perhaps Bagehot's chief contribution to all the subjects he wrote about, including economics, was his recognition of the significance of the social shell, of habits, institutions, ways of thinking, feeling and behaving. Without being a sociologist he introduced a sociological dimension into all his thinking. His appeal to-day—and the demand for "Bagehot-like" thinking and writing—derives in largest measure, as Mr. Buchan points out, from the fact that he is the "true ancestor of our modern view that the knowledge of what a society is really like, what drives it, what checks it, what distorts its judgement, cannot be gleaned from statistics or mere facts alone, but is as much the province of the literary and imaginative arts as of the moral and metric sciences." Of course, judgments on the validity of conclusions reached by the use of "literary and imaginative arts" are always open to criticism and contradiction. Bagehot would not have minded this, since the essence of liberal discourse was the freedom (of thinkers) to speculate. Although he left no school, many subsequent writers have owed much to him. They included one of his greatest admirers, G. M. Young, who described him aptly as if not *Victorianorum maximus* certainly *Victorianus maxime*.

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NOTES AND MEMORANDA

THE EFFECTS OF INTERNATIONAL TRADE ON THE
MEASUREMENT OF REAL NATIONAL INCOME

THERE is, by now, broad general agreement on what one is trying to do when estimating the domestic product of a country at constant prices. But there is no generally accepted method of estimating net property income from abroad at constant prices. It has been variously suggested that net property income from abroad, if positive, should be deflated by the price index of imports and, if negative, by the price index of exports; that, on the contrary, a positive balance should be deflated by the price index of exports and a negative balance by the price index of imports; that income to and from abroad should be separately deflated by price indices of exports and imports respectively; that, as any deflation must be arbitrary, it is safer to use an index with a wider coverage, such as the price index implicit in the estimates of total national expenditure at current and at constant prices or the price index implied in the corresponding estimates of the gross domestic product; and even that it is wrong in principle to attempt to express income as such in real terms. Each of these views still seems to have its advocates.

The problem can perhaps be simplified and a solution more easily obtained if we first consider the wider question: is it sensible to try to measure changes in real terms in those parts of the national income which cannot be directly identified with particular goods and services, as happens when a country's income is greater than its total expenditure on goods and services for consumption or investment at home or abroad? If so, what is the object of deflating such income and does the object suggest the appropriate method?

Estimates of the gross or net domestic product at constant prices provide a measure of the total output of goods and services resulting from economic activity and, as such, provide a direct measure of a country's economic effort. But for some purposes it is useful in addition to have a measure of the total goods and services which become available for consumption or investment as the result of economic effort or of owning property abroad; a measure, in other words, of the real income which can be enjoyed—the reward of effort—as distinct from the goods and services produced. It is necessary not only for completeness or articulation's sake but also for practical economic analysis, to have constant-price estimates with an income content and national (rather than domestic) coverage.¹ Differences

¹ As shown in *Economic Arithmetic* (Chapter 10) by Robin Marris, who has shaken me away from the nihilistic views which I expressed some years ago (*Income and Wealth*, Series IV, p. 154). The present note has also benefited considerably from the comments on an earlier draft made by Roy Geary and David Burdett.

between the (gross or net) domestic product and national income, when both are expressed at constant prices, can result either from changes in the terms of trade or from net property income paid to or received from abroad. We shall consider each of these in turn.

The adjustment of the domestic product at constant prices for changes in the terms of trade is relatively straightforward, and consists in replacing the estimates of exports of goods and services at constant prices by the current value of exports deflated by the price index of all imports and purchases abroad of goods and services.¹ The estimates adjusted for the terms of trade thus include the estimated value of imports at base-year prices which can be purchased with the current value of exports. It should be noted that exports are here regarded as a source of foreign currency, and the result is affected only by changes in the money value of exports, whether due to changes in the prices or to changes in the volume of exports. Several writers have used this method of adjustment,² which has never, to my knowledge, been seriously challenged.

The other possible adjustment for the terms of trade, symmetrical with the one just described, would consist in replacing imports by the value of exports at base-year prices needed to finance the actual level of imports. The result would indicate the level of the domestic product needed to meet the current level of national expenditure. The former is the appropriate method of adjustment if we are concerned to show the effect on domestic or national income; the latter is the appropriate method of showing the effect on domestic or national product.

It can readily be seen that, in the hypothetical case of two countries trading only with each other, the gain (or loss) in the income of one country, measured by the import-equivalent of its exports, equals the loss (or gain) in the product of the other country, measured by the export-equivalent of its imports. This makes sense as economics; for the same goods and services which form the exports and are part of the domestic and national product of the one country form the imports, and hence are part of the real income, of the other country. It is wrong to assume, as is sometimes done, that the adjustments to income (or the adjustments to product) in the two-country case should be equal and opposite. The desire for articulation should not lose touch with economics. The gain (or loss) from changes in the terms of trade in the product of the one country is necessarily equal to the loss (or gain) in the income of the other country. This result is achieved by the two symmetrical methods of adjustment mentioned above—which are simply two sides of the same coin.

In the present context there is no essential difference between income

¹ The first use of this adjustment may have been by Sir Arthur Bowley (*Studies in the National Income, 1924-1938*, 1944 edition, p. 197), who attributed the method to the present writer.

² Cf. W. B. Reddaway, "Movements in the Real Product of the United Kingdom, 1946-1949," *Journal of the Royal Statistical Society*, Vol. CXIII, 1950, p. 454.

derived from exports and property income obtained from abroad; both are simply sources of foreign currency. The appropriate deflators to apply to income derived from the export of goods and services plus net property income from abroad are the price indices of imports and of any other goods and services purchased out of such income. The national income at constant prices adjusted for international trade should thus include the imports and other goods and services from abroad which the current level of exports plus/minus net income from/to abroad enable the country to purchase. The total income in question is almost invariably positive; provided that it is positive, the same method of deflation is appropriate whether net property income from abroad, by itself, is positive or negative. In the rare event of net property income flowing abroad exceeding the current level of exports, estimates of the national product and of the national income could be obtained by making a *pro rata* reduction in the estimates of the domestic product. Since the whole of the proceeds of exports would then be needed to cover income flowing abroad, deflation by the export price index would clearly be inappropriate.

Thus, by regarding the adjustment for changes in the terms of trade and the deflation of income from abroad, including the proceeds of exports, as a single operation, the problem is simplified and its solution becomes apparent. Income from abroad is used, of course, not only to buy imports but also to make investments abroad, to repay foreign debts, and to acquire gold and foreign-exchange reserves. All imports and other purchases abroad of real goods and services should be deflated by the price indices appropriate to each item. The only part of the estimates which would necessarily involve imputation would be changes in money assets, such as gold and foreign-exchange reserves. It would be assumed, in effect, that any income from abroad which is not currently spent could have been used to increase (or if negative to reduce) all imports and other purchases abroad of real goods and services *pro rata*; but if part of the surplus is used for the repayment of foreign debt, fixed in money terms, this part would require to be deflated by the general price index of imports from the lending country. Thus only what is normally a very small proportion of the estimated national income at constant prices (the unspent surplus in the balance of payments) would, in the sense indicated, have a hypothetical character.

It has recently been suggested¹ that any imputation of this kind should be avoided and that the import price index should not be used for deflating any income from abroad in excess of that required to finance the actual level of imports, on the grounds of not counting chickens before they are hatched. There is no question, of course, that such surplus income forms part of the gross national product and of the national income. Hence, even if we do not know how it is intended to be used, it must—along with all other components of income—be deflated by an index of the prices of goods

¹ *A System of Price and Quantity Indexes for National Accounts* (United Nations, December 1957).

and services which, potentially at least, form part of real income. Logically, the only alternative is to give up altogether the attempt to measure real income as such.

Exports themselves are most unlikely to be purchased with the income derived either from their sale or from property owned abroad. Deflation by the export price index, so far therefore from being a policy of prudence, has only a remote chance of being correct. It is also unsatisfactory to have to switch from one price index to another whenever the sign (+ or —) of the balance of payments changes.

The only defensible ways of deflating an unspent surplus in the balance of payments seem to be either: (a) to use a price index of the goods and services on which other income from abroad has in fact been spent and on which the surplus income might have been spent (the surplus usually being a small proportion of the total, the effect of the additional expenditure on import prices can fairly safely be ignored), or (b) to take the strictly agnostic view that we know nothing about how such income is ever likely to be spent and to use a price index covering all goods and services, whether imported or home-produced, that are currently purchased out of national income. As indicated above, the first of these alternatives seems in general likely to produce the more realistic results. If greater prudence is required, the second method can be used without, at least, any fear of logical inconsistency.

To summarise briefly: the object of estimating the national income at constant prices is to provide a measure of the total volume of goods and services which have been purchased out of income plus those which could have been purchased abroad with any unspent surplus in the balance of payments; a balance-of-payments deficit would require a *pro rata* reduction in the value of all goods and services purchased abroad. The method recommended here can be said to have the merits of: (i) applying consistent treatment to a surplus or deficit in the balance of payments and to a change in the terms of trade; (ii) satisfying the condition of symmetry in the case of two countries trading only with each other; (iii) being fool-proof against the paradoxical results obtainable by other methods, noticed by Dr. A. L. Gaathon;¹ (iv) being simple to apply and easy for the “man-in-the-street” to understand; and (v) above all making sense as economics. The same cannot be said of any of the other methods which have been proposed.

In accordance with the procedure recommended above, estimates of the national income at constant factor cost adjusted for international trade would include:

$$\frac{\text{Exports at current market prices} \pm \text{Net property income from/to abroad}}{\text{Price index of goods and services purchased abroad excluding import duties}} = E, \text{ say.}$$

¹ Described in the Introduction to the section on the deflation of national accounts of *Income and Wealth*, Series IX.

Estimates of the national income at constant market prices adjusted for international trade would include:

$$E \times \frac{\text{Purchases abroad in current year at base year prices including import duties}}{\text{Purchases abroad in current year at base year prices excluding import duties}}$$

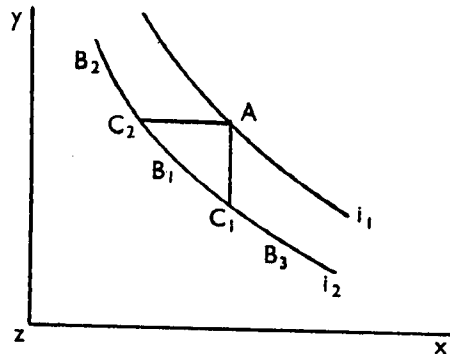
E is a measure of the total goods and services which can be purchased from abroad, valued exclusive of import duties. Estimates of expenditure on imports at market prices must include these duties; hence the need for the revaluation of imports implied in the last term. It is best, of course, to undertake any revaluation piecemeal, in as much detail as possible.

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INDIFFERENCE CURVES AND COMPLEMENTARITY

THIS note explains how one simple diagram can be used to show the effects of complementarity. The diagram shows the plan of a three-dimensional indifference surface where the quantities of goods x and y are shown on the horizontal and vertical axes and the quantity of good z , measured on a third perpendicular axis, is held constant at two different



levels. i_1 and i_2 are cross-sections of the indifference surface, and represent positions with equal real incomes but different quantities of good z . Suppose that with a given real income and relative prices of the three goods a consumer would choose position A . If the relative price of good z fell so as to induce an increase in the consumption of z , with real income held constant, the consumer would adopt a position B on i_2 at which the slope of i_2 , showing the relative prices of goods x and y which are assumed to be unchanged, would be equal to the slope of i_1 at A . C_1 and C_2 are the points on i_2 where the consumption of goods x and y respectively are the same as at A . If B lies between C_1 and C_2 , as at B_1 , goods x and y are both substitutes for z , since a rise in the consumption of z induced by a fall in the relative price of z with real income unchanged causes a fall in the consumption of both x

and y , their relative price being unchanged. If B lies to the left of C_2 as at B_2 , y is complementary to z ; if B lies to the right of C_1 as at B_3 , x is complementary to z . In either case a rise in the consumption of z will cause a rise in the consumption of the complementary good, the price of x and y relative to each other remaining unchanged, and a decrease in consumption will occur only for the good which is a substitute for z .

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THE SUBSTITUTION THEOREM

THIS note provides a brief and simple synthesis of various derivations of the central conclusion of demand theory, a branch of economics that may have become so technical as to be overlooked by the non-specialist.

The deductive content of the economic law that demand and price are inversely related is the substitution theorem which explains the effect on demand of a change in relative prices with real income constant. Constancy of real income is achieved by a change in money income such that the consumer is either indifferent between the new and initial selections of goods (the method of the compensating variation) or is just able to purchase the initial selection at the new prices (the method of the cost indifference).¹ Since in an analysis based on calculus there is no difference between the two methods and since in a geometrical analysis they yield the same results, it matters little which is used. In what follows the method of the cost difference is preferred because it is generally applicable, whereas its alternative can be used only if situations of indifference are admitted.

In 1938, with characteristic thoroughness and lucidity, Hicks familiarised the indifference-curve analysis of consumer's demand;² in his recent book this approach is barely mentioned as a special case of the logic of order.³ If a formal deduction had been given it probably would have been based on assumptions somewhat similar to the following:

- (1) The consumer's ranking of various combinations of goods remains the same, that is, his tastes are constant.
- (2) Goods are perfectly divisible, so that there will be several series of combinations of goods, each series representing different situations of indifference. That is, the consumer's ranking of various alternatives is a weak ordering consisting of a division into groups, each of the groups being strongly ordered (having a rank of its own), but all

¹ See P. A. Samuelson, "Consumption Theorems in Terms of Over-Compensation Rather than Indifference Comparisons," *Economica*, February 1953, and J. R. Hicks, *A Revision of Demand Theory* (1956), Chapter VII.

² *Value and Capital*, 2nd ed. (1946), Chapter II.

³ *A Revision of Demand Theory*, pp. 18-19.

positions within each group being non-ordered or indifferent to each other.

(3) The consumer's ranking of alternatives is transitive, that is, if combination of goods P is preferred (or indifferent) to Q and Q is preferred (or indifferent) to R , then P is preferred (or indifferent) to R .

(4) There is a diminishing marginal rate of substitution of one good for another as the latter replaces the former in combinations of indifference.

(5) Of two combinations of goods with the same quantity of all goods other than X the consumer prefers that combination with the largest quantity of X .

(6) In any price-income situation the consumer will choose from the combinations of goods available that combination which he most prefers.

In a two-dimensional diagram with good X measured on the horizontal axis and other goods, G , on the vertical axis the various alternative combinations of goods may be arranged in a series of curves connecting the combinations of indifference presupposed by assumption (2). Remaining assumptions require that the indifference curves are stationary (1), non-intersecting (3 and 5), sloping downwards from left to right (5) and convex to the origin (4), and that the farther away from the origin a curve is, the greater is the consumer's preference for the combinations of goods that lie on it (3 and 5).

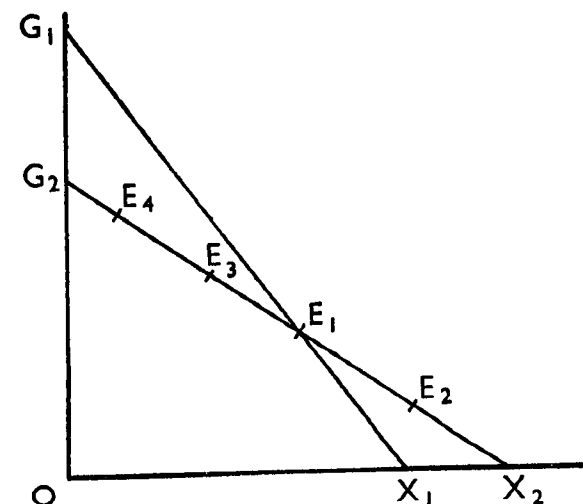
Prices and income restrict the combinations of goods available to the consumer; in the diagram below, to the combinations on or within G_1X_1O . In accordance with assumptions (3), (5) and (6) the consumer will choose that combination where an indifference curve is tangential to G_1X_1 , say E_1 . The combinations of goods on or within G_2X_2O are those available to the consumer after a reduction in both the price of X and his money income such that he is just able to purchase combination E_1 , that is, his real income is constant. The consumer will now choose a combination where an indifference curve is tangential to G_2X_2 . With the convexity of indifference curves implicit in assumption (4) and with the slope of G_2X_2 less than the slope of G_1X_1 (the slope of these lines measures the ratio of the price of X to the price of G), the new tangency position must be to the right of E_1 , say E_2 . Thus the substitution effect of a fall in the price of X is to increase the demand for it.

The revised treatment Hicks prefers¹ is essentially to drop assumption (4) about the diminishing marginal rate of substitution and not to bother arranging combinations of indifference in any systematic way. Initially the consumer chooses a combination along G_1X_1 (assumption 5), say E_1 , which is preferred to all combinations under G_1X_1 but may be preferred or

¹ *Op. cit.*, Chapters V-VII.

indifferent to the other combinations along G_1X_1 . After the price change and income adjustment the consumer will choose a combination on E_1X_2 . He will not choose a combination under G_2X_2 (assumption 5) nor along G_2E_1 (1 and 6), and combinations on or within $G_1E_1G_2$ other than those on G_2E_1 are no longer available to him. The elimination of assumption (4) has the consequence of weakening the substitution theorem to include the possibility of demand remaining constant when there is a price change.

If assumption (2) is changed so that indivisibility of both G and X is assumed it is then possible to consider the case where each combination of the two goods has a distinct place in the consumer's ranking, that is, strong ordering. Strong ordering implies discontinuity, but discontinuity does not



preclude weak ordering. Hicks demonstrates the first conclusion but appears to overlook the latter,¹ which makes assumption (2) unnecessary also for the weak-ordering derivation of the substitution theorem. In the strong-ordering derivation assumption (5) can be dropped. Hicks was forced to include this assumption in the weak ordering case, since without it it would be possible for the initial position to be E_3 and the new position E_4 , or vice versa, or for E_3 and E_4 to coincide; a general conclusion that is self-evident.

In the strong ordering case the initial combination of goods chosen by the consumer may be anywhere on or within G_1X_1O , say E_3 , which is then shown to be preferred to any alternative combination. The new position will be E_3 or a combination within or on $E_1X_2X_1$, but not on E_1X_1 . All other possible combinations, that is those on or within $G_2E_1X_1O$, have been shown previously to be less preferred than E_3 , and by assumption (1) the consumer's preference scale remains the same. Thus the substitution theorem in its weak form is proven. The strong ordering derivation is the

¹ *Op. cit.*, pp. 39-44.

well-known revealed preference theory of Samuelson¹ and Little² about which Hicks retains some scepticism.³ He claims that since situations of indifference are relevant in reality, they should be accounted for in the theory, but admits that a decision must be made between such situations and on grounds excluded from consideration.⁴ In the same way the preference theories of demand have eschewed utility maximisation from the analysis, it is possible to eschew preference from the analysis.

This decision clears the way for demand theory to be based on only one assumption about the consumer's behaviour:

If in any situation a combination of goods, P , is chosen instead of all other available combinations, then in all situations in which combination P and any or all of the combinations available in the previous situation are available P will be chosen.

Consider the above diagram. Initially a combination of goods on the line within G_1X_1O is chosen. G_2X_2 will pass through this combination, which thus lies along G_2E_1 . Complying with the above assumption, the new combination chosen will be the same as the previous one or be on or with $E_1X_2X_1$ but not on E_1X_1 . Thus the substitution theorem in its weak form is proven.⁵ This derivation is valid regardless of whether or not the consumer makes his decisions in terms of a preference field, and if he does makes no difference whether his preferences are strongly or weakly ordered. The assumptions associated with the preference theories are unnecessary; all that is required is that the decisions (not preferences) of the consumer are strongly ordered and consistent. Without this assumption no theorising would be possible.

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OPEN-MARKET OPERATIONS VERSUS RESERVE- REQUIREMENT VARIATION: COMMENT⁶

In a recent article⁷ Mr. Joseph Aschheim gives qualified approval to the variation of cash-reserve requirements but concludes that open-market operations are usually preferable in countries where an active securities

¹ P. A. Samuelson, *Foundations of Economic Analysis* (1947), Chapter V.

² I. M. D. Little, *A Critique of Welfare Economics*, 2nd ed. (1957), Chapter II.

³ *Op. cit.*, p. vi.

⁴ *Op. cit.*, pp. 20-1.

⁵ A general proof along these lines is given by K. Lancaster, "Revising Demand Theory," *Economica*, November 1957.

⁶ The interpretations and conclusions are those of the authors and do not necessarily reflect the views of other members of the Brookings staff or of the administrative officers of the Institution.

⁷ "Open-Market Operations versus Reserve-Requirement Variation," *ECONOMIC JOURNAL*, December 1959, pp. 696-704.

market exists. An increase in cash-reserve requirements depresses commercial-bank earnings more than an equivalent amount of open-market sales by the central bank. Aschheim argues that the commercial banks will sell securities and shift into loans in an effort to restore their earnings and that in consequence yields on government securities will be driven up more, and bank loans restrained less, when reserve requirements are increased.

This will be the outcome, however, only under special conditions, which are not set forth by Aschheim. His argument requires that government-security sales by commercial banks in response to an increase in reserve requirements exceed the total of sales by the central bank and commercial banks that would occur if equivalent open-market operations were conducted.

An increase in reserve requirements and open-market sales may be considered equivalent if they have the same effect on commercial-bank deposits.¹ If the commercial banks have no excess reserves and are unable to obtain additional reserves, open-market sales of A will force a reduction in deposits of A/r , where r is the required reserve ratio. Commercial-bank earning assets will be reduced by $(1 - r)A/r$. If deposits are reduced by A/r by means of an increase in the required reserve ratio, earning assets of the commercial banks will fall by A/r . When the required reserve ratio is raised earning assets bear the full impact of the reduction in deposits because total reserves remain unchanged.

It is likely that part of the reduction in earning assets will take the form of sales of government securities by the commercial banks. The fractions taking this form may be designated as a for the reduction in earning assets brought about by open-market operations and b for the reduction attributable to higher reserve requirements. The increase in reserve requirements will involve larger total sales of government securities only when $b(A/r) > a[(1 - r)A/r] + A$. This will be the case when $(b - a) > r(1 - a)$. Increases in reserve requirements will put more direct pressure on government-security yields than will equivalent open-market sales only when b exceeds a by the indicated margin. This contrasts with Aschheim's implication that it is only necessary that b exceed a for reserve-requirement increases to have the greater impact.

It may be correct, as Aschheim argues, to expect that, under conditions of strong demand for credit, security sales by commercial banks will represent a greater fraction of the decline in earning assets when reserve requirements are increased than when open-market sales are employed. In the

¹ This definition seems more significant than a possible alternative definition that would indicate that an increase in reserve requirements and open-market sales were "equivalent" if they produced the same initial reserve deficiency (or absorbed equal amounts of free reserves). With the alternative definition, deposits would fall less when reserve requirements were increased than when "equivalent" open-market sales were conducted; the decline in earning assets might equal, exceed or fall short of the decline attributable to "equivalent" open-market sales.

terminology of this note, b may exceed a , but not necessarily by the margin indicated above. b would exceed a if the ratio of government securities to earning assets were a decreasing function of the cash-reserve ratio or, alternatively, an increasing function of the rate of bank earnings. There is no evidence, however, that such relations hold in the United States. In fact, over the decade 1950-59, exactly the opposite relations prevailed. The tendency of banks to shift from securities to loans is a familiar difficulty in the application of restrictive credit policy; it does not seem to be a peculiar weakness of reserve-requirement variation.

The choice between reserve-requirement variation and open-market operations may affect the net carrying cost of the public debt, even if it has no direct influence on security yields. When the central bank engages in open-market purchases or sales it increases or decreases its earning assets. If, over a business cycle, the authorities choose to tighten credit whenever appropriate by selling securities and to relax credit by lowering reserve requirements, the earnings of the central bank will be smaller and the earnings of the commercial banks larger than if the same changes in credit conditions were brought about by raising reserve requirements and buying securities. In the United States and other countries where earnings of the central bank in excess of a certain rate or amount are paid to the government, policies that have closely similar monetary results may have different budgetary implications. This point was recently stressed by the Congressional Joint Economic Committee in recommending that the Federal Reserve authorities provide the additional bank reserves needed to allow secular expansion of the money supply through open-market purchases rather than by further lowering reserve requirements.¹

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OPEN MARKET OPERATIONS *VERSUS* RESERVE- REQUIREMENT VARIATION: COMMENT

IN a recent article in this JOURNAL,² Professor Aschheim finds an "asymmetry" between increases in reserve requirements and open-market sales which "militates against the increase of reserve requirements as a counter-inflationary measure" (p. 703). While he adds several interesting observations to the present debate over these two central bank instruments, Aschheim's analysis is unfortunately neither free of error nor conclusive.

His technique of comparison is a generally acceptable one. In his

¹ Joint Economic Committee, *Staff Report on Employment, Growth, and Price Levels* (Washington, December 24, 1959), p. 406, and *Report of the Committee* (Washington, January 26, 1960), p. 43.

² J. Aschheim, "Open-market Operations *versus* Reserve-requirement Variation," *ECONOMIC JOURNAL*, December 1959, pp. 697-704.

"second type of situation" the commercial banks are assumed without excess reserves and in equilibrium with respect to the structure of their assets.¹ The central bank is assumed to reduce the "volume of bank reserves by a given amount" (p. 679; I trust Aschheim means the volume of bank *deposits*, since the volume of reserves is not affected by a change in reserve ratios), and the efficacy of the two techniques is measured by the extent to which each reduces the quantity of loans made by the banking system. On the basis of an "income" motive and a "liquidity" motive, Aschheim concludes that open-market sales win decisively.²

The adverse (from the view-point of restrictive policy) "income" effect of reserve requirement increases is certainly important; in stressing it, however, Aschheim has forgotten his own point that "higher reserve requirements reduce not only the total volume of commercial-bank assets but also the proportion of commercial-bank earning assets to their total assets. On the other hand, open-market operations reduce the total volume of commercial-bank assets without reducing the proportion of earning assets to total assets" (pp. 699-700). The greater loss of earning assets, and hence income, caused by raising reserve requirements (as compared to open-market sales) will most probably induce the banks to increase the proportion of their earning assets in the higher-yield asset (*i.e.*, loans), but it must be remembered that the *total amount* of earning assets is less. There is no *a priori* reason for believing that a larger fraction of a smaller total will be greater.³ The question is an empirical one.

The other of the two reasons Aschheim advances for this shift in the banks' preferences is, however, fallacious. He claims that the "liquidity needs of commercial banks are to a greater extent met by the required reserves themselves with a higher reserve requirement than with an unchanged reserve requirement" (p. 700). An arithmetic example suffices. Suppose a particular bank has 100 of deposits, a 10% reserve requirement ratio and no excess reserves; further, suppose that it desires sufficient secondary reserves (*i.e.*, Government securities) to be able to meet a withdrawal of one-fifth its deposits. Then its balance sheet is:

Assets.	Liabilities.
Reserves: 10	Deposits: 100
Securities: 18	
Loans: 72	

¹ Aschheim associates this situation with a "neutral" monetary policy, although he makes it clear throughout that he means "restrictive." He also considers the ("first type" of) situation where banks are in the process of switching from securities to loans at the time the central bank acts. I prefer not to start comparative statics analysis from a position of disequilibrium.

² Some minor exceptions are noted by Aschheim in his Section V.

³ Theoretically, one can say, however, that there is *some* rise in the reserve requirements ratio for which the total-earning-asset effect against loans exceeds the "income" effect toward loans. But that is possibly a rise to 100% reserve requirements.

Now if its reserve requirements are raised to 20%, and it still wishes to be able to cover net withdrawals up to one-fifth its deposits, its balance sheet will be:

Assets.	Liabilities.
Reserves: 20	Deposits: 100
Securities: 16	
Loans: 64	

In each case, securities will be one-fourth as large as loans. A change in the relative earning rates of securities and loans or consideration of the "income" effect may induce the bank to alter the extent to which it maintains its liquidity; but, *from liquidity considerations alone*, the ratio in which the bank holds securities to loans is completely unaffected by a reserve-requirement change.

If we accept Aschheim's conclusion that a greater amount of loans will be made by the banking system after a rise in reserve requirements than after comparable open-market sales, it follows, as he states, that interest rates on Government securities will be raised "to a greater extent in response to higher reserve requirements" (p. 701).¹ But it is probable that the concern of the monetary authorities is not only with the interest *rate* but also with the total interest cost of the privately held (non-Government and non-central-bank) Government debt. While either policy will increase this total interest cost, we cannot tell, without further assumptions, which will increase it the more.

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OPEN-MARKET OPERATIONS VERSUS RESERVE- REQUIREMENT VARIATION: REPLY

I

1. In their interesting note, Messrs. Goode and Gurley allege that my "argument *requires* that government security sales by commercial banks in response to an increase in reserve requirements exceed the total of sales by the central bank and commercial banks that would occur if equivalent open-market operations were conducted."² Their allegation is erroneous. My argument was that under conditions of an excess demand for private credit there is an asymmetry between the two central-bank measures in that greater shifting by commercial banks from government securities into private loans

¹ If we assume, plausibly, that there is no difference in the effect of the two policies on the non-bank public's demand curve for Government securities.

² Italics mine.

is induced by an increase in reserve requirements than by restrictive open-market operations. For this argument it is quite unnecessary that, in Goode and Gurley's terminology, $(b - a) > r(1 - a)$. All that is necessary is that $b > a$; this inequality suffices to establish the asymmetry between the two central-bank measures.

2. On the question whether $b > a$, Goode and Gurley say different things. On the one hand, they say that, "It may be correct, as Aschheim argues to expect that, under conditions of strong demand for credit," $b > a$. On the other hand, they state that, "there is no evidence, however, that such relations [as would make $b > a$] hold in the United States. In fact, over the decade 1950-59 exactly the opposite relations prevailed."

It is regrettable, indeed, that Goode and Gurley have not seen fit to share their specific evidence with the reader. In any event, as Goode and Gurley point out, $b > a$ if the ratio of total government securities to earning assets is a decreasing function of the required cash-reserve ratio. That this relation holds when the demand for credit is strong follows from what my article referred to as the "income" effect and the "liquidity" effect of higher reserve requirements. Under the impact of an increase in reserve requirements the higher marginal utility of bank income, reinforced by the lower marginal utility of the moneyness of bank assets, induces commercial banks to sacrifice liquidity to obtain additional earnings. There is no reason to believe that this implication of economic theory is less applicable to the United States than to any other country.

3. Goode and Gurley observe that: "The tendency of banks to shift from securities to loans is a familiar difficulty in the application of restrictive credit policy; it does not seem to be a peculiar weakness of reserve-requirement variation." The point of my article was not that the tendency of banks to shift from securities to loans is a peculiar weakness of reserve-requirement variation. Rather, the point was that, for reasons reiterated in (2) above, this tendency is greater under the impact of reserve requirement variation than of open-market operations.

4. Finally, Goode and Gurley note that, "The choice between reserve-requirement variation and open-market operations may affect the net carrying cost of the public debt, even if it has no direct influence on security yields." It is because of this familiar fact that my own article concluded that even in countries where an active securities market exists, there may still be a distinct advantage in endowing the central bank with both weapons.

II

1. I now turn to Professor Porter's strictures. Though he grants that the adverse "income" effect of an increase in reserve requirements is "certainly important," he evidently objects to my "stressing it." For he charges me with having forgotten my own point that higher reserve requirements reduce the proportion of commercial-bank earning assets to their total

assets. This point, far from having been forgotten, was the very basis for my argument. It is precisely because an increase in reserve requirements reduces the proportion of earning to total assets that it has an adverse "income" effect as compared with restrictive open-market operations, which do not reduce the proportion of earning to total assets.

2. Next Porter charges that my reasoning in terms of an adverse "liquidity" effect is fallacious. He believes he has shown that "from *liquidity considerations alone*, the ratio in which the bank holds securities to loans is completely unaffected by a reserve-requirement change." Unfortunately, his "proof" is pointless, because he specifically assumes in his example that the bank "desires sufficient secondary reserves (*i.e.*, Government securities) to be able to meet a withdrawal of one-fifth its deposits," *regardless* of the level of the cash-reserve requirement. Thus, *by assumption*, he prevents the ratio in which the bank holds securities to loans from being affected by an increase in the cash-reserve requirement. Porter "proves" what he assumes.

3. Lastly, Porter suggests that "it is not unlikely that the concern of the monetary authorities is not only with the interest *rate* but also with the total interest cost of the privately held (non-Government and non-central-bank) Government debt." Let me merely note that there exists another position on this issue, namely that the net interest cost of Government debt is a concern for tax policy rather than for monetary policy.

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PROFIT SHARING BETWEEN PRODUCING COUNTRIES AND OIL COMPANIES IN THE MIDDLE EAST: A REPLY

As one who has been intimately associated with most of the major oil negotiations in the Middle East during the past decade, I was very interested in Dr. Penrose's article, "Profit Sharing Between Producing Countries and Oil Companies in the Middle East" in the *ECONOMIC JOURNAL* of June 1959. It is apparent that Dr. Penrose has given a great deal of thought to these very complicated problems, and she is to be congratulated on her lucid presentation. However, for the record, I think I should point out a few things that are factually incorrect and several inferences with which I do not agree.

Despite its qualified language, the thesis of the article is unmistakable: There is lack of competition in the bargaining processes by which concessions are granted and agreed upon, and the decisive weight is on the side of the companies in their negotiations by reasons of their monopolistic power.

It is clear that the term "monopoly" as used in this article has several meanings. It is, of course, correctly used when applied to an oil concession. Any oil concession is a monopoly, *i.e.*, the company involved is granted exclusive rights to explore for, develop and carry away oil from a specified area for a specified time. Obviously, nobody would risk capital in exploring for oil unless they had some form of guarantee—call it a monopoly if you wish.

I find it extraordinary, however, that Dr. Penrose assumes that there is not competition for concessions. A high degree of competition has been going on in both Venezuela and the Middle East, not to mention other areas. As a matter of fact, the competition became so keen that the terms offered for recent concessions has caused speculation as to the business acumen of some bidders. There are indications that several of the successful bidders are already regretting their success.

The implication in Dr. Penrose's article also is that there was no competition in the past. It is perhaps forgotten—although well known in oil circles—that the Saudi Arabian concession could have been in other hands if the others had thought it worth a down payment of £30,000. Dr. Penrose states: "There is little doubt that some of the early agreements were made by rulers who knew little of what they were signing away." Conversely, the companies knew little of what they were receiving. I am confident that a study of early agreements would show that they were very close to the maximum terms which anyone would pay at the time. The rulers and governments demanded and received gold payments—most of them 4s. gold per ton. This royalty, of course, was in addition to other payments, such as bonuses, dead rent, etc.

It should be recalled that during the 1930s crudes similar in quality to the Middle East crudes being produced were selling in Texas for less than \$1.00 per barrel at the well and even lower than \$0.50 per barrel in 1931 and 1933. The cost of delivering Texas oil from the well to Northern European markets was a little less than the tanker cost from the Persian Gulf. Residual fuel oil was available in seemingly unlimited quantities at the large Caribbean refineries at \$0.60–0.75 per barrel f.o.b. Although there were no posted prices in the Middle East pre-war, it is not difficult to estimate the maximum value of the crude for delivery into Europe in competition with Texas and Caribbean crude and products. It can easily be seen that 4s. gold (about 13 c. per barrel until February 1934, when gold was revalued at \$35 per ounce, and thence about 23 c. per barrel) plus other payments to the governments came to an average of nearly 50% of the profit, and at times was even more.

After the War, with inflation and the rapid increase of crude prices, higher United States and United Kingdom corporate income taxes and frozen gold prices, the oil companies operating in the Middle East recognised that the fixed royalty payment no longer gave the equitable division originally intended, and that additional royalty payments were neither

economically practical nor a permanent method of maintaining equity between the parties. The "rapid spread" of 50/50 was the result of this recognition of the need to restore the equity which had been frustrated by drastically changed conditions, beyond the control of either party and unforeseen at the time the agreements were negotiated.

There is no relationship between this adjustment of old agreements and the signing of new concession agreements. New concession agreements should bring the Governments whatever they are able to negotiate, whether it be better terms for the Government or less favorable. If some of the early agreements, made before the potential of an area was known, appear more favorable to the oil companies than new ones negotiated after the risk-takers have demonstrated the area was rich in oil, is this not the proper reward for risk-taking?

Even in Iraq, where Dr. Penrose states incorrectly that five American companies now participate, it should be realised that three of these companies pulled out more than thirty years ago because they thought the terms too stiff.

There is the implication in Dr. Penrose's remarks that there is no potential competition from governments—that they are restricted in marketing. In fact, practically all producing countries can receive royalty oil which they are free to sell anywhere, at any price they are willing to accept. They find, however, just as the oil companies do, that a lot of capital investment is required in transportation, refining and marketing facilities before crude can be disposed of.

Dr. Penrose writes that 75% was obtained by the "Emir of Qatar" from the Italians and Japanese. The correct facts, which were widely reported in newspapers and oil journals, are that the Italian agreement was made with Iran, and the Japanese agreement with Saudi Arabia and Kuwait for the offshore area beyond territorial waters of the Kuwait/Saudi Arabia Neutral Zone.

The Italian agreement, although incorrectly reported as a 75/25 deal, actually involved a 50/50 agreement with the National Iranian Oil Company, which included liability of half of the development costs. This group in turn has a 50/50 concession with the Iranian Government. In the case of the Japanese company, the agreement with Saudi Arabia amounts to 56% profit payment and 57% to Kuwait.

As for the question of sharing profits made outside the country, it is important to note that those who suggest doing so are unwilling to share in the capital investment required to generate these profits, if any. The financial statements of the oil companies indicate that the total profits in 1958 in the Eastern Hemisphere on all operations, including producing, were appreciably less than the payments made by them to the governments of producing countries. (See recent report of First National City Bank of New York by William S. Evans, *Petroleum in the Eastern Hemisphere*.)

Dr. Penrose writes that it is extremely difficult to believe that the oil companies do not have a powerful influence on prices and, consequently, on the revenue obtained by producing countries. I think it can be shown that world competition sets the price. If the price is unfair—and the implication here is that it is too low—then two things happen. First, the price is available to all and if too low, competitive refineries will buy and take away product markets by price competition while still making a satisfactory profit. Secondly, if the price is too low the Government could take its royalty oil in kind and sell it for a higher price. In actual fact, most of the complaints that the oil companies receive is that posted prices have been too high.

Dr. Penrose refers to the "transportation monopoly of the major companies." If the major companies have a transportation monopoly they are certainly doing a poor job with it. At present there is a 20% surplus of tankers, and owners are ready to charter at below out-of-pocket costs to save tie-up charges.

In Dr. Penrose's mind there is clearly much confusion between nationalisation and the cancellation of concessions. I doubt if it is generally realised that oil concessions in the Middle East are already nationalised. That is, all the facilities are either the existing property of the Government, or a government entity, as in Iran, or become the sole property of the Government under terms of the contract after termination. Rights are then granted for a period of years in return for the performance of certain obligations. If a country were to seize the properties and prevent a company from exercising its rights under such a contract it is incorrect to dub this act as nationalisation. It is nothing more or less than the abrogation of a solemn contract which is part of the law of the land.

One of Dr. Penrose's important assumptions is that governments have the right to nationalise the property of foreigners as well as that of their own citizens on payment of fair compensation and that such action is justified when the economic interests of the country are thereby furthered. The important point here is that although the countries may have the power to abrogate a contract they do not have the right unless they pay prompt, adequate compensation, plus liquidated damages for loss of profit during the remaining life of the contract.

In so far as principle, however, is concerned, it is important to keep the record straight. If there is one thing that has been laboriously achieved in Anglo-American history over past centuries it is that the King or the Government is under the law and not outside it. What protection is there for either private citizens or private corporations if we allow in principle that governments are free to break, unilaterally, solemn contracts ratified by the highest authority in the land? It is true that in some countries there are overriding government rights, such as to achieve national security, but they are exercised only under careful restrictions, including fair compensation not determined unilaterally but, if necessary, by the courts. We

must never forget that such safeguards are not often available in international affairs. The lack of them, however, does not warrant acceptance of the assumption that a government is superior to its contracts. Of what use then would be a contract? Would it permit a company, too, to unilaterally abrogate its contract if its economic interests were thereby furthered? No, a government is, equally with the company or individual, bound to the provisions of a contract freely entered into, and if revision is necessary, then it is a matter for negotiation and not unilateral action.

H. W. PAGE

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PROFIT-SHARING IN MIDDLE EAST OIL—REJOINDER

ALTHOUGH my article on the sharing of profits from Middle East oil production¹ was painstakingly designed to analyze as objectively and impartially as possible the fundamental considerations governing the bargaining positions of oil companies and governments in the Middle East, it has (perhaps for this very reason) come under attack from both sides. My friends among the Middle Eastern economists have privately objected to my contention that the oil-producing countries would not gain by "nationalising"² the companies, and also to my conclusion that these countries are not "exploited" by virtue of the monopolistic position of the companies. On the other hand, the distinguished director of the Standard Oil Company of New Jersey, Mr. Page, objects to the notion that the oil companies have monopolistic power with respect to concession agreements, marketing, price or transport, while Professor Salera insists that in any case it is the governments that often enjoy "the superior economic power."³ In addition, Mr. Page raises the difficult and as yet unresolved question under what conditions a sovereign state can legally abrogate its contracts with foreign nationals.

With this last problem international lawyers have been grappling for some time and I have no special competence in the matter.⁴ Mr. Page and

¹ "Profit Sharing Between Producing Countries and Oil Companies in the Middle East," *ECONOMIC JOURNAL*, Vol. LXIX, June 1959, pp. 238–54.

² Mr. Page is, of course, quite correct in pointing out that strictly speaking the issue is not one of "nationalisation" but of "abrogation of contract," since the companies operate only under concession contracts. The former term is the more commonly used, perhaps because it has less invidious connotations nowadays, but Mr. Page is within his rights to insist on the latter.

³ Virgil Salera, "A Note on Profit Sharing in Middle East Oil," *ECONOMIC JOURNAL*, Vol. LXIX, December 1959, pp. 812–13.

⁴ For a convenient survey of the issues see George Lenczowski, *Oil and State in the Middle East* (New York: Cornell University Press, 1960), pp. 94 ff.

I evidently agree that adequate compensation should be paid, but it seems to me that there is ground for argument over the question whether compensation should include "liquidated damages for loss of profit during the remaining life of the contract," when much of the profit can be attributed to the monopolistic market position of the private producers. Clearly we cannot undertake a full discussion of this problem here; there is no way in economics of determining what is a "proper reward for risk-taking" or an "equitable" division of profits, and therefore economic analysis provides no criteria for deciding how much "damage" due to loss of profit should be included in an "equitable" compensation. I was concerned neither with the legal issue nor with the problem of determining appropriate compensation but only with the circumstances in which it might be to a country's advantage to abrogate its contracts on payment of compensation.¹

When we come to the question of the amount of competition in the international oil industry we have to analyze a very mixed bag. Mr. Page is certainly correct in stating that there has been intense competition for the new concessions recently granted in the off-shore areas and in Iran; there was nothing to the contrary in my paper, and I certainly would not quarrel with the implication that the governments have done extremely well as a result.² As to the original concessions, I suppose that the political manoeuvring and behind-the-scenes bargaining could be classed as a kind of competition, although surely Mr. Page has not forgotten the governmental policies and private restrictions affecting such competition. Whether or not the terms of most of the original concessions were the "maximum terms which anyone would pay at the time" is very difficult to judge, and there is little point in disputing the matter; the important issue with which I was primarily dealing related to the problem of renegotiating existing agreements, and here Mr. Page does not appeal to competition but to the recognition by the oil companies of "the need to *restore* the equity which had been frustrated by drastically changed conditions" (*italics mine*).

I always find myself slightly bewildered by the tendency of the spokesmen for business firms to emphasise at one moment competition as the most significant force determining a firm's behaviour and at the next moment to emphasise equity, the public interest and fair play. Equity becomes an important factor only when competitive forces are largely inoperative;

¹ As I have pointed out in an earlier paper, it would rarely pay a country to nationalise a foreign firm if it had to pay compensation including the full present value of expected monopoly profits. See my "Foreign Investment and the Growth of the Firm," *ECONOMIC JOURNAL*, Vol. LXVI, June 1956, p. 234.

² I am indeed grateful to Mr. Page for giving me the opportunity to acknowledge in print three unforgivable errors with respect to the new Italian and Japanese concessions, and to the composition of the American group in the IPC. All of the errors, which he corrects, occurred in the same footnote of my original article (p. 245), and I have been busily correcting them by hand in offprints. My excuse would only be understood by people doing research and writing in out-of-the-way parts of the world, and I can only offer apologies for my failure to check more carefully. Fortunately, the footnote errors have no bearing whatsoever on any part of my argument.

rarely can the same phenomena be explained on *both* grounds.¹ My discussion of the bargaining problem was based on the assumption that both the oil companies and the governments were concerned to do as well as they could for themselves, and I still suspect that this assumption comes fairly near to the truth. The companies insist that a 50/50 split of the profits is fair; this may be so, although I have not seen any attempt to show *why* it is fair. Presumably to everybody except economists anything split equally is *ipso facto* split fairly!

Professor Salera, on the other hand, holds that the 50% profits tax imposed on Aramco by the Saudi Arabian government was a "unilateral decision" by the Government which made Aramco very unhappy. I have yet to see any evidence that it was unilateral, and Mr. Page implies that, equity having been served, Aramco would not have been unhappy. As a matter of fact, to give 50% of its profits to Saudi Arabia in the form of an income tax should not have distressed Aramco, since it cost the company practically nothing—it merely meant that the company, which is incorporated in the United States, paid taxes to Saudi Arabia instead of to the United States Government, whose corporate income tax is now 52% in any case.²

I would agree with Professor Salera that political considerations complicate the oligopoly bargaining problem, but it certainly is not necessary to postulate anything so pseudo-scientific as "the dynamics of the international oil industry" (p. 313) to explain the likelihood that the governments will be able to obtain progressively larger shares of the profit. The simple facts are that the governments are no longer easily dominated, they are becoming increasingly aware of their strategic political position (although North African oil will reduce their economic bargaining power), and their peoples, imbued with highly charged feelings of national consciousness, are sometimes fiercely (and often irrationally) determined to reduce Western influence in their economies to a minimum. Ricardian rent analysis, to which Professor Salera appeals, is a strange and lonely traveller in such company, and

¹ Some of the difficulty arises, of course, because business-men and economists use the term "competition" differently. A delightful example recently came to my attention: the Chairman of the Board of the Standard Oil Company of Indiana, after pointing out that in the first six months of 1960 demand could be expected to rise while production controls would prevent "senseless overproduction of products" in the United States, went on to say, "In this economic climate prices should firm and strengthen, but the oil industry is so intensely competitive that improvement in the ratio of demand to supply does not automatically cause strengthening of price"! First National Bank of Chicago, *The Outlook for Business the First Six Months of 1960*, December 8, 1959.

² In the *Hearings* cited by Professor Salera, Mr. Davies, Chairman of the Board of Aramco, attributed the 50% profits tax of Saudi Arabia to the *benevolence* of the Saudi Arabian Government, stating, "... the Saudi Arabian Government was insisting on an income tax which would result in no additional burden on the company." *Emergency Oil Lift Program and Related Oil Problems, Joint Hearings Before Subcommittees of the Committee on the Judiciary and Committee on Interior and Insular Affairs* (U.S. Senate, 85th Cong., 1st Sess., 1957) Part 2, p. 1430.

Mr. Davies also explicitly agreed that there were no income taxes paid to the United States on the operations of Aramco in Saudi Arabia because of the tax credit against foreign income taxes which is granted by the U.S. Treasury. See *ibid.*, p. 1421; also pp. 1442 and 1471.

it has little relevance to the problem of how profits (or rents) are to be divided between companies and governments.

So far as the price structure of the international oil industry is concerned, it must be remembered that the seven international major companies control around 90% of the crude oil produced in the Middle East and in Venezuela, and refine and sell the bulk of the petroleum products sold outside the United States and Soviet controlled areas. Crude-oil production in the United States, the third major source of supply, is regulated by government agencies. Estimates of the control of the commercial tanker fleet by the integrated companies through ownership or long-term charter range from 72% to as much as 90%.¹ It is true that since 1958 price competition in crude oil outside the United States has for a number of reasons become a serious problem for the industry, and that the established pattern has been breaking up. But the argument that "world competition sets the price" of crude oil has, I think, been effectively exploded, even if we were to use a very loose notion of "workable competition." There is not space to discuss the matter here, and I can only refer the interested reader to the important literature on the subject.² I do not intend to imply, however, that price competition in the economists' sense *should* be the primary determinant of crude oil prices; this is an entirely different and rather difficult question.

But surely it is disingenuous of Mr. Page to say, on the one hand, that the governments of the oil-producing countries are not restricted in marketing their royalty oil, since they "are free to sell anywhere, at any price they are willing to accept," and that they would do so if oil prices were too low, yet on the other hand to indicate that they *cannot* do so because they do not have the "transportation, refining and marketing facilities" necessary before "crude can be disposed of." Is this not an admission of my contention that the integrated companies have extensive control over these later stages of the industry and are unwilling to provide markets for oil available from other sources?

Indeed, the most significant fact about the international petroleum

¹ See Melvin G. de Chazeau and Alfred E. Kahn, *Integration and Competition in the Petroleum Industry* (New Haven: Yale University Press, 1959. Petroleum Monograph Series, Vol. 3), p. 343. Incidentally, as Mr. Page suggests, there is a severe surplus of tankers at the present time; furthermore, if one can accept Professor Nielsen's analysis of the past record in forecasting the need for oil tankers, one can also agree that the oil companies as well as the independent tanker companies have often done a "poor job with it." There is nothing in economic analysis suggesting that errors of business firms provide proof of the existence of competitive conditions! See Robert S. Nielsen, *Oil Tanker Economics* (Bremen: Weltschiffahrts Archiv, 1959).

² I can only mention a few of the significant discussions:

The Price of Oil in Western Europe, Economic Commission for Europe, March 1955.

The International Petroleum Cartel, Staff Report to the Federal Trade Commission, Committee Print No. 6 (82nd Cong. 2d Sess. 1952), pp. 352 ff.

Michael Laudrain, *Le Prix du Pétrole Brut* (Paris: Genin, 1958). Contains extensive bibliography.

M. G. de Chazeau and A. Kahn, *op. cit.*, pp. 211-17. One of the more recent, though brief, discussions.

industry is the vertical integration of the major companies. For the most part, the majors produce their crude oil for their own use; selling crude is not their primary business, and relatively little is sold "spot" to independents on the open market. Nevertheless, as Mr. Page points out, their financial statements "indicate that the total profits in 1958 in the Eastern Hemisphere on all operations . . . were appreciably less than the payments made by them to the governments of the producing countries." In other words, in 1958 *all* of the profit from the *integrated* operations of the companies was put at the level of crude-oil production. As any economist would immediately suspect, there are tax advantages in such an arrangement, at least for the American companies. The device by which this is achieved is the posted price, which is the basis for calculating payments to be made to the governments of the producing countries on all oil produced, but which has no necessary relation to the price at which the majors actually sell the crude oil they do not use in their own subsidiaries and certainly no relation to the value of the oil used in their own operations. Whether the posted price is "too high" or "too low" depends on the point of view; there are no economic criteria. It certainly has been higher than genuine price competition would have produced—but then it is not necessarily the actual "market price"; it is naturally too low from the point of view of governments desiring a greater share in the oil companies' profits.¹

EDITH PENROSE

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CAPITAL EXPORTS AND GROWTH FOR ARGENTINA: A REJOINDER

IN this rejoinder I wish to discuss a few points raised by Mr. J. Knapp in his interesting comment on my recent note.²

I agree with, and think valuable, Mr. J. Knapp's distinction between "unnecessary" and "excess" (in his sense) borrowings;³ indeed, it was in

¹ For a detailed exposition of the issues raised in this paragraph see my forthcoming article "Middle East Oil: The International Distribution of Profits and Income Taxes," *Economica*, August 1960.

² A. G. Ford, "Capital Exports and Growth for Argentina, 1880-1914," *ECONOMIC JOURNAL*, September 1958, pp. 589-93. J. Knapp, "Capital Exports and Growth for Argentina: a Comment," *ECONOMIC JOURNAL*, September 1959, pp. 593-7.

³ By "unnecessary borrowing" I had in mind that portion of foreign borrowing which did not serve to, or was not used to, increase the productive capacity of the borrowing country. Mr. Knapp defines "excess borrowings" as "imports of capital which arise otherwise than in connection with a need to finance such supplies of goods and services from abroad as are, in a given state of tastes, techniques and available resources, and of a given amount and composition of output and growth, both indispensable and unrequitable" and, alternatively, as borrowing which does not reflect a deficiency in actual or potential domestic saving in the borrowing country.

the former sense that I thought Argentine borrowings too large, especially between 1885 and 1890, and I should like to correct the impression I may have given that I thought that *unnecessary borrowing* was small in the Argentine in nineteenth-century conditions.¹ Rather, I think that in the ten years preceding the Baring Crisis of 1890 unnecessary borrowing was on a considerable scale, whilst I am doubtful whether "excess borrowing did, in fact, occur on a large scale in the Argentine during this period" (Knapp, *op. cit.*, p. 596).

Accordingly, I should like to comment on Mr. Knapp's use of J. H. Williams' estimates of the Argentine balance of payments between 1881 and 1900 and the conclusions which he draws from this material. He rightly draws attention to the rise in foreign debt-service charges between 1881 and 1890, which absorbed 40% of total foreign borrowing in this period: not merely did they rise absolutely but also relatively to export proceeds, since output of exportables had not yet expanded, as the various projects had not matured, and since these debt-service charges had a large core of fixed-interest payments, payable immediately, while only a small proportion of borrowing was in the form of Ordinary shares (the rules of the game). These charges were swollen by the "spendthrift" type of borrowing undertaken by the national and provincial governments with the principal object of providing themselves with "hard currency" supplies to meet their increasing foreign debt-service payments, payable in gold and sterling.² This short-term answer of borrowing abroad upon one pretext or another, which had dire longer-run consequences in a mounting burden of debt-service charges, would indeed have been unnecessary in a different political and social environment. Furthermore, unnecessary borrowing was swollen by speculative schemes and roguery, while certain unscrupulous issuing houses in Europe pushed Argentine issues not only on the lending public but also on Argentine borrowers!

However, the impression given of the claim made on loan proceeds by "apparent short-term capital export" is, in my opinion, both exaggerated and misleading.³ For, even if we assume J. H. Williams' estimates of overseas borrowing and the Argentine official trade figures reliable (the latter, as I shall show, were not), the "apparent short-term capital export" figure is very much of a "catch-all" estimate. It includes Argentine tourist expenditure abroad, and immigrants' remittances, both of which have been estimated at 5 million pesos each in the late 1880s,⁴ and I do not believe this conclusion to be correct conceptually. The immigrants' remittances (whether

¹ J. Knapp, *op. cit.*, p. 596.

² For a full treatment of this episode with depreciated paper currency, see A. G. Ford, "Argentina and the Baring Crisis of 1890," *Oxford Economic Papers*, 1956.

³ Mr. Knapp uses this apparent capital export as evidence of considerable "excess borrowing" between 1881-90.

⁴ J. H. Williams, *Argentine International Trade under Inconvertible Paper Money, 1880-1900*, pp. 105-7.

those of the permanent immigrants or of the temporary immigrants—golondrinas—who came from Italy and Spain to shift the harvests) could hardly have formed the sort of savings which could even potentially have been tapped. They were payments to keep the rest of the family going in Europe and would have all been spent in Argentina, had the rest of the family accompanied the remitter. If remittances had been forbidden by decree, then I believe the migration would have been insignificant. If column (8) in Mr. Knapp's table is reduced to cover these points by 10 million pesos a year, capital exports then form 14% of loans instead of 26%. Also included in this capital export figure are brokerage payments on the loans, the net repatriation of land mortgage bonds (cedulas) by European holders, the asset transfers of banks and railway companies as required for genuine local purposes and for speculative purposes.

Argentine official estimates of import and export values in this period are somewhat unreliable, as volumes (particularly of imports) were valued at "official" valuations which sometimes bore no resemblance to actual prices. If Argentine imports from the United Kingdom (c.i.f.) are compared with United Kingdom exports to Argentina (f.o.b.) (neglecting the timing differences) and an allowance of 15% is made to cover c.i.f./f.o.b. differences, the Argentine figures are of the right order of magnitude for 1881–90, but overvalue imports by 15%, crudely, in 1891–1900. As the United Kingdom provided some 38% of Argentine imports in the 1890s, it is reasonable to assume that total imports also were overvalued by 15%, thus tending to reduce the figures for short-term capital import and increase the figures for short-term capital export by 14–15 million pesos a year on average in this decade. Adjustments, however, in the opposite direction of roughly similar magnitude should be made for tourist expenditure and immigrants' remittances in 1891–1900.

Export values, on the other hand, were overvalued in the 1880s on account of high nominal valuations applied to cereals, to the extent of 30 million gold pesos in aggregate for the years 1884–90. However, the more nearly correct figure for export values in 1889 is 123 million gold pesos, not 90 million as given by J. H. Williams, so that the former overvaluation is offset for the purposes of aggregative comparisons, but this provides a sad commentary on the reliability of the statistics. Fortunately, reliability improves after 1892.

Accordingly, I suggest that it is dangerous to base too much on a composite residual derived from unreliable Argentine official trade statistics, and J. H. Williams' estimates of overseas borrowing and interest charges—a residual, moreover, which includes immigrants' remittances, tourist expenditure abroad, brokerage payments, the repatriation of cedulas, the activities of speculative syndicates, the holding abroad of funds previously borrowed, for example, by railway companies for the purchase of loco-

motives, which would not be required until track had been laid, besides the acquiring of external assets by Argentina.¹

While I agree that it is an open question, statistically speaking, whether domestic savings were scanty or otherwise, I have the impression that they would have been insufficient to meet the large concentrated demands of railway building in this period. In this connection I should like to stress that I do believe that Argentinians were very interested in railways—their effect on land values was most important (as, indeed, in parts of Britain)—but the supplying of capital was a very different matter. It came from Britain directly, and indirectly via public borrowings in the case of the state-owned lines.

In conclusion, Mr. Knapp is correct in distinguishing between "unnecessary" and "excess" borrowing, but somewhat exaggerates, on the basis of unreliable information and a "catch-all" concept, the importance of excess borrowings in Argentina, while I would like to stress the extent of unnecessary borrowings in the years before the Baring Crisis.

A. G. FORD

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ECONOMIC EFFICIENCY OF TAXATION: REJOINDER TO DR. PREST

ALTHOUGH I am not sure that I have understood the last paragraph in Dr. Prest's note, I agree that the "economic efficiency" of taxation is certainly a "misnomer." Dr. Prest's note proves this point beyond doubt. In spite of the quotation marks, the problematic nature of its importance and our arguments that inefficiencies of more "efficient" taxes should be weighed against their advantages, it seems that the term has been understood as implying general economic superiority. Also, since borrowed from Kaldor, some readers might have been wrongly impressed that I necessarily take sides in the controversy about the expenditure tax. So, why not abandon the term, but not the problem, which is whether the comparative net expenditure-restraining (or deflationary) effects per unit of receipt of the various taxes should be considered legitimately one of the criteria for choosing among taxes. I believe that the problem should be answered independently of one's own views as to the empirical differences, in this respect, between *any* two taxes.

Truly, in my *Journal of Political Economy* article² I have discussed, and if

¹ Suppose a company holds newly borrowed funds in London in year one, and employs them in year four. This will increase "short-term capital exports" as computed by Mr. Knapp in year one, and in year four will reduce them, or even cause an increase in "short-term capital imports."

Again, in the 1890s some interest payments recorded by J. H. Williams were never paid in cash but extra bonds, shares, were issued in lieu. This would reduce the "apparent short-term import of capital."

² "Deflationary Effects of Outlay and Income Taxes," *Journal of Political Economy*, June 1959, pp. 266–74.

successfully, have cast some doubts, on three arguments that suggest that there is an important difference between the deflationary effects of outlay and income taxes, but not discussing *other* arguments should certainly not be taken as a token of support or adoption. Dr. Prest reproaches me for not raising some secondary effects of the substitution of an expenditure tax for an income tax, including administrative problems. I have not discussed this problem *at all*, and had I discussed it, my conclusions on this issue would, probably, have been quite close to those of Dr. Prest. But this is not the issue that I chose to discuss. I am not sure at all that my treatment of "my" problem is satisfactory, but I cannot have doubts as to its importance. In some cases, say that of an estate tax and an income tax, the "empirical" difference between the taxes is obvious.

On this problem Dr. Prest justifiably remarks that the benefits of a greater stock of privately held government securities, although important, have their counterpart in the disadvantages of a greater national debt. This does not apply, of course, to the case of credit creation by a central bank which was uppermost in my mind. My line of thought was as follows: the government finances all its expenditures by "printing money" and then collects as much taxes as needed to prevent inflation. In this case, of course, the less it collects, the higher the money balances left at the hands of the public. Since the same price level is assumed, the higher nominal money balances are also higher real money balances, so that *ceteris paribus*, the public should be better off. Wealth effects in future periods, inflationary as they might be, only reflect the increase in welfare. Naturally, often, if not always, there is no *ceteris paribus*, and I have attempted to clarify this at the end of my article.

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ECONOMIC EFFICIENCY OF TAXATION

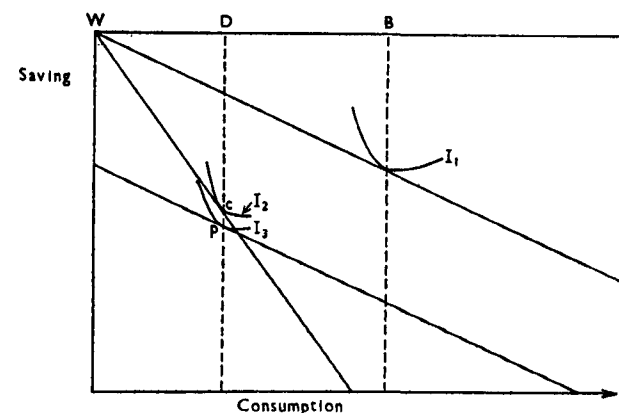
IN his article "Is the 'Economic Efficiency' of Taxation Important?" (ECONOMIC JOURNAL, March 1959) Mr. A. Morag discusses the relative advantages and disadvantages of indirect and direct taxes. He shows that from the point of view of the individual tax-payer, a tax levied on the consumption of a specific good may be preferable to a general income tax, provided that the object of each tax is to reduce the consumption of that good by a given amount, rather than to raise a given amount of revenue, as is usually assumed to be the Government's aim when comparisons of this kind are being made.

Mr. Morag then takes his argument a step further and

effect of a general sales tax with an income tax. Now, general consumption is measured along the horizontal axis, and net saving (or dissaving) along the vertical axis.

The Government wishes to reduce consumption from $W-B$ to $W-D$. This can be achieved by imposing a general sales tax, in which event the equilibrium position is represented by point C , on indifference curve I_2 . Alternatively, an income tax can be imposed, which leads to equilibrium at point P , on indifference curve I_3 .

The imposition of a sales tax, rather than an income tax, leaves consumers with additional money balances—cash and/or bonds—to the value



$C-P$. Moreover, the argument continues, "the higher money balances . . . are also higher real balances, for—and that was the basic assumption—the two alternative taxes are economically equivalent so that *the current price level must be the same in both cases.*" In fact, the basic assumption was nothing of the kind. It was merely that each tax would cut demand to the same extent; the sales tax is able to do this by reducing the attractiveness of consumption relative to saving, *i.e.*, by raising the price level. On the other hand, the income tax (or the poll-tax as we must say to be consistent with the labelling of the diagram) leaves the price level undisturbed.

While it is true that the fact that C lies on a higher indifference curve than P suggests that individuals *ought* to feel better off with the imposition of a sales tax than an income tax, the reactions of individuals may in practice be consistent with a feeling of being worse off. The additional comfort of the larger money balances may be of less account than the discomfort of higher prices. In other words, the trade unions may be more, rather than less, inclined to seek wage increases.

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CURRENT TOPICS

THE Annual Meeting of the Royal Economic Society was held on Thursday July 7 at the London School of Economics. Professor J. R. Hicks was elected to the office of President in succession to Sir Robert Hall, who was elected a Vice-President. Professor R. C. Tress was elected to the Council. With these exceptions, the Council and Officers were elected without change for 1960-61.

THE Annual Meeting considered and approved the proposals of the Council to raise the Annual Subscription of the Society to 50s. and to make corresponding changes in the rates of Life Subscription and of other subscriptions. It was agreed that these increases should take effect from July 7.

THE Secretary reported on the membership and finances as follows:

	1959.	1958.	1957.	1956.
New Fellows and Library Members elected	492	407	490	50
Fellows lost by death, resignation, or default	327	300	496	33
Number of Fellows and Library Members on December 31	6444	6279	4572	694
Total Compounders included in above total	1789	1769	1155	159
Surplus of Income over Expenditure	—	—	—	278
Surplus of Expenditure over Income	£790	56	38	—

AFTER the formal business the Rt. Hon. Reginald Maudling, President of the Board of Trade, and Mr. Alan Day opened a Discussion on "Problems of European Trade and Relations."

WE record with gratitude a grant of £2,460 from the Rockefeller Foundation to make possible the series of six surveys of recent developments of economic theory, of which the first appeared in the June issue of the ECONOMIC JOURNAL. This series owed very much to the initiative and encouragement of the late Professor Norman Buchanan, formerly Director for the Social Sciences at the Foundation. Arrangements are being made for the joint publication both of the Royal Economic Society series and of that which is being simultaneously produced by the American Economic Association when the two series are complete.

THE Trustees of the Houlton-Norman Fund, on the recommendation of their Advisory Committee, have made the following awards of research grants for 1960/61:

Mr. Thomas Balogh, Fellow of Balliol College, Oxford.	Studies in Financial Organisation.
Mr. Maxwell Gaskin, Lecturer, Department of Political Economy, University of Glasgow.	Methods of Short-term Finance of British Overseas Trade.
Mr. B. W. Hill, Research student, King's College, Cambridge.	The Administration of Robert Harley as Chancellor of the Exchequer and Lord High Treasurer of Great Britain.
Mr. E. J. Homeshaw, Lecturer in Liberal Studies, Walsall & Staffordshire Technical College.	The Development of Borough Government in South Staffordshire with particular reference to Walsall in the period 1836-1935.
Dr. D. S. Lees, Lecturer in Economics, University College of North Staffordshire.	The economics of health services in the United Kingdom.

An offer of awards for 1961/62 will be made in due course. Further information may be obtained from the Secretary, Houlton-Norman Fund, c/o Bank of England, London, E.C.2.

THE following have been admitted to Life Fellowship of the Society:

Arnold, H. C. F.	Mavinkurve, G. S.	Sayana, Dr. V. V.
Caralopoulos, N.	Mehta, D. D.	Sen-Gupta, N. M.
Dalisay, Dr. A.	Mueller, P. H.	Thweatt, W. O.
Griffiths, B. L.	Pickering, M. A.	Watts, Miss N. G. M.

THE following have been admitted to Fellowship of the Society:

Adler, Mrs. D. R.	Creet, H.	Hill, N.
Afonja, S.	Das, Prof. M.	Hillidge, J. E.
Aldred, S. W.	Davison, J. P.	Hooley, R. W.
Andersen, N. R.	Dennis, H. C.	Hudson, H.
Ando, A.	De Silva, D.	Hughes, Dr. H.
Archer, R. W.	Diss, N. E.	Ikimi, I. O.
Arora, V. M.	Donnelley, T. J.	Indraratna, A. D. V. de S.
Austin, D. V.	Du Moulin, H.	Ingram, J. W.
Barrell, D. W. F.	Dunn, C. B.	Jain, R. C.
Barucci, Dr. P.	Durham, V. F.	Jalaluddin, M.
Bassey, J. H.	Egerer, G. V.	Jana, P. C.
Bentley, M. J.	Eka-Eteh, M. J.	Kane, J. G.
Bhanot, J.	Farnsworth, T. A.	Kazushi, Prof. O.
Birch, D. K.	Fisher, T. W.	Keene, T. P.
Boyce, R. F.	Frobisher-Alltoft, J. A.	Klvac, G.
Bray, Prof. J. O.	Gaitonde, M. Y.	Lakhota, R. N.
Brown, J. M.	George, K. D.	Lane, P. J. T.
Bruton, C. F.	Gitlow, Prof. A. L.	Lee, D.
Buchanan, D. M.	Glasgow, R. E.	Leslie, A. N.
Burgess, R. S.	Groenewegen, P. D.	Lloyds, R. E.
Cook, P. C.	Gulati, S. R.	MacBean, A. I.
Corden, Dr. W. M.	Hancock, Dr. K.	MacCallum, A.
Couzier, R.	Hester, D. D.	

McKenzie, R. E.	Ocadiz, J.	Seshan, M. I.
McParish, R.	Onuoha, O. A.	Smith, S. M.
McQuaid, Miss G. A.	Opoku-Achampong,	Steele, R. I.
Mallyon, C. A.	J. W.	Stevens, Capt. B. B.
Marks, A. A.	Overbury, A. L.	Stott, J. R.
Mathur, H. M.	Parekh, S. B.	Tai Lan Sun
Meguid, Dr. A. F. A.	Patterson, H.	Tausig, A. C.
Mensah, T. K.	Paukert, F.	Throsby, C. D.
Molhuysen, P. C.	Pons, D. M.	Tolfree, W. R.
Moore, R. J.	Powell, A. A.	Vassiliou, Dr. G. V.
Morris, Dr. V. P.	Prasad, S.	Vidor, E. H.
Morton, R. F. H.	Prithvinath, K. G.	Wallace, R. H.
Muojeke, R. N.	Raymond, J. G.	Weinstock, Dr. U.
Nascimento, V. C. de	Reddi, O. S. R.	Wijarawardana,
A.	Rees, H.	K. H. P.
Nath, P.	Ross, L. C.	Wilde, B.
Naz, A. Hameed	Sacks, I.	Williams, J. R.
Newman, C. A.	Salmon, M. J.	Winhall, B. D.
Nicholls, G. F.	Sassella, G.	Wong, Prof. Po-Shang
O'Brien, H. E.	Saunders, Miss J. L.	

THE following have been admitted to Library Membership of the Society:

Ball State Teachers College, Muncie, Indiana, U.S.A.
 Boekhandel Kirchner, Amsterdam C., Netherlands.
 California State Polytechnic College, Pomona, California, U.S.A.
 Centre de Recherches Economiques Appliquées, Paris, France.
 College of Commerce, West Virginia University, Morgantown, West Virginia, U.S.A.
 Columbus Memorial Library, Pan American Union, Washington D.C., U.S.A.
 Dept. of Economics, Stanford University, Stanford, California, U.S.A.
 Dept. of Statistics, Federation of Malaya, Kuala Lumpur, Malaya.
 Fundo de Fomento de Exportacao, Lisbon, Portugal.
 Gettysburg College, Gettysburg, Pennsylvania, U.S.A.
 Ministry of Agriculture, Cairo, Egypt.
 Ministry of Aviation, London.
 National War College, Yan Ming Shan, Taiwan, Rep. China.
 South Dakota State College, Brookings, South Dakota, U.S.A.
 Stanford Research Institute, Menlo Park, California, U.S.A.
 Stonehill College, North Easton, Mass., U.S.A.
 University of Akron, Akron, Ohio, U.S.A.
 Utica College of Syracuse University, Utica, N.Y., U.S.A.
 Villanova University Library, Villanova, Pennsylvania, U.S.A.
 Xavier College, Kew, Victoria, Australia.

RECENT PERIODICALS AND NEW BOOKS

Journal of the Royal Statistical Society

VOL. 123, PART 2, 1960. *Statistics of the Transport of Goods by Road*: K. F. GLOVER. *The Structure of the English Milk Industry*: E. STRAUSS. *Human Infertility and Artificial Insemination: The Demographic Background*: D. V. GLASS. *Artificial Insemination and the Frequency of Incestuous Marriages*: J. HAJNAL. *On Some Input-Output Computations*: T. I. MATUSZEWSKI.

Applied Statistics

VOL. IX, No. 1, MARCH 1960. *Some Applications of Multivariate Methods in Botany*: S. C. PEARCE and D. A. HOLLAND. *Some Statistical Aspects of Preference and Related Tests*: C. I. BLISS. *A Study of Some Potential Biases in the Operation of a Consumer Panel*: A. S. C. EHRENBURG. *An Application of Linear Programming to Agricultural Economics*: S. E. VINCENT. *On Comparing Two Observed Frequency Counts*: M. KUPPERMAN. *Analysis of Variance of a Latin Square Design with Missing Observations*: C. Y. KRAMER and S. GLASS. *Note on British Unemployment Statistics*: D. BAILEY.

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VOL. XXVII, No. 106, MAY 1960. *Bilateral Monopoly, Successive Monopoly, and Vertical Integration*: F. MACHLUP and M. TABER. *Towards a More General Theory of Capital*: C. A. BLYTH. *Some Effects of the \$1.00 Minimum Wage in the United States*: H. M. DOUTY. *Economists' Cost Rules and Equilibrium Theory*: G. F. THIRLBY. *Methodological Prescriptions in Economics: A Reply*: T. W. HUTCHISON; *A Rejoinder*: K. KLAPPHOLZ and J. AGASSI. *The New Age of Technology, 1750-1900*: D. G. COLEMAN.

The Manchester School of Economic and Social Studies

VOL. XXVIII, No. 2, MAY 1960. *An Experiment in Comparative Costing in the Hospitals Service*: R. SIDEBOTHAM. *Manufacturing Industry in the New Towns*: J. H. DUNNING. *The South Wales Sliding Scale, 1876-1879: An Experiment in Industrial Relations*: J. H. MORRIS and L. J. WILLIAMS. *Wage Policy in Holland*: B. HAAS. *An Index of Wage-rates by Industries*: J. R. CROSSLEY.

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VOL. 12, No. 1, FEBRUARY 1960. *Economic Theory and Agrarian Economics*: N. GEORGESCU-ROEGEN. *Aggregated Rebate Schemes and Independent Competition*: B. YAMEY. *Notes on the Working of the Gold Standard before 1914*: A. G. FORD. *Earnings-drift in the United Kingdom, 1948-57*: J. MARQUAND. *Cash-flow in a Controlled Economy: The Case of Hungary*: J. BARACS. *A Note on the Measurement of Real Income*: S. WELLISZ.

Scottish Journal of Political Economy

VOL. VII, No. 2, JUNE 1960. *The Economic Articles in Blackwood's Edinburgh Magazine, and Their Authors, 1817-53*: F. W. FETTER. *Adam Smith, Clubman*: J. F. BELL. *Recent Developments in the Jute Industry*: A. M. CARSTAIRS and A. V. COLE. *Industrial Planning in Hungary*: G. F. RAY. *The Restrictive Trade Practices Act, 1956: A Review of Certain Judgments*: F. LIVESEY.

Yorkshire Bulletin of Economic and Social Research

VOL. 12, No. 1, MARCH 1960. *The Economic Outlook: Retrospect and Prospect*: D. C. HAGUE. *The Earls Fitzwilliam and the Wentworth Woodhouse Estate in the Nineteenth Century*: J. T. WARD. *The Marginal Efficiency of Capital and the Present-value Rule*: G. MILLS. *The Pace and Progress of Port Investment in England 1660-1830*: D. SWANN. *Isaac Ironside and the Hollow Meadows Farm Experiment*: J. SALT.

National Institute Economic Review

No. 9, MAY 1960. *The Economic Situation. The Strategy of Indian Development*: I. M. D. LITTLE.
 No. 10, JULY 1960. *The Economic Situation. World Trade in Manufactures*: R. L. MAJOR. *Defence Expenditure*: D. C. PAIGE.

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VOL. VIII, No. 3, JUNE 1960. *Government Competition and the Performance of the French Automobile Industry*: J. SHEAHAN. *Costs and Prices in Launderettes*: T. KEMPNER. *Stocks in Distribution*: W. G. MCGLELLAND. *On the Short-run Cost Function*: M. GOTTLIEB. *Austrian Steel: Development and Prospects*: F. SETHUR. *Labor Turnover as an Index of Unemployment in the United States, 1919-1958*: D. DEWEY. *Individual Price Maintenance*: R. A. HALL. *Comment on Resale Price Maintenance*: N. H. LEYLAND.

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MARCH-APRIL 1960. *First Impressions of the Finance Bill*: G. S. A. WHEATCROFT. *Estate Duty on Testamentary Trusts of Foreign Lands*: V. L. KORAH. *Surtax Directions Up to Date*: G. B. GRAHAM. *Australia: The Tax Code of a Developing Economy: I*: A. G. DAVIES. MAY-JUNE 1960. *Re Pettit Annuities*: D. C. POTTER. *Schedule A Tax*: C. N. BEATTIE. *Fingers Burnt by Section 412*: P. LAWTON. *The Dating of a Document*: J. G. MONROE. *The Ostone Case*: J. L. MONTROSE. *Australia: The Tax Code of a Developing Economy: II*: A. G. DAVIES.

Journal of the Institute of Actuaries

VOL. 86, PART I, No. 372, 1960. *Some Notes on Bonus Distributions by Life Offices*: N. BENZ. *The Population of Ireland*: W. A. HONOHAN. *The Mortality of Post Office Pensioners*: P. R. COX and L. V. MARTIN. *Changes in Estate Duty Law*: T. F. SWIFT.

The British Journal of Sociology

VOL. XI, No. 2, JUNE 1960. *Sociology and Management Studies*: J. H. SMITH. *Islam and Social Stratification in Northern Nigeria*: E. R. YELD. *Voluntary Unemployment and Unemployability in Jamaica with Special Reference to the Standard of Living*: E. E. HOYT. *Social Stratification and Political Elite*: W. L. GUTTSMAN. *Scaling Social Status in Western Germany*: E. K. SCHEUCH and D. RUSCHEMEYER.

The Sociological Review

VOL. 8, No. 1, JULY 1960. *The Assimilation of Negroes in a Dockland Area in Britain*: H. MADDOX. *Solidarist Syndicalism: Durkheim and Duguit: I*: J. E. S. HAYWARD. *Family Cohesion in Leisure Time*: E. K. SCHEUCH. *Notes on the Social Structure of a Canadian Pioneer Town*: E. DERBYSHIRE. *Social Implications of Overspill: The Worsley Social Survey*: J. B. CULLINGWORTH. *Aspects of the Social Structure of a University Hall of Residence*: A. GIDDENS. *Research Report No. 1: Department of Social Science, the University of Liverpool*: W. H. SCOTT and J. B. MAYS. *Unconformity in the Affluent Society*: R. WILSON.

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VOL. IX, No. 7, 1960. *Linear Programming for Increased Farm Profits: A Yorkshire Example*: I. G. SIMPSON. *Land Maintenance Enquiry*: J. R. BELLERBY and J. M. DUNN. *Farm Sales and Farm Prices, 1902-1942: Denmark*: K. BJERKE.

The Banker

VOL. 110, No. 411, MAY 1960. *New Brakes on Credit. Estimating the Overload. Divided Europe*: P. BAREAU. *Tightening the Law for Building Societies*: G. LEE. *Australia's Banking Reform*: B. TEW. *How the "Special Deposits" Plan Originated. Recovery in Wales*: E. V. MORGAN. VOL. 110, No. 412, JUNE 1960. *Special Deposits in Practice. Not by Aid Alone*: M. H. FISHER. *Australia's Evolving Money Market: How the Market Works*: C. T. LOOKER; *Trading Banks and the Market*: A. T. MAXWELL. *Cents and Centimetres for Britain? Radcliffe under Scrutiny—Now for its Critics*: A. C. L. DAY. VOL. 110, No. 413, JULY 1960. *Whither America? The Complex Role of Consumer Durables*: J. E. HARTSHORN. *Restraining Sweden's Boom*: R. JALAKAS. *Ireland's Evolving Central Bank*: N. J. GIBSON. *New Light on the Bill Market*.

The Bankers' Magazine

VOL. CLXXXIX, No. 1394, MAY 1960. *A Neutral Budget?*: C. T. SAUNDERS. *The Balance of Payments*: M. D. STEUER. *The Radcliffe Evidence: I: Stocks of Commodities, Fixed Capital and the Interest Rate*: SIR RALPH HAWTREY. *Survey of Economic Conditions in the U.S.A.: Mixed Trends in the First Quarter*.

VOL. CLXXXIX, No. 1395, JUNE 1960. *The Meaning of Efficiency in Economics*: E. J. MISHAN. *Central Banking in Libya*: A. G. CHANDAVARKAR. *Elementary Mathematics for Economists—A Suggested Approach*: M. H. PESTON. *Survey of Economic Conditions in the U.S.A.: \$500,000 million National Product*.

VOL. CLXL, No. 1396, JULY 1960. *Finance for Overseas Development and Export Credits*: L. ARCHIBALD and M. A. B. HAMLYN. *The Radcliffe Evidence: II: Financial Institutions and Monetary Policy*: H. B. ROSE. *Survey of Economic Conditions in the U.S.A.: A Summer Lull. Correspondent Banking in the United States*: J. S. G. WILSON.

Barclays Bank Review

VOL. XXXV, No. 2, MAY 1960. *Britain the Good Neighbour. Britain's Fishing Industry*.

District Bank Review

No. 134, JUNE 1960. *Statistics as an Aid to Management*: J. RYAN and G. C. C. CHIVERS. *Is Business Diversification Desirable?*: L. AMEY. *What is the Price?*

Lloyds Bank Review

No. 57, JULY 1960. *Towards a European Solution*: BARON SNOY ET D'OPPUERS. *Local Authority Borrowing, 1955-1960*: H. COWEN. *The Revolution in Sport*: J. HENNESSY.

Midland Bank Review

FEBRUARY 1960. *The Midland Bank Index of Business Turnover. Capital Issues Control: Dead or Dormant? The Disappearance of the Dollar Gap*. MAY 1960. *Analysis of "The Reverse Gap." Monetary Survey 1959-60*.

National Provincial Bank Review

No. 50, MAY 1960. *How to Reduce Taxes*: SIR OSCAR HOBSON. *United States Overseas Investment and European Economic Integration*: J. H. DUNNING.

The Three Banks Review

No. 46, JUNE 1960. *Recent American Anti-trust Experience*: R. B. HEFLEBOWER. *Progress of Integration on the European Railway Network*: C. E. R. SHERRINGTON. *George Carr Glyn and the Railways*.

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MAY 1960. *Prospect for Transport in the 1960s*: G. WALKER. *Fiscal Policy and Monetary Policy as Instruments of Economic Growth*: J. C. R. DOW. *To Fortify Prosperity. Farm Improvements and the Landowner*: F. STURROCK.

Planning

VOL. XXVI, No. 441, APRIL 1960. *Consumer Protection and Enlightenment*. VOL. XXVI, No. 442, JUNE 1960. *Division in Europe*: M. CAMPS. VOL. XXVI, No. 443, JULY 1960. *Government by Appointment*.

Town and Country Planning

VOL. XXVIII, No. 4-5, APRIL-MAY 1960. *Prince Rupert, British Columbia*: P. D. MCGOVERN. *Moscow's First New Town: II*: I. ROZHIN. VOL. XXVIII No. 6, JUNE 1960. *The Local Employment Act, 1960*: J. B. CULLINGWORTH. *Planning Problems of the Large Towns. Hollow Victory: The Wythall Decision*: D. E. C. EVERSLEY. *A New City in China*: KO FA.

The Journal of the Institute of Transport

VOL. 28, No. 10, MAY 1960. *The Channel Tunnel*: M. A. CAMERON. *The Future Development of Merchant Ships*: R. S. MACFARLANE. *The Port Transport Industry*: A. J. MATTILAND-MAGILL-CRIGHTON. *Refrigerated Transport*: J. L. CREGEEN.

Motor Business

No. 21, DECEMBER 1959. *The Outlook for the United Kingdom Motor Industry. The American Passenger Car Industry. The Industrial Diesel Engine in Great Britain*. No. 22, APRIL 1960. *The United Kingdom Motor Components Industry. The French Motor Industry. The British Market for Buses and Coaches*.

Hard Fibres

No. 36, MARCH 1960. *World Fibre Position. World Situation. London Stock Exchange Quotations.*

No. 37, JUNE 1960. *London Stock Exchange Quotations. This Season's Grain Prospects.*

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VOL. 47, No. 264, WINTER 1959-60. *Blossoming Desert: Water, Oil and Ore in the Free Sahara: R. CALDER. The Comprehensive School in Sweden: W. JAMES. Standardization British Industry: M. M. SCOTT.*

Which?

JUNE 1960. *Reports on Canned and Frozen Peas, Prismatic Binoculars, Mothproof Paper Handkerchiefs.*

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Steel Review

No. 18, APRIL 1960. *Steel and British Exports. On the Right Road?: A. S. DICK. British Shipbuilders Build Abroad: P. DUFF. Automation, a New Export Industry: L. BAGG. Selling to Western Germany: G. H. GARNER. Opportunity in the Middle East: N. LAWSON. Through the Iron Curtain: M. H. FISHER. Ghana: Prospects in West Africa: P. AL. Attack on the Dollar Market: W. GRAEBNER. Financing British Exports: J. W. WOODROFFE.*

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VOL. XXXVI, No. 73, MARCH 1960. *Essays in Honour of Sir Douglas Copland. The Economics of the Soviet Challenge: A. H. HANSEN. The Benefits and Cost of Private Investment from Abroad: A Theoretical Approach: G. D. A. MACDOUGALL. Relations between C Servants and Ministers in Policy Making: J. G. CRAWFORD. Economic Control in a Dependent Economy: T. W. SWAN. The Banking Formation Table and Supply of Money: J. M. GARLA. State Capital Differences in the Basic Wage: H. P. BROWN. Business Enterprise Accounts Relation to Different Kinds of Social Accounting Systems: R. MATHEWS. Prices, Productive Wages and Inflation: R. I. DOWNING. Copland's Working Life: J. B. CONDLIFFE, W. PRE. H. BURTON, F. R. E. MAULDON, G. A. WELLER, G. S. COLMAN, W. S. KELLY, F. RILEY, R. HOHNEN and M. BROWN.*

VOL. XXXVI, No. 74, APRIL 1960. *The Australian Economy, February 1960: A. S. HOLM. Federal-State Financial Relations in India: W. PREST. Economic Aspects of Pasture Improvement in the Australian Wool Industry: F. H. GRUEN. Movements in Tasmania's "International Reserves": A. HAGGAR. Dr. Corden's Uniform Tariff Proposal: A Comment: M. BERNAS. The Teaching of Elementary Mathematics to University Students of Economics: R. S. G. RUTH. FORD.*

The South African Journal of Economics

VOL. 28, No. 1, MARCH 1960. *The National Income and Expenditure of South-West Africa 1920-1956: D. C. KROGH. Banking and Finance in the Sudan: A. F. BRIMMER. ekonomiese belangrikheid van trekarbeid vir Betsjoeanalandprotektoraat: D. P. ERASMUS. Shaul Index of Economic Activity: E. OSBORN. Tariff Protection, Industrialization and Balance of Payments, with Special Reference to the Union of South Africa: G. MARAIS.*

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VOL. IV, No. 1, MARCH 1960. *Changes in the Union's Merchandise Exports, 1938-1957: F. F. WINKLÉ. The South African Manufacturing Industry and an Increase in the Price of Gold: M. VAN DEN BERG. Some Issues in Regard to the Development of Under-developed Countries, with Special Reference to the Role of the Union in the Development of Africa: S. P. DU TOIT VIJJO.*

The Canadian Journal of Economics and Political Science

VOL. 26, No. 2, MAY 1960. *Meinecke, Morality, and Foreign Policy: R. W. STERLING. Changing Pattern of Indonesia's Representative Government: J. M. VAN DER KROEF. British Steel: A Unique Record of Public Regulation: H. E. ENGLISH. The Estimation of Ship Earnings in Historical Studies of the Balance of Payments: D. NORTH and A. HESTON. The establishment Dispersion of Occupational Wage Rates, Ontario and Quebec, 1957: S. W. OST. Federal-Provincial Voting Patterns in Canada: H. A. SCARROW. Local Autonomy and Central Administrative Control in Saskatchewan: D. V. SMILEY.*

The Indian Economic Review

VOL. IV, No. 3, FEBRUARY 1959. *Theory of Wage-oriented Monetary Policy: J. ASCHHEIM. An Elementary Agricultural Policy Model: M. BRONFENBRENNER. Friedrich List and the Historical Concept of Balanced Growth: F. CLAIRMONTE. Monetary Policy and Economic Expansion: MAN MOHAN SINGH.*

Tata Quarterly

VOL. XV, No. 1, JANUARY 1960. *The Role of Agriculture in Indian Economic Development—A Point of View.*

Arthaniti

VOL. III, No. 1, NOVEMBER 1959. *Arthur Cecil Pigou: BHABATOSH DATTA. A Note on Multi-sector Growth Models: AMBICA GHOSH. National Accounts and Secondary Inflation: BAUDHAYAN CHATTERJEE and ASOK SEN. A Note on Adjusting Frisch's Transaction Matrix: S. KRISHNA MOORTHY. Input-Output Analysis, National Income Accounting and Planning: AJIT K. BISWAS. The Marginal Efficiency of Capital, the Rate of Interest and Investment: R. E. SLESINGER. A Note on Selling Cost: MIHIR KANTI RAKSHIT.*

Population Review

VOL. 4, No. 1, JANUARY 1960. *Utopia by Sterilization: H. L. MENCKEN. Cultural Factors in Economic Development: R. E. SLESINGER. Cultural Aspects of Indonesia's Demographic Problem: J. VAN DER KROEF. A Note on Demographic Statistics in India: S. CHANDRASEKHAR.*

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VOL. X, No. 1, MARCH 1960. *Population and Development: JOAN ROBINSON. The Problem of Regional Distribution: AMARTYA KUMAR SEN. The Economic Theory of Customs Union: H. G. JOHNSON. Models and Development Planning: NURUL ISLAM.*

The Panjab University Economist

VOL. 1, No. 1, OCTOBER 1959. *Economic Development of Export Economies: G. M. MEIER. The Social Setting of Growth: S. C. SUFRIN. Property Taxation Insights: R. W. LINDHOLM. Capital Accumulation and Economic Growth: S. A. ABBAS.*

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VOL. V, No. 1, APRIL 1960. *"Gross" and "Net" Concepts of Capital Formation: K. R. CHOU. An Introduction to Econological Theory: T. R. MCHALE. A Reappraisal of the 1953 International Tin Agreement: LIM CHONG YAH. Political and Economic Books on Malaya: U. A. AZIZ. The Economic Characteristics of the Population of Singapore, 1957: SAW SWEE HOCK and R. MA. The Chinese and Indian Land Problem—Divergent Approaches: F. F. CLAIRMONTE. Some Non-economic Factors in the Economic Development of Underdeveloped Countries—the Vietnamese Experience: TON THAT THIEN.*

The East African Economics Review

VOL. 6, No. 2, DECEMBER 1959. *Still More Odds and Ends: SIR ERNEST VASEY. The Proposed European Free Trade Association: T. M. LOUDON. The Cement Industry of East Africa: J. D. NYHART. An Economic Appraisal of Kenya's Maize Control: M. P. MIRACLE; A Rejoinder: A. A. HALLER. Relationship between Population and Potential Arable Land in the African Reserves and the European Highlands: B. R. DAVIDSON and R. J. YATES.*

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VOL. 6, No. 2, APRIL 1960. *Benefits of Sterling Area Membership. Dividing the Indus Basin Waters.*

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VOL. 9, No. 1, MARCH 1960. *Symposium on the Report of the Trade and Tariffs Commission: H. G. JOHNSON, W. G. DEMAS, G. M. MEIER and T. BALOGH. Revisions, and Suggestions for Deflating Gross Product Estimates: A. P. THORNE. Accelerated Development with a Minimum of Foreign Aid and Economic Controls: R. W. LINDHOLM. The Beneficial Effects of Devaluation in some Underdeveloped Economies: A. RUBNER. Marital Stability in Two Guianese Sugar Estate Communities: C. JAYAWARDENA. Household and Family in the Caribbean: N. L. SOLIEN. Economic Development: A New Strategy: L. BEST.*

VOL. 9, No. 2, JUNE 1960. *A National Accounts Study of the Economy of Barbados: J. BETHEL.*

Journal of the Statistical and Social Inquiry Society of Ireland

VOL. XX, PART II, 1958-9. *The Growth and Aging of Population*: L. C. MULLIGAN. *Investment in Northern Ireland*: R. BELL. *State Debt Balance Sheets*: M. O'REILLY. *Changes and Trends in our Educational System since 1922*: T. O. RAIFEARTHAIGH. *The Universities and Management Training*: J. W. GARMANY. *Some Provincial Variations in Irish Agriculture*: J. J. BYRNE. *Some Aspects of the Marketing of Milk in Northern Ireland*: D. L. ARMSTRONG. *Trade Union Organisation in Ireland*: R. ROBERTS. *Symposium on Economic Development. Estimates of the Gross Domestic Product of Northern Ireland, 1950-56*.

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DECEMBER 1959. *The Report of the Radcliffe Committee. The Irish Air Lines. Impressions of the Irish Economy*: R. M. HAVENS.
MARCH 1960. *What Sort of Budget? The Irish Tourist Industry. Prospects for the 1960s*: C. F. CARTER.

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VOL. LXXXI, No. 5, MAY 1960. *Employment Fluctuations, Productivity and Cost-inflation in Manufacturing Industry*: H. A. TURNER. *Dismissal Procedures: A Comparative Study. The Work of the General Federation of Labour in Israel*: A. BECKER. *The Evolution of State Pension Schemes in Great Britain*.
VOL. LXXXI, No. 6, JUNE 1960. *The United States National Labour Relations Board*: J. E. SHANKLIN. *Labour Turnover—Meaning and Measurement*.
VOL. LXXXII, No. 1, JULY 1960. *Sharing the Benefits of Productivity. The Influence of International Labour Conventions on Nigerian Labour Legislation. The Comparison of Industrial and Agricultural Earnings*: H. KÖTTER.

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VOL. XIII, No. 4, APRIL 1960. *New pages and notes for Sudan. Revised money and banking statistics for Greece. Usual statistical material*.
VOL. XIII, No. 5, MAY 1960. *Revised International Table on Interest Rates. Usual statistical material*.
VOL. XIII, No. 6, JUNE 1960. *Daily Exchange Rates. International Finance Corporation. Usual statistical material*.

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VOL. VII, No. 3, APRIL 1960. *The Role of the International Monetary Fund in Promoting Price Stability*: W. R. GARDNER. *The Integration of Sector Finance and National Income Accounts*: P. HØST-MADSEN. *Monetary Analysis of Income and Imports and its Statistical Application*: J. J. POLAK and L. BOISSONNEAULT. *Russian Gold and the Ruble*: O. L. ALTMAN. *Canada's Foreign Exchange Market: A Quarterly Model*: R. R. RHOMBERG.

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- No. 12, 1959. *The State Plan for 1960—a Step Forward on the Path of Socialist Development of the National Economy*: R. MOLDOVAN and V. RAUSSEK. *The Increase in the Economic Efficiency of the Utilisation of Investment Funds*: R. SÁVEANU. *For a Better Utilisation of Production Capacities in Ferrous Metallurgy*: A. IANCU. *Contracts for Agricultural Produce and Their Role in Intensifying Exchange Between Town and Country*: C. DANGIU and Q. SNAK. *The Fallacious Theory of "Monopolistic Competition"*: I. ANGHEL. *Scope for Increasing Labour Productivity in the "Solidaritatea" Building-materials Works, Bucharest*: A. DRAGANESCU. *The Warsaw Conference of Economists from Socialist Countries on National Accounting*: A. ROXEN and Gh. BELU. *The Moscow Meeting of the Representatives of Central Banks of Socialist Countries*: M. NĂSTASE.
- No. 1, 1960. *On the Factors Comprising the Forces of Production*: A. NEGUCIOIU. *The Saving of Raw Material—The Main Element in Reducing Costs in Timber Processing*: C. EMANOIL and S. BANU. *The Economic Efficiency of Silage Maize*: V. NICA. *The Adaptation of Consumer-goods Production to Demand*: I. IONESCU. *Against the Apologetics of the Class Structure of Contemporary Capitalism*: N. IVANCIU. *Ways to Reduce Costs for the Main Grain Products in State Farms*: O. PARPALĂ. *Problems of Animal Production and Costs in State Farms*: P. AVARAMESCU. *Current Problems of the Economic and Organisational Strengthening of Collective Farms*: Gh. IONIȚĂ and D. DUMITRIU.
- No. 2, 1960. *The State Budget for 1960*: I. CRAIU. *Aspects of the Expanding Socialist Reproduction of Skilled Manpower*: S. PERT and O. CHULEA. *Raising the Technical Level of Production by Equipment Modernisation*: V. ROTARU and V. SAVA. *The Role of the Foreman in the Organisation and Management of Production*: M. VIONESCU. *The Economic and Organisational Strengthening of Collective Farms*: S. HARTIA. *The Social-Economic Structure of the Population in the Light of the 1956 Census*: P. ISCOVICI. *Post-war Investments in the German Federal Republic—Instruments of West German Imperialism*: Ș. UNGUREANU. *Some Problems of Planning Circulating Capital*: N. MIHUȚIU. *Aspects of the Activities of Agricultural Associations*: T. LAZĂR. *The Discussion of the Improvement of the Economic Operation of the Mining Industry*: I. PREDOI.
- No. 3, 1960. *Some Problems of Price Fixing for Industrial Products and of the Distribution of the National Income to Accumulation and Consumption*: I. RACHMUTH. *The Correlation of Retail*

- Prices:* S. ARSENE. *Productive Fixed Assets as an Economic Category of Socialism:* M. MEHEDINTU. *The Importance of Input Norms for Saving Resources:* S. GHEORGHIU. *The Development and Utilisation of Indivisible Funds in Collective Farms:* N. VELICU. *Aspects of the Agrarian Problem in Documents of the Rumanian Communist Party:* N. MARCU. *The Reformist Apologetics of Capitalism in the New Programme of the German Socialist-Democratic Party:* D. FRIKE. *Some Problems concerning the Profitableness of State Farms:* GH. SERAFIM.
- No. 4, 1960. *The Militant Character of Marxist-Leninist Ideology. V. I. Lenin on the Alliance between the Working Class and the Working Peasantry:* S. NICA and GH. IONITA. *The Leninist Policy of the Rumanian Workers' Party of Building the Technical and Material Basis of Socialism:* E. HUTIRA and M. PARALUTA. *Leninist Teaching on the Role of Labour Productivity in the Victory of the New Socialist System:* Z. BRINCU. *The Application in Industry of the Leninist Conception of Distribution According to Work:* S. ZEIGHER. *The Actuality of the Leninist Analysis of Contradictions in Imperialist Reproduction:* E. DOBRESCU. *Theoretical Problems of the Building of Communism—the Principle of Material Incentives:* L. LEONTIEV. *On the Elaboration of the Balance of the National Economy:* C. IACOBOVICI. *The Economic Efficiency of Mechanisation in State Farms:* S. PETRESCU and E. JIANU.

NEW BOOKS

British

The Agricultural Register, new series. Changes in the Economic Pattern 1957-9. London: Oxford University Press for the Oxford University Agricultural Economics Research Institute, 1960. 9½". Pp. xii + 147. 25s.

[This useful publication gives a factual account of the changes that have occurred in 1957-59 in the production, marketing and prices of agricultural products and the use of land, labour and capital in British agriculture. It is mainly the work of Dr. H. Frankel. The purpose is primarily descriptive, but the data provided suggest some interesting conclusions, especially with regard to trends in productivity and their relation to government policy.]

BARKER (T. C.). *Pilkington Brothers and the Glass Industry.* London: Allen & Unwin, 1960. 10". Pp. 296. 40s.

[To be reviewed.]

BARKER (T. C.), CAMPBELL (R. H.), MATHIAS (P.) and YAMEY (B. S.). *Business History.* London: The Historical Association (59A Kennington Park Road, S.E.11), 1960. 8½". Pp. 36. 5s.

[This pamphlet is addressed mainly to those who are engaged in or are about to be engaged in the writing of the history of an individual firm, usually under the sponsorship of the firm itself. The writers from their pooled experience give a large number of useful hints on the best way to set about the job and suggestions on sources of information. These are likely to be most valuable to practitioners of the subject. Somewhat less happy is the authors' introductory statement on the aims that may be achieved by business history. The business-man, they say, should recognise that the publication of a serious history of his firm is a valuable form of public-relations activity; and the historian, for his part, should welcome the opportunity to debunk the myth of the robber barons and to reveal the contribution made by the personal qualities of business-men to economic growth. It is clear from what they say later on that the authors do not really believe that the main aim of the business historian should be to substantiate one particular preconceived point of view, but that is certainly the impression they give in their opening section.]

BENHAM (F.) and HOLLEY (H. A.). *A Short Introduction to the Economy of Latin America.* London: Oxford University Press for the Royal Institute of International Affairs, 1960. 8½". Pp. x + 169. 18s.

[To be reviewed.]

A Bibliography in Economics for the Oxford Honour School of Philosophy, Politics and Economics. Second Edition. London: Oxford University Press, 1960. 8½". Pp. 82. 6s. 6d.

[The new edition of this most useful bibliography is on the same lines and the same scale as its predecessor, which was published in 1957. It is too extensive to be usable by most undergraduate students without a good deal of guidance, but it is extremely helpful for teaching, and in parts it is detailed enough to provide a good starting-point for research purposes.]

COLES (R.). *Development of the Poultry Industry in England and Wales, 1945-1959.* London: Poultry World (Dorset House, Stamford Street, S.E.1), 1960. 8½". Pp. 80. 7s. 6d.

[This is a full and statistically well-documented survey. It is mostly concerned with egg production, but a chapter at the end deals with the table-poultry industry. These two branches of the poultry industry have shown certain features in common in recent years, notably the trend towards larger-scale units of production. They are notably dissimilar, however, in that egg production has leant heavily on government subsidy, whereas table-poultry production, though admittedly sheltered from foreign competition, has been able to grow without any subsidy.]

DOBB (M. H.). *An Essay on Economic Growth and Planning.* London: Routledge & Kegan Paul, 1960. 9". Pp. vii + 119. 15s.

[To be reviewed.]

GUILLEBAUD (C. W.). *Wage Determination and Wages Policy.* An economic monograph. Welwyn: Nisbet, 1960. 8½". Pp. 31. 2s. 6d.

[To be reviewed.]

HAYEK (F. A.). *The Constitution of Liberty.* London: Routledge & Kegan Paul, 1960. 9½". Pp. x + 570. 45s.

[To be reviewed.]

HICKS (J. R.). *The Social Framework.* An introduction to economics. Third edition. London: Oxford University Press, 1960. 7½". Pp. xii + 272. 18s.

[In this new edition of his famous text-book Professor Hicks has not found it necessary to make such far-reaching changes as he did in the second edition (published in 1952). The main change is that the National Income data used for illustration are those for 1957, instead of 1949, which, as Professor Hicks sees it, should now be regarded as having been still economically in the war-period. This change in date has called for a good many changes in the text, but not for a revision of its basic structure. Of the various other changes that have been made, the most important are in the chapters on population, which now take account of the radical changes in prospective trends that have become clear since the book was first written.]

HOUSE (J. W.) and FULLERTON (B.). *Tees-Side at Mid-Century.* An industrial and economic survey. London: Macmillan, 1960. 10". Pp. 454. 36s.

[This descriptive survey is the work of two geographers on the staff of King's College in the University of Durham. It gives a comprehensive account of the industries of the region, its natural resources, its population and employment structure, and its administration. It is primarily a work of reference for the use of those concerned with the problems of the region.]

JENKS (C. W.). *Human Rights and International Labour Standards.* London: Stevens for the London Institute of World Affairs, 1960. 9". Pp. xvi + 160. 25s.

[The author is Assistant Director-General of the International Labour Office. In this book he discusses the contribution which the formulation of International Labour Standards by the I.L.O. has made towards carrying out the purposes of the Universal Declaration of Human Rights adopted by the United Nations in 1948.]

JERVIS (F. R.). *The Evolution of Modern Industry.* London: Harrap, 1960. 8½". Pp. 320. 18s.

[This is a text-book designed mainly for the use of students preparing for professional examinations, such as those of the British Institute of Management. It provides a survey of British industrial development (mainly since the Industrial Revolution) which is compact, informative and reasonably lively, but not particularly analytical and in some places not fully abreast with the results of recent researches.]

LAMARTINE YATES (P.). *Food, Land and Manpower in Western Europe.* London: Macmillan, 1960. 9". Pp. xiii + 294. 35s.

[To be reviewed.]

LANGE (O.). *Essays on Economic Planning.* London: Asia Publishing House; Calcutta: Statistical Publishing Society, 1960. 11½". Pp. iv + 72. 36s.

[To be reviewed.]

LYTHE (S. G. E.). *The Economy of Scotland in its European Setting, 1550-1625.* Edinburgh and London: Oliver & Boyd, 1960. 9". Pp. viii + 277. 21s.

[To be reviewed.]

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MARSHALL (A. H.). *Financial Administration in Local Government*. London: Allen & Unwin for the Royal Institute of Public Administration, 1960. 9". Pp. 392. 32s.

[To be reviewed.]

NOVE (A.) and DONNELLY (D.). *Trade with Communist Countries*. London: Hutchinson for the Institute of Economic Affairs, 1960. 8½". Pp. 183. 30s.

[To be reviewed.]

PREST (A. R.). *Public Finance in Theory and Practice*. London: Weidenfeld & Nicolson, 1960. 9". Pp. 408. 45s.

[To be reviewed.]

ROSTOW (W. W.). *The Process of Economic Growth*. Second edition. London: Oxford University Press, 1960. 9". Pp. xii + 372. 35s.

[The first edition of Professor Rostow's book was reviewed by Mr. Kenneth Berrill in the *ECONOMIC JOURNAL* for September 1955, pp. 498-506. In the new edition Professor Rostow has not made any alterations in what he wrote before, but he has added four additional essays which he has published since then, including his well-known paper on "The Take-off into Self-sustained Growth" from the *ECONOMIC JOURNAL* of March 1956.]

SALTER (W. E. G.). *Productivity and Technical Change*. University of Cambridge Department of Applied Economics, Monograph 6. London: Cambridge University Press, 1960. 10". Pp. xii + 198. 22s. 6d.

[To be reviewed.]

SAUL (S. B.). *Studies in British Overseas Trade, 1870-1914*. Liverpool: Liverpool University Press, 1960. 9½". Pp. 246. 35s.

[To be reviewed.]

SRAFFA (P.). *Production of Commodities by Means of Commodities*. Prelude to a critique of economic theory. London: Cambridge University Press, 1960. 10". Pp. xii + 99. 12s. 6d.

[To be reviewed.]

THOMAS (D. St. J.). *Rural Transport*. A report sponsored by Dartington Trustees, Dartington Hall, Devon. Dawlish: David Charles, 1960. 8½". Pp. 28. 4s. 6d.

[This is a summary of a study which will later appear in book form; it has been brought out now largely so as to make the author's conclusions available in time to be presented to the Committee on Rural Bus Services, under the Chairmanship of Professor D. T. Jack. It contains a great deal of interesting detail on rural transport problems, based largely on intensive surveys carried out in Devon and Northumberland. The author makes out a convincing case for his view that both British Railways and many of the larger bus companies are out of touch with the realities of rural transport problems. In his view, they too often unimaginatively follow rules of thumb which are neither in their own interests nor in those of the communities they serve. Somewhat less convincingly argued is the author's case for subsidising rural transport in general.]

THOMPSON (E. P.) (Ed.). *Out of Apathy*. New Left Books series. London: Stevens, 1960. 9". Pp. xii + 308. 15s.

[These energetic essays by spokesmen of the "new left" are not essays in economics, even though most of the issues discussed have an economic basis. Nor are they really essays in the study of society, in any broad sense, for the authors are in general more concerned to expose the iniquities of the agents of mass communications and of Mr. C. A. R. Croxall than to attempt to analyse scientifically the changes that are actually taking place in society from the point of view of the worker and his family. Essentially they are essays on power and on moral values: why power is in the wrong hands and why it is used to foster the wrong values. They are stimulating reading.]

TUCKER (G. S. L.). *Progress and Profits in British Economic Thought, 1650-1850*. Cambridge Studies in Economic History. London: Cambridge University Press, 1960. 9". Pp. viii + 206. 27s. 6d.

[To be reviewed.]

WEBB (R. K.). *Harriet Martineau. A radical Victorian*. London: Heinemann, 1960. 9". Pp. xiii + 385. 35s.

[To be reviewed.]

WORSWICK (G. D. N.) (Ed.). *The Free Trade Proposals*. Oxford: Blackwell, 1960. 10". Pp. viii + 142. 30s.

[To be reviewed.]

YOUNGSON (A. J.). *The British Economy, 1920-1957*. London: Allen & Unwin, 1960. 9". Pp. 272. 28s.

[To be reviewed.]

Canadian

SCHWARTZ (C.). *The Search for Stability*. Contemporary Saskatchewan, I. Toronto: McClelland & Stewart, 1959 (London: Bailey & Swinfen, 1960). 9½". Pp. xii + 252. 48s.

[This is a comprehensive survey of the agricultural economy of the province of Saskatchewan. Chief attention is given to the problem of price stability. Price and income prospects facing Saskatchewan farmers, like prairie farmers generally, are unpromising, and the various public measures which have been adopted so far, and which the author describes, have clearly not solved them. Mr. Schwartz argues that agriculture should have some protection from the free working of the price system, if only because of the absence of price competition in other sectors of the economy. One possible future line of development is increased vertical integration between farmers and processors and distributors, but the author views this with suspicion, as likely to lessen farmers' independence.]

American

ADELMAN (M. A.). A and P. A study in price-cost behavior and public policy. Harvard Economic Studies No. CXIII. Cambridge, Mass.: Harvard University Press, 1959 (London: Oxford University Press, 1960). 8½". Pp. xvi + 537. 80s.

[To be reviewed.]

AITKEN (H. G. J.). *Taylorism at Watertown Arsenal*. Scientific management in action, 1908-1915. Cambridge, Mass.: Harvard University Press (London: Oxford University Press), 1960. 8½". Pp. viii + 269. \$5.75.

[To be reviewed.]

BORTS (G. H.). *Regional Cycles of Manufacturing Employment in the United States, 1914-1953*. National Bureau of Economic Research Occasional Paper 73. New York: National Bureau of Economic Research (261 Madison Avenue, New York 16), 1960. 9". Pp. 60. 75c.

[This substantial paper is reprinted from the *Journal of the American Statistical Association* for March 1960. The author studies the relative amplitude of fluctuations in thirty-three states in the United States and compares them with relative rates of growth. The measure used is manufacturing employment. Some curious conclusions emerge. On the whole, high growth rates and wide fluctuations go together more often than not, the explanation largely lying in the differing industrial structure of the states compared. On the other hand, states which suffer a decline over time in their rates of growth (relative to other states) tend to have more violent fluctuations than would be expected on the basis of their industrial structure, and states whose rates of growth increase over time conversely have less violent fluctuations. These conclusions are documented with much statistical detail, and their economic significance is briefly discussed.]

BOWEN (W. G.). *The Wage-Price Issue*. A theoretical analysis. Princeton, New Jersey: Princeton University Press (London: Oxford University Press), 1960. 9". Pp. xv + 447. 68s.

[To be reviewed.]

CAVES (R. E.). *Trade and Economic Structure*. Models and methods. Harvard Economic Studies, No. CXV. Cambridge, Mass.: Harvard University Press (London: Oxford University Press), 1960. 8½". Pp. viii + 317. 48s.

[To be reviewed.]

DE CHAZEAU (M. G.) and KAHN (A. E.). *Integration and Competition in the Petroleum Industry*. Petroleum Monograph Series, Vol. 3. New Haven, Connecticut: Yale University Press, 1959 (London: Oxford University Press, 1960). 9½". Pp. xviii + 598. 60s.

[To be reviewed.]

Economic Unity in Europe: Programs and Problems. Addresses presented at sessions of the National Industrial Conference Board. New York: National Industrial Conference Board (460 Park Avenue, New York 22), 1960. 9". Pp. 127.

[This contains addresses delivered by G. W. Ball, J.-C. Pettit, F. A. Allan, L. R. W. Soutendijk, L. Tennyson and Reginald Maudling before a meeting of the National Industrial Conference Board in January 1960. Also included are records of the ensuing discussions and factual summaries regarding the present positions of the Common Market and E.F.T.A.]

GARVY (G.). Deposit Velocity and its Significance. New York: Federal Bank of New York, 1959. 9". Pp. 88. 60c.

[To be reviewed.]

GOODMAN (G.). The Poverty of Nations. Presenting a new system of economic thought. Ann Arbor, Michigan: Ann Arbor Press, 1960. 8½". Pp. xxiv + 122. \$3.50.

[This essay in the form of a dialogue represents the result of many years' reflection on the part of the author. He makes high claims for his ideas, which, he believes, invalidate or render unnecessary much of the economic thought of recent years. The central doctrine put forward is that utility is to be measured by consumption rather than by income, and that therefore economic inequality is much less than appears on the surface. Saving redounds to the benefit of the community at large, and the rich save much of their income. This last contention is based not so much on empirical data as on *a priori* arguments about satiety being reached in consumption above a level of about a million dollars a year. The author's argument appears to be that no one could take exception to the degree of inequality that exists in consumption. In support of his main thesis Dr. Goodman develops a number of subsidiary lines of argument about the role of profits and saving. Dr. Goodman has evidently been greatly influenced by Marx, and much of his work is devoted to an attempt to escape from Marx's conclusions. Otherwise his arguments are worked out mainly from first principles and show little influence of either contemporary writings or traditional neo-classical economics.]

HERFINDAHL (O. C.). Copper Costs and Prices, 1870-1957. Baltimore, Maryland: Johns Hopkins Press for Resources for the Future, Inc., 1959 (London: Oxford University Press, 1960). 9½". Pp. xi + 260. 48s.

[This monograph has a specific thesis. It is that in the very long run the process of discovering, developing and producing copper responds to economic incentives and is conducted in a stable environment that results, in a broad way, in conditions of constant returns. If abnormal years are disregarded, it appears that the trend of copper prices relatively to the general price-level has been stable since the 1920's, having experienced a once-for-all decline compared with the level that prevailed in the quarter-century before 1914. A large part of the monograph is taken up by a chronological survey designed to show which periods can properly be regarded as abnormal. This is followed by an analysis of the degree of competition that has existed in the production of copper; this is necessary because the author's procedure of inferring cost conditions from market prices would be invalidated if competition were not sufficiently active.]

JONES (W. O.). Manioc in Africa. Stanford, California: Stanford University Press or the Food Research Institute, 1959 (London: Oxford University Press, 1960). 9½". Pp. x + 315. 54s.

[This is an extremely detailed study of the history, cultivation, preparation, production and consumption of manioc (cassava, tapioca) in tropical Africa. The author is evidently an enthusiast for his subject and has gathered a remarkable amount of information from many sources. It is not quite clear for what class of reader this great mass of detail is intended, but the general chapters give a clear account of the main problems and potentialities of the plant, and the regional studies should be useful for purposes of reference. Manioc is a shrub, cultivated mainly for the sake of its roots, which are a cheap source of carbohydrates. It is grown almost exclusively by small native producers for subsistence or for sale in local markets. The author believes that the admitted dangers of a form of subsistence based too exclusively on manioc should not be allowed to conceal its advantages as a cheap source of calories in a developing economy. Its potentialities as feeding-stuff for animals may also be considerable.]

KAYSER (C.) and TURNER (D. F.). Antitrust Policy. An economic and legal analysis. Cambridge, Mass.: Harvard University Press, 1959 (London: Oxford University Press, 1960). 9½". Pp. xxii + 345. 60s.

[To be reviewed.]

LEIBENSTEIN (H.). Economic Theory and Organizational Analysis. New York: Harper & Brothers, 1960. 8½". Pp. x + 349.

[To be reviewed.]

McKIE (J. W.). Tin Cans and Tin Plate. A study of competition in two related markets. Cambridge, Mass.: Harvard University Press, 1959 (London: Oxford University Press, 1960). 9½". Pp. xv + 321. 60s.

[To be reviewed.]

PAYNE (G. L.). Britain's Scientific and Technological Manpower. Stanford, California: Stanford University Press (London: Oxford University Press), 1960. 9½". Pp. xiii + 466. 45s.

[To be reviewed.]

ROGERS (G. W.). Alaska in Transition. The southeast region. Baltimore, Maryland: The Johns Hopkins Press for Resources for the Future, Inc. (London: Oxford University Press), 1960. 9½". Pp. xiv + 384. 56s.

[This is a readable general survey of the economic, administrative, and social structure and problems of South-east Alaska. The main economic theme is how best to use the region's natural resources. As the author sees it, the central dilemma regarding the treatment of Alaska has not yet really been resolved, namely whether the natural resources of the region should be "mined" by a population consisting for a large part of temporary dwellers or whether it is possible and justifiable to build up a well-rounded economy with permanent residents.]

SHOUP (C. S.). Ricardo on Taxation. New York: Columbia University Press (London: Oxford University Press), 1960. 9½". Pp. 285. 48s.

[To be reviewed.]

SHOUP (C. S.) and others. The Fiscal System of Venezuela. A report. Baltimore, Maryland: The Johns Hopkins Press, 1959 (London: Oxford University Press, 1960). 9". Pp. xiii + 491. 70s.

[To be reviewed.]

SPENCE (C. C.). British Investments and the American Mining Frontier, 1860-1901. Ithaca, New York: Cornell University Press for the American Historical Association, 1958 (London: Oxford University Press, 1959). 9". Pp. x + 288. 36s.

[To be reviewed.]

SPIEGEL (H. W.). The Rise of American Economic Thought. Philadelphia, Pennsylvania: Chilton Company, 1960. 9½". Pp. x + 202. \$5.00.

[This contains extracts from the writings of some two dozen early American economists, ranging in date from colonial times to the founding of the American Economic Association in 1885. The editor adds brief introductory essays outlining the life and work of the economists concerned.]

THIN (TUN). Theory of Markets. Harvard Economic Studies, No. CXIV. Cambridge, Mass.: Harvard University Press (London: Oxford University Press), 1960. 8½". Pp. viii + 120. 40s.

[To be reviewed.]

VACCARA (B. N.). Employment and Output in Protected Manufacturing Industries. Washington, D.C.: The Brookings Institution, 1960. 9". Pp. x + 107. \$2.00.

[This is a careful and sophisticated statistical study of output trends and employment structure in those American industries which enjoy high protection, as contrasted with American industry as a whole. Industries which are heavily protected and which also face substantial foreign competition have in general expanded their output at a lower rate than the national average. This reflects not only the inroads of foreign supplies but also, in a number of cases, a stable or declining level of overall consumption of the products concerned. Labour input per dollar of output is generally above the national average in these industries, so that the contraction in employment that might be caused by more liberal admission of imports would be liable to be disproportionately severe. As against this, the quantitative importance of these industries in the American economy is very small, and to that extent the reabsorption of displaced labour might not be too difficult, at least in some cases.]

French

PONSARD (C.). Histoire des theories économiques spatiales. Paris: Armand Colin, 1959. 10". Pp. 202.

[To be reviewed.]

Swedish

AKERLUND (H.). Guldparistandarden. Internationellt penningssystem och ekonomiskt program. Stockholm: Akademisk Avhandling, 1959. 9". Pp. 223. Kr. 18.

[The gold par standard, which is the title of this book, is the name used by the author to describe the post-war system of fixed exchange rates with government commitment to full employment. The book is concerned with the difficulties of operating this system and reconciling it with stable price. The author's conclusion is summarised in his own words as follows: "it is essential that the rate of increase of national income is brought into step with the rate of accumulation of gold and foreign exchange, the proportion of the latter being restricted as far as possible. . . . In this way a financial system can supply a regulator which hinders or at least retards an inflationary development. The other force acting is the income maximisation which prevents a general fall in prices and employment." The concept of income maximisation, which plays a large part in the author's argument, is an extension of the principle of profit maximisation to the activities of all groups in the economy capable of influencing their own remuneration.]

Norwegian

STOLTZ (G.). Arbeidstidsproblemer. En økonomisk analyse. Oslo: Oslo University Press, 1958. 10½". Pp. 116.

[This is a study of hours of work, conducted mainly but not wholly in *a priori* terms. Models are first set up describing the determination of the hours of work in terms of utility analysis, on the basis of various alternative assumptions. Attention is then turned to the relation between the intensity of work and the number of hours worked. Here again various possible functional relationships are considered, and some of the evidence is surveyed. The two final chapters consider questions of substitution between labour and capital when the hours of work are changed; much of the argument here follows the doctrine put forward by Ohlin in 1924, that a reduction in hours of work will provide an inducement to shift to less capital-intensive methods of production, since a reduction in the length of the working day will tend to raise the cost of capital per unit of output, if it is not accompanied by more shift-working and if user cost is not important. A rather surprising omission from Mr. Stoltz's survey (to judge by the English summary) is that no attention is paid to the case when premium rates are paid for overtime work.]

Italian

EINAUDI (L.). Cronache economiche e politiche di un trentennio. Vol. I, 1893-1905; Pp. xxv + 552, L. 3500; Vol. II, 1903-9, pp. xl + 845, L. 4000; Vol. III, 1910-14, pp. xlviii + 728, L. 4000. Turin: Giulio Einaudi Editore, 1959 and 1960.

[Dr. Einaudi has long been known throughout the world as a theorist of taxation, as an economic historian and as a financial statesman who has held the highest office in his country. He is shown in these volumes in the capacity in which he has been best known to his countrymen—as an almost daily preacher of economic "sermons," as he calls them. For thirty years, until Fascism forbade, he regularly wrote in a newspaper a brilliant running commentary on the economic questions of the day. A selection of these is being collected in these volumes, which carry the story from 1893 to 1914, with more to come. The thread that runs through these writings is opposition to the excessive protective tariff, which Dr. Einaudi sees as springing from the alliance between the industrialists of the North and the latifundian lords of the South. While there is in general continuity in the point of view throughout the period, Dr. Einaudi admits in his preface that there are some respects in which he has changed his mind: and the most interesting perhaps is the admission that he has come to doubt that the principle of "justice in taxation" is susceptible, as he held for a long time, of definition or of being deduced from some logical principle (Preface to Vol. II). Readers will look forward to succeeding volumes.]

FOSSATI (E.). Elementi di politica economica razionale. Milan: Giuffrè, 1958. 10". Pp. 286. L. 1500.

[This is a reprint of the book with the same title which was first published in 1955. It contains a good résumé of the main concepts of Keynes' Theory of Employment, and is noteworthy for its synthesis of these concepts with the Paretian system of general equilibrium. The author, who is well known as an econometrician, also indicates ways in which econometric techniques can be used in the application of Keynesian analysis to problems of economic policy.]

FOSSATI (E.). Problemi di nostri giorni. Milan: Giuffrè, 1959. 10". Pp. 249. L. 1500.

[A collection of recent contributions by Professor Fossati to newspapers and other journals, dealing with questions of contemporary, and in some cases more permanent importance. Many of these articles, which as a whole reveal the wide range of the author's interests, present a somewhat unusual amalgam of Keynesian theory with the precepts of the Roman Catholic Church, as set out in *Rerum Novarum* and later Papal encyclicals.]

Dutch

QAYUM (A.). Theory and Policy of Accounting Prices. Contributions to Economic Analysis, XX. Amsterdam: North-Holland Publishing Company, 1960. 9". Pp. 123. 26s. 6d.

[The purpose of this study is to show how the tool of linear programming may be used to overcome "structural disequilibrium" (understood as the under-utilisation of some factors). Subsidies and taxes are to be applied in such a way that the resulting relative prices provide sufficient incentive for the full employment of all factors. The more interesting chapters are those dealing with the administration and cost of accounting price schemes, their effect upon the rate of savings and their influence on economic growth.]

Swiss

SUCHESTOW (M.). The Changed Structure. A different picture of the monetary economy. Winterthur: Keller, 1960. 8". Pp. 174.

[To be reviewed.]

Greek

ZOLOTAS (X.). Economic Development and Technical Education. Bank of Greece Papers and Lectures, No. 4. Athens: Bank of Greece, 1960. 9". Pp. 60.

[The author is Governor of the Bank of Greece. The first part of his paper discusses in general terms the role of technical education in economic growth. He then considers in some detail the inadequacy of the provision made for technical education in Greece and puts forward a programme of measures to expand it.]

Japanese

ISLAM (N.). Foreign Capital and Economic Development: Japan, India and China. Studies in some aspects of absorption of foreign capital. Tokyo, and Rutland, Vermont: Charles E. Tuttle, 1960. 8½". Pp. 253. \$5.00.

[To be reviewed.]

OTSUKI (M.). Theoretical Investigation of General Accounting and Farm Accounting. Kyoto: Research Institute of Farm Accounting, Faculty of Agriculture, Kyoto University, 1958. 10". Pp. 88.

[This contains four papers published by the author in Japanese at various dates, now drawn together into a book and translated into English. Chief among the theoretical problems of farm accounting discussed is the proper treatment of items of a capital nature.]

*Official***BRITISH**

Report of the Commission of Enquiry into the Natural Resources and Population Trends of the Colony of Fiji, 1959. London: The Crown Agents for Overseas Governments and Administrations on behalf of the Government of Fiji, 1960. 13½". Pp. x + 154. 5s.

[This provides a thorough and interesting survey of the economy of the island and a plan for its development during the next ten years. Accepting as a target an increase of the national income at 3% per annum, and no reduction in consumption per head, the conclusion is reached that a grant of some £13 million will need to be given to the Government of Fiji, spread over the period 1961-70. The members of the Commission were Sir Alan Burns, Mr. T. Y. Watson and Professor A. T. Peacock.]

WALKER (G.). Traffic and Transport in Nigeria. Colonial Research Studies No. 27. London: H.M. Stationery Office, 1959. 10". Pp. xiv + 319. 75s.

[To be reviewed.]

INTERNATIONAL

ORGANISATION FOR EUROPEAN ECONOMIC CO-OPERATION. Statistics of Sources and Uses of Finance, 1948-1958. Paris: O.E.E.C., 1960. 11". Pp. 195. 15s.

[This is more than just a routine collection of statistics. Its aim is "to provide a systematic statistical description of money and credit developments in the various O.E.E.C. countries... integrated with the statistics of national product and expenditure." For each country four basic tables are given for each year, in so far as the data permit. Of these, Table 1 is the most original, but also the most controversial in the implications that may appear to be involved in its lay-out. The first part of this table calculates what is referred to as the Total Expenditure Gap, defined as the difference between previous year's production at previous year's prices and current year's expenditure at current prices. This Expenditure Gap is then shown as being made up of three components, production increase, price increase and import surplus. A footnote (which has all the appearance of an afterthought) is added emphasising the purely *ex post* nature of the relationships shown, but the terminology used certainly invites the unjustifiable inference that price increases and import surpluses are necessarily the result of inflationary gaps. The second part of Table 1 provides "data for monetary analysis" and amounts essentially to an elaborated version of the equation of exchange $MV = PT$. Here again the *ex post* magnitudes need careful handling and interpretation. Finally, the "data for balance of payments analysis" follow more conventional lines. Table 2 deals with sources and uses of surplus funds by sector, somewhat as in the table on the finance of capital formation in our own National Income Bluebook. Here it is a little surprising that although a distinction is made wherever possible between central and local government, the more interesting separation between enterprises and households is not attempted. Tables 3 and 4 deal with the assets and liabilities of money-creating institutions. All in all, the O.E.E.C. statisticians have brought together a most interesting body of information, and the congratulations due to them for their enterprise need not be stinted, whatever doubts may be felt about the tendencies to implicit theorising referred to above.]

EUROPEAN PRODUCTIVITY AGENCY, ORGANISATION FOR EUROPEAN ECONOMIC CO-OPERATION. Mission Report on Restrictive Business Practices in the United States, by O. D. K. NORBYE. Paris: O.E.E.C., 1959. 10½". Pp. 142.

[Most of this report consists of a straightforward account of United States Anti-Trust Laws and the ways in which they are enforced. A concluding chapter contains a more general review of the aims and achievements of anti-trust legislation.]

UNITED NATIONS. Commodity Survey 1959. New York: United Nations, 1960. 11". Pp. 188. 17s. 6d.

[This survey is the third in its series. The first fifty pages are devoted to a general discussion of recent trends in output, consumption and prices of primary products. The remainder of the survey deals with events in the markets for specific commodities. The survey is not entirely confined to the events of the very recent past. An interesting chart is included showing in juxtaposition the movements of the prices of the chief primary products in 1920-38 and 1947-59. Although the authors do not believe that there is any great likelihood of a general and extended fall in prices comparable to that of the inter-war period, they adhere to the view expressed in a former survey that the decline in prices in 1957 and their subsequent near-stability has reflected long-term trends in supply and demand and not merely the effect of short-term fluctuations in income in advanced countries. In addition to this general threat of excess supply, there remains the probability of substantial fluctuations in prices of individual commodities.]

UNITED NATIONS. Economic Survey of Europe in 1959. Geneva: United Nations, 1960. 11". Pp. xii + 368. 21s.

[This year's issue consists of four parts. The first, in accordance with the usual practice, is a survey of events in 1959. The second deals with current long-term development plans in Eastern Europe. The third part contains two chapters, the first on the size, structure and institutional framework of the public sector in the various countries of Europe, and the second on the role of the public sector in short-term economic policy. This last chapter contains an interesting general essay on budgetary policy, with country illustrations. Finally, the fourth part of the survey contains two long chapters on capital formation and economic growth and problems of internal and external balance in the less-developed countries of Europe, including Ireland.]



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LINEAR THEORY¹

THE subject which I shall be discussing in this survey concerns the group of techniques—Linear Programming, Activity Analysis, Input-Output and Theory of Games²—which have come to us, chiefly from America, during the last fifteen years. It is apparent, from the most casual inspection of these topics, that they are very closely related. Further examination shows that they can be set around a recognisable core, which may be regarded as a restatement of a central part of conventional economic theory. It will be my object, in what follows, to isolate this core; and to consider what there is that the economist, who has no intention of becoming a practitioner of the techniques, may yet have to learn from it.³

This being the intention, it will obviously be proper to put what I have to say into a form in which the mathematics are kept down as much as possible; but it is useless to conceal from the reader that we are dealing with a mathematical subject. The phenomenon which we are to examine is the application to economics of a new kind of mathematics. The most obvious difference between this new mathematical economics and the older variety (which goes back to Cournot) lies in the kind of mathematics that is being used.

¹ This is the second of the series of special articles, referred to in the June issue, designed to give a summary of recent developments in economic theory and supported by the Rockefeller Foundation.

² I shall have much less to say about game theory than about the others.

³ My purpose is therefore quite different from that of the numerous text-books which seek to teach the techniques to the practitioners. It is, however, not far from that which might have been expected from the authors of *Linear Programming and Economic Analysis* (Dorfman, Samuelson and Solow); it is certainly true that without their work the present paper could not have been written. My main criticism of their performance is that they did not sufficiently differentiate their task from that of the text-books. I accordingly propose to begin in quite a different way from that in which they begin, though in the latter stages of my work I shall draw on them very heavily. (It would then be a great nuisance not to have a single name for this composite author; I shall make bold to mention him, when I need to do so, DOSSO.)

Reference must also be made to the excellent survey by W. J. Baumol ("Activity Analysis in one Lesson," *A.E.R.*, December 1958). His purpose has been nearer to mine, but I think he would be the first to admit that there is room for both of us.

The text-books from which I have derived most benefit are those of S. Vajda (*Theory of Games and Linear Programming*) and S. I. Gass (*Linear Programming*). Both of these are highly mathematical; but they have helped me to grasp the structure of the theory (with which I shall be largely concerned) more clearly than I could get it elsewhere.

All through the "neo-classical" period—in the age of Marshall, of Pareto, of Wicksell, even in that of Pigou and Keynes—the economist's main mathematical tool was the differential calculus, expressed (when necessary) in the form of symbols, reduced (when possible) to the form of curves. This, of course, was perfectly natural; most economic problems were problems of maxima and minima, and (since the days of Newton and Leibniz) the differential calculus has been the standard method by which such problems had been approached. It has, however, long been known that there are some quite elementary maximum problems (such, for instance, as those concerned with perimeters of triangles) for which the calculus method is not at all well suited; they may, however, give no trouble if they are tackled on an *ad hoc* basis, usually in Euclidean terms. The development of systematic methods for the study of such cases as these has been an object to which, in our time, quite formidable mathematical ability has been devoted. And the new methods, once found, have often proved to be more satisfactory than the old, even in fields where it is possible for both to be applied.¹ The linear theory, which we are to examine, derives much of its character from the fact that it is an application of some of these newer mathematical methods to economics.²

So much must be said, even at the start; though it is inevitable that by saying it one raises the suspicion that economics is being used as a mere opportunity for mathematical exercise, valuable enough to the mathematicians who disport themselves upon this parade-ground, but with a marginal product (in terms of the things in which economists are interested) that is, after all, infinitesimal. I would not myself deny that there is something in this. It is easy to find pieces of "activity analysis" that do no more than re-state a fairly obvious point in esoteric terms. Nevertheless, after all discounting, there are substantial things that remain. Most obviously, there are the contributions which have been made by the associated techniques to the solution of certain kinds of business (or other practical economic) problems; but these, though their importance is unquestionable, will not be our main concern in what follows. The contributions which have been made by the new methods to economic theory look, at first sight, much slighter.

¹ Thus Hardy, Littlewood and Polya (*Inequalities*, p. 108), writing (in 1934) of a distinct but related field: "The (calculus) method is attractive theoretically, and always opens a first line of attack on the problem; but is apt to lead to serious complications in detail (usually connected with the boundary values of the variables) and it will be found that, however suggestive, it rarely leads to the simplest solution." As we shall see, it is much the same story here.

² Since my own formal mathematical education (such as it was) ended in 1923, I do not pretend that I myself feel at all at home with these newer methods. I can, however, feel fairly confident about the use which I have had to make of them, because of the advice which I have received from a number of experts. My greatest debt is to Dr. H. W. Kuhn (of Princeton), who was spending the year of 1958–59 in London, and who was kind enough to criticise a first draft in considerable detail. Afterwards, in California and in Japan, I had the benefit of consultations with Michio Morishima, with Kenneth Arrow and with George Dantzig himself. To each of these (and also to the Assistant Editor of this JOURNAL, who called my attention to a qualification not easy to disentangle from the literature) I offer my thanks.

One cannot claim much more for most of them than that they are improvements in the statements we can now make of familiar points, some of which we were (more or less) aware, but which one can now realise that we were putting rather badly. I shall consider such matters in some detail. I would, however, maintain that they are chiefly worth considering because they do carry with them a deepening in our understanding of something that is rather central—nothing less than the ends-means relationship which is what so much of economics is about. Something of that will, I hope, emerge before I have finished.

I. ORIGINS

It is convenient to let the story begin from a simple pedagogic point.

Anyone who has attempted to put the Walrasian theory of general equilibrium (with fixed coefficients of production) on to a classroom diagram will have had something like the following experience. One cuts it down to the simplest possible case—two goods and two factors. Measuring quantities of the two goods along two axes, one gets a diagram such as that shown in Fig. 1. The quantities of the two goods that can be produced with a

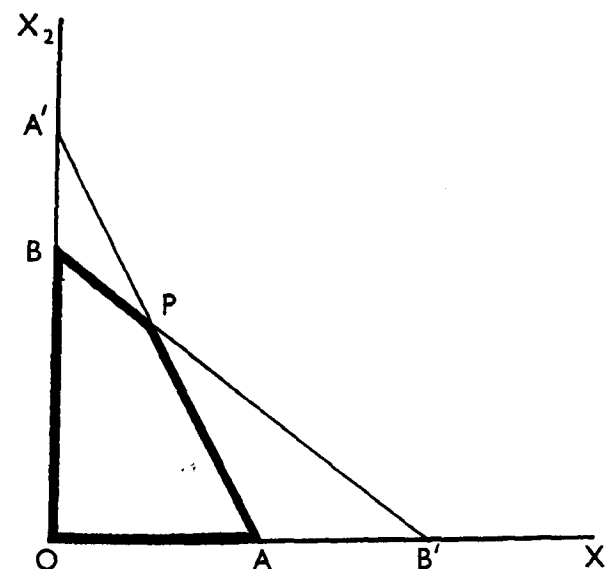


FIG. 1

given supply of factor *A* are shown by the straight line *AA'*; the quantities that can be produced with a given supply of factor *B* are shown by the line *BB'*; thus it is *only* the set of quantities represented by *P*, the point of intersection, that *can* be produced, so long as one assumes (as Walras assumed) that both factors are to be kept fully employed. The quantities of products, and the quantities of factors employed in the production of each, seem therefore to be determined, before anything has been said about prices, or about demands. The general equilibrium system, which is supposed to show the

way in which output adjusts itself to demand through the price-mechanism, has the serious defect, when it is regarded as a means of teaching economics: that in the simplest example, the example which it is most natural to take as an illustration, it does not work.

Now, it is, of course, true that as soon as we introduce another product (or, more generally, so long as we keep the number of products greater than the number of factors) the difficulty disappears, or at any rate becomes less acute. The quantities of products cease to be technologically determined, so that the price-mechanism can begin to function. For many Walrasians¹ that has been enough. The case of fixed coefficients, with fixed supplies of factors, has been for them no more than a stepping-stone on the way to something more general; the rigidities which appear in the elementary case have not therefore seemed to be so very interesting. Yet it must be admitted to be a defect in a theory that it does not clear up its own elementary cases. Mere consideration of the elementary case is enough to show that the Walras theory cannot be quite right.

It does not appear that much attention was paid to this weakness in the days of Walras and Pareto.² What brought it to the surface was Cassel's simplification of the Lausanne system;³ in Cassel's version it rather stood out. As is well known, there was a phase (in the 1920s) when Cassel's treatise was displacing those of the "historical" and "Austrian" schools in the curricula of Central European universities; during such a struggle its weaknesses would be carefully watched. It is not surprising that this particular difficulty was noticed;⁴ and it is also intelligible that by some of those who came to Cassel with an *Austrian* background the way in which the difficulty has to be met was noticed too.⁵

For there is a memorable section in Menger's *Grundsätze*⁶ in which he distinguishes between "economic" and "non-economic" goods—the latter, in his terminology, being goods which have no value, because the amount of them which is desired, when no value is set upon them, is less than the quantity of them that is available. There is a general tendency (so Menger maintained) for the range of goods that are "economic" to widen in the course of development; minerals, for instance, that have no value at an early stage of development become valuable when more capital is accumulated. Accordingly, to a follower of Menger, the determination of economic equilibrium would not merely involve the determination of the prices of those goods that have prices (as in Walras); it should also involve the

¹ Including the present author, when he wrote *Value and Capital* (1939).

² It should be noticed that Walras' basic fixed-coefficient model did not assume fixed factor-supplies.

³ *Theory of Social Economy*, Part II.

⁴ See the discussion of W. L. Valk's *Principles of Wages* (1928) in D. H. Robertson "Wage Grumbles" (*Economic Fragments*, p. 52).

⁵ Articles by Neisser (*Weltwirtschaftliches Archiv*, 1932), Stackelberg (*Zeitschrift für Nationalökonomie*, 1933) and Zeuthen (also in *Zeitschrift für Nationalökonomie*, 1933) are widely quoted.

⁶ Chapter 2.

determination of which goods are to have prices, and which are to be free. The weakness of the Walras-Cassel construction lies in the implied assumption that the whole amount of each available factor is utilised; once that assumption is dropped, the awkwardness of the construction (even in the two-good, two-factor case) can be shown to disappear.

It is at once apparent, if we drop the assumption that both factors must be fully utilised, that the possible combinations of products that can be produced from available resources are not confined (in Fig. 1) to the point *P*; they comprise all those combinations that are represented by the whole area *OAPB*. Nor is *P* the only *efficient* combination; for if product X_2 were not *wanted*, *OA* would be the maximum amount of X_1 that could be produced; there would be a sense in which production would be maximised all along the broken line *APB*. The only peculiarity of the point *P* is that it is the only point at which both factors are scarce. If we do not assume that, the whole of *APB* becomes a *frontier*. As demand varies, the equilibrium point can move from one end of this frontier to the other. Throughout the whole of this process the price-mechanism is working.

It is easy for the "intuition" of the "literary" economist to get that far; but there would have been little progress beyond that point if it had not been for the mathematicians. It was the fact that mathematical methods were being prepared, which were capable of dealing with the equilibrium of a system which is restricted by inequalities, that made it possible to go on. The next events to be recorded are therefore the appearance of two mathematical papers, which I shall make no attempt to discuss in detail, but which must be mentioned, since from them everything subsequent has sprung. An attempt will be made later to describe the substance of their contributions in different terms.

The first of these papers, in order of publication, was the "proof," by Abraham Wald, of the existence of an equilibrium of the Walras-Cassel system, extended (as just explained) so as to allow for the possibility of free, as well as scarce, factors. This was not in fact a satisfactory proof, since it assumed that the demands for products would not fall to zero, however high prices rose—an assumption that can hardly be admitted. It did nevertheless establish that the "extended" system is capable of mathematical manipulation; it may therefore be said to mark the first stage in the process by which the "Austrians" had their mathematical revenge on the followers of Walras.¹

¹ Wald's paper was presented (with an introduction by Karl Schlesinger) to a seminar in Vienna presided over by Karl Menger (mathematician son of the economist Menger) in March 1934. It was printed in *Ergebnisse eines mathematischen Kolloquiums*, Heft 6, 1935. There is a further paper in the following issue of the same publication, and an article (which, among other things, summarises the results of these mathematical papers) in *Zeitschrift für Nationalökonomie*, 1936. The *Zeitschrift* article was translated into English (*Econometrica*, 1951).

The reasons which led Wald to make his curious assumption about demand functions have been explored by Dr. Kuhn ("On a Theorem of Wald" in *Linear Inequalities and Related Systems*, *Annals of Mathematics Studies* 38, Princeton, 1956). I shall be returning to this matter later. (See below, p. 699.)

Much more important, for what followed, was the other: the famous paper by John von Neumann "A Model of General Economic Equilibrium" (to give it the title by which it is known to English readers).¹ It has been the extraordinary achievement of this work that it has had a profound influence on the development of economic thinking in several different directions. As a dynamic model of an expanding economy, it has been the father of many growth models; but it also has some more static aspects (which alone concern us in this place²); as things have turned out so far, the influence of these has been at least as important. The dynamic model is built up as a sequence of "single-period" links; each of these links, since there is no opportunity for adjustments over time *within it*, can be regarded as a static (or timeless) system. The form in which von Neumann studies this static system is substantially that which we have been calling the "extended Walras-Cassel"; but in his hands this is already passing over into *activity analysis*. He does not content himself with allowing for the possibilities that available inputs may not be used, feasible outputs may not be produced; he allows for the possibility of joint products, and that available processes may not be employed. Besides, there is included in von Neumann's construction a first statement of what was to become known as the Duality principle (of which I shall have much more to say later). It is singularly appropriate that it was von Neumann who introduced that principle into the theory of economic optimisation, for it is the link which establishes a connection (we shall be examining later what sort of a connection) between that theory and the Theory of Games.

From this point, the later developments begin to branch out; but before discussing these later developments, it will be well to attempt a statement of the stage so far reached. There is indeed no single work which can be said to correspond at all exactly to the stage I have in mind. New ideas tumble out one after another with such rapidity in von Neumann's few pages, that he is already in the middle of the next chapter before he has finished with the first. It will be useful here to take things more slowly. The "prototype" theory which I shall describe in the next section will still run in terms of "extended Walras-Cassel"; that is to say, it is solely concerned with the allocation of given factor supplies in the production of a number of products, each of which is to be made by combining factors in proportions that are technically given. Only afterwards shall I go on to the reinterpretations, by von Neumann and others, which have not merely allowed for variable

proportions of factors, for joint supply and for intermediate products (all of which things are left out in the prototype), but have enabled the analysis to be applied to problems of business management which are at first sight of quite different kinds. One of the main difficulties with later writings is that they are (rightly) so impressed by these reinterpretations that they insist on beginning their exposition on a high plane of generality. I find it easier to take one thing at a time; though the theory which will now be described is mainly interesting because it can be generalised, it is easiest to put it, at the first round, in a rather conventional setting.

II. THE PROTOTYPE

1. Given amounts of M factors of production are available; we will call these amounts $b_1, b_2, \dots, b_M$. There are N products which can be produced by the utilisation of these factors; the (as yet undetermined) amounts of these products we call $x_1, x_2, \dots, x_N$. There are fixed technical coefficients; that is to say, the amount of each factor required to make a unit of each product is given. The amount of the i th factor needed to make a unit of the j th product we call a_{ij} .

It is clearly implied, when the problem is stated in these terms, that the constants (a 's and b 's) must obey certain restrictions if they are to make economic sense. Though these restrictions look terribly obvious, we shall get into serious trouble if we do not put them down. (1) Every b_i must be positive; negative factor supplies are meaningless, and a product that required a factor that was in zero supply could not possibly be produced. (2) The technical coefficients a_{ij} cannot be negative; we may, however, allow some of them to be zero—not every factor need be required for every product. (3) But some amount of at least one factor must be required for every product; there can be no j for which $a_{ij} = 0$, for all i . Mathematically, these restrictions define what we are calling the prototype problem. Since they were (I believe) first set out formally by Wald, I shall call them (together with a fourth rule to be mentioned later) the *Wald rules*.

If a set of outputs ($x_1, x_2, \dots, x_N$)—or, more briefly (x_j)—is to be *feasible* it must satisfy two sets of conditions, or *restraints*. First, no x_j may be negative (though some or all may be zero); this again looks obvious, but again it is vital that such obvious matters are not overlooked. Secondly, the amount of any factor that is required to produce the set (x_j) must in no case exceed the amount of that factor that is available. The first set of restraints—that $x_j \geq 0$ for all j —might be called product restraints, but (with an eye on subsequent generalisation) I prefer a more general description. I shall therefore call them *sign restraints*. The second set, which imply that

$$\begin{aligned} a_{11}x_1 + a_{12}x_2 + \dots + a_{1N}x_N &\leq b_1 \\ a_{21}x_1 + a_{22}x_2 + \dots + a_{2N}x_N &\leq b_2 \\ &\vdots \\ a_{M1}x_1 + a_{M2}x_2 + \dots + a_{MN}x_N &\leq b_M \end{aligned}$$

¹ There is an awkward question of priority. The von Neumann paper was also published in the *Menger Ergebnisse* (Heft 8, for 1935–36, published 1937). (The English translation is in *Review of Economic Studies*, No. 33, 1945–46.) It is, however, understood that it was originally presented to a seminar at Princeton in 1932, which puts it before Wald, and even before such things as the Neisser article above mentioned. (I know, from personal recollection, that he had these things in mind in September 1933, when I met him with Kaldor in Budapest. Of course I did not understand what he was saying!)

² Although all the theories we shall be discussing have (or can have) dynamic aspects, the static side will give us quite enough to deal with.

I shall for the same reason call *specific restraints*. There are N sign restraints and M specific restraints, $M + N$ in all. There are N x 's to be determined. Thus the number of restraints is always *greater* than the number of unknowns, when all restraints are taken into consideration.

As always in such cases, it is a great help to make as much use as we can of a diagrammatic representation. The problem which has just been set out, for M factors and N products, is precisely that which was expressed, for two factors and two products, in Fig. 1. The feasible *region*,¹ as drawn, was bounded by straight lines that corresponded to the four restraints: two sign restraints (OA and OB), two specific restraints (AA' and BB'). The Wald rules have made it necessary that we should get a feasible region that is something like $OAPB$. It is clearly not excluded that one of the specific restraints might have been ineffective (if AA' , BB' had failed to meet within the positive quadrant) so that the feasible region might have been reduced to a triangle. And it is clearly not excluded that one (or both) of the specific "arms" might have been parallel to an axis; what is excluded is that they should both be parallel to the same axis, for that would mean that there was a product which did not require any factor, and that is ruled out. It would therefore seem that the polygonal form (such as $OAPB$), or something like it, is going to be typical.

2. It would now be possible to pose the problem before us in the form of asking for a determination of all feasible solutions: the answer to that question, in the case illustrated, would be the definition of the whole area $OAPB$. But out of all these points, it is only those that lie upon the frontier APB which are really interesting; it is only these which, in some sense or other, "maximise output." How do we distinguish between these frontier points and the rest of those that are feasible? There are, in principle, two ways of making the distinction.

One is to say that a feasible point is a frontier point if it is a terminus of a vector from the origin; that is to say, if it is laid down that the various outputs are to be produced in fixed proportions, the quantity of any product (and hence of the composite product) that is produced must be maximised. The other is to say that if the products are valued at fixed prices ($p_1, p_2, \dots, p_N$) the value of output ($\sum p_j x_j$) must be maximised. (It must be clearly understood, if we adopt this second distinction, that the p 's must be non-negative; we may allow some of them to be zero, but it will be nonsense for all to be zero. This is the fourth of the Wald rules.)

There are economic purposes for which the difference between these two approaches is very important; the whole theory of increasing returns may be said to depend upon it. It can, however, be shown² that under present

¹ I am aware that for mathematicians the term *region* has connotations of continuity which are not necessarily implied in the uses I shall be making of it. A more correct terminology would, however, involve explanations which for present purposes are largely irrelevant. In this, and some other cases, I must ask forgiveness for a use of terms in something looser than the strict mathematical sense.

² See below, p. 689.

assumptions they come to the same thing, so it does not matter which we use. It has proved to be more convenient to work with the test by value of output, according to which a position on the frontier is found by maximising $\sum p x$ for given (p). A set of outputs which does this, subject to the restraints, is called an *optimum*.

It is at once apparent that for the case which is shown in our diagram there are two sorts of optima. (1) The optimum may be *at a vertex*, such as A , P or B . (2) The optimum may be, as we shall say, *on a flat*—on AP or PB . There will be several values of the price-ratio (p_1/p_2) which will correspond to each vertex optimum; but it is only particular values of the price-ratio which will give a flat optimum—but for those values any point on the flat can be optimum. It will now be shown that the distinction between vertex optima and flat optima is quite generally valid; but for that purpose we need some more general definitions.

3. Let us begin by looking at the vertices on our diagram more closely. At P the two products are both being produced, and the two factors are both scarce; thus we have two positive products (as we may call them) and two scarce factors. At A (and at B) there is only one positive product, and one scarce factor. At O (which must be reckoned as a vertex, though—so long as the Wald rules hold—it cannot be an optimum) we have no positive product and no scarce factor. Thus at all the vertices the number of positive products is equal to the number of scarce factors.

When a factor is scarce the corresponding specific restraint becomes an equation; we may then say that the restraint is *operative*. Thus the vertex P is determined by two specific restraints which are operative. At A there is only one specific restraint which is operative; but the place of the other is taken by a sign restraint, which now becomes operative ($x_2 = 0$). At O it is only the sign restraints which are operative. Thus each of the vertices is determined by two operative restraints—two equations to determine the two unknowns. A general rule for the determination of a vertex is accordingly suggested: a vertex is a set of N outputs (x_j) which is determined by N operative restraints, to be selected from the total number of restraints ($M + N$). But this is not quite the whole story.

For (as is again apparent from the diagram) the list of points which would be calculated by this rule is longer than the list of vertices. When the above procedure is applied to that elementary case it would not only throw up the true vertices (A , P , B and O); it will also throw up the pseudo-vertices (A' and B'). These must clearly be excluded; what excludes them? They are excluded by their failure to satisfy some of the restraints which in their determination have been taken as non-operative. A true vertex is a set of outputs which is determined by selecting N of the $M + N$ restraints to be operative, and which also satisfies (as inequalities) the remaining non-operative restraints. Thus, when the optimum is at a vertex, the number of

positive outputs should be equal to the number of scarce factors; and the non-scarce factors should be in excess supply.

4. So much for the vertices; now for the optima which lie *on the flat* between the vertices. It is clear that the number of scarce factors cannot ordinarily¹ be greater than the number of positive products; for if it was, we should have more equations than unknowns, and the system would be over-determined. But it is perfectly possible that the number of scarce factors may be *less* than the number of positive products. (Thus for an optimum between A and P , on Fig. 1, we have two positive products, and only one scarce factor.) It will later be shown that this is a general characteristic of flat optima; but it will be more convenient, for the moment, to define them, and to get out their properties, in another way.

It is a well-known rule that if α, β are two points on a line, with co-ordinates (x_α, y_α) (x_β, y_β) , the co-ordinates of any other point on the line can be expressed as $(k_\alpha x_\alpha + k_\beta x_\beta, k_\alpha y_\alpha + k_\beta y_\beta)$ where $k_\alpha + k_\beta = 1$. In terms of these *weights*, the point α is $(1, 0)$; the point β is $(0, 1)$; any point on the line between α and β will have both weights positive; any point outside $\alpha\beta$ will have one weight negative. There is therefore a sense in which we can regard any point on the line between α and β (including α and β) as being a *weighted average* of α and β ; it being understood that the weights are non-negative, and add up to 1.

The points on the flat between A and P (on Fig. 1) can thus be regarded as weighted averages of A and P —two vertices which, in the case where the optimum is on the flat, must be such that at them the value of output $V (= \sum p x)$ is the same. It is accordingly suggested that we might define the flat optimum as a condition in which two (or more) vertices give the same value of output; any weighted average of these vertices may then be an optimum. It is evident that if V takes the same value at each of the points $(\alpha, \beta, \dots \lambda)$, it will also take the same value at any weighted average of $(\alpha, \beta, \dots \lambda)$. But before we can accept this definition there is a further matter to be cleared up.

If a point is to be an optimum it must be feasible; how do we know that these points, defined as weighted averages of vertices, are feasible? It can in fact be shown that they must be; this is a special case of a general, and very important property—*any weighted average of a set of feasible points must be feasible*. The mathematical name for this property is *convexity*;² what we have to show is that the feasible region is convex. The proof is as follows.

Let $(\alpha, \beta, \dots \lambda)$ be feasible points. Take the point which is expressible as the weighted average $(k_\alpha, k_\beta, \dots k_\lambda)$. Substitute its co-ordinates (written in full) into any one of the specific restraints, say the i th. Then

$$a_{i1}x_1 + a_{i2}x_2 + \dots + a_{iN}x_N = k_\alpha(a_{i1}x_{1\alpha} + a_{i2}x_{2\alpha} + \dots + a_{iN}x_{N\alpha}) + \dots + k_\lambda(a_{i1}x_{1\lambda} + a_{i2}x_{2\lambda} + \dots + a_{iN}x_{N\lambda}) \leq k_\alpha b_i + k_\beta b_i + \dots + k_\lambda b_i$$

¹ It will later appear that there is a qualification to this statement which is of some importance.

² For a further discussion of this concept, see below, p. 687.

since $(\alpha, \beta, \dots)$ satisfy the restraints, and the k 's are non-negative. Then, since the k 's add up to 1, the last sum is b_i . Thus any weighted average satisfies the specific restraints, and can be shown to satisfy the sign restraints in the same way. Thus it is feasible.

It is accordingly safe to lay down that when there is a "tie" between vertex optima any weighted average of these vertex optima is itself an optimum. That is what the *flat optimum* means.

5. So far we have (basically) been arguing from analogy; the method described in the last paragraph can, however, be used to give something which is a bit nearer to a proof of the properties in question.

It is not only the points *on the flat* which can be regarded as weighted averages of vertices; if we bring all the vertices into account, any point within the feasible region (inside the region, or on its boundary) can similarly be expressed as a weighted average of vertices. (This can often be done in several ways, but that does not matter.) Further, in view of the convexity of the region, it is *only* points that are within the region that can be thus expressed. Suppose that we now take $(\alpha, \beta, \dots \lambda)$ to be the vertices, and consider a point which can be expressed by $(k_\alpha, k_\beta, \dots k_\lambda)$. Substituting its co-ordinates into the value of output, as we have previously substituted into the restraints, we get

$$V = \sum p x = k_\alpha V_\alpha + k_\beta V_\beta + \dots + k_\lambda V_\lambda$$

where $V_\alpha, V_\beta, \dots V_\lambda$ are the values of output at the vertices. Then, since the weights are non-negative and add up to 1, it is obvious that in the case where there is one of the V 's which is larger than any of the others, the optimum is reached if the whole weight is placed at that vertex; while in the case where there is a "tie," an optimum will be reached by dividing the weight between the tying vertices *in any manner*. That is all that there is to be said.

6. So far as the determination of the optimum is concerned, that completes the prototype theory; the most remarkable development of the theory is nevertheless still to come. This is concerned with the determination of factor prices.

Let us go back, for a moment, to the "Walras" model, of the two factors and two products, with which we began. It is not merely the case that if we analyse it in Walras' manner, outputs appear to be established independently of demands; it is also the case that (if product prices are assumed to be given),¹ factor prices appear to be determined independently of the supplies of the factors. Corresponding to the *equations*

$$a_{11}x_1 + a_{12}x_2 = b_1, \quad a_{21}x_1 + a_{22}x_2 = b_2$$

(which make outputs seem to depend upon technical coefficients and factor

¹ Walras, of course, did not assume that they were given. That this is an important assumption has nevertheless been brought to the attention of economists by Samuelson (see his Factor Price Equalisation Theorem).

supplies only), there are the equations of prices and costs (that there is no profit that cannot be imputed to some factor); these will read

$$w_1 a_{11} + w_2 a_{21} = p_1, \quad w_1 a_{12} + w_2 a_{22} = p_2$$

Taken by themselves, they seem to make the factor prices w_1, w_2 depend upon product prices and technical coefficients only.

As we have seen, the first set of equations is not universally valid. It needs to be completed so as to allow for the possibility of a factor being in excess supply; when that is done, demands come back into the picture. An exactly analogous argument, applied to the second set, uncovers the assumption that the outputs of both products are positive. If that is not so, if (say) $x_2 = 0$, there is no reason why the cost of the second product should equal its price. A possible combination of factor prices would be such that price equalled cost for the first product, but fell short of cost for the second. The second would not then be produced; it would not pay to produce it.

This simple example is sufficient to show that the theory of imputation (derivation of factor prices from product prices) needs to be completed by an inclusion of "inequality" cases, just as has been done for the theory of quantity optimisation. It also suggests (what proves to be true) that there is a sense in which the one theory is a mirror image of the other. Let us look at this more generally.

7. Suppose that at a particular optimum, n of the N possible products are positive products, the remaining $N - n$ having zero outputs. And suppose that m of the M factors are scarce factors, the remaining $M - m$ having zero factor prices.¹ Then it would appear from our preceding discussion (though there is qualification to this to be made in a moment) that at a vertex optimum $m = n$, while at a flat optimum $m < n$. We must again look at these two cases separately.

At the vertex optimum we have $m = n$ equations of the form $\sum a_{ij} x_j = b_i$ to determine the n positive outputs; and (since price equals cost for each of these n products) we have an equal number of equations, of the form $\sum w_i a_{ij} = p_j$, to determine the $m = n$ prices of the scarce factors. Corresponding to the other factors, where $w_i = 0$, we have the inequalities $\sum a_{ij} x_j < b_i$. Corresponding to the other products, where $x_j = 0$, we have the inequalities $\sum w_i a_{ij} > p_j$. Apart from the difference in sign of the two sets of inequalities, there is complete symmetry.

The flat optimum is at first sight more perplexing. Here we have $m < n$; there are only m equations to determine the n positive outputs; these outputs are therefore under-determined, but that (it will be remembered) is what they should be. On the other hand, we have n equations $\sum w_i a_{ij} = p_j$ to determine the m prices of the scarce factors; these seem therefore to be over-determined. The explanation is that it is not possible for a flat optimum to occur at any arbitrary set of prices (p); it can only

¹ I take it for granted that the factor prices of the non-scarce factors are zero.

occur at particular sets of (p), which are related in such a manner that the n equations of prices and costs can be simultaneously satisfied. (The *labour theory of value*, regarded as a statement that the prices of positive products must be proportional to their labour costs, when labour is the only scarce factor, may be regarded as a particular case of this proposition.) If we have begun with an appropriate (p), we can get a flat optimum, with a corresponding (w). The restraints on the (x) will be operative, for all factors where w_i is not zero; and the restraints on the (w), as we may begin to call them, will be operative, for all products where x_j is not zero. Where w_i is zero, and where x_j is zero, we have the same inequalities as before.

But now, having found a way of overcoming the obstacle of over-determinateness in the case where $m < n$, we should look back to see whether we have not been too precipitate in the other case. Would it not have been possible to have found a way round, in a similar manner, which would have salvaged the possibility that $m > n$? The factor prices would then have been under-determined, so that there would have been "flatness" on that side—there is no difficulty about that; but the only way in which m operative equations on n positive products can all be satisfied, when $m > n$, is for there to be some special relations between the factor supplies (b), just as there had to be suitable relations between the (p) in the opposite case. There is no doubt that this way out is mathematically valid, and it is useful as showing how we may complete the symmetry; but I have refrained from bringing it in until now, since I think that the economist is justified in feeling a little shy of it, at least in the present application. He is undoubtedly interested in the optima that will be reached at various (p), some of which will certainly be inter-related, so that the case where $m < n$ is important to him; but he had begun by thinking of the factor supplies as *given*, so that inter-relations between them, which would enable more than n factors to be scarce simultaneously, would be rather a fluke. Still, it is a possibility, and it is a possibility which, at this stage, has important consequences.

For what we now come to is the Principle of Duality. The conditions which govern the outputs (x) and the factor prices (w), in an optimum position, correspond exactly. We had, however, determined the (x) in a way which could be completely described without introducing the (w); since the restraints on the (w) are so remarkably similar, it is strongly suggested that the (w) might themselves have been *independently* determined in a similar way. That this is in fact so can be shown as follows.

8. We started with the condition that the (x) should be *feasible*: in the sense that they are non-negative, and that their factor requirements do not exceed the available factor supplies—that is to say, that $\sum a_{ij} x_j \leq b_i$ for all i from 1 to M (the specific restraints). We found ourselves imposing a parallel set of restraints on the (w): that they should be non-negative, and that the costs of the products, at these factor prices, should equal or exceed the given product prices—that is to say, the $\sum w_i a_{ij} \geq p_j$, for all j from 1 to N (which

we may now regard as specific restraints on the (w) . Evidently we may say that the (w) are *feasible* if they satisfy the restraints just laid down.

Now take the specific restraints on the (x) , multiply each of them by the corresponding w , and add. Since if the (w) are feasible, they must be non-negative, the resulting inequality will hold, whenever both (x) and (w) are feasible. What it states is that the cost of the set of outputs (x_j) , valued at the factor prices (w_i) , cannot exceed the aggregate value of the factors, at those same factor prices. If this cost is C , and this factor value B , we have $C \leq B$, whenever (x) and (w) are both feasible.

Then take the specific restraints on the (w) , multiply each by the corresponding (x) , and add. If both (x) and (w) are feasible, the inequality which results from this operation must also hold. What it states is that the aggregate value of the products, at prices (p) , cannot exceed the aggregate cost of those products, at factor prices (w) . $V \leq C$, when (x) and (w) are both feasible.

So far we have made no use of the optimum conditions. But it is easy to show that when (x) is optimum, $C = B$; for when w_i is positive the corresponding restraint is then an equation, and when it is not an equation, the corresponding $w_i = 0$. Similarly, when (w) is optimum—or such as to correspond to an optimum (x) —we have $V = C$. Thus, when (x) and (w) are both optimum, we have $V = C = B$. (The social accounts come out right!)

For any feasible (x) and (w) , $V \leq B$; no feasible V can exceed any feasible B . The feasible B 's lie above the feasible V 's, except for the possibility that some feasible V 's and some feasible B 's may be equal. At the optimum, $V = B$, so that at the optimum this equality is realised. It follows that no feasible V can exceed the optimum V , so that at the optimum V is maximised; that, of course, does no more than confirm the definition with which we started. But it also follows that no feasible B can be less than the optimum B , so that at the optimum B is minimised. We could have determined the "equilibrium" factor prices as an *independent* optimum problem: by seeking those factor prices which minimise factor value, subject to the condition that the unit cost of no product shall fall below its given (product) price.

9. That, I think, is the easiest way of demonstrating, or at least of explaining, the Duality Principle; but there is perhaps a little more to be said in order that the significance of the principle should be fully brought out. It is rather a defect of the foregoing treatment that it has had to introduce the factor prices, in Walras' manner, as elements in a model of competitive capitalism, in which the factor prices govern *distribution*; in the other part of the theory, in which the optimum *quantities* had been determined, no such assumption as this had been required. It would in fact have been possible to have introduced the factor prices, without reference to distributive shares, as instruments of quantity optimisation; though it would not have been so

easy to carry through the argument in detail, we might have proceeded on something like the following lines.

Suppose that arbitrary (non-negative) prices are set upon the factors, and that an entrepreneur (or planner) is provided with a fund which is just sufficient to enable him to employ the whole of the available supplies of the factors at those given factor prices. Suppose that he seeks to maximise the value of output, under the single (specific) restraint that the cost of output is not to exceed the value of his fund; that is to say, that $C \leq B$. The outputs which he will select will, very likely, not be feasible; they will infringe some or other of the *separate* specific restraints, which (we are of course supposing) do still in fact hold. It does, however, follow from our previous analysis (it would be nice if there were some simple *direct* proof, but I do not see one) that there will be some set of factor prices, our optimum (w) , at which the optimum that he selects will in fact be feasible, and will indeed be an optimum of the whole system. The optimum factor prices are the *right* factor prices in this sense.

On this approach, distribution only comes in, if at all, in a secondary manner. If all the factor prices are changed in the same proportion the restraint $C \leq B$ is unaffected in *real terms*; just the same combinations of outputs are open, or appear to be open, as before. Thus, by the preceding test, the optimum (w) remains indeterminate, to the extent of a multiplier; in order to determine its level, we have to impose some additional condition, and the condition that the value of output, at the optimum, should be equal to its cost is one that will obviously be convenient to impose. Then it all falls out as explained.

This is more the way in which economists have thought of the determination of factor prices belonging in with that of product quantities; the discovery that factor-price determination is an optimum problem in its own right, so that we can begin at either end, is distinctly harder to place. One can see that it makes sense in economic terms (when the possibility of zero outputs is allowed for); but it is hardly a formulation which would have occurred to the economist if it had not been suggested to him by the mathematician. The nearest thing which might have occurred to him would have been to say that the maximisation of output is a minimisation of the scarcity of the resources applied. That is a way in which an economist might want to talk, but he would hardly have believed that he was quite correct in doing so. What he is now to learn is that there is a way in which he is justified in doing so, after all.

III. BEYOND THE PROTOTYPE

The summary which has just been given has been confined to a statement of the Linear Theory in Walras-Cassel terms; it should, however, be emphasised that none of the standard works do put it in those terms, and the

reason why is fairly evident. The reactions which we have appeared to be analysing so minutely—the changes in the sorts of factors that are scarce, and of producible products that are actually produced—are hardly so important in the real world, as to be deserving of such elaborate attention. Certainly it seems odd to deal with them in such detail before we deal with more important matters. The Walrasian habit of taking these things as settled, *before* the equilibrium system is set up, is not (in direct application) so very unreasonable. The chief reason why the prototype theory is very well worth having is that, once we have it, it can so easily be interpreted in other ways.

On the way to these economic reinterpretations there are, however, some mathematical reinterpretations and extensions which need to be noticed. To the mathematician these are rather obvious; they are the reason why no mathematician would ever stop at the prototype theory. But since they have been excluded from the prototype theory, they must be set down before going further.

1. It will be remembered that in our formulation of the prototype we began by imposing certain "economic" restrictions on the constants—the Wald rules. The a 's were to be non-negative (with the qualification that some factor must be required for every product); the b 's were to be positive; and then there was the supplementary rule that the p 's were to be non-negative (but not all zero). Useful as these restrictions were to begin with, it may have been noticed that by the end of our discussion they were wearing rather thin. The minimisation problem, which emerged as the dual, could itself have been stated as a maximisation problem, in the same form as the original (or "primal," as it is coming to be called); but in that case the signs of *all* the constants would have had to be reversed. We took it for granted that a problem of that kind could be dealt with in much the same way. But this raises the broader question: do we need to put any restrictions on the constants?

Mathematically, the answer is no. Almost the whole of the foregoing can be re-worked without the Wald rules; so that any a , b or p can be allowed to be positive, zero or negative. The chief trouble which arises if this is done (it is the reason why it seemed best to begin with the Wald rules) is that we have to allow for some side possibilities, which are obviously excluded in many economic interpretations, so that it was rather a convenience to be able to ignore them at a first round. I shall not attempt, *even here*, to work them in properly; some brief description must, however, be given.

It is possible, in the first place, if no restrictions are set upon the constants, that there may be no feasible solution, no "feasible region." The specific restraints may be mutually contradictory, or they may contradict the sign restraints. (For example, $x_1 \leq -6$ is a possible specific restraint if we allow any constants; but it contradicts the sign restraint $x_1 \geq 0$.)

Secondly, even if there is a feasible region, it is not necessary that it should

be optimisable for a given (p). Clearly, if there were no specific restraints (only sign restraints), while the p 's were positive, there would be no optimum, since V could be indefinitely increased. The same thing may happen if there are specific restraints, when they fail to confine the feasible region in some direction.

Neither of these things can happen under the Wald rules; they cannot happen with the primal,¹ nor (it is important to notice) can they happen with the prototype dual.² This is a particular case of a general theorem, the general *Duality Theorem*, which states that if an optimum exists for the primal, it exists also for the dual. I shall make no attempt to prove this theorem, which is true for any values of the constants. There is also an extension of the theorem, which connects the two exceptions: it states that if the primal, though feasible, is unoptimisable, the dual will not be feasible.³ Since (of course) either problem may be regarded as primal, the correspondence holds (in a sense) both ways. It is, however, worth noticing that the possibility remains open that both primal and dual may not be feasible.⁴ This is a rare case, but it can arise.

2. *Convexity*. If a feasible region exists it must be convex; for the proof of convexity (which was given above⁵) is independent of the Wald rules; it will hold for any values of the constants.⁶ We are still dealing with convexity properties, and shall continue to do so in all the forms of the linear theory. Since this has the effect of setting a sharp limitation on the range of economic problems to which the theory is applicable, it will be well to consider the concept a little more deeply before going further.

What is the relation (we may begin by asking) between this convexity concept and that which has hitherto been more familiar to economists, in the works, for instance, of Pareto or Joan Robinson? We are accustomed to say that a curve such as AB (Fig. 2) is "convex outwards" if its steepness continually increases as one moves downwards along it. This definition is clearly different from that to which we have here come, since the one is a property of a region, the other of a curve; but since the region OAB is

¹ Under the Wald rules the origin (all outputs zero) is always feasible. That is enough to show that a feasible region must exist. Increasing (x) along any vector will always encounter a restraint; V must therefore have a maximum value.

² Under the Wald rules a zero value for all w is *never* feasible; but a feasible solution can always be found by giving the w 's sufficiently large *positive* values. Between the corresponding value of B and the zero value (which is not feasible) a minimum value must exist.

³ This can easily be illustrated by a slight variation of our Prototype case. If we maintain the other rules, but allow the existence of one product which does not require any factor to make it, the primal will be unoptimisable, if that product has a positive price. But the cost of that product must be zero, at any factor prices; so it must fall short of the positive product price; the dual cannot be feasible.

⁴ An example is given in Vajda, p. 78.

⁵ See above, p. 680.

⁶ Other parts of the "prototype" argument would require more modification; but I shall not go into that here.

convex on the new definition,¹ while $O'A'B'$ is not, it does look as if there would be some sense in saying that a convex region is one that is bounded by something like a "convex outward" curve.

It is indeed true that a convex region can be defined in something like this manner. The convexity of the curve AB (Fig. 2) could have been indicated by the fact that the tangent, at any point of the curve, lies outside the region OAB except at the point of contact. We can get rid of the exception about the point of contact (rather awkward in the case of linear boundaries) if we put the same property a little differently. We can define a convex region as one which is such that through any point *outside* the region

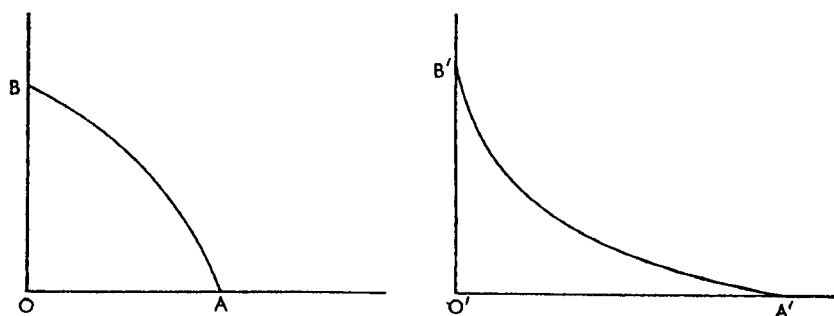


FIG. 2

a line² can be drawn so that the whole of the region lies on one side of the line (with no point of the region lying on the line). It is obvious that if a region is "dented" (like $O'A'B'$), this condition will not be satisfied at a point which lies within the "dent." It can be proved that this "no dent" definition amounts to the same thing as the "weighed average" definition which we used previously.

I shall not attempt to prove this equivalence; it is one of the things which economists may reasonably take over from the mathematicians.³ It is nevertheless of much use to the economist to know that the equivalence exists. For once we have it, we can at once see that the convexity, which is so important in the linear theory, is fundamentally the same thing as that which we are accustomed, in our diagrams, to think of as a phenomenon of *diminishing returns*. Convexity, in the new sense, covers constant returns as well as diminishing returns (if AB were a straight line, the region OAB would still be convex). What it does not cover is increasing returns (as illustrated

¹ It is sufficient to observe that if α and β are two points within the region (or on its boundary) any point between them on the line joining them will be within the region in the same sense.

² In two dimensions; plane, or whatever corresponds, in more than two.

³ To prove that "convexity no-dent" implies "convexity weighted-average" is not difficult; to prove it the other way (the "theorem of the supporting hyper-plane") is distinctly more awkward. There is a proof in von Neumann and Morgenstern, *Theory of Games*, pp. 134 ff; see also Vajda, *op. cit.*, p. 22. The neatest proof which I know is that given by Debreu in an appendix to Koopmans and Bausch, *Selected Topics in Economics involving mathematical reasoning*, Cowles Foundation Paper No. 136, p. 96.

by $O'A'B'$). We can check this by observing that, under increasing returns, an output of zero at a cost of zero may be feasible, an output of x at a cost of c may be feasible, but an output of $\frac{1}{2}x$ at a cost of $\frac{1}{2}c$ will *not* then be feasible.

Under increasing returns, also, there will be a lack of correspondence between the two senses of optimum. A position which maximises output in the quantity sense (that it is the maximum that can be produced when the output of commodities are to be combined in fixed proportions) will not necessarily be one which maximises the value of output at *any* set of product prices. It is a convexity property (a consequence of the equivalence of the two definitions of convexity) that the two senses of optimum come together.

We are accordingly in sight of a rather powerful re-statement of a distinction which has long been known to be crucial for economics. The reason why constant-returns assumptions, and diminishing-returns assumptions, are so much more manageable than increasing-returns assumptions, is that in the former cases we can use convexity properties, while in the latter we cannot. There is in fact not much difficulty in dealing with phenomena of diminishing returns by linear methods (a curve can always be approximated by a polygon);¹ but the linear theory, since it is based upon convexity, cannot be extended, without losing most of its virtues, into the realm of increasing returns.

3. *The Equational Form.* This is a convenient point at which to mention another complication—that the form in which we have been posing the optimisation problem is by no means the only form in which what is in substance just the same problem can be put.

The excess supplies of the factors (which are zero in the case of scarce factors, and have to be positive when the factor is not scarce) are themselves a part of the (primal) problem; they are determined, along with the outputs (x_j), when we maximise V subject to the restraints. If they had been introduced explicitly, the primal problem could have been expressed as a maximisation of V , subject to the equations

$$a_{11}x_1 + a_{12}x_2 + \dots + a_{1N}x_N + e_1 = b_1$$

(for all factors), together with the sign restraints on the outputs and on the excess supplies ($x_j \geq 0$, $e_i \geq 0$). Now, as soon as we have left the Wald rules behind us (so that we do not have to worry about the signs of the constants), this is exactly the same thing as maximising

$$\sum q_j x_j + \sum q_i e_i$$

¹ I do not mean that we have to introduce a linear re-statement in order to make use of the "weighted-average" concept of convexity. It is indeed obvious from the diagrams of Fig. 2 that we do not. It is possible (and useful) to re-state Paretian economics (with curved frontiers and indifference curves) in terms of convexity properties. This has been done, in a manner which should become classic, in the first of Tjalling Koopmans' *Essays on the State of Economic Science* (1957). I should like to take this opportunity of expressing the debt which I owe to that admirable work, which has had more effect upon the present paper than may appear on the surface. (The companion piece, that is mentioned in the previous footnote, did not appear until after this survey had been substantially written.)

where q and q' are new sets of price-weights; for the e 's could always be eliminated from the latter sum with the aid of the given equations. (It would then reduce to the familiar form $\sum p_j x_j$, with p 's depending on the given q and q' and on the given a 's.) The optimisation problem is therefore the same as the maximisation of a "weighted sum" of s variables, all of which are to be non-negative, and which are connected by t equations ($t < s$).¹

The "equational" formulation, which reduces all the restraints to sign restraints, at the expense of increasing the number of variables, is indeed that which is most commonly used in works on Linear Programming.² I have preferred to put the matter the other way, which (since it operates with fewer variables) offers more scope for geometrical illustration. Besides, the equational method is less obviously in touch with traditional economics. It is, however, well suited for some economic applications (as we shall see in a moment). There is much to be said for being ready to work either way.³

IV. LINEAR PROGRAMMING

Our sketch of the underlying theory is now complete; we can return to the story.

In order that Linear Programming should be born, two more things were necessary.

1. It had first to be realised that there are problems, other than the straightforward "economic" maximisation of the value of output from given resources, which are formally equivalent to economic optimisation. Opportunities, that is, for the application of the generalised theory (which has been described in the preceding section of this survey) had to be discovered. It is usual to associate this stage with two examples that have become classic—the "transportation problem" posed in 1941 by F. L. Hitchcock,⁴ and the "diet problem," which was posed in a (still unpublished) paper by Jerome Cornfield that was circulated in the same year.⁵ But it is probably more

¹ If $t > s$, and the equations are independent, the problem would be over-determined, and could not have a solution. If $t = s$, and the equations are independent, they will themselves determine a single solution, which will be the actual solution if it satisfies the sign restraints.

² The reason for this is mainly computational. If a problem is presented in inequality form it is easily converted into equational form by the introduction of "slack" variables (such as our e 's). The reverse process involves solving the equations, which may well be extremely laborious.

³ If the primal variables (x) are completed by the introduction of the excess supplies of the factors, the dual variables (w) must be similarly completed by introducing the differences in the dual inequalities. These, in our prototype formulation, are the differences between cost and price—the *unprofitabilities* of the products, we may call them. When these are included the dual problem is in turn reduced to the minimisation of a weighted sum of N variables, subject to sign restraints, and connected (now) by $N - M$ equations.

⁴ In the *Journal of Mathematics and Physics*, Massachusetts Institute of Technology, Vol. 20, pp. 224–30.

⁵ These have been described in innumerable places. There is a simple account in G. Morton, "Notes on Linear Programming," *Economica*, 1951; and a fuller in DOSSO, Chapters 2 and 5.

correct to regard these as no more than forerunners. The true begetters of Linear Programming were those who perceived the opportunities in question in connection with war production: Tjalling Koopmans, who rediscovered the transportation problem in connection with shipping, and G. B. Dantzig, who encountered similar questions in his work for the U.S. Air Force.¹ It was when Koopmans and Dantzig got together, after the War, that things really happened.² Here, however, we may content ourselves with a word about the conventional examples.

The *diet* problem—to determine the cheapest diet by which a minimum intake of given nutrients can be achieved—is very near to our prototype; indeed, when set out, it fits exactly into the prototype dual. (The amounts of nutrients in each food are the a 's; the quantities of foods are the w 's; the minimum intakes are the p 's; and the costs of the foods are the b 's. Every nutrient must be contained in some food, or—as is at once apparent—the problem cannot be feasible.) The *transportation* problem—to determine the cheapest pattern by which given demands of m markets can be supplied from n sources, with given unit costs of transport from any source to any market—is in a sense more interesting, since it is a beautiful example of a problem that sets itself up in terms of *equations* between non-negative variables. (The amount to be delivered from *each* source to *each* market has to be determined; these are connected by equations, since the total supply from each source, and demand from each market, is given.) Though some of the variables can be eliminated by means of the equations, so that it may be thrown back to the determination of $(m - 1)(n - 1)$ variables, connected by $m + n - 1$ specific restraints, the choice of variables to be eliminated is very arbitrary; and though the initial unit costs are all positive, there is no guarantee that the same will hold for the coefficients which take their places, after elimination. Thus the transportation problem already requires the more general theory, while for the diet problem the prototype is sufficient.

2. The mere posing of these problems would not have been an advance, if there had existed no method by which the problems could have been solved. The main development in that direction was to follow a little later. It should, however, be made clear that, even before the invention of the Simplex method, the problems were *in principle* solvable; as soon as it is known that the optimum (if there is an optimum) must be at a vertex, or known that the optimum (if there is an optimum) must be at a vertex, or between *tying* vertices, identification of the vertices (and there was a rule for that) and calculation of the cost (as it was in these examples) at the vertices, would always lead to a solution *in the end*. With simple classroom examples, that is often by no means an impossible undertaking. But in any practical

¹ The influence of Leontief's work in demonstrating the practical applicability of one form of allocative theory, and in turning the attention of economists to a model in which produced commodities figure as inputs (this, as we shall see, itself means going beyond the Wald rules) also requires recognition.

² See their (indigestible) volume, *Activity Analysis of Production and Allocation*, ed. Koopmans (1951).

instance the amount of work to be done piles up very rapidly.¹ Even with the aid of computers (the simultaneous development of which has been a most important element in the practical success of Linear Programming), the solution of most real problems would still have been out of reach without the invention of better methods.

Any detailed discussion of such methods must clearly lie outside the scope of this survey. Reference must, however, be made to the Simplex method (discovered in 1947 by Dantzig²), which was historically the means by which this difficulty was sufficiently overcome to make Linear Programming a usable technique. Effectively, what the Simplex method provides is a means by which we can recognise an optimum when we have reached it; and by which, once any vertex (true vertex) has been identified, we can move from it in the *direction* of the optimum. It is itself a consequence of convexity. If one was trying to climb a mountain, and one knew that it was a convex mountain (without valleys or saddles), the shortest way of getting to the top would be to go straight up, from wherever one happened to be. That is (more or less)³ what the Simplex method does—in n dimensions!

The weakness of the Simplex method (as so far described) is that it requires the identification of some (true) vertex as a starting-point. Sometimes this can be found by inspection (for a problem which satisfied the Wald rules it would present little difficulty); but very often it cannot, save by luck. If it cannot, there is a preliminary investigation which must be carried through before the above process can start. Various methods have been suggested whereby this preliminary stage can be systematised; that which seems to be most generally useful is an adaptation of the Simplex method

¹ It may be useful to take an example from the transportation problem. If there are no more than 5 sources and 4 markets there are 20 variables to be determined; even after elimination, these cannot be reduced to less than $4 \times 3 = 12$ variables, subject to 12 sign restraints and $5 + 4 - 1$ specific restraints, 20 in all. The number of possible vertices is the number of ways in which 12 can be selected from 20; this is no less than 127,970. Thus if the thing were gone at bull-headed, more than an eighth of a million calculations, each of considerable size, would be necessary.

² Set out by that author in Chapter 21 of *Activity Analysis* (*op. cit.*). Versions are, of course, to be found in all the text-books.

³ More accurately, it may be described as follows: As we have seen, any vertex A is a solution of n of the restraints (sign and specific) considered as equations. A vertex *neighbouring* to A can be defined as one which is a solution of $(n - 1)$ of A 's equations, together with one of those which were not taken when A was determined. (A must, of course, be a true vertex, and the neighbouring vertices must be true vertices.) If A is an optimum the value of $V (= \sum p_i x_i)$ at A must, of course, be no less than the value at any of the neighbouring vertices. It is less obvious, but it is true (as a result of convexity) that if A is not an optimum there must be at least one of the neighbouring vertices where the value of V is greater than it is at A . (This is the same principle as that which is familiar to economists, that—under universal diminishing returns—a maximum is sufficiently determined by looking at marginal conditions.) Thus in order to discover whether A is an optimum it is only necessary to look at its relations with its neighbouring vertices. And in order to proceed as rapidly as possible to the optimum, from a given vertex, it is only necessary to select that one of the neighbouring vertices along the "edge" to which V increases most rapidly; then to repeat the operation with the vertex so reached; continuing until a vertex has been found from which there is no increase to any neighbouring vertex. That is the Simplex method.

itself. By introducing extra variables into the original problem, a subsidiary problem can be written down which is such that: (1) a true vertex of the subsidiary can be found by inspection, and (2) an optimum of the subsidiary is a true vertex of the original problem. Thus the subsidiary can be solved by the Simplex method; once the subsidiary is solved, the Simplex method can be applied to the original problem without difficulty.¹

Other methods are, however, in use. It is sometimes useful to begin by tackling the dual to the original problem; the dual can, of course, be written down immediately, and once the dual is solved, the primal can be solved at once. (An obvious case of this is when the primal has many variables but only two specific restraints; for the dual can then be reduced to two variables, and can be solved graphically.) There is also a Dual Simplex method, in which the dual is kept in sight all the time. A direct attack on the difficulty of finding a vertex from which to start is made by the "Multiplex method" (published in 1957 by Ragnar Frisch).² This requires only a feasible point (not a vertex) as a starting-point; from that it identifies a "centre" of the feasible region; if one moves from the centre, in the direction of increasing V , one should arrive somewhere near the optimum.

These are the basic tools which are at the disposal of the Linear Programmer; by these means a problem is soluble, if it can be cast into appropriate form, and of problems that can be so cast there appears to be an ample supply.³ Most of them (like the diet problem and the transportation problem) are problems of the least cost method of carrying through a given programme; problems (both military and civil) of the public sector do often fall fairly naturally into that form. But since the coefficients in the weighted sum that is to be maximised (or minimised) may (when we have left the prototype) be either positive or negative, there is no reason why the determination of a maximum profit combination of inputs and outputs (prices of the inputs and outputs being given) should not be tackled in a similar way. Thus the uses of Linear Programming are not confined to the public sector, but can be extended, at least to some extent, to the field of private enterprise.

There is, however, a doubt which creeps in at this point; and it seems proper that in a survey like the present, such doubts should be mentioned. What is the relation between this new technique and the process of market adjustment by the price-mechanism, on which economists have been accustomed to rely for the solution of what are, after all, for the most part much the same problems? One can understand that there are problems of "economic maximisation" which are unsuitable, for social or institutional

¹ For a description of this device, see Gass, *Linear Programming*, pp. 61–66.

² It is briefly described by van Eijk and Sandee in *Econometrica*, January 1959, pp. 9–13.

³ A fat bibliography has been published by Vera Riley and S. I. Gass (Johns Hopkins Press, 1958). It is summarised in nine pages at the end of Gass's book (above cited).

reasons, for solution by a competitive process; the "public sector" problems just mentioned are obvious examples of this, but no doubt there are others. Here, where the reason for the non-availability of the market mechanism is non-economic, it is an obvious gain to have found an alternative. What seems distinctly less clear is the usefulness of the technique in those cases which have so much troubled economists, where there are economic reasons why the market mechanism will not work. It looks only too likely that in these cases the Linear Programming technique will also be unsatisfactory.

Competitive theory (it has often been remarked by Linear Programmers) takes it for granted that the individual firm is maximising its profits; that, so they say, means that the Linear Programming problem, inherent in the firm's own production, has already been solved. That, they naturally maintain, is a big assumption. It has been shown by experiment that any complex problem of this sort requires a technique for its solution; without that technique it is too much to expect that the individual firm will be able to maximise its profits; now that the technique has been provided, the gap in the traditional theory can be filled. One would not deny the merits of this argument as a piece of salesmanship; but its deeper significance seems to come out more clearly if it is stood the other way up.

The traditional case for competition can be put into the form of saying that it is a way of avoiding the Linear Programming problem (the macro-problem, we might call it) which is involved in the co-ordination of production over the whole economy. The macro-problem is broken up, by the market, into little bits, each of which should be too simple to warrant the application of elaborate technique; the co-ordination between the bits (which would have otherwise to be provided by a supertechnician) is provided by the market mechanism. If this process were to be carried through fully there should be no scope for Linear Programming within the firm; for the firm's problem should be reduced to that of optimising against a set of restraints, so few and simple that the solution would be obvious. In practice, of course, the fragmentation is rarely carried so far as this; at the most, the market takes over a part of the task of co-ordination; a significant part is left to be done within the firm. The application of Linear Programming to business problems does therefore remain open as a useful possibility. We should, however, ask: why is it that the fragmentation does not proceed so far as to prevent this happening? What is it that stops the market from taking over the whole job?

Doubtless there are many reasons. But surely one should not overlook the reason which has, after all, most commended itself to economists: the diseconomies of small scale. Now if it is true that small-scale diseconomies are the main economic reason why fragmentation does not proceed to the limit it will follow that the same force which restricts the application of the market mechanism will also restrict the application of the linear technique. For the presence of scale economies implies the absence of convexity: some

qualification (which may be more or less serious) to the convexity which Linear Programming requires.

One is driven to the conclusion that Linear Programming and the price mechanism are rather close substitutes—both in the things they can do and in those they cannot. But the fact that two things are close substitutes does not exclude the possibility that there may be a part for each to perform.

V. ACTIVITY ANALYSIS

There is a wide sense of the term "Activity Analysis" in which it would include the whole of the theory (as opposed to the practical technique) of Linear Programming. I am using it here in a narrower sense, to which its title is (I think) more appropriate.

Let us go back to the prototype theory (which is subject to the Wald rules), and concentrate attention (this time) on its economic interpretation. As given so far, that economic interpretation was rather narrow. The prototype theory was presented as nothing more than a re-working of the Walras-Cassel system; the "fixed coefficients" and other basic restrictions, which notoriously limit the applicability of that system, were retained. It was, however, already shown by von Neumann¹ that there is an easy way in which they can be relaxed. All that is needed is a slight change in point of view.

It is convenient to begin with a rather special problem—that of products in joint supply. It is implicit in the Walrasian assumptions that the processes of production of the various products are *independent*: in the sense that the output of any product can be increased, by the absorption of additional units of the factors, without affecting the supplies of other products, except in so far as factors are withdrawn from the production of these other products. Though this independence assumption is not a bad approximation to reality, it is certainly not true universally; it is better, therefore, to do without it. There are indeed various ways by which that could be done.

It would, for instance, be possible to observe that joint supply relations can be reduced to (linear) equations connecting the various outputs (x); we have a regular technique for dealing with such equations. By their aid, for instance, some of the x 's could be eliminated; we could then proceed, with the remaining x 's, as before. That is the procedure which would be suggested by what has been said previously; but if we do proceed in that way, we are raising the question—what is the status of those x 's, which remain as variables of the system, after the others have been eliminated? They are outputs, but they are not all the outputs—they *represent* both themselves and the others. The notion accordingly presents itself that it will be easier to work, from the start, with indices of output, which are to be distinguished from the actual outputs of the commodities, and which will spare us the

¹ In the article above cited.

(arbitrary) choice of which variables to eliminate. It is from that idea that Activity Analysis arises.

An *activity* is a process whereby certain quantities of inputs are transformed into certain quantities of outputs. There are *constant returns to scale* (this is an essential assumption of Activity Analysis) so that an activity can be carried on at any *intensity*; by increasing the intensity, one simply increases all inputs and all outputs in the same proportion. Thus the k th activity, carried on at unit intensity, transforms $a_{1k}, a_{2k}, \dots, a_{Mk}$ of the factors into $\alpha_{1k}, \alpha_{2k}, \dots, \alpha_{Nk}$ of the products; if carried on at intensity X_k it transforms $a_{1k}X_k, \dots, a_{Mk}X_k$ of the factors into $\alpha_{1k}X_k, \dots, \alpha_{Nk}X_k$ of the products. (The a 's and α 's are non-negative constants, which define the activity. Of course, where there is no joint supply, all but one of the α 's will be zero.)

If there are R activities, carried on at intensities (X_k) the total input of the i th factor is $\sum a_{ik}X_k$ (summed over all k); the total output of the j th product is $\sum \alpha_{jk}X_k$ (summed over all k). Thus V , the total value of output (at prices p_j), is $\sum \sum p_j \alpha_{jk}X_k$ (summed over all j and all k —all products and all activities); this may be written $\sum P_k X_k$, where P_k (being $\sum p_j \alpha_{jk}$ summed over all products) is nothing else but the value of the output of the k th activity, when that is carried on at unit intensity. Everything can now be expressed in terms of the X 's. The sum to be maximised is $\sum P_k X_k$ (where the P 's, since they depend upon given p 's and given α 's, are given constants). The specific restraints take the usual form

$$a_{11}X_1 + a_{12}X_2 + \dots + a_{1R}X_R \leq b_1$$

$$a_{M1}X_1 + a_{M2}X_2 + \dots + a_{MR}X_R \leq b_M$$

there are the usual sign restraints. Thus the whole of the prototype theory can be reinterpreted, so as to allow for the possibility of joint products, without requiring any formal (or mathematical) change.

That, I think, is the best way to introduce the "activity"; but the idea would be much less important than it is if it could only deal with joint products. As a result of this restatement, there is a further extension, much more far-reaching, which is automatically at our disposal. In the prototype theory, we maintained the Walras-Cassel assumption of the "fixed technical coefficients"—that there is just one way of producing each product, so that the a_{ij} 's are all constants. It may well have appeared that we were putting too much weight upon this assumption (it was, after all, abandoned long ago by those who worked in the Walras tradition¹); it was nevertheless convenient to maintain it, for purposes of exposition, and it was safe to do so, because it would be so easy to abandon it when the time came.

The Activity Analysis model, just described, is in fact no longer tied down by the assumption of fixed technical coefficients. Just as the possibility was left open, in the prototype, that some possible products would not be pro-

duced; so it is left possible here, for exactly the same reason, that some possible processes (for a product that is produced by another process) will not be employed, so that the intensities of these processes (X) are zero. The condition for this to happen can be worked out at once from the condition for zero output in the prototype. The intensity of the k th activity will be zero if $P_k < \sum w_i a_{ik}$; that is to say, if the activity is unprofitable at the imputed factor prices. Thus, while some of the disused activities will represent products that it does not pay to produce, others (and probably in practice these will be the more interesting) will represent methods of production that it does not pay to employ. Accordingly, by a sufficient widening of the range of possible activities, everything which economists are in the habit of saying about factor substitution can be brought in.

It must be emphasised that the resulting model is mathematically identical with our prototype model; the Wald rules are still in force; all that has happened is that it has been given a different economic dress. Nevertheless, by that simple change it has been converted into a general theory, with a range which is comparable to that of the Paretian theory of general equilibrium. The Activity Analysis approach is indeed in the end not so dissimilar from the Paretian approach; their strengths, and their weaknesses, are much the same. We get no help from Activity Analysis in dealing with increasing returns, the nut which is hardest to crack by Paretian methods; indeed, it may be said that the Activity Analyst is more completely dependent upon the hypothesis of constant returns to scale than the Paretian. There is nothing to prevent the Paretian from exploring the realms of increasing returns, to the very limited extent to which they can be explored by his methods; to the Activity Analyst they are forbidden territory. Each is beset by the temptation to make excessive use of the price parameters, which are associated on the one side with the assumption of perfect competition, on the other with convexity assumptions, which amount (in practice) to much the same thing. The possibility of methods that it does not pay to employ can be dealt with on either method; where Activity Analysis gains is in its more explicit attention to the possibility of products that it does not pay to produce, and of factors that it does not pay to use. For any problem where these latter possibilities are not important (and that is surely the case with the majority of economic problems) it will not matter which method one uses. If either is applicable, both will be applicable; each will give the same results.

This being so, it is not surprising to find that particular problems, for the solution of which the new method has a decided advantage, are far from common. It can indeed happen—it is already happening—that people who have learned to think in the new way will begin by getting their problems out in that way; but it usually appears in the end that they could have been got out in the old way just as well.¹ This is not to deny that there are things

¹ A nice example is to be found in the papers by Farrell and Champenowne (*Econometrica*, July 1954).

¹ By Walras himself in his last edition; by Pareto already in the *Cours* (1898).

which it is easier to notice if one is thinking in the new manner; one wonders whether Samuelson would have put forward his famous Factor-price Equalisation Theorem just when he did, if he had not been working, at the same time, at the development of Activity Analysis.¹ It would, however, appear that (apart from Input-Output applications, which I shall be considering in the next section) the principal achievement of the new method has been the establishment of very general theorems, which are mainly valuable because, when we have them, we can go on in our old ways with a better conscience. The chief of these is the proof of the existence of a competitive equilibrium (the solution of Wald's problem) which is contained in a most remarkable passage of the DOSSO book.² The general character of this proof (too important a matter to be omitted from this survey) may be sketched out, very roughly, as follows.

From the Wald rules about the constants— a 's, b 's and p 's (or P 's)—which are carried over into Activity Analysis, it follows (as we have seen) that production is optimisable; there is a set of quantities of products (x) which maximises the value of output for given product prices (p), and there is a set of imputed factor prices (w) which belongs to that optimum. If production is organised (as it should then be possible for it to be organised) into firms which operate under perfect competition, the earnings of the factors will be such as correspond to these imputed factor prices. Thus on the "supply" side the equilibrium exists; but nothing has yet been said about the demands for the products. These must now be brought in. All we assume, at this stage, is that the demands depend, in some way, upon the product prices and factor earnings; then, since the factor earnings depend on product prices, both the demands (x') and the supplies (x) of the products have been shown to depend upon the product prices (p).³ The difficulty is to show that there must be some set of product prices which makes demands equal to supplies. This is tackled in the following way.

Starting from any arbitrary set of product prices (and derived factor prices), we have an (x') determined by the demand functions; but this (x') may not be feasible, or, if feasible, it may not be efficient—there may be no (p) for which it would be optimum. What DOSSO then does is to diminish (or increase) all the x' in the same proportion, until the resulting set of quantities, $k(x')$, does lie on the frontier of the feasible region. To this $k(x')$ there will correspond a set of prices (p'), being a set of prices for which $k(x')$ is an optimum. (Usually, indeed, as when $k(x')$ is at a vertex, there will be many such sets of prices; but that does not—too much—matter.) These

¹ There is a family resemblance between the Factor Price Theorem and the Input-Output Substitution Theorem (see below, p. 703) due to the same author.

² Pp. 366–73. It appears that in its final form this proof is due to Solow; but it was built up by stages, that are to be associated with the names, first of Wald himself, then of Lionel Mackenzie, of Samuelson and of Harold Kuhn. (There is another discussion in Baumol, *op. cit.*, pp. 859–65.)

³ The (p) are, of course, to be understood as relative prices; if all p 's, and consequently w 's, are multiplied by the same multiplier, they will generate the same (x)—and the same (x').

(p') prices are rather analogous to "supply prices," to be put against the "demand prices" (p) with which we began.

A rule has therefore been evolved by which a set (or sets) of supply prices can be associated with the given demand prices. At this point it is possible to invoke the aid of a powerful mathematical tool, the *fixed-point theorem*,¹ according to which (provided that a number of conditions, which can be shown to hold in this case, are satisfied) there must be some (p) which is itself included among the sets of (p') which, in this manner, it generates. Once that is established, the rest is simple. For since the total earnings of the factors (which, by "Walras' law," are all spent) are equal to the total value of output,² it follows that at this (p), $\sum p x' = \sum p(k x')$. Since the k 's are the same for all products, $k = 1$. The quantities demanded are optimum quantities; supplies and demands are equal. Thus the competitive equilibrium exists.

The most interesting thing about this proof, to the economist, is the little that has to be assumed about the demand functions.³ It is necessary that there should be some set of demands, some (x'), that is generated by every (p) and the (w) that belongs to it; but little more is necessary.⁴ There is nothing that corresponds to the "downward slope of the demand curve." The explanation of this rather surprising omission is that nothing has been said about the uniqueness of the equilibrium. Multiple equilibria are perfectly possible. Sufficiently strong "downward slope" assumptions (what Samuelson calls "the weak axiom of revealed preference"—what I should prefer to describe in terms of the absence of net-income effects) do, however, prove uniqueness. That is where they come in. It is, of course, familiar, from simple examples, that the presence of net-income effects may lead to such things as "upward sloping demand curves" and multiple equilibria.

VI. INPUT-OUTPUT

Throughout our discussion of Activity Analysis we have maintained the Wald rules; with the implication, which they carry, that factors and products (inputs and outputs) are fundamentally different sorts of things. Analysis

¹ The general idea of a fixed-point theorem is well explained in Courant and Robbins, *What is Mathematics?*, pp. 251–5. It should, however, be noticed that what is there described is the original Brouwer theorem, not the slightly more complicated Kakutani theorem, which is what is needed for the above purpose. See the passage in DOSSO, just cited; also Baumol, p. 859.

² See above, p. 684.

³ It is quite unnecessary to make the peculiar assumption, which Wald made in 1934, that demands do not fall to zero, however high prices rise. As Kuhn has shown in the paper that was previously mentioned (*Linear Inequalities, op. cit.*), the reason why Wald made this assumption was that he did not have the duality theory. He took it for granted that all of a given list of outputs must have prices equal to costs; and that meant that he had to exclude the possibility of zero outputs. Though he allowed for the possibility of factors with zero prices, he did not allow for the other zero, which is dual to it.

⁴ It has to be assumed that the demand functions are continuous—that there are no jumps in demand as prices change. This is necessary, if we are going to insist on making it a condition of equilibrium that demands should equal supplies. If we were prepared to be content with some sort of approximate equality this continuity condition could presumably be loosened a bit.

of that kind can deal with most aspects of a static system (under constant returns to scale); but it cannot deal with intermediate products, which are outputs from one angle and inputs from another. What it must be assuming about such products is that they have been "netted out" by vertical integration. It is, however, uncertain whether actual production is capable of such integration, without being involved in lateral integration also; in any case, the intermediate products which certainly exist are worthy of study on their own account. It will not be expected that any very serious discussion of the Input-Output theory, invented by Leontief as a means of studying such linkages,¹ can find a place at the end of this already lengthy survey; it has, however, proved so attractive a field² for the application of the developments which we have been considering that it cannot be left altogether on one side.

It is characteristic of Leontief's model that it reduces the primary factors to one only—homogeneous labour; apart from labour, the inputs of each industry are the outputs of other industries. We define x_i as the gross output of the i th commodity, including that which is absorbed as inputs of other industries, or indeed (for the seed-corn must come out of the harvest) as input in the production of x_i itself. The amount of the i th commodity which is needed as input of the j th (per unit of the latter) is taken as given, like the corresponding coefficients in the prototype; it will cause no confusion if we write it a_{ij} , as before. The demand for the product x_i , as input in the production of other commodities, will then come to $\sum a_{ij}x_j$ (summed over all j); the net, or final, output is the difference between this and gross output, that is to say, it is $x_i - \sum a_{ij}x_j$. The amount of labour that is required (per unit of product) for the j th product we will simply write a_j . Then the demand for labour is $\sum a_jx_j$ (over all products).

What are the restraints under which this system operates? There are, of course, first of all the usual sign restraints (all x_i non-negative). If we suppose that the supply of labour (b) is given, we have a specific restraint, of the usual kind, due to the limitation of the supply of that factor; here it will appear as $\sum a_jx_j \leq b$. It is, however, further necessary that the net outputs of the products should be non-negative. It is possible, that is, for the whole output of a particular product to be absorbed as inputs in the production of other products; but it is inconsistent with static equilibrium for more than the whole output to be so absorbed. Thus we have another set of specific restraints, of the form $\sum a_{ij}x_j \leq x_i$ (for all i), or, written in full,

$$a_{i1}x_1 + a_{i2}x_2 + \dots + (a_{ii} - 1)x_i + \dots + a_{in}x_n \leq 0$$

It is the appearance of these "Leontief restraints," as we may call them, in

¹ *Structure of the American Economy* (1st ed., 1941; 2nd ed., 1951); *Studies in the Structure of the American Economy* (1953). I have made extensive use of the chapters on Input-Output in DOSSO (IX and X); it does, however, take some effort to disentangle from these chapters the essential points.

² As will be apparent to anyone who turns the pages of *Econometrica* or the *Review of Economic Studies*, it is one of the fields of application on which interest has been centred in the most recent years.

addition to the labour restraint, which marks the Leontief system off from those we have considered hitherto.

It may be assumed, for the same reasons as before, that the a 's (of every kind) are non-negative; but that cannot mean that all of the coefficients in any Leontief restraint can be non-negative. If they were, it would follow at once (because of the zero on the right-hand side) that outputs of all commodities with non-zero coefficients must be zero. For the Leontief system to be feasible at all, it is first of all necessary that the "feedback coefficient" a_{ii} (of any output into its own production) should be less than unity. But that means that we are bound to have one negative coefficient in each of the

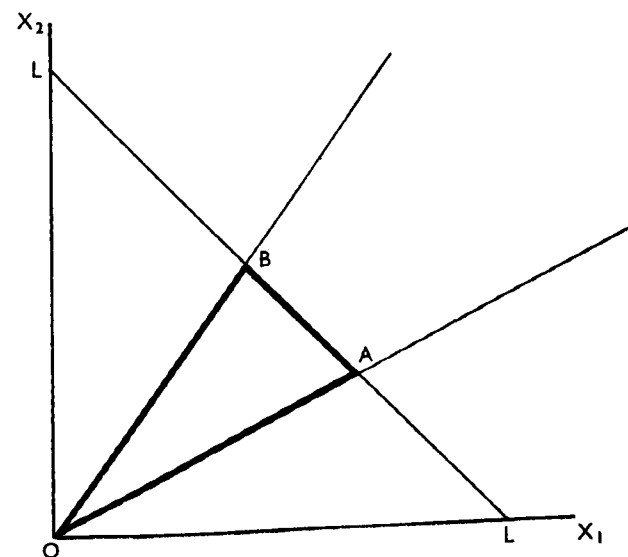


FIG. 3

Leontief restraints; accordingly, the Wald rules, and their consequence—assured feasibility—will not apply.

The situation which emerges can easily be illustrated diagrammatically (Fig. 3). If gross outputs x_1 and x_2 are measured on the two axes, the labour restraint will appear as a downward sloping line of the usual kind (LL); while the Leontief restraints will appear as upward-sloping lines (because of the negative coefficient) through the origin (because of the zero on the right-hand side). The feasible region is accordingly cut down to the triangle OAB . Evidently it will continue to take the same sort of form—a pyramid or "cone" with apex at the origin—in more than two dimensions.

There are two things, which are already visible in this construction, which require to be noticed. In the first place, the mere condition that $a_{ii} \leq 1$ (which keeps the Leontief lines upward sloping) is not sufficient to ensure that there exists a feasible region. The line OA could easily be swung up (or OB swung down) so that the feasible region disappeared. What this

would mean (in the two-goods case) is that the amount of x_2 absorbed in making x_1 was greater than could be replaced by absorbing all of the x_1 in the x_2 industry (so that if net x_1 were zero, net x_2 would still be negative); with a coefficients chosen at random that would certainly be possible, and it would certainly mean that the system would not work. The same thing can naturally happen in more complicated ways when there are more than two commodities. The conditions (upon the a coefficients) for it *not* to happen are called the Hawkins-Simon conditions;¹ it is unnecessary to write them out here. It is sufficient to observe that some such conditions must be satisfied if the Leontief system is to be feasible.

Secondly, if the system is feasible, efficiency requires that the "point" selected should lie on that part of the boundary which is formed by the labour restraint. From any other point of the feasible region, gross outputs can be increased proportionately, and therefore all net outputs in the same proportion. It is accordingly to be expected that any optimum (in the sense so far used) will lie on that part of the boundary. But this needs checking up.

It is natural to take, as the thing to be maximised, the value of *net* output (at given prices p). But it is easy to show that the value of net output at "gross" prices is the same as the value of gross output at "net" prices—the "net price" of a product being interpreted as the *value added* per unit of output in its production. For

$$V = \sum p_i(x_i - \sum a_{ij}x_j) = \sum (p_i - \sum p_j a_{ji})x_i = \sum \pi_j x_j$$

where π_j (the "net price") is $p_j - \sum p_i a_{ij}$. With p 's and a 's given, the π 's are given. It is accordingly correct to maximise $\sum \pi_j x_j$ against the restraints.

An optimum, as we know, must either lie at a vertex or "between" vertices. Now the vertices of the Leontief region are: (1) the origin, which—since we do not now have the Wald rules to support us—cannot be excluded as a possible optimum; (2) the points such as A , B on the diagram, which are intersections of Leontief restraints with the labour restraint. At the origin, however, V is necessarily zero, while at the latter vertices V will necessarily be positive² (if there is a feasible region), so that it is only the latter vertices which we need consider. Each of these vertices will represent a position in which there is a zero net output of all but one of the commodities, and a maximum net output of the one that remains. Possible optima (all of which, it is now confirmed, must lie on the labour restraint part of the boundary) are weighted averages of these vertices.

If there are positive net outputs of all the n commodities, V must have an equal value at all of these vertices, so that $\sum \pi_j x_j$ must be the same all over the "plane" $\sum a_j x_j = b$. This can only happen if π_j bears the same proportion to a_j for all commodities. This we may write $\pi_j = wa_j$, where w is

¹ They were worked out, with a little trouble, by the eponymous authors, in *Econometrica* during the year 1949.

² We keep the "extra" Wald rule, that the p 's are non-negative, and not all zero.

easily recognisable as the (imputed) price of labour. Thus we have n equations

$$p_j - \sum p_i a_{ij} = wa_j \quad (\text{for all } j)$$

to determine the gross prices (p) relatively to the wage of labour. It will only be at these prices that the net outputs of all N commodities can be positive.

How do we know, it may, however, be asked, the prices (p) that are determined by these equations will be non-negative? It turns out that the conditions for this to be so are the same Hawkins-Simon conditions as we had formerly to invoke to establish feasibility. Thus, granted these conditions, the internal coherence of the Leontief model is established.

Substitutability in Leontief Models. There are a few more points to be noted. The prices which have just been determined are independent of the demands for the commodities; however demands change, the optimum point must keep on the "labour restraint" plane, so that the prices just determined must continue to hold. Thus, in spite of the "fixed coefficients" at which products are transformed into one another, the fact that there is (ultimately) only one scarce factor keeps the "labour theory of value" in operation, with the system operating under constant cost. It follows from this that even if the net outputs of some commodities are zero (so that they are pure intermediate products, only produced in order to be re-absorbed into the productive process) their "net prices" must still be equal to the value of their labour coefficients: the condition $\pi_j = wa_j$ must still hold for such products. Equality does not require, as seemed at first sight, that net output should be positive; it is sufficient that gross output is positive.

There is a more remarkable consequence of the same property, that has been pointed out by Samuelson—his "substitution theorem."¹ It is not necessary, in the Leontief model, to start, as hitherto supposed, with given technical coefficients—given methods of producing the commodities. There may be a choice of methods, and it will yet follow that there is one method which has to be adopted for each product; the method chosen is independent of the demands for the products. Thus the Leontief system produces under constant cost, even if methods are (in principle) variable.

This, it will be recognised, is again a generalisation of the labour theory of value. If all labour was applied directly to the making of finished products (and labour was the only factor), there might be a choice of methods, but efficiency would dictate that the most efficient method should be used for each product—as Marx (for instance) knew very well. The choice of method would be independent of the demand. What Samuelson has shown is that the same continues to hold, so long as labour is the only primary factor of production, even if labour is applied indirectly as well as directly. Put in this way, his result is by no means surprising.

¹ Originally stated in Chapter VII of *Activity Analysis* (ed. Koopmans). No. 280.—VOL. LXX.

There is, however, an exception to the classical doctrine, that has been familiar since the days of J. S. Mill. If some of the products are joint products, the relative prices of the joint products will depend upon demand; it is then possible that a shift in demand will lead to the substitution of one method of production for another, even though labour is the only primary factor. The Leontief system excludes such joint production, so that in the Leontief system this complication cannot arise. It is, however, to be expected that it will arise if we attempt to extend the Samuelson principle to cases in which joint production is allowed.¹

It may be useful to show in detail how this is. In terms of Activity Analysis, the general problem may be posed as follows: There are R activities, capable of producing the N commodities (by input of some and output of others, and, of course, by input of labour). Since the activities include many alternative possible methods of producing the commodities, R may be supposed to be larger—if we like much larger—than N . We may generalise our notation, and write α_{ik} as the output of the i th commodity by the k th activity, when it is operating at unit intensity; inputs can be covered by the same symbol, α_{ik} being negative when the i th commodity is an input. Here we will write β_k for the input of labour. Then, if X_k is the intensity of the k th activity, the net output of the i th commodity, over the whole system, is $\sum \alpha_{ik} X_k$. We have to maximise $\sum p_i \alpha_{ik} X_k$, subject to the restraints: $X_k \geq 0$ for all k ; $\sum \alpha_{ik} X_k \geq 0$ for all i ; $\sum \beta_k X_k \leq b$. Formally, the problem is almost the same as before. Since some α 's are positive, and some negative, there is still the same question of determining whether or not there exists a feasible region; in order that it should exist the α 's will have to be suitable. We will suppose that they are suitable.

Following the same argument as before, it would be necessary, if all activities were utilised, that $\sum p_i \alpha_{ik} = w \beta_k$ for every activity. But this gives us R equations to determine N prices; if $R > N$, as we have supposed, the system is over-determined.² Thus, in general, it will not be possible for more than N activities to be utilised; the rest will have $\sum p_i \alpha_{ik} < w \beta_k$, and intensity zero. Optimisation involves the selection of a particular set of not more than N activities, which are to be employed; an optimum set of activities must satisfy the conditions just stated. If the optimum set consists of the whole number of N activities the prices at which these activities can be employed will be determinate; any demands for final outputs which the system is capable of satisfying can be satisfied at these prices and with these activities. Now if there is no joint supply, at least N activities will be required to produce the N commodities; this therefore is Samuelson's case.

¹ The point of the elaborate investigations by Koopmans and Arrow (Chapters VIII and IX of the *Activity Analysis* volume) was to clear up this exception.

² This assumes (and it is assumed throughout the argument) that the activities are "linearly independent"—that we are not including any activity which is a mere combination of other activities. In economic applications that (I think) may be taken for granted.

But if there is joint supply it will be possible for the N commodities to be produced in positive quantities with less than N activities; the prices are then not determinate, and it is possible that as demands vary, the activities that are utilised may change.

The matter may be illustrated, and the argument made more precise with the aid of a diagram (Fig. 4). Suppose that there are two commodities being produced and three possible activities: $N = 2$ and $R = 3$. Measuring the intensities of the activities along three axes, the labour restraint becomes a plane; as we have seen, the optimum must lie upon that plane: let us therefore take it to be the plane of the paper. The intersections of this plane with the co-ordinate planes will accordingly appear on the paper as a triangle XYZ . The sign restraints and the labour restraints limit possible optima to points within or on the sides of this triangle. The two

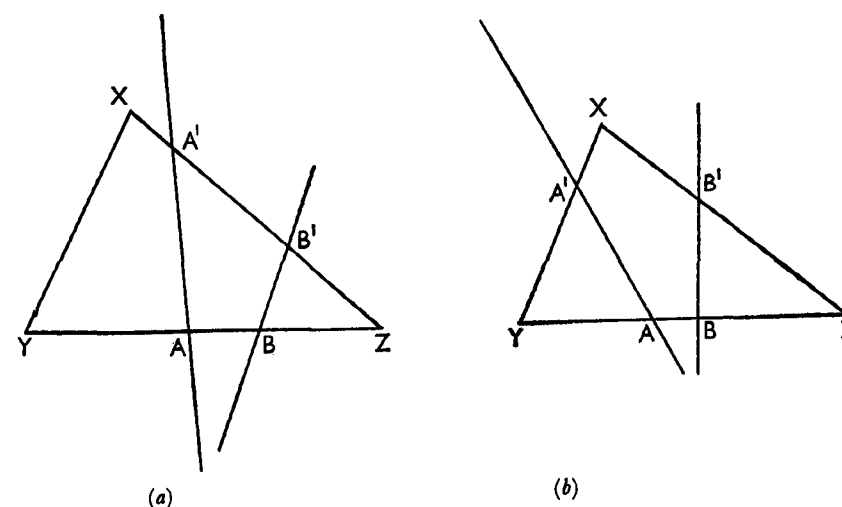


FIG. 4

Leontief restraints (which will also be shown as straight lines—the intersections of the Leontief planes with the labour plane) will limit the possible optima further. If they are to be operative at all they must intersect the triangle: there are then two main cases, in one of which they intersect the same two sides (Fig. 4 (a)); in the other there is only one side which they both intersect (Fig. 4 (b)).

Now in either case, for the reason above stated, it is not possible that all three activities should be used in an optimum position; the optimum cannot therefore lie *within* the triangle XYZ ; it must lie *on* one of the sides. Accordingly, in Fig. 4 (a), possible optima lie along AB or along $A'B'$; one of these stretches will be more efficient than the other. If it is AB the system will be at A when the demand for one commodity is zero, at B when the demand for the other is zero; they can be combined (efficiently) in any proportions by moving along AB .

In this case, therefore, the Samuelson theorem is verified; but now consider Fig. 4 (b). Possible optima now lie along AB , or along the broken line $A'XB'$. If AB is optimum, all is as before; but if the other is the optimum stretch there is a change in the combination of activities as demand varies from one extremity to the other. But this exception can only arise if the point X is on the optimum path—if positive net outputs of the *two* commodities can be secured by using only *one* activity. Joint production is accordingly a necessary condition for the exception to arise.

VII. CONCLUSION—THE THEORY OF GAMES

There remains one further topic which needs consideration before we have exhausted the list of specialisms which, in their relations to one another, we set out to examine. It will, however, be convenient, before I take up that topic, to interpose some general remarks upon the field we have already covered.

The methods of analysis (if indeed they are more than one method) that have been described are rather tied down by the assumption of constant returns to scale, or (perhaps even more fundamentally) by the convexity which is associated with an absence of scale economies; nevertheless, subject to that restriction, the field with which they deal is dealt with very thoroughly, more thoroughly than it was dealt with by the methods previously in use. As I have explained, I do not think that the new methods need displace the old methods; it may indeed be said that one of the services of the new methods is to provide a justification for the use of the older methods, which was previously lacking. Granted convexity (the necessary condition for the new methods to operate) it has now been fully *proved* that a general optimum must also be a local optimum—that marginal conditions are therefore sufficient to establish its general optimality. Consequently if one is prepared to grant (as in many cases one is) that the changes one wants to consider will not involve any change in the number or specifications of the kinds of goods that are to be produced, or of the resources that are used, the old-fashioned marginal rules are all that have to be considered. The occasions on which the economist will want to go further, so as to have to use the new methods in relation to particular problems (while being able to retain the convexity conditions which enable him to use them) are really rather infrequent.

It must nevertheless be recognised (and this is the point on which I now want to lay stress) that the new methods are a great advance upon the old in the understanding which they convey of the *raison d'être* of the price mechanism. The rather inappropriate mathematical methods, which have been employed (at all levels of mathematisation) by the school of Cournot and Walras—and of Marshall—did in this respect rather let us down. For they caused it to appear that the price system is just one way of organising an economy efficiently; that it is, in a sense, exterior to the economic

problem, something that is brought in from outside. What the linear theory has shown—and this, speaking as a theoretical rather than as a practical economist, seems to me to have been its greatest service—is that, so long as the convexity assumptions hold (and though I have constantly emphasised that they do not hold universally, I would certainly admit that they hold, to a fair approximation, over a large part of the economic field), the price mechanism is something that is inherent. It did not have to be invented, or brought in from outside. It belongs.

This indeed is what was first perceived, after a fashion, by Menger and his followers; but they did not have the power of explaining, in a manner which would compel communication, the truth that they had seen. Now it has all been set down in black and white. It has been made apparent, not only that a price system is inherent in the problem of maximising production from given resources but also that something like a price system is inherent in any problem of maximisation against restraints. The imputation of prices (or “scarcities”) to the factors of production is nothing else but a measurement of the *intensities* of the restraints; such intensities are always implicit—the special property of a competitive system is that it brings them out and makes them visible. It is through its power of developing the intensities (in the photographic sense of developing), so that they are available for use as instruments in the process of maximisation, that the competitive system does its job.

To have taken so much of economics, and to have reduced it to a problem in pure mathematics, is no doubt in many ways a most notable achievement; to many economists it will be a rather shattering achievement, but it is (after all) the kind of thing that has happened in one after another of the natural sciences. It is not surprising that it should happen to us also. Nevertheless, the question persists: how much of economics is it that is being thus absorbed? If we take the famous definition, given so many years ago by Lord Robbins—“the relationship between ends and scarce means that have alternative uses”¹—economics, in that sense, is very well covered by the linear theory. It has, however, been shown that in that sense it has very little to do with “human behaviour”—a phrase that Robbins did allow to creep in. The “logic of choice,” now that it has been fully mathematised, appears as nothing else but pure technics—the distilled essence of a general technology.

Economics, surely, is a social science. It is concerned with the operations of human beings, who are not omniscient, and not wholly rational; who (perhaps because they are not wholly rational) have diverse, and not wholly consistent, ends. As such, it cannot be reduced to a pure technics, and may benefit by being distinguished from a pure technics; for we can then say that its concern is with the use that can be made of pure

¹ *Nature and Significance of Economic Science*, p. 15. The “Austrian” credentials which are presented in the footnote to that page should be noticed.

technics by man in society. And that looks like being a distinctly different matter.

But is it? Here I come to my last topic, on which I propose to be brief. In the Theory of Games we have a subject (evidently related to those which we have been discussing, at least in the sense that it uses some of the same mathematics) which is specially concerned with the analysis of behaviour when ends are different, either completely or partially opposed. Are we to say that the rest of economic theory, which is not pure technics, is nevertheless capable of being treated in much the same way by the sister subject—the Theory of Games?

I do not pretend to know the answer to that question. I am not equipped to answer it; the Theory of Games now covers a vast territory, and there is far too much of it that I make no pretence of understanding. I shall confine myself to one point which I think I do see clearly—namely that the relation of economics to the Theory of Games is an entirely different matter from those which we have been discussing. There is no doubt that the theory of optimisation (whether or not it is economics) is highly relevant to economics; it may well be that the Theory of Games is highly relevant; but one does not follow from the other.

This is worth stating, because it is easy to get the impression that the connection is closer. One of the neatest ways of proving the general Duality theorem¹ (which, it will be remembered, has not been proved in this paper) is to develop it as a consequence of the fundamental theorem of Game theory—the Minimax theorem, as it is called.² If this is done, it looks as if the theory of optimisation is being swallowed up by Game theory—as if the Theory of Games was not merely swallowing that part of economics on which it has obvious designs, but was ready to absorb the lot! But that, I am convinced, would be a mistake.

Though the Minimax theorem is usually stated as a theorem in Game theory (and no doubt it is that application which to mathematicians is the most fruitful), it is not necessary to state it that way. It can easily be stated in a more abstract manner—as a pure property of numbers that are arranged in a rectangular matrix. Any such matrix has a minimax (the minimum of row maxima) and a maximin (the maximum of column minima). It is easy to prove that the minimax must always be greater than, or equal to, the maximin. What von Neumann's Minimax theorem states is that there is a process of "enlarging" the matrix by which the gap between minimax and maximin (if it initially exists) can be so reduced that it ultimately disappears. This process of enlargement is simply the addition of new rows and columns which are weighted averages (in the sense in which we have been using that term) of the former rows and columns. By sufficient enlargement, minimax and maximin can be brought together.

¹ See above, p. 687.

² See, for instance DOSSO, Chapter 16.

What I want to emphasise is that this enlargement is a purely abstract operation, which can be given all sorts of meanings, that have nothing but a formal connection with one another. When the Minimax theorem is used as a means of proving Duality the matrix is a matrix of technical coefficients; the enlargement (in one direction) is carried out by varying outputs, in the other by varying factor prices. When it is used in Game theory the matrix is a matrix of pay-offs; the enlargement is performed by mixing strategies. The mixing of strategies has nothing necessarily to do with the Minimax theorem; it is one of the ways in which the theorem can be applied, and no more. That the Minimax theorem can be used in the theory of optimisation does not show that "Outputs *v.* Factor Prices" is in any sense a Game.

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BIBLIOGRAPHICAL NOTE

So much bibliographical work has been done by others upon the subjects covered in this survey that there is no case for appending to it a formal bibliography. The wants of mathematicians and of Linear Programming technicians are catered for in the bibliography to Gass, *Linear Programming* (1958). There is a more selective bibliography, more directed to economists, in DOSSO (Dorfman, Samuelson and Solow, *Linear Programming and Economic Analysis*, 1958). The further reading that can be recommended to the non-mathematical economist is, however, rather limited; most of it has been mentioned already.

For an easy introduction, there is G. Morton, "Notes on Linear Programming" (*Economica*, 1951); with W. J. Baumol, "Activity Analysis in One Lesson" (*A.E.R.*, 1958) to follow. Valuable background is provided by Koopmans' introduction to *Activity Analysis of Production and Allocation*, and by the first essay in his *Essays on the State of Economic Science* (1957). After these, there is nothing for it but to plunge into the DOSSO book, so frequently mentioned.

On the side of technique, Charnes, Cooper and Henderson, *An Introduction to Linear Programming* (1953) remains the simplest account of the Simplex method; it should, however, be noticed that it is the original method that is there described, not the revised method, making use of the "subsidiary," that is mentioned on p. 692 above. If one uses DOSSO for this purpose, there is much to be said for beginning with their chapter on the transportation problem. It should however be recognised that the technique of linear programming is a practical subject, like practical statistics or practical accounting; though it can be taught in classes to students of quite average intelligence, it is a tiresome thing to work out for oneself from a book.

MONETARY THOUGHT AND MONETARY POLICY IN ENGLAND¹

THE purpose of this paper is to review certain basic notions that have underlain English monetary policy during the nineteenth and twentieth centuries. I shall contend that the theoretical approach to the problems of policy needs redirecting in the light of changes in the institutional and political environment. I have nothing revolutionary to say and, restricting myself to the more elementary aspects, I shall throughout emphasise theory rather than the course of events.

In some of the more lively phases of monetary controversy during the last 160 years the front of the stage has been occupied by questions of the foreign exchanges and the balance of payments, but even in these phases discussions of practical policy have more or less explicitly assumed certain views on internal policy; indeed, the classical contribution of English thought was the insistence on the connection between the internal and external objectives of monetary policy. At other times, when attention has been focused on troubles common to many countries rather than disturbances in the monetary relations between countries, considerations most relevant to a closed system have naturally come to the forefront. It is with these internal aspects that I am directly concerned—remembering always, however, the sound tradition that we separate the internal from the external at our peril.

Throughout the period—we can date it from the Bullion Report of 1810—the broad approach of every generation has been a Quantity Theory approach. I take this in the most general sense of a belief that the value of money is dependent, to an important extent, on its quantity, and that therefore some control of the supply of money is an essential prerequisite of any sensible monetary policy. The Quantity Theory, in all its simplicity, has great attraction. It is a supply-and-demand analysis, with a demand schedule whose peculiarity derives directly from the concept of money not as an object of exchange but as the medium of exchange. That this is only a small part of the truth is acknowledged even by those economists who rate it most highly, and I should be guilty of travesty if I were to accuse authoritative writers of allowing the Quantity Theory to monopolise their thoughts on monetary action. But I am going to suggest that we should all have a clearer view if we went back to the starting-point and looked afresh at the basic concepts. We must go back to the nature of money and the demand for it.

The word “money” is used in two senses. Money is the standard by which we measure the exchange values of things and in which debts are

denominated. This is the abstract sense in which we use the term; we know what pounds, shillings and pence are, in the sense that we know they are the units in which debts and prices are stated. We run into difficulties—the familiar index-number problem, on which I shall not comment—when we begin to generalise about “the value of money,” still using the word “money” in this abstract sense, but at least there is no doubt about what is the “money.” When we say that our economic system has acquired its present shape on the basis of a general assumption that the value of money is reasonably stable, it is of this abstract sense that we are thinking. Yet when we say that, in order to achieve this stability in the value of money, we must control the supply of money, we have switched away from the abstract sense of money to its other, concrete sense. For by “control of the supply of money” we mean control of the availability of certain assets which are used as media of exchange and stores of value. We have switched from an unambiguous abstraction to a class of marketable objects whose boundary has neither sharpness nor certainty nor permanence. And we have arrived at one of the perennial questions of controversy: the question of what assets are, and what are not, included in the “money” category. I suspect that, because money in the abstract sense is an unambiguous concept, people have subconsciously believed that there must also be a simple answer to the question of what is money in the concrete sense. They have been looking for a sharp line of distinction where only Marshallian shading has reality. This pursuit of a will o’ the wisp has had its effects on discussions of policy, for people have been too ready to believe that there is an identifiable quantity the control of which is all-important.

The difficulty of identification has derived from the twofold nature of money (we are now speaking only of the concrete sense) as a medium of exchange and as a store of value. Money is both these. An asset which entirely ceases to be a store of value ceases to be used as a medium of exchange, as has been seen when a money is rejected in the final stage of hyper-inflation. There are articles which are stores of value but are clearly not money because they are *never* used as media of exchange. But are we to label as money all other stores of value, that is to say all those which are ever brought into use, whether commonly or occasionally or only rarely, as media of exchange? The usual answer is that we should include as money only those assets which are commonly used as media of exchange. Resort to the adverb “commonly” at once emphasises the absence of any sharp line of distinction. Are balances in a clearing bank to be labelled money while deposits in the Post Office Savings Bank are not? I find it impossible, on the evidence of recent practice, to find any watertight reasons for so distinguishing. It is sometimes supposed that the distinction can be made to turn on the simplicity of the procedure for transferring the asset. When I take a coin or a note out of my pocket, and hand it across the counter, I am using money to make a payment. When I draw a cheque on a current

¹ Presidential Address to Section F of the British Association for the Advancement of Science at Cardiff, September 2, 1960.

account at a bank, economists would certainly say that I am using money to make a payment. But if this act of writing an instruction to a bank is a use of money, why not also written instruction to the Post Office Savings Bank or a Building Society? And what could be more simple than the showing of a consumer's credit card? Nor is it altogether satisfactory to retreat to the fact that many Post Office and Building Society balances lie for long periods undisturbed, for this is also true of many balances in the Clearing Banks. Especially this is liable to be true of deposit account balances, yet most economists would regard them as money, equally with current account balances, and the procedure for paying them over to other people is scarcely less simple than drawing a cheque on a current account.

Nor is there conviction in the notion that the line can be drawn by reference to whether interest is earned. Present English practice is that interest is not paid on current accounts, but this has not always been so, nor does it universally apply in other countries where banking competition is more free. Even in present English conditions, large sums are held in current accounts as minimum balances, ordinarily undisturbed, as inducement to the banks to operate accounts without charge: interest is thus virtually paid and offset by turnover charges. Whether the question of what is money is made to turn upon what has been common usage among economists, or on whether the asset is commonly used as a medium of exchange, or on whether it yields interest, it is not possible to give an unambiguous answer.

A similar attempt to escape from the difficulties of identification of money is to be found in the distinction sometimes drawn between "active money" and "idle money." The actual division of bank deposits into demand deposits and time deposits is often thought of as a statistically convenient approximation to an economically significant division into active money and idle money. But this distinction is at best misleading. No asset is in action as a medium of exchange except in the very moment of being transferred from one ownership to another, in settlement of some transaction, and no class of asset used in this way can logically be excluded from the class of active money. Between transactions all money is idle. Yet if activity is held to cover the state of being held in readiness against possible use in exchange, then all monetary assets are active all the time. It is not merely that we cannot easily earmark for statistical assessment the quantity that is active: there is no such quantity, except in the all-embracing sense of all those goods or claims regarded by their owners as potentially useful for settling market commitments. It is this wide concept of liquid assets that we must put, in the place conventionally occupied by "the supply of money," as the monetary quantity influencing total effective demand for goods and services. And we must interpret it widely enough to include credit that can be brought into existence concurrently with a decision to exercise demand.

When all the assets included in this class are reviewed in detail we find that they include not only the deposit liabilities of banks but also the readily callable liabilities of a large and widening range of other financial intermediaries. The ease with which these intermediaries enlarge their balance-sheet totals is as relevant to the monetary situation as is the behaviour of those financial intermediaries we call "banks." Nor should we limit the range to firms ordinarily regarded as financial intermediaries. Among firms whose main activity is manufacturing or trading, most do a great deal of lending and borrowing: they extend "trade credit" to their customers, and they take "trade credit" from their suppliers. Many are active on both sides of the account, and nearly all are involved in credit transactions on one side or the other. The distinction between banks as creators of credit and other firms as users or intermediaries in the monetary field is if not completely false at least misleading. From the point of view of the pressure of effective demand, the crucial step is that which increases the power to acquire goods and services, on the part of people inclined to exercise it immediately; and banks are by no means the only firms to place this power in the hands of others.

That trade credit, in the sense of credit granted by firms whose primary business is non-financial, is an effective element in the supply of purchasing power, is a view sometimes conceded but with the odd qualification that it is only "net" credit that counts in this way. If, for example, a statistical measure is sought, it is supposed that only the excess of a firm's claims over its debts to others should be counted.¹ This is a position that cannot be sustained. We are thinking of the power to exercise demand for goods and services, and for this purpose the gross total of trade credit is relevant. An entire closed circle of firms in manufacturing industry may begin giving credit more freely, and all of them proceed to place large orders with each other; there is no doubt about the increase in effective demand, although the increase in credit granted by all the firms together is balanced by the increase in credit taken by all the firms together. No one would seriously suggest that bank credit should be "netted out" by deducting the debts people owe to the banks, although one of the tables in the Radcliffe Report curiously errs in this way.²

We should pause here to notice that a distinction between "credit" and "capital" is no more helpful in monetary analysis than is the distinction between banks and other creators of credit. This distinction between credit and capital was vigorously argued in the nineteenth-century literature of

¹ Cf. J. Viner, *Studies in the Theory of International Trade* (1937). In the course of his review of the writings of the Banking School and the Currency School, Viner says (p. 247) that "J. S. Mill went too far" in including trade credit in the stock of purchasing power. But Viner concedes the substantial point later in the same paragraph.

² Cmnd. 827 (1959), Table 22 (on p. 171). That in twelve months no one should, to my knowledge, have drawn attention to the oddity of column (1) in this table, is a sad commentary on the extent to which the arguments used in the Report have been understood.

the subject, and there are echoes of it in those contemporary views that draw a distinction between the "money market" (or "credit market") where the central bank has its business and, on the other hand, the "capital market," upon which the influence of the monetary authorities can only be indirect. It is better that we should think of a single market, or at least a single group of markets, in which immediate purchasing power is traded against claims whose variety, in maturity and in other respects, is infinite. In some countries this is a more imperfect, in others a less imperfect market; but the important likeness that links all parts of the market is the trading of more immediately for less immediately available purchasing power. All participants in the market are so trading; all are trading in capital in the sense of purchasing power, and none is trading in capital in the sense of goods. Each part of the market is as fundamentally a money market as any other, and each part of the market is just as much a capital market as any other. All are adding to the supply of credit when the claims against themselves are more immediately useful than the other claims which are the trading counterpart. This supply of credit, which can be immediately used for exercising demand, is no monopoly of the banks; the power of the banks to create credit (and it is credit, not money, that is relevant here) thus provides no justification for control of the banks while other credit agencies are left uncontrolled.

A presumption in favour of discriminatory control of the banks can, however, be established if it can be shown that there is a sufficiently firm proportionality between the volume of bank credit and the volume of other credit. If, when bank lending is curtailed, other lending must necessarily be curtailed in equal proportion, the control of banks becomes a useful technique, on the administrative principle that their heads are the easiest to hit. If every firm dealing in credit always held absolutely stable the proportionate distributions of its assets and its liabilities—that is to say, if balance sheets always had exactly the same structures—this proportionality of the supply of effective purchasing power to the supply of bank credit could be taken as the basis of policy. In fact, there are two important reasons why this strict proportionality cannot be assumed. The first is that in course of time people devise new financial intermediaries; the efficiency of the financial system increases, and this process tends to accelerate in a prolonged spell of business prosperity. The second—and in the short period relevant for most purposes of policy, this is the more weighty—the reliability of non-bank debtors varies according to the general trade prospect. This is, of course, our old friend "the inherent instability of credit"; but it is important to recognise that in its modern form it refers not so much to bank credit as to the relation between bank credit and non-bank credit. At a time when, as an anti-inflation measure, the authorities are enforcing a restriction of bank credit, the apparently favourable position of other debtors makes the extension of non-bank credit peculiarly easy, as

we saw in England in the middle 1950s.¹ The important practical question is how easily one source of credit can replace another, and whether such a disturbance sets up any corrective process which will act quickly enough to be useful for purposes of policy.

Before I turn to this fundamental question, I must refer to the use of another concept, deeply embedded in the literature of our subject. This is the velocity of circulation. I have hitherto been formulating monetary phenomena by referring to the supply of and the demand for various assets and liabilities; but many writers have thought it more convenient to refer to variations in demand as variations in the velocity of circulation of money. They think of people not as wanting more or less intensely to hold money but as being less or more quick to pass on money in exchange for goods and services. Put like this, the one concept is simply the reciprocal of the other, and it does not matter which we use. I myself prefer to think in terms of the demand for money balances, because the term "velocity of circulation" implies closer analogy with a physical process than I can find in the working of the monetary system, and I notice that when economists seek to explain changes in the velocity of circulation they at once begin to talk about the intensity of the demand for money. Like houses and other assets, money is not going round steadily all the time. Instead—again like houses and other assets—it is always resting in the ownership of one person or another, save for the isolated moments when it changes ownership. What people mean when they say that the velocity of circulation has increased is that the volume of transactions has increased relatively to the stock of money (in some sense), or that the national income has increased relatively to the stock of money (the ratio more specifically referred to as the "income velocity of circulation"). As a label for the purely statistical phenomenon of the ratio of one quantity to another, the term velocity of circulation is harmless enough, and so well established in the literature that it would be foolish to refuse the convenience of using it. The trouble begins when we jump to the conclusion that a rise in the ratio of payments to bank deposits means only that firms have decided to put their bank deposits to faster use, whereas much of what has happened is that firms have decided to give more credit and people have shifted some of their savings into the hands of more nimble intermediaries. The artificiality of the concept lies, in short, in its reliance on a distinct and identifiable category of money; and one danger in using it lies in its encouraging us to overlook the relevance, to the pressure of total demand, of sources of credit outside this defined category. A further danger is that the definition

¹ No comprehensive statistics of trade credit exist, even for joint-stock companies. For companies quoted on the Stock Exchange and engaged in manufacturing, building and distribution, however, some figures can be extracted from the investigations made by the National Institute of Economic and Social Research. For these companies, the balance sheets relating to late 1956 showed trade creditors £2,050 million, as compared with £444 million bank loans, and trade debtors £2,609 million, as compared with £649 million cash and bank balances. The swings in these figures for trade credit, from one year to another, also dwarf changes in the bank credit and bank balances employed by such companies (*v. Radcliffe Report, Cmnd. 827, paras. 297–311*).

normally used being either bank deposits or bank deposits plus notes, which (particularly the notes) come fully into action only late in productive processes, a rise in the velocity of circulation is a phenomenon that lags behind a rise in the disposition to spend. The existence of this lag should warn us against undue reliance on any corrective mechanism set up by "a rise in the velocity of circulation."

The basis of such a corrective mechanism is sometimes represented as the anchorage of the velocity of circulation in the peculiar demand for the medium of exchange. Our examination of the nature of money and of the demand for it has, however, warned us that there is no single asset or group of assets that uniquely possesses a uniform monetary quality that is totally absent from all other assets. Except for purely didactic purposes, it does not help to talk about a normal velocity of circulation any more than it helps to say (which is the same thing) that the elasticity of demand for money is unity. On the other hand, convenience in settling transactions is an important quality in a monetary asset; various monetary assets have this quality in varying degrees. If money income rises, or if the supply of some of these assets falls, people will feel some lack of this convenience in relation to the contingent needs against which they hold such assets, and this is the substance to which economists refer when they assume a certain normality in the velocity of circulation. But we must remember that many assets have the monetary quality in varying degrees; if, as the supply of some of them falls relatively to income or turnover, others can easily be increased, the sense of inconvenience is minimised, and we have to ask ourselves whether it remains effective enough to be interesting. We are in fact back at our major question of the relation between supplies of different classes of monetary assets, having merely reformulated, with the help of the concept of the velocity of circulation, the problems we had already traversed.

In our own time most attention has been given to a comparatively late link in the chain of argument: the question of how, as the supply of monetary assets becomes less adequate, increasing inconvenience manifest in rising interest rates provokes a fall in total demand. Although this part of the argument has always had some attention, the almost exclusive concentration upon it is something of a post-1920 novelty. In the great controversies of the nineteenth century the prior question of the relation between varied monetary assets was always well to the fore. In the early part of the nineteenth century one of the major questions related to the connection between the Bank of England's note issue and the issues of the country banks. Thornton, in his *Paper Credit* (1802), had developed the view that the issues by the country banks were substantially governed by the Bank of England's issue.¹ He may have been wrong in this opinion, but he certainly regarded it as important, because he regarded both kinds of notes as money, the supply of which was relevant to the price level. When the Bullion Committee (of

¹ H. Thornton, *An Enquiry into the Nature and Effects of the Paper Credit of Great Britain*, pp. 211-41.

which Thornton was a member) in 1810 investigated the depreciation of the pound they adopted this view in one of the more emphatic statements in their Report,¹ but only two pages later they carefully explained the power of country bank-notes permanently to displace Bank of England notes.² They also noted the importance of increasingly effective use of bank deposits in circumscribing the real demand for bank-notes. In the controversy which raged round the Report, and more especially in the controversies of the next three decades, the relation between country notes and Bank of England notes continued to be hotly debated. There were no indisputable statistics that could be used to help settle the argument, just as in our own day there are not yet statistics to enable us to convince each other on the question whether or not the liabilities of the clearing banks are absolutely crucial to the behaviour of the wider structure of credit.

In the next generation the most hotly debated question was the regulation of the issue of bank-notes. In this phase—the Currency School and Banking School controversy—those who argued for strict regulation of the issue of Bank of England notes were no longer prepared to rely upon any automatic dependence of country issues upon Bank of England issues. They argued for—and obtained—strict and direct limitation of the country issues. But this relation of country to London issues of notes now scarcely held the centre of the stage. The main dispute now raged round the position of other claims—bank deposits, bills of exchange and trade credit generally. The Currency School argued for strict regulation of the issue of bank-notes. The Banking School, more diffuse in their remedies for economic instability, were united only in their negative view that the Currency School remedy was invalidated by the fact that bank-notes formed neither the only nor the governing part of the supply of purchasing power. The use of bank deposits, bills of exchange and other forms of credit as substitutes for bank-notes had long been acknowledged in the literature; on the historical order of events as we know them, it might rather have been argued that bank-notes were a substitute for bills of exchange. But now that a strong case was being made for strict control of the supply of money, the question which was money and which was not money became of high practical importance; moreover, the spectacular growth of banking was emphasising the weight of bank deposits in the total circulation.

The simplest Currency School view was that only gold and notes were money, and that therefore the circulation of gold and notes together should be made to reflect the changes in the gold supply; this is the essence of the 1844 Bank Act. But this is doing the Currency School less than justice. Its protagonists did acknowledge the relevance of banking and other credit, but some took the line that while notes should be strictly controlled, deposit banking should be kept in order by some other measures; others

¹ In the opening of their Section IV.

² Cf. Thornton's Chapter IX, where qualifications are as abundant as in any modern survey.

argued that the velocity of circulation of banking and other instruments was comparatively so low that these were unimportant parts of the money supply; again others argued that, since gold or notes could be demanded in all final payments, the pressure of purchasing and economic activity could never for long get out of line with the supply of the basic monetary instruments. It was this last view that was destined to dominate many decades; it prevailed against the Banking School view that the components of the money supply were so many and varied, and such effective substitutes for each other, that any attempt to control their quantity was doomed to failure, and would probably aggravate economic crises.

The prevailing doctrine—which gave Britain its basic monetary laws for seventy years—depended on the fact that gold or Bank of England notes could be demanded in all final payments. This derived not merely from the law of 1833: it was deeply rooted in the country's practice for a long time before that. This singular quality of gold and notes became directly important as soon as a general breakdown of credit developed; at other times bank deposits and bills of exchange were generally good enough, but in a crisis a business-man had to be able to put his hands on notes or gold, or he risked bankruptcy. As long, therefore, as a financial crisis was thought a possibility, bankers and other granters of credit paid some regard, in the conduct of their lending business, to the state of the Bank of England's reserve. And just in these decades Bank Rate movements were beginning to be employed by the Bank of England as the method of protecting the Reserve. A rise in Bank Rate became all important as an index—a warning that a breakdown of credit, followed by a disastrous spell of depressed markets, might be just round the corner.¹ The Banking School were right in emphasising the variety and the importance of sources of credit, but the Currency School were right in arguing that the superstructure of credit could not for very long get out of line with the supply of the basic money, the gold and bank-notes. In this situation the broad line of argument developed in the first part of this paper was not important. But the economy was distressingly unstable.

It was also one in which some of the most relevant circumstances were changing. If it was right to assume that the superstructure of credit could not for very long get out of line with the supply of the basic money, experience very quickly showed that the possible time-lag could be of devastating importance. Partly because the Bank of England was not using its warning signal promptly enough, and partly because the underlying causes of instability were very strong, crises of the first order of magnitude recurred in 1847, 1857 and 1866. This experience led the authorities to modify the Currency School policy to the extent of admitting that the Bank of

¹ This interpretation of the *modus operandi* of Bank Rate at this time is convincingly argued by A. B. Cramp in his article, "Horsley Palmer on Bank Rate" (*Economica*, November 1959), and in his unpublished Ph.D. thesis (London), *Opinion on the Operation of Bank Rate, 1822-60*.

England must act as lender of last resort to prevent breakdown of the system. The crisis of 1866 was the last of the old kind, and Bagehot's writings ensured the respectability of the new policy. Nevertheless, Bank Rate continued to retain something of its power as a warning signal internally; this was partly because memories of the old-fashioned crises lingered on, and partly because, although it ceased to portend a breakdown of credit, a high Bank Rate was still apt to portend a spell of trade depression. Not until the effective adoption of Full Employment policies was the warning power of Bank Rate reduced to a ghost of its old self.

The scene was also changing in that the internal effects of Bank Rate were becoming relatively unimportant. In the second half of the nineteenth century London's power as an international financial centre grew fast, and the Bank of England was enabled to perform its duty of keeping the pound on gold by operating principally on the international capital position.¹ (This had always been an element in the *modus operandi* of Bank Rate, but in the period 1860-1914 it became the principal element.) Some of its direct influence as a signal for business-men remained, as I have suggested above; more importantly, the disturbance of the international capital situation disturbed investment in the developing countries overseas, with severe repercussions on the trade of the home country. Just how much monetary conditions really affected the trade cycle it is impossible to say; if we are looking only at the last few decades before 1914 I find myself much in sympathy with Rostow's view of "an essentially negative element,"² for the rise in interest rates often waited until the boom was already cracking, and merely ensured that the depression should be severe. However, without going so far as this we must still admit that the quick power of Bank Rate on the international capital position was the dominant feature, and this change of emphasis was duly reflected in the dwindling literature on monetary questions. Bank Rate as the controller of international gold movements came to occupy a leading place in expositions of the monetary system; the Quantity Theory and the 1844 Act remained alongside the discussion of Bank Rate, but the old and the new were in this phase never really integrated. It was the literature of this phase that was more or less my introduction to the subject, and I well remember my first impression of confusion, whether a rise in Bank Rate increased the quantity of money (which seemed to be the result of attracting gold) or decreased the quantity of money (which seemed to be a necessary part of the deflation a rising Bank Rate was supposed to provoke). My teachers soon put this right, but when I look back at the pre-1920 literature I am not surprised at my early difficulties.

The main development of monetary thought in the course of the 1920s was the integration of these various elements into a single coherent body of

¹ For a contemporary exposition, see, e.g., G. Clare, *A Money Market Primer* (2nd Edition, 1905), esp. pp. 103-7 (on effects on international movements) and 36 (for attitude that no disturbance of the internal economy is sought).

² W. W. Rostow, *British Economy of the Nineteenth Century*, p. 57.
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theory. The development originated mainly, I believe, in the pre-1914 academic activity in the study of the trade cycle, though there was also powerful stimulus from the international monetary strains of the 'twenties themselves. Having regard to what we know Marshall to have been thinking at the turn of the century, it is not surprising that the reshaping of monetary thought in the next generation was largely the work of Marshall's successors, especially Lavington, Keynes and Robertson; and we must not forget that English economists were beginning to notice the work of Wicksell and his followers on the Continent.

As a survey of this kind must necessarily concertina many intricate episodes in the history of thought, I will summarise these developments of the 1920s simply by reference to the form in which they emerged, at the end of the decade, in Keynes's *Treatise on Money*. The *Treatise* has between its four covers many strands of thought, as those who were students in those days will remember too well; but for our present purpose we may confine our attention to two of them. The first is that the demand for money was refashioned by looking at money primarily as one among other stores of value, the preference for the peculiar convenience money possesses being weighed in the manner traditional in the ordinary theory of value, against the interest that could be obtained on the other stores of value. The second idea we must notice was, along Wicksellian lines, that the rate of interest influenced the balance between the demand for capital and the willingness to lend, thus providing a mechanism whereby the supply of money (and the demand for it) was linked with the pressure of total demand, and so with movements in the general level of prices.

The first of these developments—the liquidity preference theory of interest—represented a clean break from the Quantity Theory, in that money, ceasing to be a pure medium of exchange, ceased to have that freakish unit elasticity of demand and became something whose value was determined in a way we need not feel strange when we had just been learning a more universal Theory of Value.¹ But in his formulation Keynes preserved his links with tradition by notionally dividing money into "active money," whose elasticity of demand was unity, and "idle money," the utility of which behaved in the more ordinary way and had to be balanced against the interest that could be earned by holding bonds. For the purpose of establishing his main propositions Keynes need not have made this bow to his ancestors, but he did, and I suspect that life would be easier if we forgot about it; I have already noted the artificiality of the distinction. However, its use did facilitate demonstration of an equilibrating mechanism in the system. A rise in prices increased the amount of active money needed, the money available for idleness was thus reduced, the demand for bonds therefore fell, the rate of interest rose, demand for capital goods was checked

¹ Cf. J. R. Hicks, "A Suggestion for Simplifying the Theory of Money," *Economica*, February 1935, p. 3.

—and so the rise in prices was stopped. This is the Keynesian system of 1930 in baldest form, and the *précis* omits many sources of friction continually emphasised by Keynes. In terms of practical policy, the analysis did point advantage in control of the supply of money; to Keynes this meant control of the supply of bank deposits, and his attention to such subjects as the cash ratio in banks and central bank operations is always related to this. He emphasised throughout—and this is a big step beyond the Currency School position—that there is a dangerously long time-lag between movements in "bank-money" (*i.e.*, bank deposits) and the corresponding movement in notes, "so that a control over the volume of notes operates too late—after the evil has been done by a change in the volume of bank-money which may have taken place some months earlier."¹ He went further and, emphasising the crucial position of the rate of interest in the equilibrating mechanism, urged central bankers to think more directly in terms of forcing the rate of interest to behave in the required way.²

This was, of course, not the end of the Keynes story, and in the *General Theory* (1936) Keynes developed ideas that drastically modified any notion of the economic system as a self-stabilising system. Particularly, he argued certain consequences of the shortcomings of the rate of interest as part of the equilibrating mechanism: the liquidity trap and the notion of an under-employment equilibrium came in. Like the *Treatise* before it, the *General Theory* bristled with ideas, many of which were hotly disputed; but both in his 1930 emphasis on the rate of interest as a crucial cog in the mechanism and in his subsequent relative loss of faith in its efficacy Keynes had wide following. In such investigations as they were able to make the Radcliffe Committee found a good deal of support for the later Keynesian view. In this sense the scepticism of Radcliffe is Keynesian, but in certain other respects—and here I am thinking of parts of the *Treatise* that Keynes did not revise—the Radcliffe view of the economic system is quite unlike that of Keynes.

The break from the Keynesian exposition may perhaps best be seen by exaggerating it, imputing to Keynes a simplicity that was never his. Keynes was thoroughly traditional in drawing a sharp line between money and other assets. To him money had changed from being coin and notes to being notes and bank deposits, notes being the small change of "bank money." In his model there are four major classes of assets: cash, bank money, bonds and others; there are central banks (whose liabilities are cash), there are banks (whose liabilities are bank money and who are holders of cash and bonds as well as other assets) and there are non-banks (*i.e.*, corporations and individuals who are holders of cash, bank money, bonds and other assets, and who are also much concerned with spending on "real" assets). A distinction between money and bonds is that the

¹ Vol. II, p. 264.

² *Ibid.*, pp. 369–74; cf. Report of the Committee on Finance and Industry ("Macmillan Report"), Cmd. 3897, 1931, para. 359.

former is useful for payments and the latter are not; another distinction between them is that bonds do and money does not carry interest. With this classification and some reliance upon the interest rate as a balancer of savings and investment, we can make a coherent working model, useful for explaining how policy should be shaped.

But the world in which we live lacks these sharp distinctions. And, remembering that for purposes of policy we must get as close as we can to the points of business decision, the more we try to eliminate dangerous time-lags, the more blurred the distinctions become. There is no clear line between purchasing power that carries no interest and interest-earning assets that have no influence on purchasing power. "Commercial banks" shade into industrial banks, savings banks and building societies, and these into a host of other financial intermediaries; the liabilities of these are close substitutes for each other, so that a clamping down on one group will not create such an abrupt scarcity of liquidity as will have a worthwhile impact on the pressure of total demand. This is, of course, the kind of argument that was being used by the Banking School a hundred years ago, when J. S. Mill and others pointed out that the substitutability of bank deposits for notes was high, whence they argued that a control of notes alone would be merely a nuisance. Time's answer to the Banking School was the recognition that bank deposits were as good as notes, coupled with institutional arrangements for making good a Currency School contention that the supply of bank deposits was proportional to the supply of notes. Having got so far, we then got into the habit of saying that bank deposits were the important quantity, that our central banks should regulate the bank deposits and that notes could be left to take care of themselves.

Can we now, as a latter-day Currency School, argue that, although other financial claims are good substitutes for money, we can rely upon the constancy of their ratio to the bank deposits we have learned to control? I doubt it. Or can we now, following those who taught us all about central banking, force the non-bank lenders into a pattern by imposing on them liquidity rules analogous to those whereby the clearing banks are controlled? The Radcliffe Committee looked at the question, and shuddered. Or can we try to check the development of financial institutions, by proclaiming that none but the clearing banks may create money? This is not just an idle fancy: our ancestors did something like this when they strangled the country note issue—but they did not stop the private creation of money. They could not stop it, because money is the creation of the public that chooses to impute certain qualities to certain claims.

I have referred repeatedly to the Currency School and Banking School controversy because I believe that the arguments of the last few years have very close parallels with that earlier controversy. The Currency School case depended on sharp lines of distinction and rigid proportionalities. The case was accepted as the basis for practical policy; we muddled through

the next hundred years partly by modifying the policy, partly by imposing proportionalities and partly enduring disadvantages we no longer find tolerable. In modification of the policy, we developed central banking to dull the terror of financial crises, and now we have gone much farther by insisting that there shall be no trade depression. The age-old tendency of financial institutions to become more numerous, more varied and more efficient flourishes in an economy that avoids major breakdowns; the process is accelerated, and a policy that depends on a stable relationship between institutions become less and less realistic.

This is a negative conclusion, and it is because they took this view of the nature of money and the monetary processes that the Radcliffe Committee's conclusions appeared to give such little positive guidance. But even negative conclusions have their importance: we sometimes need to search around for something quite different which will get results. And the conclusions to which our general discussion points do, after all, have highly practical implications. To take a major point, restriction of the supply of bank deposits, if long continued, can be expected to become increasingly ineffective as a curb on total demand, because the demand for liquidity can be so well satisfied from other sources. Worse than this, restriction of the banks will increase the opportunities for alternative lenders, so that the banks will lose ground to their competitors and the heads the Government can hit will become progressively less influential in the behaviour of the economy. Or to take another point, on which the Radcliffe Committee's recommendation was grossly misrepresented in some quarters, consider the channels for local-authority borrowing. The fact that Treasury bills are, and local authority mortgages are not, "liquid assets" to the clearing banks has some very short-period relevance, in that the banks are outstandingly efficient lenders, but if the market for credit is fundamentally a single market, an addition of short government paper has much the same effect on the monetary situation wherever it is injected. Banks are not the only lenders sensitive to liquidity.

Our analysis has its uses for bankers as well as for policy-makers. The English clearing banks, acting as a cartel, fix the rate they pay on time deposits, and have only one class of such deposits: at seven days' notice. They are sometimes urged to compete for deposits now going to building societies or hire-purchase finance houses by offering higher rates for longer periods. Against this proposal, it has been argued that the total of deposits in the clearing banks is fixed by the supply of "liquid assets," and that therefore the banks could get no more deposits by offering higher rates but would simply reduce their own profits. This over-simple argument can be made true only if we make certain assumptions about strictly rigid proportionality in the balance sheets of all sorts of firms and households, and insist that for one size of the national debt and one size of the national income there is only one possible size for the total of bank deposits. This

is a particular manifestation of the old idea that there is only one kind of money (in this case bank deposits) and that the demand for it is rigidly related to the national income. But once we admit that the liabilities of other institutions may be quite good substitutes for the liabilities of the clearing banks, and that business attracted by non-bank intermediaries affects the non-bank demand for national debt, the consequences of non-competition by the clearing banks become expensive to them. By refusing to compete, they stand to lose a larger and larger proportion of the total lending business in the country. To put the point in an extreme way, if the banks always ignored competition on the principle to which I have referred, their place as creators of the chief monetary assets would gradually be lost to other more aggressive financial intermediaries. And no doubt there would be quantity theorists a century hence to point out that the then predominant money (claims on the aggressive intermediaries) had increased roughly in proportion to the national income: they might even find that clearing bank deposits had become the small change of the monetary system!

Or are we perhaps already there? If the crucial decisions to place orders for production depend "upon the composition of the spender's assets and on his borrowing power and . . . upon the methods, moods and resources of financial institutions and other firms which are prepared (on terms) to finance other people's spending,"¹ then in an important sense bank deposits have already become the small change of the system. This is no fad of a theorist's exposition, for its implications are surely lessons of the first importance to practical policy. For it means that there is no dependable monetary ceiling against which a boom will bump its head. As the boom rises, the sources of liquidity broaden, and the rising demand for the means of payment comes too late and is too easily satisfied. It follows that a policy of stabilising bank deposits and waiting for the expanding volume of payments to force interest rates upward, while intuitive central bankers try to be nimble in "following the market," is not enough; action would always be too late, as it was when strain on the note-issue was expected to set the corrective mechanism in motion. If monetary policy is to be used at all, we must make it operate on as broad a front as possible; action on the supply of bank money must be thought of as purely incidental to a positive, aggressive and far-reaching interest-rate policy. How far we can depend on this is, as the Radcliffe Committee emphasised,² a matter on which much more systematic investigation is required. If we want to catch up with events and accept the implications of the Full Employment policy we must urgently investigate the efficacy of a far more vigorous interest-rate policy than any we have yet seen, and, lest this should (as I expect) prove a non-starter, we must think again on how the flexibility of fiscal policy might be increased.

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¹ Radcliffe Report (Cmd. 827), para. 389.

² *Ibid.*, para. 474.

DISTRIBUTION AND PRODUCTIVITY UNDER INFLATION, 1947-57¹

1.0. The main object of this paper is to see whether, on an international survey, the rapid rise of national money incomes in recent years has been associated systematically with any changes in distribution. The usefulness of the inquiry derives from the number of countries surveyed, rather than from analysis of the statistics country by country. The common categories in which these statistics are presented may conceal some substantial differences. But we are in the presence of a very general and far-reaching movement of money incomes and prices, and if such a movement has any predominant effect on the relative size of pay and property incomes in contemporary economies generally, or in those of a certain type, the present evidence could hardly fail to show it; and similarly, if there is no such effect.

1.1. We have in fact attempted two surveys. The first uses the materials gathered in the *United Nations Yearbook of National Accounts Statistics* to follow the distribution of the net domestic product between three sectors—pay of all kinds; incomes of unincorporated enterprises; and the remainder, treated as property income—year by year, mostly from 1950 to 1957, in some twenty-five countries. The criterion of inclusion has been simply the availability of the accounts in the three-sector form: some important economies—such as, in Europe alone, Denmark and Norway, Italy and West Germany—have had to be omitted, and those included comprise some that are small and some in whose statistics the range of estimate can hardly be other than wide. The second survey takes eight countries for which the nationally reported statistics enable us to trace the movements not only of income but also of the deployment of the occupied population, and which include some of the major industrial economies, and some of the major exporters of primary products: they are Australia, France, the Netherlands, New Zealand, Sweden, the United Kingdom, the United States and West Germany. Here we have used the estimates of the numbers occupied to adjust the shifts of income between sectors for the associated shifts in the number of income-recipients, and so to follow the relative movements of average pay per employee and the average product available per head of the whole occupied population, including employers and self-employed.

¹ We are very much indebted to Dr. H. van Blankenstein, of the Royal Netherlands Embassy in London, for most helpful provision of statistical materials; and to J. C. R. Dow, W. M. Gorman, P. E. Hart, R. G. Lipsey and A. W. H. Phillips, for their discussion of a draft of this paper, with suggestions for further inquiry which have added much to the interest of the materials now presented. But none of these is responsible for any statement of fact or opinion in the present paper. We are further indebted to Miss Sheila Chantler for drawing the figures.

1.2. As a by-product of our inquiry, we offer some materials concerning the course of inflation before and after the check to the rise in wholesale prices that came about in 1951-52, and the possible connections between the rate of rise of prices and the growth of productivity.

2.0. The survey based on the *U.N. Yearbook of National Accounts Statistics* is presented in Figs. 1, 2 and 3, and in Tables V and VI of the Appendix.

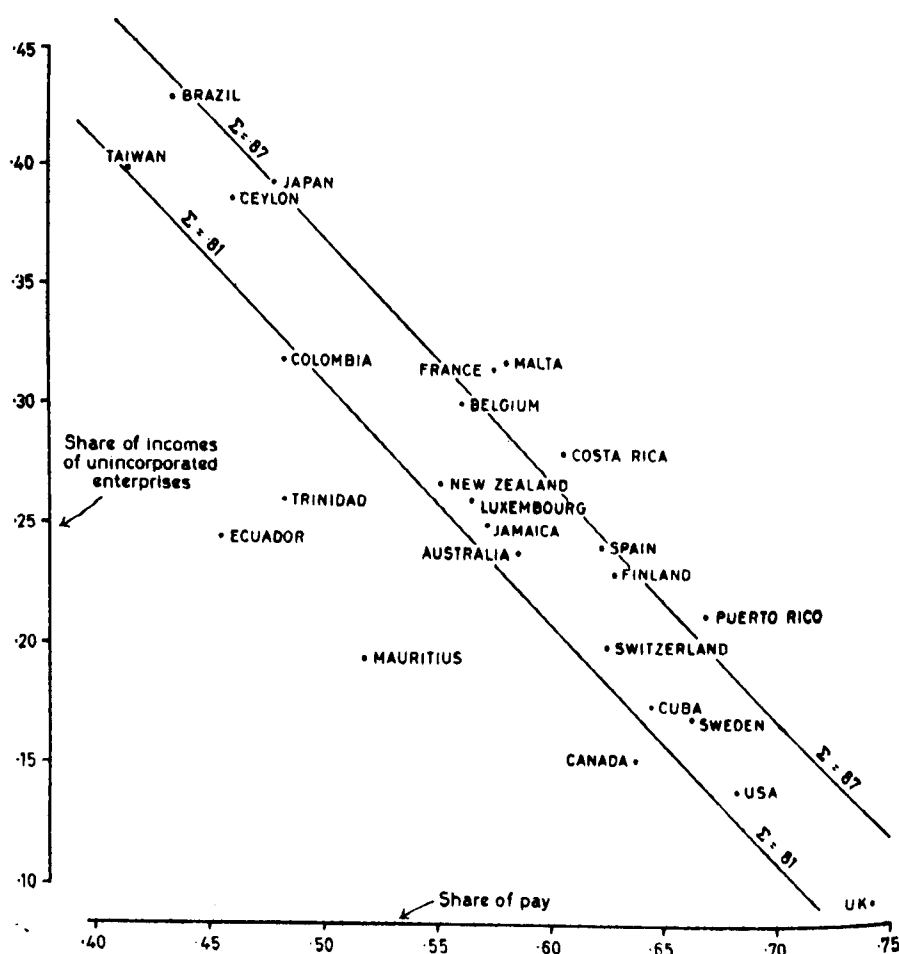


FIG. 1.—Shares in net domestic product, medians of values recorded within 1950-57.

Before discussing the outcome we must set out some points in the treatment. (a) Here, as elsewhere, we have not tried to distinguish wages and salaries, but have included all sorts of compensation of employees under the one head of pay. In the past it is the share of wages alone that has had most attention. But salaries are now bigger in the aggregate relatively to wages than they used to be; and the line between the two no longer follows a well-marked social boundary—there were always some occupations through which it could be drawn only arbitrarily, and as the occupational structure changes

in an era of great technical advances, the sectors of the labour market where it still serves to mark off non-competing groups become a smaller part of the whole. (b) As far as possible we have deducted net income from abroad from national income, so as to reach an estimate of net domestic product, and we have assumed throughout that any such deduction should be made wholly from reported property incomes, though this assumption is not warranted for remittances from emigrants. In some countries no estimate of net income from abroad was given, and we made no adjustment. (c) The incomes of unincorporated enterprises—that is, broadly, of the self-employed—proved to play a vital part in the comparison of different countries, and so we had to leave out those countries which did not report such incomes separately from profits and other property income.

2.1. Our main concern is with movements from year to year, but the comparison that the present data permit between the distributive patterns of different countries in the same period presents one striking feature which we must pause to notice at the outset. At a first glance the share of pay in the net domestic product is seen to vary widely from one country to another—in not a few countries it is less than a half, in the United Kingdom and the United States it is 70% and more. But when we bring into account the share of the self-employed we find much levelling up. If we take for each country the median of the annual values of the combined shares of employees and the self-employed, we find that sixteen out of the twenty-five countries lie between 81 and 87%. The scatter is shown in Fig. 1. The question arises how far this combination is significant. The self-employed are made up mainly of the professional man, the small trader and shopkeeper, the craftsman doing bespoke or repair work, and the small farmer; where the sector is large it is the trader and farmer who predominate. Probably the part of the income of the self-employed that is a return on property is small.¹ The earned part, however, is non-contractual, and for the farmer it fluctuates with the price of the produce. It seems, therefore, on the whole, that if we want to compare the return to labour as a whole in different countries at any one time we do well to take the incomes of employed and self-employed together, and treat their sum as an approximation, but that when we compare one year with another in any one country we must bear in mind that the incomes of the self-employed are liable to sharp changes from causes which bear only indirectly on the pay of employees in the same country.

2.1.1. In assessing the significance of the similarity between the composite share of work in different countries we must allow that if this share

¹ We have tried the effect of assuming that the incomes of the self-employed in each country are properly divisible between pay and property incomes in the same proportions as the remaining income of the country is so divided; these proportions are given in row 4 of Table V. But the assumption is itself questionable, and the scatter it yields does not seem significantly different from that of Fig. 1, though of course the combined share of work runs lower.

is in fact generally not less than three-quarters, the proportionate differences in it between one country and another are inherently contained within a comparatively small range. The variability appears wider if we look at

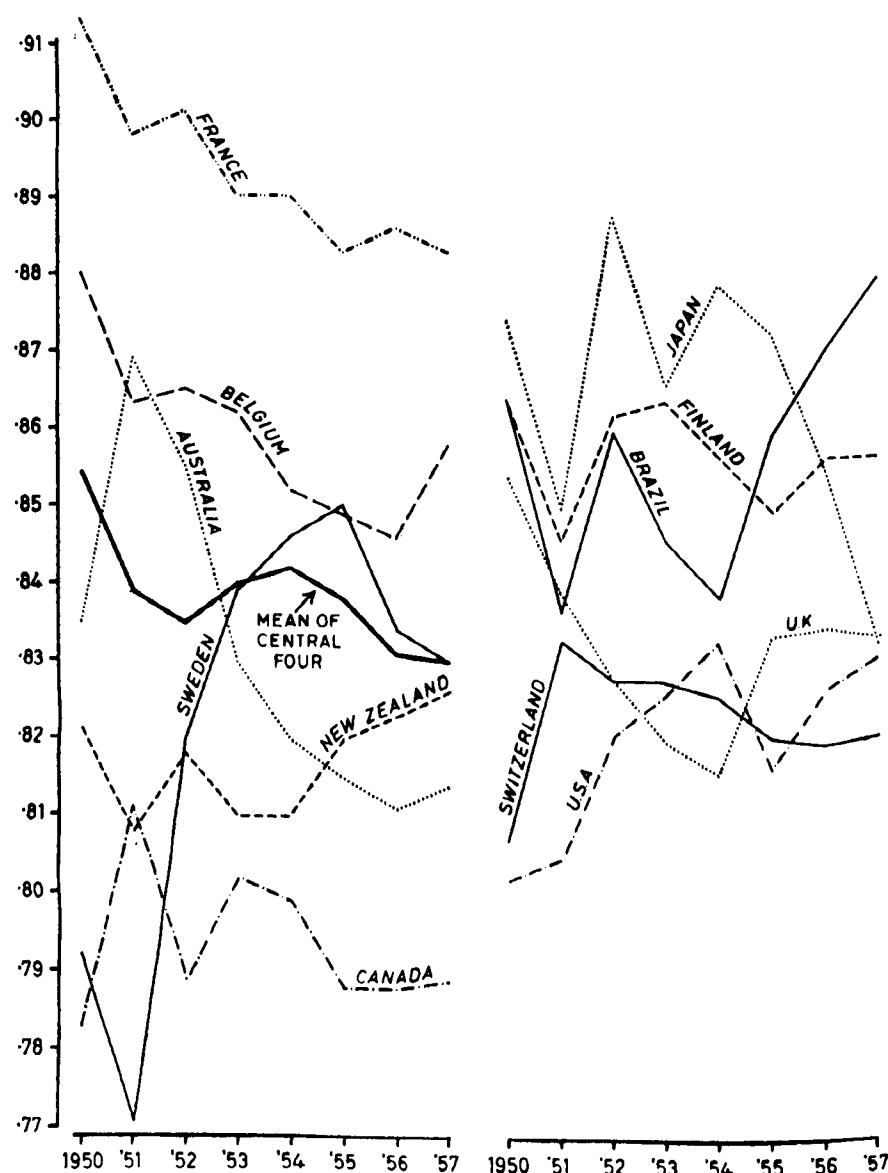


FIG. 2.—Pay of employees plus incomes of unincorporated enterprises as share of net domestic product, 1950–57.

property income: though the range from 81 to 87% amounts to only about $\pm 4\%$ about the midpoint, it implies a range of from 19 to 13% in the share of property, and that is more than $\pm 18\%$.

2.1.2. None the less, that the composite share of work should lie in the

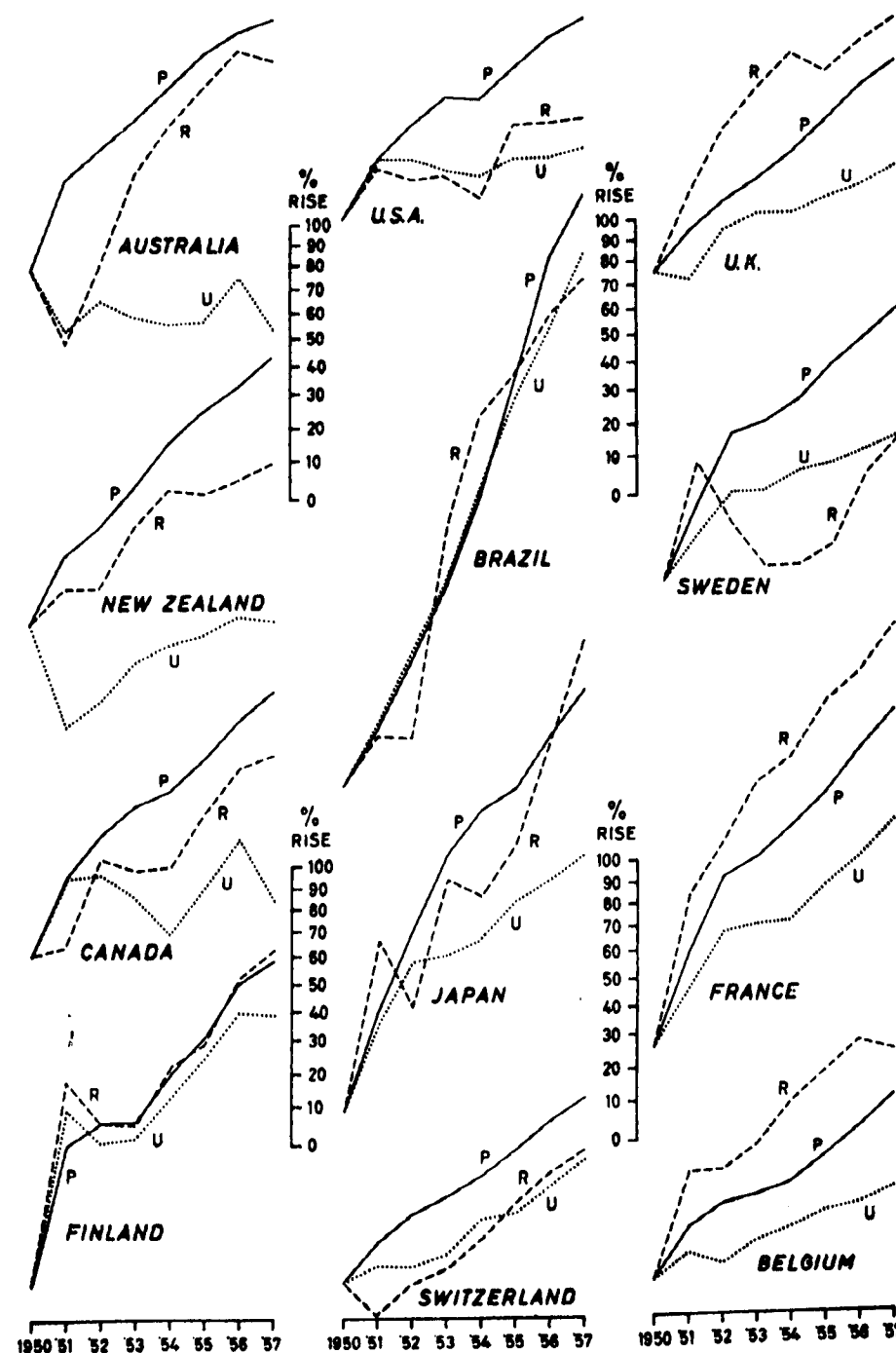


FIG. 3.—Proportionate changes in amounts of pay (P), income of unincorporated enterprises (U) and rest of net domestic product (R), 1950–57.

same region in economies whose structures and stages of development differ widely is an observation that calls for explanation. Admittedly, it is consistent with our expectations about the stock and yield of capital in a developed economy. From the limited available evidence we might expect the capital coefficient (when capital includes houses, stocks and work in progress) to lie between 3 and 4, and the rate of return on real capital between 5 and 10%. If the extremes coincided, a coefficient of 4 with a yield of 10% would claim 40% of the product, a coefficient of 3 with a yield of 5% would claim 15%. This last outcome would leave 85% for the share of work. If we took 80% as more representative after allowance for the element of property income in the composite shares before us, we find a rate of return that lies between 5 and 6.7% according as the capital coefficient lies between 4 and 3; with a coefficient of $3\frac{1}{2}$ the rate of return would be 5.7%. These magnitudes are plausible, but in themselves they provide no explanation, they only transpose what we have to explain. This is, basically, why the forces that bear upon distribution operate, in economies of various structure and development, to bring about much the same division between work and property—one, namely, that is around 80 : 20 and not (say) 20 : 80. Our observations, though unrefined, show enough similarity to make this question a test for all theories of distribution.

2.2. From the comparison of the distributive patterns of different countries in the same period, we turn back to the course of change in those patterns year by year. Has there been much change, and if so, has it followed any predominant course? Fig. 2 shows the movements from year to year of the combined share of work that we have just been discussing, in twelve of the biggest of the countries in Table V. Fig. 3 throws light on these movements, by showing for each country the proportionate changes from year to year in the amount of each of the three kinds of income—pay, the income of unincorporated enterprises, and the return to property.

2.2.1. The main impression of Fig. 2 is one of diversity, with no predominant pattern: an impression which the inclusion of the twelve smaller countries would only strengthen. But some similarities can be found, and they are indicated by the curve labelled "Mean of Central Four"—a median formed by averaging the four values in the centre of each year's array of the eighteen countries for which we have annual values throughout, namely, the twelve in the figure, together with Ceylon, Colombia, Costa Rica, Luxembourg, Mauritius and Puerto Rico. It suggests a fall in the composite share of work between 1950 and 1952, and after an intervening recovery up to 1954 a renewed tendency to fall. The materials of Fig. 3 show that this pattern arises out of two sorts of movement. First, the contribution of unincorporated enterprises to the composite share of work has very greatly fallen. In some countries—notably Australia, Canada, New Zealand and the United States—the aggregate income of unincorporated enterprises has on balance hardly changed during eight years in which

other income has risen greatly. In others—such as Belgium, France, Japan and the United Kingdom—it has risen, but by no means as much as other income. Second, the rate of rise of this other income has varied: in a number of countries both pay and the return to property (if that term may pass for what Fig. 3 calls the rest of net domestic product) rose rather faster in 1950-52, and again after 1954, than in the years between, and the difference was especially marked in the return to property. Thus the main factors in the preponderant fall of the composite share of work in 1950-52 and after 1954, and its downward trend on balance, seem to have been the smallness of the rise in the income of unincorporated enterprises, and a relatively rapid rise in the return to property in 1950-52 and after 1954.

2.2.2. If we leave aside the sector of unincorporated enterprises, how has the remaining product been divided between pay and property? The curves marked *P* and *R* in Fig. 3 give us a conspectus of the course of division in twelve countries. It has been convenient to start the curves at the same point in 1950, but, of course, the choice of base is arbitrary, and we must beware of supposing that if the series diverge after that they are moving away from a position of adjustment: they may equally well be correcting a divergence prevailing in 1950. This has immediate application here. The relations of 1957 were very generally different from those of 1950: in three countries the return to property had risen more by 1957, in six it had risen less, and only in three—Brazil, Finland and Japan—was the rise of the two sorts of income much the same. But if we start not with 1950 but with 1951 or 1952, only in four countries does much divergence remain. In the others, the rise of the two sorts of income has been closely parallel: it seems that once the impact of devaluation and Korea had been absorbed, pay and the return to property remained in a steady relation to one another.

2.2.3. Of the four exceptions, Australia is doubtful: the return to property rose more than pay if we start with 1951, but that was a year in which it had fallen absolutely, and if we start with 1950 the relations are reversed. But in the other three—New Zealand, Sweden and the United States—there does seem to have been a progressive rise in pay relatively to the return to property. We shall return later (3.3.5) to the rise in Sweden.

2.2.4. The strongest impression of all, however, when we survey the whole field, is that no one course of change in distribution predominated. This finding, though negative, is significant, because in another respect one marked course of change certainly did predominate—the total of money income rose much more than real income, in every country. In a word, inflation does not bring with it any strong tendency to raise pay relatively to the return to property, or vice versa, but is compatible with shifts in either direction. Perhaps we can go farther, and surmise that resistances to inflation, which hold back prices or money incomes in some sectors of the economy, tend to bring distributive shifts, but that where inflation is least impeded and most general its distributive effects (between those broad

categories alone that we are considering here) are least: it may be more than a coincidence that in Fig. 3 the *P* and *R* curves keep closest together in the three countries where their rise is steepest—Brazil, Japan and Finland. But Table I also shows that elsewhere the shifts were still not very big, nor were they systematically connected in size or direction with the rate of rise of money income.

TABLE I

Country.	Rise in net domestic product in terms of current money, 1957 on 1950.	Change, 1957 on 1950, in:					
		Combined share of pay and unincorporated enterprise in whole net domestic product.			Share of pay in net domestic product outside sector of unincorporated enterprise.		
	%	(No. of percentage points.)					
Brazil . . .	305	+2			+4		
Japan . . .	145		Nil	-4			-2
Finland . . .	117					Nil	
France . . .	115			-3			-3
Colombia . . .	110	+1				Nil	
Sweden . . .	77	+4			+6		
Luxembourg . . .	76			-6			-7
Canada . . .	69	+1			+1		
United Kingdom . . .	69			-2			-1
Costa Rica . . .	65			-1			-2
Mauritius . . .	57			-5			-5
Puerto Rico . . .	53		Nil		+1		
New Zealand . . .	52	+1			+5		
United States . . .	51	+3			+4		
Australia . . .	51			-3	+2		
Switzerland . . .	50	+1			+2		
Belgium . . .	49			-2			-2
Ceylon . . .	35			-4			-6

3.0. So far we have been considering the aggregate amounts of income accruing to three sectors, in some twenty-five countries for which estimates have been made available through the United Nations in comparable form. We shall now examine eight countries more closely, bringing in particulars of the deployment of the occupied population, and using as our indication of distributive tendencies the pay/income ratio. This is the ratio which the average pay per employee (taking wages and salaries, and employees of every grade, together) bears to the average income available per head of the whole occupied population.

3.1.1. The pay/income ratio is convenient on two grounds. First, it takes account of the dependence of the division of the product between different sectors on the deployment of the occupied population between them. The share of pay in the product, for example, approaches 75% in the United Kingdom but is below 60% in France, mainly because employees in receipt of pay make up 92% or more of the occupied population of the United Kingdom, but only some 75% of that of France. The deployment

of the occupied population does not only differ widely between countries but may also change substantially from one time to another within one country: in recent years, for example, the proportion in the sector of unincorporated enterprise has generally been falling. We make an adjustment for these underlying differences when we follow not aggregate income but income per head.

3.1.2. The pay/income ratio is also convenient because it provides a first answer to the question, has pay kept pace with productivity? At any one time it shows what part of the product achieved per head of the occupied population goes to the average employee, and from one year to another it shows whether the employee has gone forward in step with the whole community, or slower or faster than the rest. Moreover, since changes in the amount of capital per head of the population are bound to be small within a short span of years even when investment runs high, its movements suggest whether the rate of return per unit of capital has risen or fallen from year to year.

3.1.3. But it has its drawbacks. One is that though it does not depend so directly as the share of pay as a whole on the size of the sector of unincorporated enterprise, that is, of self-employment, it is still influenced by that sector. If the employees of an economy are working alongside poor peasant proprietors, their own pay will bear a higher ratio to the average income of all occupied persons than if the self-employed were prosperous professional men. If there were no self-employed at all, and all "employers" were managers and so employees, the pay/income ratio would be the same as the share of pay in national income.¹ When we bring in the self-employed, they make the pay/income ratio higher or lower than the share of pay, according as their average income is smaller or bigger than average pay.² This must be remembered when the ratio is used for international comparisons.

$$\begin{aligned} \text{Share of pay in national income} &= \frac{\text{Average rate of pay}}{\text{Average income per occupied person}} \times \frac{\text{No. of employees}}{\text{No. of occupied persons}} \\ &= \text{Pay/income ratio} \times \text{Proportion of employees in all occupied} \end{aligned}$$

It will be remembered that "average income per occupied person" here is the quotient of the whole national income divided by the number of occupied persons, and not the average of the incomes accruing to occupied persons alone.

¹ Suppose there are *E* employees, with average pay *p*, and *S* self-employed, with average income *i*. Then if as before we neglect the element of return to property in the incomes of the self-employed we can approximate the aggregate return to work by *Ep* + *Si*. Let this be a proportion *λ* of the national income *Y*. Then the pay/income ratio is defined as

$$\begin{aligned} p \div \frac{Y}{E + S} \\ &= p \div \frac{Ep + Si}{\lambda(E + S)} \\ &= \lambda \div \frac{Ep + Si}{Ep + Sp} \end{aligned}$$

With a given division of national income between work and property, the pay/income ratio will be lower according as the average income of the self-employed is greater than average pay, and this influence will be stronger, the greater the relative numbers of the self-employed.

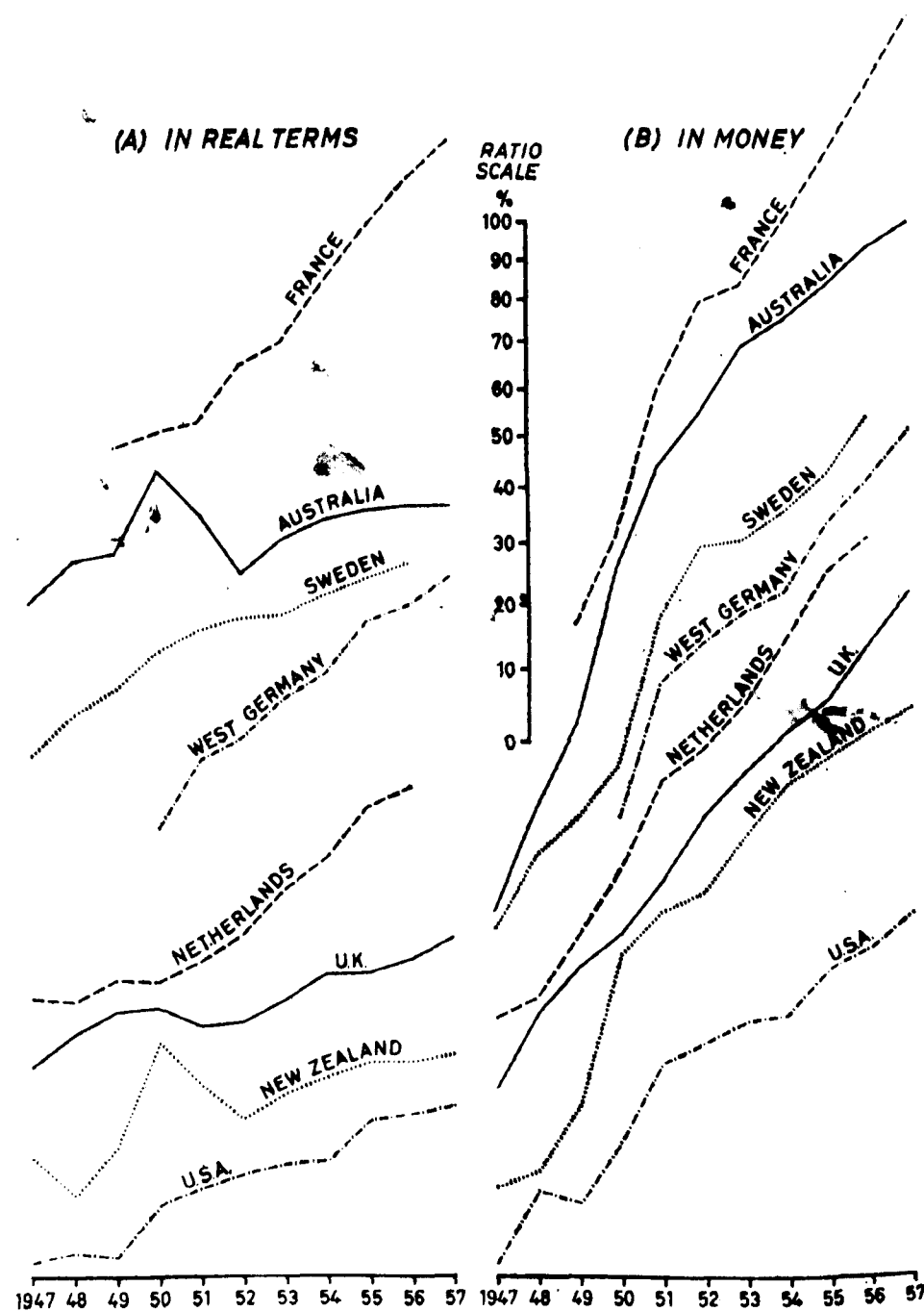


FIG. 4.—Rates of rise of income per head of occupied population, 1947-57.

3.1.4. The pay/income ratio also has this drawback, that we cannot proceed directly from ratios calculated for different sectors to the ratio for the whole economy: later we shall give ratios estimated separately for the agricultural sector and the rest of the economy, and these sector ratios can both be lower (or higher) than the ratio for the economy as a whole.¹

3.2. We have calculated pay/income ratios for eight countries which provide sufficient particulars of their occupied population year by year, and which include examples of different types of economy: four continental European countries—France, the Netherlands, Western Germany and Sweden; the United Kingdom; the United States; and two countries largely dependent on the export of primary products, Australia and New Zealand. A broad survey of the movements of real and money income per head of their occupied populations since 1947 is provided by Fig. 4; the data are in Table VI. We obtained the series for real income by deflating money income per head with a general price index, made by combining the series available in each country for cost of living, wholesale prices and rates of pay, in the proportions 8, 1, 1. It will be seen that all eight countries have achieved a substantial rise in real income per head, but in all of them the rise in money income per head has been much greater.

3.3.1. In this setting we can look at the pay/income ratios. The data are again in Table VI, and Fig. 5 shows the ratios for the agricultural sector and the rest of each economy separately. The reason for separating the agricultural sector is that it takes the impact of swings in the prices of primary products in world markets; especially during and after the Korean

¹ The proportions of the following example are not very different from those of Sweden:

	Sectors.		
	Agricultural.	Rest.	Whole economy.
(a) Income	3	27	30
(b) Pay	1	18	19
(c) No. of occupied	6	27	33
(d) No. of employees	3	24	27

$$\text{Pay/income ratio} = \frac{(b)}{(d)} \div \frac{(a)}{(c)}$$

$$\text{For the agricultural sector, this} = \frac{1}{3} \div \frac{3}{6} = 66.6\%$$

$$\text{For the rest, this} = \frac{18}{24} \div \frac{27}{27} = 75.0\%$$

$$\text{For the whole economy, this} = \frac{19}{27} \div \frac{30}{33} = 77.4\%$$

If in the rest the figures for pay and the number of employees instead of being 18, 24 were 3, 4, the pay/income ratio in each sector would be unchanged, but that for the whole economy would be only about 63%.

In general, if the quotient $(b) \div (d)$ is now higher in one sector than another, and the absolute values of (b) and (d) in that sector are raised in the same proportion, the quotient for the whole economy will be raised, and the pay/income ratio there will rise with it, though there will have been no change in the pay/income ratios in the sectors. The pay/income ratio in the whole economy will likewise be raised if the absolute values of (a) and (c) are raised in the sector where their quotient is lower.

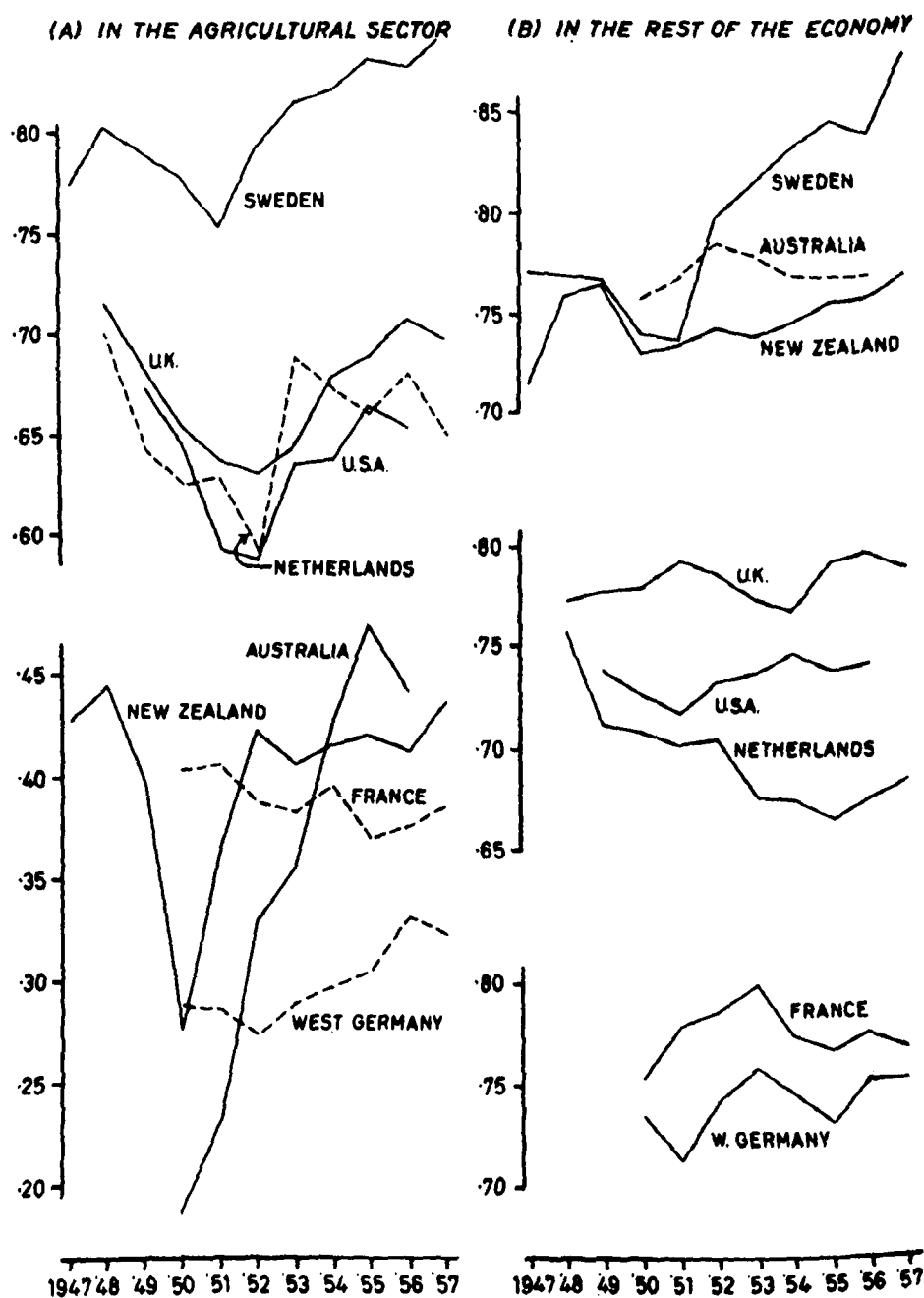


FIG. 5.—Pay/income ratios.

War these were wide, and in some economies they brought a big but soon reversed change in the relative size of profits and of incomes of unincorporated enterprises. We therefore thought that in separating the agricultural sector we should be largely removing an exogenous disturbance of the usual processes of distribution within the economy, which could be seen more clearly in the remaining sector. But the data for the whole economy are given in Table VII, though not graphed.

3.3.2. We must not place too much weight on the results we get for the internal proportions of the agricultural sector by itself: there is too much dubiety about the number of employees within the labour force of agriculture, and about their effective rates of pay, including payments in kind. The differences between the general levels of the pay/income ratio in different countries are therefore hardly capable of any direct interpretation. But the pattern that appears in the year-to-year movements in a number of countries, of a fall in the ratio down to 1952 and then a rise, is significant, and can be attributed to the opposite movement of the prices of primary products; though something may also be due to an increasing tendency, through public agencies for wage-fixing and through the pull of job opportunities in the towns, to bring up the wages of the farm worker nearer to those of the worker in industry.

3.3.3. In the other sector, that is, in the whole economy save agriculture, forestry and fishing, we see at once that the ratios of the different countries are at very much the same level. Sweden rises away from it in the later years, the Netherlands fall below it; but the other six are all never far from 0.75. This level, moreover, they keep. There are movements up and down, especially in the earlier years in New Zealand and (as the ratio for the whole economy shows) Australia, where we may see the impact of wide movements in the prices of exports. But elsewhere the movements lie within limits only about 4 percentage points apart, and they show no trend. We can, therefore, say that for most of the time in these six countries (outside agriculture) the average pay of an employee has been very closely three-quarters of the product available per head of the occupied population, and that this relation has been kept at a time when pay and profits have been bounding up year after year and the national income in money has as much as doubled in a decade.

3.3.4. The similarity of the ratios in different countries is another facet of the common pattern of distribution already illustrated in Fig. 1, and it raises again the question why the numerical outcome of the process of distribution should be so nearly the same in different countries. But no less striking is the comparative stability of the ratio within each country. Evidently there is some mechanism that keeps the returns to work and property in a fairly settled relation to one another even when their absolute amounts are changing rapidly under various pressures, some of them very different from the impersonal forces of the competitive market. It may be

that profits have been rising under the pull of demand, and pay has risen only consequently; or it may have been the claims for higher pay that were pushed through in the first place, with only consequent rises in prices and absolute profit margins; or something of both processes together, with this one or that taking the lead from one time to another. On this our materials throw no light. But they do show that whatever processes are actually at work are such as to bring about an outcome which remains remarkably the same. There is a paradox to resolve here. The quickness of the adjustment by quite large amounts implies, we might say, some freedom of the parties to name their own price; and yet when they have named it we find that an invisible hand has actually been holding them on a short rein.

3.3.5. But in the Netherlands and Sweden the rein seems not to have been so short: here the pay/income ratio outside agriculture has shifted progressively, over some five or six years, in the one country downwards, in the other upwards. If in the Netherlands we divide the whole national income into two components only, pay and the rest, we find that pay has risen fairly steadily by as much as nearly 10% a year, but the rest rose more than that from 1947 to 1948, and continued to rise somewhat faster until 1955; in the last two years its increase has been checked. There is no presumption that the proportions obtaining in 1947-48, at an early stage of recovery, should have persisted; but by the departure from them the pay/income ratio outside agriculture was brought to a lower level than we find elsewhere in Fig. 5. The major change seems to have been a rise in undistributed profits.¹ In Sweden the origin of the shift is more sharply defined: whereas pay rose year by year, by rather more than 9% a year on the average, the rest of national income actually declined for two years after 1951, and only in 1957 did it regain and pass the level of that year. The main source of this contraction and slow succeeding growth lay in undistributed profits, which after a sharp rise in 1950-51 fell back until in 1955 they were smaller than they had been seven years before.² Thus in both countries the main explanation of the shift of the pay/income ratio lies in a divergent movement of undistributed profits, but in the Netherlands they rose, in Sweden they fell.

4.0. Our materials enable us to throw some light on the course of inflation in the eight countries, and to ask whether any connection can be traced between the rates of rise of prices and of productivity.

4.1.1. We can form an indication of the course of the general level of labour costs per unit of output, by dividing the index of real product per head of the occupied population (already shown in Fig. 4) into that for

¹ Centraal Bureau voor de Statistiek, *Statistische en econometrische onderzoeken*, 3e. kw. 1959, p. 111.

² *Nationalbokföring för Sverige, 1938/39, 1946-1957* (Meddelanden från Konjunkturinstitutet, Serie B.27, 1958). Table 11, I.22, Disposable, and VI.4, Savings by Enterprises (including the irregular part of the residual).

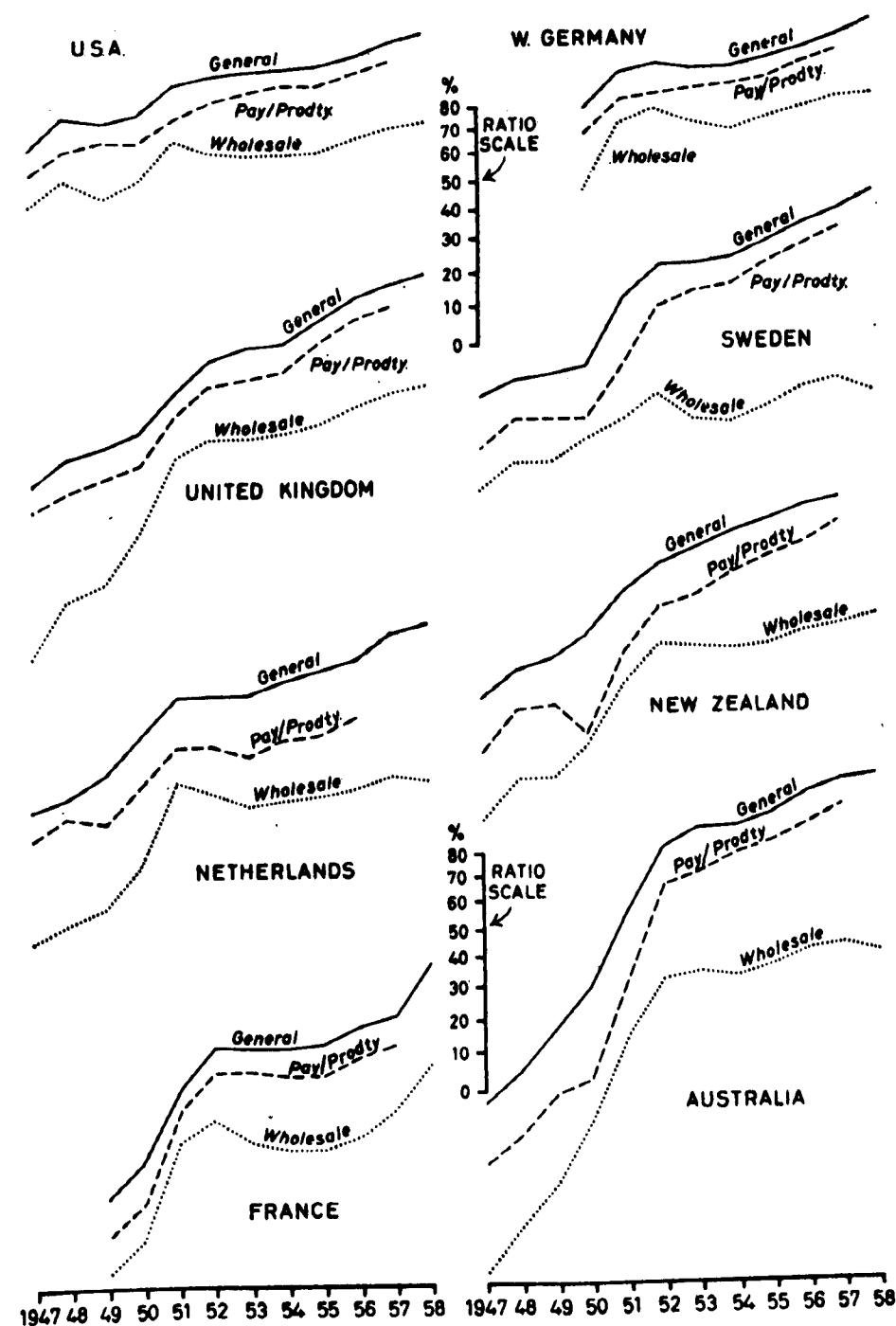


FIG. 6.—Indexes of general and wholesale prices and of pay per unit of output.

average pay: the quotient shows us approximately the rise of pay as a cost after allowance for the rise of productivity. The indication is only approximate, because the quotient may be affected by changes in the relative output of the self-employed. It also does not bring fresh evidence to bear, because it amounts only to multiplying the index of general prices by the pay/income ratio whose movements we have studied already;¹ but it serves to bring those movements to the eye as a relation between costs and prices. This is done by Fig. 6, where we can compare the movements of pay per unit of output with those of wholesale prices and of our composite index of general prices.

4.1.2. Fig. 6 shows once again the general stability of the relation between pay and product. The interval between the upper two curves is much the same at the end as at the beginning of the period save in the Netherlands, where it is wider—that is, roughly put, prices have risen relatively to labour costs, and the profit margin has widened—and in Sweden, where the opposite comes about, and there is convergence.

4.1.3. But what we see for the first time here is the difference between the movement of the general level of costs and prices and that of wholesale prices. This goes with a change in the rate of rise of both around 1952. In the opening years both are rising rapidly; after 1952 wholesale prices stop rising, even fall back for a time, while the rise of the general level of costs, and prices goes on but is a good deal slower. This is consistent with two hypotheses: (a) A rise in the prices of primary products in world markets impinges on particular countries as an exogenous factor tending to raise prices and money incomes generally, and if such a rise is already in train to quicken its pace. In so far as the principle of raising pay at least enough to offset rises in the cost of living is applied generally, and firms raise prices proportionally to rises in pay, an initial rise in the prices, say, of imported foodstuffs, will tend ultimately to raise all prices and incomes in its own proportion, however small the part of those foodstuffs in total outlay.² (b) But there is a process by which inflation is maintained even when wholesale prices are not rising, though then it may not work so rapidly. This

¹ Let average pay per employee be p , average income per occupied person y and the general level of prices π . Then the quotient is

$$p \div \frac{y}{\pi} = \pi \times \frac{p}{y}$$

² Let there be an exogenous rise of $r\%$ in the price of imports on which the proportion w of final outlay is spent. Then the cost of living rises initially by $wr\%$. On the present assumptions, all pay now rises by this proportion, and then the prices of home output are raised in this proportion too, and the rise in the cost of living is now $wr + (1-w)wr$. A second round of adjustment of pay to the cost of living and of prices to pay will follow, and the cost of living will now have risen by

$$wr + (1-w)[wr + (1-w)wr] = wr[1 + (1-w) + (1-w)^2]$$

And so on, to the limit

$$wr \left[1 + (1-w) + (1-w)^2 + \dots \right] = r$$

mechanism keeps the margin between labour costs and prices remarkably steady, whether the impulse point by point comes from a rise in the value product or a rise in costs. It may be at work at the same time as (a).

4.2.1. Figs. 4 and 6 show that inflation has gone on at very different prevailing rates in different countries, but also that within each country the rate has changed from time to time, and that in such changes countries have been often in phase with one another; in particular, it seems that the rate of inflation very generally slowed down about 1951 or 1952. This last point is enforced by Table II, though this uses money income, part of the rise in which marked a rise in real income.

TABLE II

Average Annually Compounded Rates of Rise in Money Income per Head of the Occupied Population

	Full span.		Phase I.		Phase II.	
		%		%		%
United States	1947-57	4.8	1947-51	6.9	1951-57	3.4
New Zealand	1947-57	6.6	1947-51	9.6	1951-57	4.7
United Kingdom	1947-57	6.8	1947-52	7.6	1952-57	6.1
Netherlands	1947-56	7.5	1947-51	8.3	1951-56	6.8
West Germany	1950-57	7.6			1951-57	5.8
Sweden	1947-56	7.9	1947-52	10.9	1952-56	4.4
Australia	1947-57	9.6	1947-51	16.1	1951-57	5.5
France	1949-57	11.5	1949-52	17.6	1952-57	8.0

4.2.2. It is natural to ask the question of fact, whether differences in the rate of inflation have been associated systematically with differences in the rate of growth of real income. One way to put the question is to compare different economies within the same, or much the same, span of time. This we do in Table III and Fig. 7: at least within this small number of countries no systematic relation appears.

TABLE III

Average Annually Compounded Rates of Rise, 1956-57 on 1947-48, in
(1) *General Prices*, (2) *Real Income per Head of the Occupied Population*

	(1) %	(2) %
Australia	8.5	1.1
France *	5.6	5.5
New Zealand	5.2	1.8
United Kingdom	5.0	1.5
Sweden	4.8	2.8
Netherlands	4.3	3.4
United States	2.3	2.2
West Germany †	2.1	4.6

* Starting-point 1949-50.

† Starting-point 1950-51.

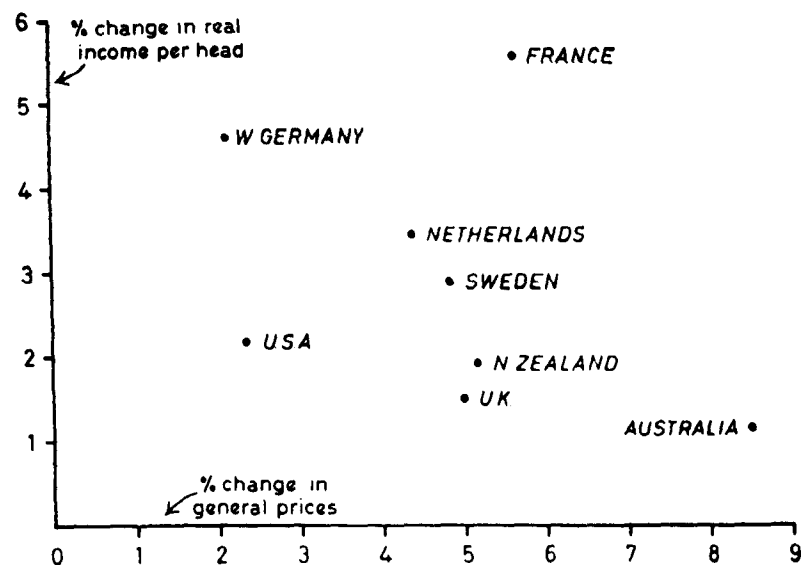


FIG. 7.—Indexes of general prices and of real income per head: average annually compounded rates of change, 1947/48 * to 1956/57.

* France 1949/50. W. Germany 1950/51.

TABLE IV

Indexes of General Prices and of Real Income per Head: Average Annually Compounded Rates of Change, in Eight Countries, over Spans between 1947 and 1957

Row 1. Index of General Prices } average annually compounded percentage rate of growth.
Row 2. Real Income per Head }

Span.		Australia.	France.	Netherlands.	New Zealand.	Sweden.	United Kingdom.	United States.	West Germany.
1947/48 to 1956/57	1	8.5	5.6 *	4.3	5.2	4.8	5.0	2.3	2.1 †
	2	1.1	5.5 *	3.4	1.8	2.8	1.5	2.2	4.6 †
1947-50	1	10.0	10.0 *	6.0	5.2	2.7	4.2	3.0	
	2	6.1	3.0 *	1.0	5.4	4.8	2.8	2.5	
1950-52	1	19.0	15.2	5.3	9.9	13.3	9.6	4.9	5.8
	2	-7.1	4.3	2.6	-5.3	2.3	-1.2	2.1	6.3
1952-54	1	2.4	-0.3	2.1	4.3	0.8	2.5	0.8	-0.7
	2	3.6	5.9	5.5	3.0	1.5	3.3	0.9	4.2
1954-57	1	3.7	2.8	3.6	2.5	4.1	4.5	2.0	2.7
	2	0.7	6.6	4.0	1.0	2.2	1.6	2.5	4.4

* Starting-point 1949.

† Starting-point 1950-.

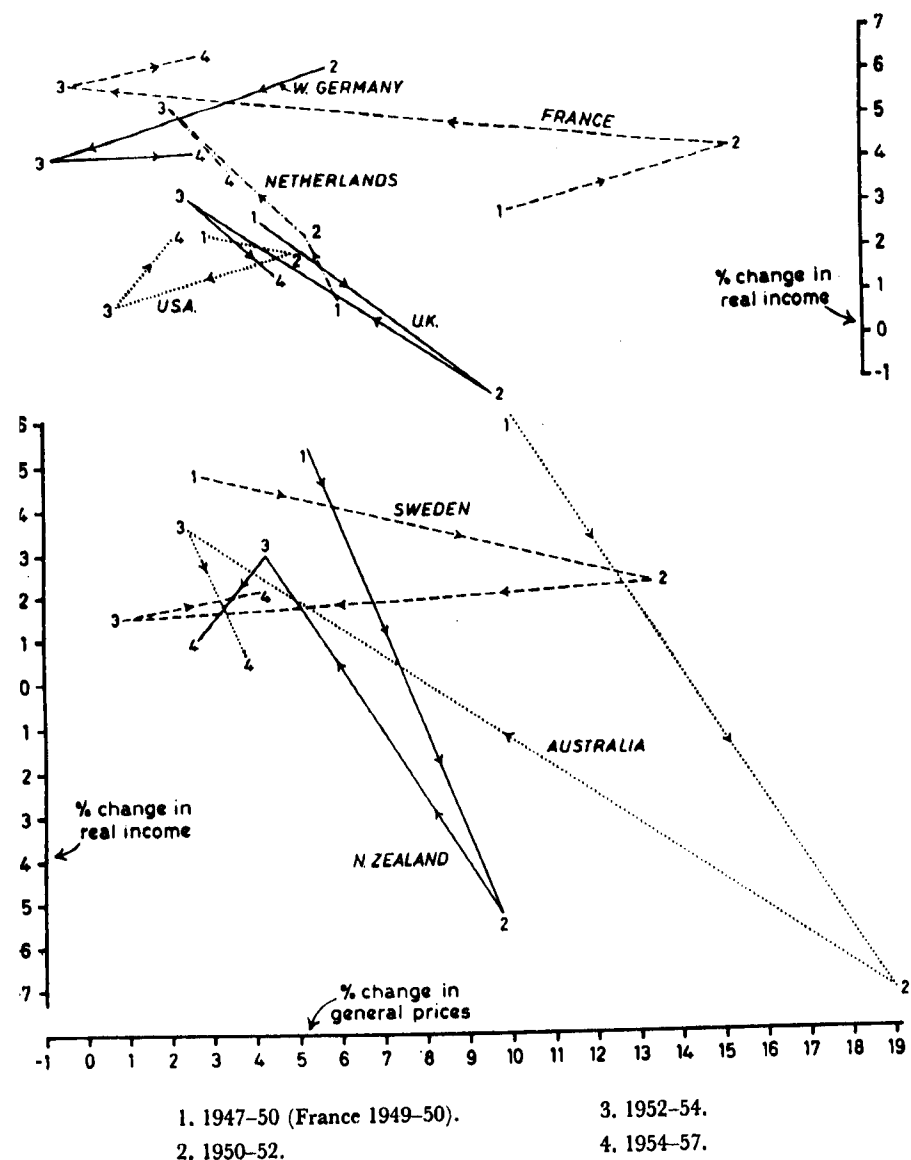


FIG. 8.—Indexes of general prices and real income per head: average annually compounded rates of change in four phases:

A second way to put the question is to compare different phases of inflation within one country. For this purpose we have as far as possible made separate reckonings for the same four short periods in all countries—1947–50, 1950–52, 1952–54, 1954–57. The data are set out in Table IV, and are shown in Fig. 8. Here again, no systematic relation appears. The proposition that some rise in prices, as distinct from stable or falling prices, promotes economic growth, or is its almost inevitable by-product, we are not able to test, for in all save very few of the periods taken here prices were in fact rising, and so was real income. But we can test the application in the short run of the propositions, first, that rising productivity helps to reduce or prevent inflation, so that we should expect periods of faster rise in real income per head to be periods of slower rise in prices; second, that rising prices are disturbing to production and check the growth of output; and third, very much to the contrary, that avoiding restraints and accepting a faster rise in prices will allow of a faster rise in real income. If the first or second of these propositions held in the short run, the lines of Fig. 8 would predominantly run downwards from left to right and upwards from right to left; and if the third, then the opposite. In fact, it is the former type of movement, that which associates a higher rate of rise of real income with a lower rate of rise of prices, that predominates: on a simple count, out of the twenty-three movements fourteen are of that type. But the nine instances to the contrary are substantial. If there has been any predominant association, then, between the rates of rise of real income and of prices, within the bounds of this material, and in the short run, it has been inverse—real income has risen more where prices have risen less; but there are significant exceptions: the rates of economic growth and inflation are not invariably connected with one another in the short run. We may compare the conclusion reached by U Tun Wai, in a study of thirty-one of the less-developed countries, in periods mostly since the Second World War:¹

“For the less developed countries in general, the findings did indeed prove to be inconclusive; but for most of the small number of individual countries for which the available statistics cover periods in which the rates of price increase differ significantly, the evidence suggests that the rate of growth was higher when the rate of inflation was lower.”

The Report on Employment, Growth, and Price Levels, prepared in 1959 by the staff of the Joint Economic Committee of Congress, after surveying the record of eight advanced countries over the last 50 or 90 years, and of twelve since 1949, found that “there is no simple relationship between changes in output and changes in prices. Rapid economic growth has at

¹ U. Tun Wai, “The Relation between Inflation and Economic Development,” *International Monetary Fund Staff Papers*, 7, 2, October 1959.

different times been associated with rising, constant, and falling price levels, just as periods of slow growth, or, indeed, of no growth, have been marked by every manner of price behavior.”¹

5.0. Conclusions

(a) A survey of some twenty-five countries whose accounts are reported in the *U.N. Yearbook of National Accounts Statistics* shows that in sixteen of them the composite share of work, approximated by the sum of pay and the income of unincorporated enterprises, lay between 81 and 87% of the net domestic product (2.0–2.1.2).

(b) The same accounts show some general tendency for the composite share of work to fall in 1950–52 and again after 1954: this was the outcome of a relative contraction of the sector of unincorporated enterprises, and a varying rate of rise of the return to property (2.2–2.2.1).

(c) After 1951 or 1952 there has been little divergence between the rises in pay and the return to property (2.2.2, 2.2.3).

(d) Over the whole field, what is remarkable is the absence of any general distributive change in the presence of general inflation (2.2.4).

(e) In eight countries the pay/income ratio (pay per employee as proportion of average income available per occupied person) after abstraction of the agricultural sector shows only minor movements about a level of 0.75, except for a decline in the Netherlands and a rise in Sweden due mainly to divergent movements of undistributed profits (3.0–3.3.5).

(f) The movements, in the eight countries, of the general level of prices, wholesale prices and labour cost per unit of output suggest that the mechanism of inflation changed at the same time as the rate, about 1952 (4.0–4.1.3).

(g) Differences in the rate of inflation have not been systematically associated with differences in the rate of growth of real income per head, whether we compare different countries or different periods; but within the present material it is instances of a lower rate of inflation being associated with a higher rate of growth of real income that predominate (4.2.1, 4.2.2).²

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¹ Joint Economic Committee, Congress of the United States, 86th Congress, 1st Session: Staff Report on Employment, Growth, and Price Levels, December 24, 1959, pp. 11–13.

² Appendix: see pp. 746–756.

APPENDIX

TABLE V

Shares of (1) Pay of Employees, (2) Income of Unincorporated Enterprises, (3) Work as a Whole, as Approximated by (1) + (2), in Net Domestic Product; together with (4), Pay of Employees as Share of Net Domestic Product Outside the Sector of Unincorporated Enterprise

Values in row 3 marked by asterisks are those taken as median, or central pair, for the purpose of Fig. 1.

SOURCE: U.N. Yearbook of National Accounts Statistics, 1957, 1958.

The net domestic product has been estimated by subtracting from "national income" (Table 3 of the Accounts) "net factor income from abroad" (Table 1 of the Accounts), where that is available. The subtraction has in effect been made wholly from property income, whereas part of it may actually consist of earnings.

The figures for Australia and New Zealand in this Table are for fiscal years beginning July 1 and April 1 respectively, and so differ somewhat from the figures for those countries in Table VII, which are for calendar years.

		1950.	1951.	1952.	1953.	1954.	1955.	1956.	1957.
Australia	1	0.490	0.587	0.577	0.581	0.591	0.601	0.589	0.615
	2	0.345	0.282	0.278	0.249	0.229	0.214	0.222	0.199
	3	0.835	0.869	0.855	0.830*	0.820*	0.815	0.811	0.814
	4	0.748	0.818	0.799	0.774	0.766	0.764	0.757	0.768
Belgium	1	0.538	0.541	0.559	0.549	0.544	0.546	0.554	0.571
	2	0.342	0.322	0.306	0.313	0.308	0.303	0.292	0.287
	3	0.880	0.863	0.865	0.862*	0.852	0.849	0.846	0.858*
	4	0.818	0.797	0.805	0.799	0.786	0.783	0.783	0.801
Brazil	1	0.432	0.413	0.426	0.419	0.414	0.440	0.475	0.472
	2	0.432	0.424	0.434	0.427	0.425	0.420	0.396	0.406
	3	0.864	0.837	0.860*	0.846	0.839	0.860*	0.871	0.880
	4	0.760	0.717	0.753	0.731	0.720	0.758	0.786	0.797
Canada	1	0.586	0.607	0.605	0.634	0.661	0.646	0.644	0.669
	2	0.197	0.204	0.184	0.168	0.138	0.142	0.144	0.120
	3	0.783	0.811	0.789*	0.802	0.799	0.788	0.788	0.789*
	4	0.749	0.763	0.741	0.762	0.766	0.753	0.753	0.760
Ceylon	1	0.480	0.457	0.453	0.464	0.473	0.473	0.472	0.469
	2	0.384	0.389	0.377	0.383	0.383	0.378	0.356	0.351
	3	0.864	0.846*	0.830	0.847*	0.856	0.851	0.828	0.820
	4	0.779	0.748	0.727	0.752	0.766	0.760	0.733	0.723
China (Taiwan)	1		0.414	0.402	0.384	0.439	0.409	0.409	0.413
	2		0.397	0.409	0.433	0.375	0.375	0.360	0.353
	3		0.811*	0.811	0.817	0.814	0.784	0.769	0.766
	4		0.687	0.680	0.677	0.702	0.655	0.640	0.639
Colombia	1	0.500	0.483	0.477	0.478	0.464	0.467	0.475	0.475
	2	0.304	0.298	0.321	0.339	0.338	0.319	0.331	0.337
	3	0.804*	0.781	0.798	0.817	0.802*	0.786	0.806*	0.812
	4	0.719	0.688	0.703	0.723	0.701	0.686	0.710	0.717
Costa Rica	1	0.601	0.597	0.586	0.596	0.596	0.599	0.605	0.614
	2	0.300	0.297	0.296	0.293	0.286	0.282	0.266	0.273
	3	0.901	0.894	0.882	0.889	0.882*	0.881	0.871	0.887*
	4	0.859	0.849	0.833	0.842	0.835	0.835	0.824	0.844

TABLE V—Continued

		1950.	1951.	1952.	1953.	1954.	1955.	1956.	1957.
a	1		0.603	0.661	0.660	0.645	0.628	0.629	0.604
	2		0.196	0.164	0.184	0.186	0.186	0.182	0.188
	3		0.799	0.825*	0.844	0.831	0.814*	0.811	0.792
	4		0.750	0.790	0.809	0.792	0.771	0.769	0.744
ador	1	0.479	0.480	0.442	0.454	0.463	0.479	0.475	
	2	0.223	0.225	0.251	0.244	0.235	0.228	0.222	
	3	0.702	0.705	0.693	0.698*	0.698	0.707	0.697	
	4	0.616	0.619	0.590	0.600	0.605	0.621	0.611	
and	1	0.614	0.585	0.620	0.620	0.614	0.611	0.622	0.631
	2	0.250	0.261	0.242	0.244	0.243	0.239	0.235	0.226
	3	0.864	0.846	0.862	0.864	0.857	0.850	0.857*	0.857*
	4	0.819	0.793	0.818	0.820	0.811	0.803	0.813	0.815
nce	1	0.548	0.559	0.570	0.568	0.582	0.577	0.588	0.586
	2	0.365	0.339	0.331	0.322	0.308	0.306	0.298	0.297
	3	0.913	0.898	0.901	0.890*	0.890*	0.883	0.886	0.883
	4	0.862	0.846	0.852	0.837	0.841	0.832	0.838	0.834
aica	1				0.578	0.570	0.575	0.573	
	2				0.253	0.255	0.244	0.215	
	3				0.831	0.825*	0.819*	0.788	
	4				0.774	0.765	0.760	0.723	
an	1	0.418	0.418	0.447	0.473	0.496	0.482	0.491	0.489
	2	0.456	0.432	0.441	0.393	0.383	0.391	0.364	0.344
	3	0.874	0.850	0.888	0.866*	0.879	0.873*	0.855	0.833
	4	0.768	0.735	0.800	0.779	0.804	0.792	0.772	0.746
embourg	1	0.589	0.508	0.508	0.496	0.583	0.555	0.565	0.566
	2	0.292	0.238	0.232	0.380	0.271	0.255	0.262	0.257
	3	0.881	0.746	0.740	0.876	0.854	0.810	0.827*	0.823*
	4	0.832	0.667	0.662	0.829	0.800	0.745	0.765	0.762
lta	1					0.592	0.588	0.573	0.577
	2					0.302	0.308	0.326	0.327
	3					0.894	0.896*	0.899*	0.904
	4					0.848	0.850	0.851	0.858
uritius	1	0.525	0.546	0.540	0.525	0.530	0.515	0.503	0.498
	2	0.198	0.186	0.188	0.201	0.190	0.176	0.183	0.173
	3	0.723*	0.732	0.728	0.726	0.720*	0.691	0.686	0.671
	4	0.654	0.671	0.665	0.657	0.654	0.625	0.616	0.602
w Zealand	1	0.458	0.532	0.540	0.534	0.548	0.565	0.569	0.587
	2	0.363	0.276	0.278	0.276	0.262	0.255	0.254	0.239
	3	0.821	0.808	0.818*	0.810	0.810	0.820*	0.823	0.826
	4	0.719	0.735	0.748	0.737	0.742	0.758	0.763	0.771
erto Rico	1	0.629	0.649	0.670	0.668	0.667	0.656	0.671	0.671
	2	0.238	0.235	0.219	0.213	0.214	0.224	0.210	0.200
	3	0.867	0.884	0.889	0.881*	0.881*	0.880	0.881	0.871
	4	0.825	0.848	0.857	0.849	0.848	0.846	0.849	0.838
ain	1					0.623			
	2					0.243			
	3					0.866			
	4					0.823			

TABLE V—Continued

		1950.	1951.	1952.	1953.	1954.	1955.	1956.	1957.
Sweden	1	0.587	0.583	0.629	0.648	0.656	0.669	0.662	0.663
	2	0.205	0.188	0.191	0.191	0.190	0.181	0.172	0.167
	3	0.792	0.771	0.820	0.839	0.846	0.850	0.834*	0.830*
	4	0.738	0.718	0.776	0.801	0.810	0.817	0.800	0.796
Switzerland	1	0.595	0.623	0.631	0.632	0.625	0.623	0.629	0.629
	2	0.212	0.210	0.197	0.196	0.201	0.198	0.191	0.192
	3	0.807	0.833	0.828	0.828	0.826*	0.821*	0.820	0.821
	4	0.755	0.788	0.786	0.786	0.782	0.777	0.778	0.778
Trinidad and Tobago	1		0.483	0.500	0.488	0.501	0.491	0.454	0.433
	2		0.260	0.260	0.254	0.264	0.274	0.252	0.237
	3		0.743*	0.760	0.742	0.765	0.765	0.706	0.670
	4		0.652	0.676	0.654	0.681	0.676	0.607	0.568
United Kingdom	1	0.738	0.737	0.723	0.718	0.719	0.740	0.744	0.745
	2	0.116	0.102	0.105	0.102	0.097	0.094	0.091	0.089
	3	0.854	0.839	0.828	0.820	0.816	0.834*	0.835	0.834*
	4	0.834	0.821	0.808	0.800	0.796	0.817	0.818	0.818
United States	1	0.650	0.653	0.675	0.692	0.698	0.688	0.703	0.712
	2	0.152	0.152	0.146	0.134	0.135	0.129	0.124	0.119
	3	0.802	0.805	0.821*	0.826*	0.833	0.817	0.827	0.831
	4	0.767	0.770	0.790	0.799	0.807	0.790	0.802	0.809
Mean of central 4 out of 18	3	0.854	0.839	0.835	0.840	0.842	0.838	0.831	0.830
	4	0.769	0.767	0.788	0.791	0.791	0.779	0.780	0.786

TABLE VI

Data for Fig. 3: Amounts in Current Money of (1) Pay, (2) Incomes of Unincorporated Enterprises, (3) Remaining Net Domestic Product (U.N. Yearbook of National Accounts Statistics, 1957 and 1958)

		1950.	1951.	1952.	1953.	1954.	1955.	1956.	1957.
Australia, million £A	1	1,535	1,934	2,083	2,248	2,439	2,659	2,807	2,899
	2	1,078	928	1,002	961	943	948	1,059	934
	3	517	431	525	658	745	820	899	877
Belgium, hundred million francs	1	1,466	1,676	1,774	1,807	1,868	1,986	2,132	2,320
	2	933	997	970	1,027	1,060	1,103	1,124	1,166
	3	326	426	429	455	509	550	591	578
Brazil, hundred million cruzeiros	1	916	1,050	1,249	1,509	1,887	2,544	3,465	4,053
	2	916	1,081	1,272	1,538	1,934	2,424	2,898	3,500
	3	289	414	409	555	734	811	945	1,032
Canada, million dollars	1	8,448	10,304	11,478	12,419	12,799	13,609	15,143	16,301
	2	2,846	3,464	3,488	3,287	2,665	2,990	3,385	2,915
	3	3,131	3,201	4,004	3,881	3,901	4,467	4,980	5,148
Finland, hundred million markka	1	2,549	3,599	3,800	3,813	4,188	4,705	5,394	5,691
	2	1,041	1,610	1,485	1,503	1,659	1,837	2,048	2,031
	3	564	940	845	838	973	1,157	1,237	1,292
France, thousand million francs	1	4,010	5,090	6,120	6,380	6,930	7,510	8,410	9,240
	2	2,670	3,080	3,560	3,610	3,660	3,990	4,260	4,690
	3	640	930	1,060	1,240	1,310	1,520	1,630	1,840
Japan, thousand million yen	1	1,415	1,819	2,222	2,679	2,983	3,139	3,616	4,057
	2	1,541	1,876	2,191	2,226	2,300	2,544	2,677	2,848
	3	428	654	554	759	726	826	1,068	1,385
New Zealand, million £NZ	1	284	336	359	396	443	480	508	552
	2	225	174	185	204	212	217	227	225
	3	111	121	121	141	154	153	158	164
Sweden, ten million kroner	1	1,559	1,890	2,228	2,310	2,453	2,689	2,888	3,109
	2	543	610	677	680	711	729	752	781
	3	553	743	636	573	575	604	722	797
Switzerland, ten million francs	1	1,044	1,153	1,238	1,290	1,355	1,444	1,559	1,651
	2	372	389	388	400	436	461	473	503
	3	339	310	337	351	378	414	445	470
United Kingdom, million £	1	7,603	8,459	9,112	9,608	10,263	11,203	12,201	12,942
	2	1,190	1,171	1,322	1,372	1,381	1,435	1,487	1,556
	3	1,509	1,845	2,165	2,404	2,632	2,510	2,713	2,880
United States, hundred million dollars	1	1,547	1,808	1,960	2,097	2,084	2,247	2,427	2,555
	2	361	423	422	407	404	422	424	430
	3	472	540	521	528	499	597	599	605

TABLE VII

Money and Real Income per Head of Whole Occupied Population, and Components of the Pay/Income Ratio in the Agricultural Sector, the Rest of the Economy and the Whole Economy, in Eight Countries, 1947-57

For SOURCES, see notes at end.

MATERIALS FOR FIGS. 4, 6

1. Composite index, base 1953, of general level of prices of final output.
2. $(18) \div (1)$, viz., real income per head of occupied population in units of currency of purchasing power of 1953.
3. Average labour cost per unit of product, approximated by $(17) \div (2)$, as index, 1953 = 100.
4. Index of wholesale prices.

PAY/INCOME RATIO: AGRICULTURAL SECTOR

5. Share of pay in total income of the sector, %.
6. Proportion of employees among total occupied in the sector, %.
7. Average pay per employee in the sector.
8. Average income per person occupied in the sector.
9. $(5) \div (6) = (7) \div (8) = \text{pay/income ratio in the sector, \%}$.

PAY/INCOME RATIO: REST OF THE ECONOMY

10. Share of pay in total income of the sector, %.
11. Proportion of employees among total occupied in the sector, %.
12. Average pay per employee in the sector.
13. Average income per person occupied in the sector.
14. $(10) \div (11) = (12) \div (13) = \text{pay/income ratio in the sector, \%}$.

PAY/INCOME RATIO: WHOLE ECONOMY

15. Share of pay in total income, %.
16. Proportion of employees among total occupied, %.
17. Average pay per employee.
18. Average income per occupied person.
19. $(15) \div (16) = (17) \div (18) = \text{pay/income ratio, \%}$.

	1947.	1948.	1949.	1950.	1951.	1952.	1953.	1954.	1955.	1956.	1957.
AUSTRALIA. Unit of currency in rows 2, 7, 8, 12, 13, 17, 18: £A.											
1	511	555	614	679	822	961	1,000	1,008	1,039	1,096	1,125
2	949	1,007	1,018	1,133	1,071	988	1,033	1,061	1,074	1,078	1,081
3	48	52	57	59	76	96	100	102	106	112	116
4	47	53	59	69	85	98	100	99	102	106	107
5				8	10	14	15	18	20	19	
6	41	42	42	42.5	42.5	43	42.5	43	42.5	42	
7				270.8	343.7	433.0	492.3	540.4	583.3	586.4	
8				1,450.1	1,472.3	1,311.1	1,377.7	1,255.4	1,222.9	1,323.0	
9				18.7	23.3	33.0	35.7	43.0	47.7	44.3	
10				65.9	67.0	68.8	66.9	66.9	66.9	67.0	
11				87.2	87.5	87.6	87.4	87.2	87.3	87.4	
12				523.3	629.0	693.6	757.6	827.8	868.8	905.3	
13				692.5	820.6	883.8	974.1	1,078.4	1,133.2	1,180.8	
14				75.6	76.6	78.5	77.8	76.8	76.7	76.7	
15	55.1	54.5	54.8	51.7	55.0	59.2	58.9	59.7	60.7	60.6	61.3
16	80.7	81.1	81.3	81.8	82.1	81.9	81.6	81.9	82.2	82.2	82.1
17	331	376	421	486	590	686	746	780	825	870	909
18	485	559	625	769	880	949	1,033	1,069	1,116	1,181	1,216
19	68.2	67.3	67.4	63.2	67.0	72.3	72.2	73.0	73.9	73.7	74.7

TABLE VII—continued

	1947.	1948.	1949.	1950.	1951.	1952.	1953.	1954.	1955.	1956.	1957.
FRANCE. Unit of currency in 2, 7, 8, 12, 13, 17, 18: '000 francs.											
1			692	761	912	1,010	1,000	1,004	1,018	1,048	1,089
2			563	580	587	631	654	707	763	813	857
3			66	72	90	99	100	98	99	104	106
4	37	65	72	78	100	105	100	98	98	102	108
5				13	14	14	14	14	14	15	14
6				33	34	35.5	35.5	35.5	38	38.5	36
7				149.1	172.7	191.8	200.0	209.1	200.0	208.3	245.4
8				370.3	425.0	491.9	520.0	525.8	538.7	550.6	632.3
9				40.3	40.6	39.0	38.5	39.8	37.1	37.8	38.8
10				63.4	65.6	65.7	66.9	65.6	64.3	65.2	65.1
11				84.1	84.1	83.6	83.6	84.5	83.8	83.8	84.8
12				346.1	441.4	527.0	548.8	582.6	637.7	715.8	766.7
13				459.2	565.8	669.8	685.7	751.5	830.9	920.8	998.8
14				75.4	78.0	78.7	80.0	77.5	76.7	77.7	76.8
15	52.1	53.9	55.6	55.0	57.6	58.2	59.0	58.4	57.9	59.1	58.9
16	72.7	73.3	73.9	73.9	73.9	74.5	74.5	75.4	75.4	75.4	76.2
17	147.5	242.1	293.0	328.4	417.2	497.0	517.6	550.0	596.0	667.5	721.9
18	206.1	329.6	389.4	441.4	535.0	636.6	654.2	709.6	776.6	852.1	933.3
19	71.6	73.4	75.2	74.4	78.0	78.1	79.1	77.5	76.7	78.3	77.3

	1947.	1948.	1949.	1950.	1951.	1952.	1953.	1954.	1955.	1956.	1957.
NETHERLANDS. Unit of currency in rows 2, 7, 8, 12, 13, 17, 18: guilders.											
1	758	780	826	904	995	1,002	1,000	1,044	1,066	1,088	1,160
2	4,538	4,535	4,699	4,673	4,751	4,917	5,203	5,471	5,845	6,051	6,162
3	82	87	86	93	102	102	100	104	105	109	126
4	72	75	78	87	107	104	100	101	102	104	107
5		25.1	22.5	21.4	21.5	20.2	22.9	21.8	21.4	22.0	21.1
6		35.9	35.1	34.2	34.2	34.2	33.3	32.4	32.4	32.4	32.4
7		311	329	365	400	422	446	486	517	542	608
8		446	512	585	637	713	648	724	784	797	935
9		69.9	64.2	62.5	62.8	59.1	68.8	67.1	65.9	67.9	65.0
10		64.5	60.9	60.8	60.4	60.6	58.3	58.5	57.9	59.1	60.0
11		85.3	85.6	85.9	86.0	86.0	86.4	86.9	87.3	87.5	87.7
12		2,585	2,646	2,854	3,181	3,286	3,408	3,734	4,023	4,345	4,739
13		3,419	3,723	4,030	4,532	4,667	5,051	5,547	6,062	6,440	6,926
14		75.6	71.1	70.8	70.2	70.4	67.5	67.3	66.4	67.5	68.4
15	56.3	58.8	55.3	55.0	54.8	54.4	53.8	53.9	53.5	54.9	55.4
16	78.6	79.6	80.1	80.3	80.5	80.6	81.0	81.6	82.0	82.4	82.7
17	2,463	2,612	2,681	2,890	3,218	3,328	3,457	3,778	4,066	4,384	4,787
18	3,440	3,537	3,881	4,224	4,727	4,927	5,203	5,712	6,231	6,583	7,148
19	71.6	73.8	69.1	68.4	68.1	67.5	66.4	66.1	65.2	66.6	67.0

TABLE VII—continued

	1947.	1948.	1949.	1950.	1951.	1952.	1953.	1954.	1955.	1956.	1957.
NEW ZEALAND. Unit of currency in rows 2, 7, 8, 12, 13, 17, 18: £NZ.											
1	683	733	754	796	892	961	1,000	1,045	1,067	1,105	1,126
2	854	812	862	999	944	901	933	955	975	974	989
3	67	75	76	72	87	97	100	106	111	116	121
4	65	72	72	78	91	101	100	99	100	104	105
5	19.3	19.6	17.2	11.6	15.5	17.8	17.1	17.5	17.7	17.4	18.5
6	45	44	43	42	42	42	42	42	42	42	42
7	292.9	325.4	342.6	371.7	424.5	460.7	475.5	505.7	517.0	517.0	534.0
8	686.7	731.2	860.0	1,342.9	1,154.8	1,086.5	1,170.2	1,216.7	1,225.4	1,249.2	1,216.7
9	42.6	44.5	39.8	27.7	36.8	42.4	40.6	41.6	42.2	41.4	43.9
10	60.1	63.9	64.7	62.8	63.2	64.3	64.0	64.3	65.7	66.2	67.1
11	84.2	84.4	84.8	85.9	86.1	86.5	86.6	86.3	86.9	87.5	87.5
12	400.1	428.4	461.9	497.1	570.7	610.2	655.1	713.1	759.7	789.2	834.1
13	560.2	565.3	604.8	680.5	778.0	820.9	886.6	956.5	1,005.5	1,043.7	1,087.0
14	71.4	75.8	76.4	73.0	73.4	73.9	74.5	75.5	75.6	76.7	76.7
15	51.6	54.3	53.8	47.8	52.0	54.5	54.3	55.2	56.8	57.4	59.0
16	77.4	77.9	78.2	78.0	79.5	79.3	79.6	79.5	80.0	80.5	80.6
17	388.5	414.5	447	488	558	595	636	693	738	767	810
18	583	595	650	795	842	866	933	998	1,040	1,076	1,107
19	66.7	69.6	68.8	61.4	66.3	68.7	68.2	69.4	71.0	71.3	73.2

	1947.	1948.	1949.	1950.	1951.	1952.	1953.	1954.	1955.	1956.	1957.
SWEDEN. Unit of currency in rows 2, 7, 8, 12, 13, 17, 18: kronen.											
1	717	751	761	776	920	996	1,000	1,011	1,046	1,100	1,142
2	8,099	8,557	8,874	9,331	9,610	9,771	9,801	10,066	10,261	10,505	10,756
3	67	70	70	70	83	96	100	102	107	111	98
4	67	72	72	76	100	106	100	99	103	108	110
5	40	41	39	38	37	39	40	41	41	40	41
6	51	51	50	48	49	49	49	49.5	49	48	48
7	2,678	3,055	3,158	3,277	3,822	4,765	4,833	5,141	5,549	5,847	6,001
8	3,461	3,815	3,998	4,214	5,087	6,019	5,936	6,271	6,636	7,018	7,056
9	77.4	80.1	79.0	77.8	75.1	79.2	81.4	82.0	83.6	83.3	85.0
10	70.6	70.5	70.3	67.8	67.4	73.4	75.7	76.2	77.7	77.0	80.9
11	91.7	91.8	91.7	91.6	91.6	91.9	91.7	91.8	91.9	92.1	92.3
12	4,929	5,430	5,629	5,881	7,161	8,466	8,804	9,169	9,801	10,418	11,639
13	6,404	7,069	7,344	7,943	9,727	10,597	10,666	11,038	11,599	12,462	13,275
14	77.0	76.8	76.6	74.0	73.6	79.9	82.5	83.1	84.5	83.6	87.6
15	66.9	67.0	66.1	64.5	64.1	69.4	71.7	72.3	73.7	73.3	73.5
16	83.5	83.7	83.5	83.5	83.5	83.8	83.9	84.1	84.5	84.8	85.2
17	4,649	5,146	5,342	5,598	6,785	8,056	8,377	8,741	9,370	9,985	10,592
18	5,807	6,426	6,753	7,241	8,841	9,732	9,801	10,177	10,733	11,555	12,283
19	80.0	80.1	79.1	77.3	76.7	82.8	85.5	85.9	87.3	86.4	86.2

TABLE VII—continued

	1947.	1948.	1949.	1950.	1951.	1952.	1953.	1954.	1955.	1956.	1957.
UNITED KINGDOM. Unit of currency in rows 2, 7, 8, 12, 13, 17, 18: £.											
1	716	760	782	809	897	971	1,000	1,021	1,063	1,124	1,166
2	524	545	564	569	553	556	573	593	594	604	622
3	73	76	78	81	92	99	100	102	109	116	119
4	58	67	70	80	97	100	100	101	104	108	112
5		49	43	42	40.5	40	40	42	42	42	[41.5]
6		68	64	64	63.5	63	62	62	60.5	60	60
7		336	329	313	337	361	386	362	421	456	481
8		470	483	479	529	573	599	588	612	646	691
9		71.5	68.1	65.3	63.7	63.0	64.4	67.9	68.8	70.6	69.6
10		72.6	72.8	72.9	74.1	73.6	72.5	72.1	74.6	74.8	74.9
11		93.7	93.5	93.6	93.4	93.6	93.7	93.9	94.0	94.0	94.9
12		318.0	340.8	356.8	391.4	422.7	441.9	464.8	501.2	541.3	573.1
13		410.6	437.9	458.2	493.4	537.7	571.1	604.9	631.6	679.7	725.9
14		77.4	77.8	77.9	79.3	78.6	77.4	76.8	79.3	79.6	78.9
15	72.2	71.2	71.1	71.2	72.3	71.8	70.9	70.8	73.1	73.5	73.5
16	92.2	92.5	92.0	92.1	92.0	92.1	92.3	92.4	92.5	92.5	93.4
17	293.1	318.7	340.4	355.3	389.6	420.7	440.1	462.7	498.8	538.9	570.6
18	374.5	414.2	440.6	459.7	495.6	539.8	573.0	604.6	631.2	678.8	725.0
19	78.3	76.9	77.3	77.2	78.6	77.9	76.8	76.5	79.0	79.4	78.7

	1947.	1948.	1949.	1950.	1951.	1952.	1953.	1954.	1955.	1956.	1957.
UNITED STATES. Unit of currency in rows 2, 7, 8, 12, 13, 17, 18: \$.											
1	822	892	882	898	970	988	1,000	1,003	1,008	1,033	1,065
2	4,145	4,205	4,184	4,464	4,580	4,651	4,715	4,741	5,003	5,046	5,102
3	82	87	90	89	94	98	100	102	101	105	108
4	88	95	90	94	104	101	100	100	101	104	107
5			17	16.5	15	15	15	16.5	17	18	[18]
6		26	26	26	25.5	25.5	25.5	26	27	27	28
7			1,287	1,323	1,498	1,466	1,452	1,411	1,484	1,522	
8			1,916	2,048	2,524	2,496	2,286	2,216	2,235	2,331	
9			67.2	64.6	59.3	58.7	63.5	63.7	66.4	65.3	
10			69.2	67.9	68.9	70.8	71.9	72.1	71.3	72.6	
11			93.6	93.5	96.1	96.6	97.5	96.6	96.5	97.8	
12			2,959	3,135	3,384	3,573	3,711	3,797	3,974	4,103	
13			4,002	4,317	4,717	4,877	5,029	5,084	5,375	5,528	
14			73.9	72.6	71.7	73.3	73.8	74.7	73.9	74.2	
15	65.3	63.6	65.1	64.3	65.1	67.2	68.9	69.2	68.8	70.3	70.9
16	84.5	84.5	83.4	84.2	87.3	88.2	89.3	88.6	89.1	89.6	91.0
17	2,634	2,824	2,885	3,060	3,315	3,501	3,635	3,713	3,894	4,088	4,235
18	3,407	3,751	3,690	4,009	4,443	4,595	4,715	4,755	5,043	5,213	5,434
19	77.3	75.3	78.1	76.4	74.6	76.2	77.1	78.1	77.2	78.5	77.9

TABLE VII—continued

	1947.	1948.	1949.	1950.	1951.	1952.	1953.	1954.	1955.	1956.	1957.
WEST GERMANY. Unit of currency in rows 2, 7, 8, 12, 13, 17, 18: D. mks.											
1				907	989	1,015	1,000	1,001	1,026	1,062	1,084
2				4,714	5,160	5,321	5,614	5,781	6,169	6,312	6,584
3				91	98	99	100	101	102	107	110
4				85	100	103	100	98	101	103	105
5				13.5	13	12	13	13	13	14	13
6				47	45	44	44	43	42	42	41
7				1,045	1,301	1,361	1,456	1,547	1,705	1,993	2,185
8				3,622	4,527	4,958	5,020	5,177	5,602	6,009	6,756
9				28.9	28.7	27.5	29.0	29.9	30.4	33.2	32.3
10				63.3	62.2	64.9	66.2	66.0	65.1	66.7	67.2
11				86.1	87.2	87.3	87.2	88.3	88.9	88.5	89.2
12				3,300	3,831	4,000	4,267	4,415	4,740	5,085	5,414
13				4,490	5,370	5,380	5,620	5,900	6,470	6,750	7,187
14				73.5	71.3	74.3	75.9	74.7	73.2	75.4	75.3
15				59.1	58.5	58.6	60.1	61.3	60.8	62.1	62.3
16				81.3	81.6	82.3	82.7	83.2	83.9	84.4	84.5
17				3,107	3,662	3,842	4,083	4,260	4,587	4,933	5,266
18				4,276	5,103	5,401	5,614	5,787	6,329	6,703	7,137
19				72.7	71.8	71.1	72.7	73.6	72.5	73.6	73.8

NOTES ON TABLE VII: (i) PRICE INDEXES

General Sources. For prices, *U.N. Statistical Yearbook*, 1953, 1957; *U.N. Monthly Bulletin of Statistics*, October 1959. For wages, *I.L.O. Yearbook of Labour Statistics*, 1953, 1957.

Index of General Level of Prices of Final Output made by combining indexes of cost of living, wholesale prices and wages with weights 8, 1, 1, respectively.

Notes on Indexes of Wholesale Prices: Australia, basic materials: home consumption of food (excluding onions and potatoes), farm products and industrial raw materials. Netherlands, New Zealand, Sweden, home-consumed goods, general. France, United States, West Germany, general. United Kingdom, general index, extrapolated through 1956–58 by wholesale price index, all manufactured products other than fuel, food and tobacco, in *O.E.E.C. General Statistics*, September 1959.

Notes on Indexes of Wages: Australia, minimum weekly rates for adults in mining, manufacturing, construction, commerce, transport, services; entries for 1957, 1958 extrapolated by index of weighted average of nominal weekly rates for adult males, in *Quarterly Summary of Australian Statistics*, March 1959. France, index of net monthly wages calculated from hourly rates, overtime and other supplements and family allowances, and after deduction of insurance contributions and tax: *Statistiques et Etudes Financières*, Suppléments 114, June 1958, and 130, October 1959. Netherlands, earnings of men per hour in manufacturing. New Zealand, minimum hourly rates for men in branches of mining, manufacturing, construction, commerce, transport, services. Sweden, average earnings per hour of men in mining and manufacturing. United Kingdom, rates for normal week, manual workers. United States, hourly wages of men and women in manufacturing. W. Germany, hourly earnings in manufacture and construction, *O.E.E.C. General Statistics*, September 1959.

NOTES ON TABLE VII: (ii) ESTIMATES OF PAY/INCOME RATIO

1. DEFINITIONS

total Occupied: All gainfully employed in jobs. Excludes unpaid family workers and the unemployed.

employees: All wage and salary earners in jobs, including Armed Forces at home and abroad; domestic servants; part-time workers counted as whole units. Biennial series have been interpolated.

national Income: At Factor Cost net of capital consumption where given, or depreciation. Adjusted for stock revaluation. Including net income from abroad. Data given for financial years have been interpolated to give estimates for calendar years.

y: Includes wages in kind and employers' contributions to social security.

income from Agriculture: Includes the value of rent where possible. Data for crop years have been interpolated to give estimates for calendar years.

2. SOURCES AND METHODS

In the notes below, minor discrepancies are not mentioned, and interpolations and extrapolations have been noted only for major items.

Australia

Sources. Census Reports 1947 and 1954 (C.R.47 and C.R.54). *Monthly Bulletin of Employment Statistics* (M.B.E.). Primary Industries Part I: Rural Industries (P.I.R.). Parliamentary Papers on National Income and Expenditure, 1946/47 to 1957/58 (N.I.E.); Table numbers refer to 1957/58 paper.

Method. (1) *Whole Economy: Employers and Self-employed:* C.R.47 and C.R.54 with interpolations and extrapolations. *Employees:* Non-rural and Armed Forces, M.B.E.; Rural, P.I.R., Table 144. Domestic: C.R.47 and C.R.54. *National Income:* N.I.E. ("Resident Income" as defined in Appendix A), Table VII, p. 21. *Pay:* N.I.E., Table I, p. 16. (2) *Farms. Total occupied:* P.I.R., Table 144. *Employees* including temporary workers: P.I.R., Table 144. *Income:* N.I.E., Table I, p. 16; includes operations of the Produce Boards (see Appendix D, Note 4). *Wages:* P.I.R., Table 145. No figures for rent.

France

Sources. Recensement Général de la Population, 1946 (R.G.46) and *Résultats du Sondage au 1/20 me.*, 1954. (R.G.S.54). *Annuaire Statistique de la France 1951–58* (A.S.F.).* *I.L.O., Year Book of Labour Statistics*; Unemployment Tables (I.L.O.). *Bulletin Mensuel de Statistique*; Quarterly Supplements, *Etudes statistiques* (E.S.).* *O.E.E.C., Bulletin of General Statistics*, March 1957, p. 53 (O.E.E.C.). *Statesman's Year Book*, 1946–58 (S.Y.). *Etudes et Conjoncture* (E.C.).* S. F. Nedzynski, "Factor Remuneration and Salaires Indirectes in the French National Wages Bill" (London, Ph.D. Thesis) (S.F.N.).

* Institut National de la Statistique et des Etudes Economiques.

Method. (1) *Whole Economy.* Lack of figures, differences of classification and the known defects of R.G.46 (see *Premiers Résultats Détaillés*, pp. XLII–XLIII, XLVII, LIX) entailed many interpolations, extrapolations and adjustments for all categories of worker. For general guidance: E.S., July/September 1956, "Evolution de la population active de la France entre 1906 et 1954"; July/September 1957, "La population active de la France 1954–57." R.G.S.54 was the main guide throughout. *Civil Employees:* R.G.46; R.G.S.54; O.E.E.C.; A.S.F., "Population Active, Emploi et Main d'œuvre," giving occasional returns from "l'Enquête Emploi," E.S. July/September 1957, p. 19 (estimates for 1957); I.L.O. *Armed Forces:* R.G.46; R.G.S.54; S.Y.; E.S. July/September 1956, p. 13, July/September 1957, p. 18; E.C. June 1957, pp. 625, 629. *Employers and Self-employed:* R.G.46; R.G.S.54; A.S.F., chapter cited above. *National Income and Pay.* A.S.F., especially 1956, 1958, "Revenu National et Grands Associations"; guidance from S.F.N. No reference found to stock adjustment. (2) *Agriculture and Forestry: Employers and Self-employed, Employees.* Guidance from E.S. July/September 1956, p. 5; R.G.46; R.G.S.54; O.E.E.C.; A.S.F. 1957, p. 68 Table III; E.S., July/September 1957, p. 19 (estimate for 1957). *Income and Pay:* E.C., September/October 1951; December numbers 1952–57; May 1958; "Le Revenu d'Agriculture." The figures are said to be subject to a wide margin of error.

Netherlands

Sources. *Statistische en Econometrische Onderzoekingen* (S.E.O.). *O.E.E.C. Statistical Bulletin*, March 1957, p. 53 (O.E.E.C.). *I.L.O. Year Book of Labour Statistics* 1958 (I.L.O.). Netherlands Central Bureau of Statistics: *Statistical Studies No. 4*, for definitions used in National Accounting. *Maandschrift van het Centraal Bureau voor de Statistiek*, February 1960 (M.S.).

Method. (1) *Whole Economy. Total Occupied:* Figures are in man-years, and "employers and self-employed" include unpaid family workers (see M.S., p. 111) for whom the man-year basis involves a substantial reduction from actual numbers. Therefore, for employers and self-employed, I.L.O. (Census of 1947) was used all through, after comparison with O.E.E.C. *Employees* in man-years: M.S., p. 113, Staat 2, plus "Arbeiders op objecten voor aanvullende werken," p. 112, Staat 1. *National Income and Pay:* S.E.O., kw. 2 and 3, December 1958; S.E.O., kw.2, 1955. (2) *Agriculture, Forestry and Fishing:* for the reason given above, *Employers and Self-employed* from I.L.O. *Employees* in man-years: M.S., p. 113, Staat 2. *Income and Pay:* S.E.O., kw. 2 and 3, 1958, Tables 25 and 36.

New Zealand

Sources. *Monthly Abstract of Statistics* (M.A.S.). Census Reports 1945 and 1951 (C.R.45 and C.R.51). Preliminary Report on 1956 Census issued as supplement to M.A.S., November 1957 (C.R.P.56). Official Estimates of National Income and Expenditure (N.I.E.): the table numbers quoted refer to the 1958 volume. *I.L.O. Year Book of Labour Statistics: Agricultural Wages* (I.L.O.).

Method. (1) *Whole Economy. Total Occupied:* M.A.S.: "Estimated Distribution of the Total Labour Force" less unpaid family workers, C.R.45 and C.R.51. *Employees:* C.R.45, C.R.51, C.R.P.56 with interpolations and extrapolations. *National Income and Pay:* N.I.E., Table 3. No reference found to stock revaluation. (2) *Farming. Total occupied and Employees:* C.R.45, C.R.51, C.R.P.56 with interpolations and extrapolation. *Income, including operations of the Produce Boards:* N.I.E., Table 4, items 24 c, d and e. *Pay:* I.L.O. approximate average weekly wage $\times$ 50. No figures for rent.

Sweden

Sources. Statistisk Årsbok för Sverige (S.A.). Meddelanden från Konjunkturinstitutet, Serie B.27, 1958: *Nationalbokföring för Sverige 1938/39, 1946-57* (N.B.).

Method. (1) *Whole Economy. S.A., Annual tables:* "Income Earners and Total Income by Industry" (Table 356 in 1959 volume) gives *Total Occupied and Employees. National Income:* N.B., Table 2, Alternative II, giving G.N.P. at factor cost; less depreciation Table 11, p. 38, item 8. *Pay:* N.B., Table 11, p. 34, IV. 4. (2) *Agriculture, Forestry and Fishing. Total occupied and Employees:* S.A., series quoted above. *Total Income:* *ibid.*, income of employers plus pay. No figure for rent, but see Table 53, 1959 volume, for relative importance of rented and owner-operated holdings.

United Kingdom

Sources. Annual Abstract of Statistics (A.A.S.). Census Report 1951 One per Cent Sample (C.R.). Census of Population of Northern Ireland 1951: General Report (C.N.I.). Government of Northern Ireland: *Digest of Statistics* (D.S.); *Ulster Year Book* (U.B.). *Blue Book on National Income and Expenditure* (B.B.).

Method. (1) *Whole Economy. Total Occupied:* Separately compiled for Great Britain and Northern Ireland. (a) Great Britain: A.A.S., Section V, "Distribution of Total Manpower," civil employment. (b) Northern Ireland: C.N.I., with U.B., 1956, p. xxxiv and D.S.(A.I) population figures, used with C.N.I., Table XXVII, as basis for "economically active," with annual deduction for unemployment, A.A.S. *Total occupied:* (a) + (b) + Armed Forces (United Kingdom), A.A.S. *Employees* (United Kingdom): A.A.S. Section V. *National Income:* B.B., 1956, 1958, Table 1. For 1947, depreciation: Table 60 in 1956. *Pay:* B.B. 1956, 1958, Table 1. (2) *Farming. Total occupied:* (a) Great Britain: A.A.S., Section V, "Distribution of Total Manpower," with deduction for forestry and fishing from C.R. (b) Northern Ireland: D.S., H., "Agricultural Manpower." *Employees* (United Kingdom): A.A.S. *Income* (United Kingdom): A.A.S., Section VI, Agriculture, "Farming net Income" plus "Cost of Labour" and "Rent and Interest." *Pay:* A.A.S., Section VI, Agriculture, "Cost of Labour."

United States

Sources. Statistical Abstract of the U.S.A. (S.A.U.); numbers refer to tables in 1958 volume. *Survey of Current Business*, July numbers (S.C.B.).

Method. (1) *Whole Economy. Total occupied:* S.A.U., 254, less unpaid family workers, S.A.U., 273. *Employees:* Industrial, S.A.U., 261; Farm, S.A.U., 270; Armed Forces, S.A.U., 254; Domestic, S.C.B.; "Average Number of Full and Part-time Workers by Industry." *National Income and Pay:* S.A.U., 386. (2) *Farming. Total occupied:* S.A.U., 270, less unpaid family workers, S.A.U., 273. *Employees:* S.A.U., 270. *Income:* S.A.U., 387. *Pay:* S.C.B.: "Compensation of Employees in Industry."

WEST GERMANY (excluding the Saar and West Berlin)

Sources. Statistisches Jahrbuch für die Bundesrepublik Deutschland 1950-1958 (S.J.). Organization for European Economic Cooperation, *Bulletin of General Statistics*, March 1957, p. 53 (O.E.E.C.). I.L.O. *Year Book of Labour Statistics* (I.L.O.).

Method. (1) *Whole Economy. Employers and Self-employed:* I.L.O. (Census of 1950); O.E.E.C.; interpolations and extrapolations. *Employees:* S.J., Section VII, B.4. *National Income:* S.J., Section XXIII, A.2. *Pay:* S.J., Section XXIII, A.1, "Bruttoeinkommen aus Unselbständiger Arbeit." (2) *Agriculture and Forestry. Employers and Self-employed:* I.L.O. (Census of 1950) carried through with deduction for fishing. *Employees:* S.J., Section VII, B.2. *Income:* S.J., Section XXIII, A.5, "Net domestic product at factor cost by industries" (includes fishing). *Pay:* I.L.O. "Agricultural Wages" giving minimum rates, cash only.* Full wage with board and lodging estimated on basis of full Austrian rates (I.L.O.) converted to D. marks through dollar exchange (O.E.E.C.).

* I.L.O. 1958 has a misprint in coding. I.L.O. have confirmed that the rates quoted are for the cash part of the wage.

CAPITAL ACCUMULATION AND THE COURSE OF INDUSTRIALISATION, WITH SPECIAL REFERENCE TO JAPAN¹

I. INTRODUCTION

THE Japanese economy succeeded in achieving rapid industrialisation from 1900 to the Second World War.² The course of industrialisation involved two different phases. The first was a structural change of industry and foreign trade, in which new non-agricultural industries of the capital-intensive type were brought into existence and expanded partly through a reduction in the proportion of labour employed in agriculture. The second phase of industrialisation was predominantly one of balanced growth of industry and foreign trade resulting in a rise in labour productivity in certain key sectors. Rapid diversification of production faced serious difficulties, particularly a shortage of capital, that is, a "weak accumulation" in Joan Robinson's sense,³ and necessitated the lowering of real wages. In the period of balanced growth the fruits of "strong accumulation" could be reaped, and real wages were raised.

The purpose of this paper is, first, to show, by using a model, the reason why a rapid structural change forces an economy to fall into a situation of weak accumulation. Secondly, the effects of balanced growth will be contrasted with the effects of structural change. Thirdly, it will be demonstrated that reasonable factor-price differentials among industries are effective, as in the case of Japanese economic development, in lessening the difficulties of carrying out structural changes and speeding up industrialisation.

II. A MODEL⁴

Let us suppose that an economy produces three types of goods, X (agricultural goods), Y (light industry goods) and Z (heavy industry goods), with its existing two factors of production, L (labour) and C (capital). The production function of each type of commodity is of the following Douglasian type:

$$\left. \begin{aligned} P_X &= B_X(L_X)^{k_X}(C_X)^{j_X} \\ P_Y &= B_Y(L_Y)^{k_Y}(C_Y)^{j_Y} \\ P_Z &= B_Z(L_Z)^{k_Z}(C_Z)^{j_Z} \end{aligned} \right\} \dots \dots \dots (1)$$

¹ I am indebted to Sir Roy Harrod, Professors Alan Gleason, Martin Bronfenbrenner, Harry Oshima, Hiroshi Shibata and Miyohi Shinohara for their helpful comments on an earlier draft. The work of translating this paper into English was supported by the Ford Foundation as part of a project for promoting translation of Japanese economic articles.

² Kiyoshi Kojima, "Japanese Foreign Trade and Economic Growth; with Special Reference to the Terms of Trade," *The Annals of the Hitotsubashi Academy*, April 1958, pp. 143-68.

³ Joan Robinson, *The Accumulation of Capital* (London, 1956), pp. 94-6.

⁴ It is not intended to build a rigorous general equilibrium model but merely to explain the course and problem of industrialisation in Japan.

where P_i ($i = X, Y, Z$) stands for the volume of output of each type of goods, L_i and C_i for labour and capital respectively used in each industry and B_i is a constant. The production function is, for the sake of simplicity, based on the assumption of constant returns to scale, or in other words, that $k_i + j_i = 1$. It is further supposed that $\frac{j_x}{k_x} < \frac{j_y}{k_y} < \frac{j_z}{k_z}$, i.e., X -industry is the least capital intensive, Z -industry the most capital intensive and Y -industry in an intermediate position, for every factor price ratio common to all industries.

Now, for the sake of illustration, let us suppose that $B_i = 1$; $L_i = 900$; $k_x = \frac{2}{3}$; $k_i = \frac{1}{2}$; and $k_z = \frac{1}{4}$ ($j_x = \frac{1}{3}$, $j_y = \frac{1}{2}$, $j_z = \frac{3}{4}$). Values for C_i are selected in accordance with our assumption concerning varying degrees of capital intensity. For the sake of simplicity, only three values are selected for each industry. Then we may obtain column (2) of Table I.

TABLE I
Production Functions, Factor Prices and Product Prices

(1) Method of production.	(2) Production function.				(3) Factor price.			(4) Product price.	
	Capital,	Labour,	Technical co-efficient,	Output,	Labour,	Capital,	Factor price ratio,	In terms of labour,	In terms of capital,
	C .	L .	$C:L$.	P .	f_L .	f_C .	$f_L:f_C$.	π .	π' .
X_1	150	900	1:6	575	0.4791	0.9583	1:2	2.087	1.043
X_2	200	900	1:4.5	618	0.5150	0.7725	1:1.5	1.942	1.294
X_3	300	900	1:3	684	0.5700	0.5700	1:1	1.754	1.754
Y_1	450	900	1:2	636	0.3533	0.7067	1:2	2.830	1.415
Y_2	600	900	1:1.5	735	0.4083	0.6125	1:1.5	2.449	1.633
Y_3	900	900	1:1	900	0.5000	0.5000	1:1	2.000	2.000
Z_1	1,350	900	1: $\frac{3}{4}$	1,220	0.3389	0.6778	1:2	2.951	1.475
Z_2	1,800	900	1:0.5	1,510	0.4194	0.6291	1:1.5	2.384	1.589
Z_3	2,700	900	1: $\frac{1}{4}$	2,051	0.5697	0.5697	1:1	1.755	1.755

The prices of labour and capital, f_L and f_C , are assumed to be equal to their respective marginal productivities in terms of goods. Thus, we obtain

$$\begin{aligned} f_L &= k_i \cdot \frac{P_i}{L_i} \\ f_C &= j_i \cdot \frac{P_i}{C_i} \end{aligned} \quad (i = X, Y, Z) \quad (2)$$

These factor prices and their ratio are calculated in column (3) of Table I.

Let us suppose that perfect competition prevails in factor markets. Factors of production move freely between industries and obtain equal reward in all industries. The cost per unit (= price) in terms of labour,

π_i , and that in terms of capital, π'_i (column 4 of Table I), of each type of goods are respectively the reciprocal of the price of labour and capital.

$$\pi_i = \frac{1}{k_i} \cdot \frac{L_i}{P_i} \quad (i = X, Y, Z) \quad (3)$$

$$\pi'_i = \frac{1}{j_i} \cdot \frac{C_i}{P_i} \quad (i = X, Y, Z) \quad (3')$$

Let ρ stand for the factor price ratio, f_L/f_C . According to the above equations, if a specific ρ is given, the economy can determine the optimum method of production, C_i/L_i , and the prices π_i and π'_i , of each type of goods.

We may find a "set" of optimum methods of production and price ratios of goods for each specific factor-price ratio. Three sets, α , β and γ , are illustrated in Table II.

TABLE II
Production Set

Set α ($f_L:f_C = 1:2$)				
	C .	L .	$C:L$.	P .
X_1	150	900	1:6	575
Y_1	450	900	1:2	636
Z_1	1,350	900	1: $\frac{3}{4}$	1,220
Set β ($f_L:f_C = 1:1.5$)				
	C .	L .	$C:L$.	P .
X_2	200	900	1:4.5	618
Y_2	600	900	1:1.5	735
Z_2	1,800	900	1:0.5	1,510
Set γ ($f_L:f_C = 1:1$)				
	C .	L .	$C:L$.	P .
X_3	300	900	1:3	684
Y_3	900	900	1:1	900
Z_3	2,700	900	1: $\frac{1}{4}$	2,051

Now, how can the factors be allocated to our three types of industries? Let us suppose that all the available labour and capital are always fully employed and utilised. Then, it follows

$$\begin{aligned} L &= L_X + L_Y + L_Z \\ C &= C_X + C_Y + C_Z \end{aligned} \quad (4)$$

where L and C are the total labour and capital of an economy at a given time. Let us call x , y and z labour allocation weights and let them stand for L_X/L , L_Y/L and L_Z/L respectively. Further, let C_{ip}/L_{ip} stand for the optimum method of production under a specific factor price ratio, ρ . Then equations (4) can be rewritten as

$$\begin{aligned} L &= L \cdot x + L \cdot y + L \cdot z \\ C &= \frac{C_{Xp}}{L_{Xp}} \cdot L \cdot x + \frac{C_{Yp}}{L_{Yp}} \cdot L \cdot y + \frac{C_{Zp}}{L_{Zp}} \cdot L \cdot z \end{aligned} \quad (5)$$

Since $x + y + z = 1$, the unknowns are two and the third is a residual. Then, factor allocation is determined according to the two equations (5)¹, and

¹ Alternatively, one may count $x + y + z = 1$ as an equation; and then, the three unknowns are determined by the three equations.

the output of each type of goods is also determined according to equations (1).¹

Table II on page 759. shows some important relationships. First, in a production set, in order to shift labour resources from X - to Y -industry, and from X - and/or Y -industry to Z -industry, an economy needs more capital, since the capital intensiveness is least in X -industry, intermediate in Y -industry and most in Z -industry. In other words, in order to increase y (the labour allocation weight for light-industry) by reducing x (the labour allocation weight for agriculture), and also in order to increase z (the labour allocation weight for heavy-industry) by reducing x and/or y ,² the same amount of labour for the economy as a whole requires a greater amount of capital, even though the capital-labour ratio for each industry remains

¹ A two-factors and two-goods case is shown in Fig. 1. The production functions of the two goods are represented by single isoquants, XX and YY , showing the combinations of labour and capital required to produce a unit of output. If the factor price ratio, p , is represented by the slope of the common tangent MN to the isoquants XX and YY , both goods are produced at the optimal factor

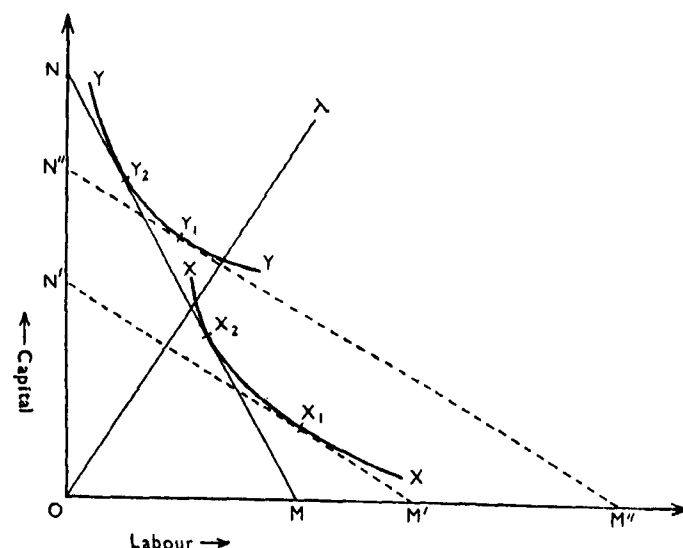


FIG. 1

combinations X_2 and Y_2 , and their costs are the same (OM measured in terms of labour, ON measured in terms of capital). If the factor price ratio is represented by the slope of $M'N'$ and $M''N''$, both being parallel to each other, the optimal factor combinations will be X_1 and Y_1 and the cost of X -goods will be cheaper than Y -goods. The capital labour proportions of the economy are represented by the slope of a λ line. The closer is the λ line to one of the optimal factor combinations, say X_2 , the larger is the labour allocation weight, x , for that industry, and vice versa. In the following argument relationships between the shift of the optimal factor combinations and the change in the labour allocation weights for given change in the λ line will be examined.

The diagrammatic representation here owes much to Professor H. G. Johnson's Preface to the Japanese edition of his *International Trade and Economic Growth*, translated by Kiyoshi Kojima and Hiroshi Shibata (Tokyo, 1960).

² It is also possible to increase z by reducing y and increasing x . This type of shift of resources is excluded from our diversification of production, since it involves the re-expansion of agriculture (X -industry).

constant.¹ This type of structural shift in labour resources may be called a *diversification of production*, which brings into existence and expands new industries of the capital intensive type in addition to the existing agricultural industries.

Secondly, as the production set is shifted from α to β and from β to γ , the efficiency of production of labour is increased and the real wage becomes higher as the capital-labour ratio rises in each industry. Let us call this type of change *rationalisation of production*. As in the diversification case, this also requires more capital in combination with one unit of labour for the economy as a whole.

Therefore, with given factor proportions, in shifting labour resources from a less capital-intensive industry to a more capital-intensive industry, or, in other words, in carrying out diversification of production in the above sense, the economy as a whole encounters a capital shortage and will have to derationalise each industry or shift the production set from γ to β and from β to α , in the direction of greater labour intensiveness and lower real wages. This is the situation of capital shortage or weak accumulation into which an economy falls during a structural change.

III. COURSE OF INDUSTRIALISATION

The above model is useful in explaining the economic development process of a country as its factor proportion changes over time.² When the growth rate of capital is greater than that of population (more exactly, labour force), the factor proportion, or capital-labour ratio, of an economy increases. Let us assume that the economy passes through four stages of factor proportion, $150C/900L$ in stage A, $250C/900L$ in stage B, $400C/900L$ in stage C and $600C/900L$ in stage D.

There are a number of possible combinations of the three products, X -, Y - and Z -goods, for each factor proportion stage. However, the optimum factor allocation to industries from the point of view of full employment of labour and full utilisation of capital is governed by the two of three labour allocation weights, x , y and z . It is easy to determine two labour allocation weights by making the third weight zero. Column (3) of Table III shows the value of y when all factors are allocated only to X - and Y -industries. Similarly, column (4) shows the value of z when all factors are allocated only to X - and Z -industries. Therefore, the labour allocation weight for X -industry is calculated by $(1 - y)$ and $(1 - z)$, which, as shown in column (5), provide us the lower and upper limits of x . For example, in the case of $[B_\alpha]$, which represents a case when the economy chooses production set α in factor proportion stage B, (a) the economy can expand Y -industry up to a

¹ This can be explained by an application of a theorem which T. M. Rybszynski first presented. See, "Factor Endowment and Relative Commodity Prices," *Economica*, Vol. XXII, No. 88, November 1955, pp. 336-41.

² The model is also useful in explaining the pattern of world trade by supposing the world consists of countries with different factor proportions.

point where y is $\frac{1}{3}$ and contract X -industry to a point where x is $\frac{2}{3}$ but maintain no Z -industry; (b) the economy can expand Z -industry until z is $\frac{1}{3}$ and X -industry until x is $\frac{1}{3}$ without any Y -industry; (c) if the economy wants to maintain three industries, x should be more than $\frac{2}{3}$ and less than $\frac{1}{3}$.

TABLE III
Factor Allocation Weight for Industries

(1) Stage of factor proportion.	(2) Production set chosen.	(3) Allocation weight for Y -industry when all factors are allocated to X - and Y -industries.	(4) Allocation weight for Z -industry when all factors are allocated to X - and Z -industries.	(5) Lower and upper limits of allocation weight for X -industry.
A (150C : 900L)	$[A_\alpha]$	$y_1 = 0$	$z_1 = 0$	$x_1 = 1$
B (250C : 900L)	$[B_\beta]$	$y_1 = \frac{1}{3}$ $y_2 = \frac{1}{3}$	$z_1 = \frac{1}{3}$ $z_2 = \frac{1}{3}$	$\frac{1}{3} \leq x_1 \leq \frac{2}{3}$ $\frac{1}{3} \leq x_2 \leq \frac{2}{3}$
C (400C : 900L)	$[C_\gamma]$	$y_1 = \frac{2}{3}$ $y_2 = \frac{1}{3}$ $y_3 = \frac{1}{3}$	$z_1 = \frac{1}{3}$ $z_2 = \frac{1}{3}$ $z_3 = \frac{1}{3}$	$\frac{1}{3} \leq x_1 \leq \frac{2}{3}$ $\frac{1}{3} \leq x_2 \leq \frac{2}{3}$ $\frac{1}{3} \leq x_3 \leq \frac{2}{3}$
D (600C : 900L)	$[D_\delta]$	$y_1 = 1$ $y_2 = \frac{1}{3}$	$z_1 = \frac{1}{3}$ $z_2 = \frac{1}{3}$	$0 \leq x_1 \leq \frac{1}{3}$ $\frac{1}{3} \leq x_2 \leq \frac{2}{3}$

Now, column (5) of Table III will show an important difference in economic development, depending on whether the economy has a rationalisation preference or a diversification preference. First, as it moves through the different factor proportion stages corresponding to a growth of capital more rapid than that of labour, the economy can choose a course such as $[A_\alpha]$ to $[B_\beta]$, and then to $[C_\gamma]$. This may be called the rationalisation preference course, since the economy aims mainly at raising labour productivity by making each industry's production method more capital intensive. This course, however, cannot expand Y - and Z -industries so greatly as the diversification preference course, since both the lower and upper limits of x decline slowly from 1 to $\frac{2}{3}$ to $\frac{1}{3}$, and from 1 to $\frac{2}{3}$ to $\frac{1}{3}$ respectively.

Alternatively, the economy can choose a course such as $[A_\alpha]$ to $[B_\beta]$ to $[C_\gamma]$ as it increases capital relative to labour. This course may be called the diversification preference course, since the economy aims mainly at the maximum expansion of Y - and Z -industries. Both the lower and upper limits of x decline from 1 to $\frac{2}{3}$ to $\frac{1}{3}$, and from 1 to $\frac{2}{3}$ to $\frac{1}{3}$. This course, however, will not make possible increases in labour productivity and real wages.

In short, given the growth rate of the capital-labour ratio, if the economy aims at the promotion of labour efficiency it has to refrain from expanding capital-intensive industries. Alternatively, if it aims at rapid structural changes towards expanding new industries of capital-intensive type not only will it be unable to raise greatly labour efficiency and real wages but also it will sometimes have to lower them by making all industries less capital

intensive. The latter is a serious difficulty of weak accumulation into which rapidly developing countries fall when the capital accumulation cannot keep up with the rapid structural change.

IV. APPLICATION TO JAPANESE ECONOMIC DEVELOPMENT

The above model is helpful in explaining the course of Japanese economic development. Since certain necessary data are not yet available, this paper will attempt no more than to indicate the method of application.

The percentage of total gainful workers employed in agriculture in various periods in Japan¹ shows that the labour allocation weight for agriculture, x , decreased from 1 in period 0 (before 1878), to $\frac{2}{3}$ in period I (1878–1902), $\frac{1}{3}$ in period II (1903–13), $\frac{1}{3}$ in period III (1913–27), and $\frac{1}{3}$ in period IV (1928–42), successively.

We have no adequate data for changes in factor proportions.² Let us assume for purposes of illustration that each period corresponds to the factor proportion stage of Table III in such way that period 0 was stage A , periods I and II were stage B and periods III and IV were stage C .

According to our model, taking the allocation weights for agriculture and the factor proportions as given above, we can calculate the factor allocation and output of the three types of goods in each period (see Table IV). Although Table IV represents only one of the possible factor allocations for each period, it is a fairly close approximation of the actual economic development of Japan.

(1) Let us assume that during period I (1878–1902), the labour allocation weight for agriculture, x , declined from 1 in period 0 to $\frac{2}{3}$ in period I, but the factor proportion increased from 150C/900L to 250C/900L and the production set was shifted from $[A_\alpha]$ to $[B_\beta]$. In other words, in this period the Japanese economy utilised its capital accumulation mainly to improve the efficiency of agriculture, and refrained from expanding manufacturing industry (y and z being $\frac{1}{3}$ and 0 respectively). It could, therefore, experience strong accumulation and harmonious development in period I.

(2) Next we shall suppose that in the transition from period I to period II (1903–12), while the factor proportion remained unchanged, x decreased from $\frac{2}{3}$ to $\frac{1}{3}$ and y increased rapidly from $\frac{1}{3}$ to $\frac{2}{3}$. As a result, the output ratio of X - and Y -goods increased from $541 : 92 = 1 : 0.17$ to $383 : 212 = 1 : 0.55$. This rapid structural change for developing light industry resulted in weak accumulation³ and forced the production set to shift back from $[B_\beta]$ to $[A_\alpha]$.

¹ Cf. Kazushi Ohkawa in association with M. Shinohara, M. Umemura, M. Ito and T. Noda, *The Growth Rate of the Japanese Economy since 1878* (Kinokuniya, Tokyo, 1957), p. 28, Table 11.

² Changes in factor proportions are well reflected in changes in the factor price ratio. The factor price ratio of Japan is examined by Gustav Ranis, "Factor Proportions in Japanese Economic Development," *American Economic Review*, September 1957, p. 597.

³ Because of an assumption that the factor proportion remained unchanged in the transition period, capital shortage in the structural change is a little exaggerated. Actually the capital/labour proportion increased by capital accumulation and foreign capital flowed in even in the transition period.

TABLE IV
Supposed Factor Allocations and Outputs in Japan

(1) Period.	(2) Production set chosen.	(3) * Allocation of capital.	(4) Output.
0	$[A_\alpha]$	$X_1 \quad 150 \times 1.0 = 150$ Total capital $\overline{150}$	$P_x \quad 575 \times 1.0 = 575$
I	$[B_\beta]$	$X_1 \quad 200 \times \frac{1}{2} = 175$ $Y_1 \quad 600 \times \frac{1}{4} = 75$ Total capital $\overline{250}$	$P_x \quad 618 \times \frac{1}{2} = 541$ $P_r \quad 735 \times \frac{1}{4} = 92$
II	$[B_\alpha]$	$X_1 \quad 150 \times \frac{1}{2} = 100$ $Y_1 \quad 450 \times \frac{1}{3} = 150$ Total capital $\overline{250}$	$P_x \quad 575 \times \frac{1}{2} = 383$ $P_r \quad 636 \times \frac{1}{3} = 212$
III	$[C_\beta]$	$X_1 \quad 200 \times \frac{1}{2} = 120$ $Y_1 \quad 600 \times \frac{1}{3} = 220$ $Z_1 \quad 1,800 \times \frac{1}{9} = 60$ Total capital $\overline{400}$	$P_x \quad 618 \times \frac{1}{2} = 371$ $P_r \quad 735 \times \frac{1}{3} = 270$ $P_z \quad 1,510 \times \frac{1}{9} = 50$
IV	$[C_\alpha]$	$X_1 \quad 150 \times \frac{1}{2} = 75$ $Y_1 \quad 450 \times \frac{1}{3} = 175$ $Z_1 \quad 1,350 \times \frac{1}{6} = 150$ Total capital $\overline{400}$	$P_x \quad 575 \times \frac{1}{2} = 288$ $P_r \quad 636 \times \frac{1}{3} = 247$ $P_z \quad 1,220 \times \frac{1}{6} = 136$
n	$[D_\beta]$	$X_1 \quad 200 \times \frac{1}{2} = 100$ $Y_1 \quad 600 \times \frac{1}{3} = 200$ $Z_1 \quad 1,800 \times \frac{1}{6} = 300$ Total capital $\overline{600}$	$P_x \quad 618 \times \frac{1}{2} = 309$ $P_r \quad 735 \times \frac{1}{3} = 245$ $P_z \quad 1,510 \times \frac{1}{6} = 252$

* The allocation of labour is easily found if total labour, 900, is multiplied by allocation weights, x , y and z , shown in this column.

Period II was the first difficult decade of structural change of the Japanese economy.

(3) During period III (1913–27), it is supposed, as in the case of period I, the labour allocation weight for agriculture, x , declined further from $\frac{2}{3}$ in period II to $\frac{1}{3}$ in period III, but the factor proportion increased from $250C/900L$ to $400C/900L$, and the production set was shifted from $[B_\alpha]$ to $[C_\beta]$. The Japanese economy utilised its capital accumulation during this time mainly to improve the efficiency of agriculture and light industry, the latter of which was not so capital intensive as heavy industry but was fairly labour absorptive. The success in maintaining strong accumulation and harmonious development in this period was due to the fact that heavy industry was not expanded (the ratio of labour allocation weights for heavy- and light-industry, z/y , being only $\frac{1}{36} : \frac{1}{18} = \frac{1}{2}$).

(4) In the transition from period III to period IV (1928–42), it is supposed, while the factor proportion remained unchanged, x decreased from $\frac{2}{3}$ to $\frac{1}{3}$ and z/y increased rapidly from $\frac{1}{36} : \frac{1}{18}$ to $\frac{1}{6} : \frac{1}{18}$. As a result, the output ratio of X -, Y - and Z -goods changed from $371 : 270 : 50 = 1 : 0.73 : 0.14$

in period III to $288 : 247 : 136 = 1 : 0.86 : 0.47$ in period IV. Thus, the output of Y - and Z -goods increased relative to X -goods and, moreover, Z -goods greatly increased relative to Y -goods. This rapid growth of heavy industry resulted again in weak accumulation and forced the production set to shift back from $[C_\beta]$ to $[C_\alpha]$. The period of the 1930s was the second difficult decade of structural change in the Japanese economy.

(5) It is hoped that the Japanese economy will reach $[D_\beta]$ in Table IV, where x is $\frac{1}{2}$, z/y is $\frac{1}{2}$ (the output ratio of Y - and Z -goods being $245 : 252$), in the post-war period or in the near future.

Our analysis is confined to a historical explanation of the course of industrialisation in Japan.¹ The relationship between the historical development and the welfare optimum is not explicitly studied in this paper. To investigate this relationship, the growth of and structural changes in demand at home as well as abroad must be introduced into our model. In our model, however, it is implicitly assumed that the effects of changes in demand conditions are wholly reflected in changes in relative prices of goods. Given prevailing long-run price trends, production functions are selected and factors are allocated in such a way that factor prices are determined by their marginal productivity and product prices are equal to the total of factor prices. In this sense, the optimum welfare is attained.

Japanese experience in industrialisation suggests the following. First, the diversification of production was necessary mainly for two reasons. The decreases in foreign demand for our traditional exports turned the terms of trade against us. Also when certain specialised lines of production increased beyond a given scale, decreasing returns to resources used intensively in that industry occurred. Thus, the traditional line became unprofitable and it became necessary to develop new industries for which the world demand was expected to grow.

Secondly, to transfer resources from the declining to the growing industries and to reach the welfare optimum required a fairly long period of adjustments. The period of structural changes for diversification was the adjustment period, during which divergences from the optimum welfare developed. Only through rationalisation was the optimum welfare attained. The economy, however, could not remain in one rationalisation course, but had to undergo another structural change followed by a second rationalisation course. "Creative destructions" in the Schumpeterian sense recurred in our economic development.

The rationalisation of limited lines of production stimulates international specialisation in so far as lines of the comparative advantage of a country over the rest of the world do not change. Actually the comparative advantage and the world price structure change over time due to the see-saw of economic development among nations and, therefore, a country must diversify even

¹ The following portions of this section and the next section are revised following the suggestions of Sir Roy Harrod.

under the *laissez-faire* system. No one can be certain, however, that the path of advance that would be chosen under *laissez-faire* would produce optimum growth, unless one is blessed with perfect foresight.

Thirdly, since our economic development and the choice of courses have been guided mainly by the growth of demand and by changes in the world price structure, our economy has been operating under a *laissez-faire* system and did not develop a system of authoritarian controls over the allocation of resources. To encourage diversification, however, protection for new industries in the form of tariffs and subsidies was provided, as justified by the infant-industry argument. Also public utilities and other social overhead investment were provided for during the period of structural changes by the government, both directly or indirectly.

V. THE IMPORTANCE OF FACTOR PRICE DIFFERENTIALS

Are there ways of lessening the difficulties of carrying out structural change? It is certain that foreign investment and the foreign-exchange reserves which the economy has accumulated prior to the structural change play a critical and strategic role. They cover the increase of capital-goods imports and help to bring about a change in the capital-labour ratio of the economy as occurred in the case of Japan.¹

Besides foreign investment, deliberate factor-price differentials among industries also played an important role in fostering rapid structural change in Japan. The effect of factor-price differentials can be evaluated from two points of view: First, whether or not they promote the expansion of certain designated industry, and, secondly, whether or not they make the cost of the goods of that industry lower and the international competitive power of that industry stronger than would be the case if free competition prevailed in factor markets and no factor-price differentials existed.

Let us examine, for example, the factor proportion of stage *B* (250C : 900L). Assume that only two goods, *X* and *Y*, are produced.² In our model, different factor-price ratios result in different production methods in each industry and lead to different costs (= prices) of goods. If no factor-price differentials exist, the production set $[B_\beta]$ or $[B_\alpha]$ can be chosen, as shown in Table V. In $[B_\beta]$ the relative cost of *Y* is lower than in $[B_\alpha]$, but *Y*-industry cannot expand to a big scale, since *y* will be only $\frac{1}{3}$. Conversely, in $[B_\alpha]$, *Y*-industry can expand to a big scale ($y = \frac{2}{3}$), but its relative cost will be higher than in $[B_\beta]$. Factor-price differentials may create a room for both expanding *Y*-industry to a larger size than in $[B_\beta]$ and reducing its relative cost lower than in $[B_\alpha]$. Now, there are two ways of determining

¹ The role played by foreign investment in Japanese economic development is thoroughly investigated by Edwin P. Reubens, "Foreign Capital and Domestic Development in Japan," *Economic Growth: Brazil, India, Japan*, ed. by S. Kuznets, W. E. Moore and J. J. Spengler (Durham, N.C.), 1955.

² A similar examination can be made in the more complicated case of three products. The effects of factor-price differentials are in principle the same as the case of two products.

factor-price differentials. The first way, which is shown in Table V as $[B_\beta]$, is to let *Y*-industry, the industry which the economy intends to expand, choose its production method, Y_1 , from the less rationalised set α , and let *X*-industry choose its method, X_2 , from the relatively more rationalised set β .¹ Conversely, the second way, as shown by $[B_\alpha]$, is to let *Y*-industry choose its production method, Y_2 , from a more rationalised production set relative to *X*-industry, X_1 . Then the allocation of factors necessary for full employment both of capital and labour will determine the labour allocation weight for *Y*-industry, as shown in column (2) of Table V. Then, it is clear, $[B_\beta]$ makes the expansion of *Y*-industry larger than $[B_\beta]$, and $[B_\alpha]$ makes it much larger than $[B_\beta]$. Hence, in order to expand a more capital-intensive industry relative to other industries, it is better to determine factor-price differentials in such way as to let that industry choose its production method from a more rationalised production set relative to other industries.

TABLE V

Effects of Factor-price Differentials in Factor Proportion Stage B (250C : 900L)

	(1) Combination of production method.	(2) Factor allocation weight for <i>Y</i> -industry.	(3) * Price of <i>X</i> -goods.		(4) * Price of <i>Y</i> -goods.		(5) Price ratio of <i>X</i> - and <i>Y</i> -goods.	
			π_x	π_x'	π_y	π_y'	$\pi_x : \pi_y$	$\pi_x' : \pi_y'$
$[B_\beta]$	(X_2, Y_1)	$y_2 = \frac{1}{3}$ or 0.125	1.942	1.294	2.449	1.633	1 : 1.261	1 : 1.261
$[B_\beta']$	(X_2, Y_1)	$y_1 = \frac{2}{3}$ or 0.200	1.942	1.294	2.830	1.415	1 : 1.457	1 : 1.093
$[B_\alpha]$	(X_1, Y_2)	$y_2 = \frac{2}{3}$ or 0.222	2.087	1.043	2.449	1.633	1 : 1.173	1 : 1.565
$[B_\alpha']$	(X_1, Y_2)	$y_1 = \frac{1}{3}$ or 0.333	2.087	1.043	2.830	1.415	1 : 1.356	1 : 1.356

* See, column (4) of Table I.

Factor-price differentials are also effective in making the cost (= price) of certain goods cheaper. This is important for a less-advanced country which wishes to develop certain manufacturing industry successfully under keen international competition. The cost (= price) of *X*- and *Y*-goods for different combinations of production methods are calculated in columns (3) and (4) of Table V, where π represents the cost in terms of labour and, therefore, price ratio $\pi_x : \pi_y$ involves no wage differentials but only profit-rate differentials for the case $[B_\beta]$ and $[B_\alpha]$ while π' represents the cost in terms of capital and, therefore, price ratio $\pi_x' : \pi_y'$ involves wage differentials but no profit-rate differentials.

Looking at the cost ratio of *X*- and *Y*-goods in column (5) of Table V, it is easily seen that the relative cost of *Y*-goods whose output expansion is desired is lowest for $\pi_x' : \pi_y'$ of $[B_\beta]$. This is, however, highly paradoxical and cannot be recommended, since *Y*-industry, to which labour should be

¹ It ought to be remembered that production methods X_1 and Y_1 belong to production set α (Table II) and their factor-price ratio is $f_L : f_C = 1 : 2$, while X_2 and Y_2 belong to set β and their factor-price ratio is $f_L : f_C = 1 : 1.5$.

attracted, must offer a lower wage than other industries, out of which labour has to be drawn.

The relative cost of Y -goods is second lowest for $\pi_x : \pi_y$ of $[B_{\alpha}]$, which is lower than that of $[B_{\beta}]$ and much lower than that of $[B_{\gamma}]$. No wage differentials are involved in $[B_{\alpha}]$, but Y -industry can offer a higher wage within a certain margin than other industries in so far as the relative cost of Y in $[B_{\alpha}]$ is lower than the world price ratio. A difficulty remains since the price of capital should be lower in Y -industry, whose expansion in output is desired. It depends on the behaviour of the capitalists whether or not they will shift capital from the more-profitable to the less-profitable industries. It may be necessary, as it was often the case in Japan, for the Government to extend loans at low interest and/or to provide subsidies to the capital-intensive Y -industry in order to foster structural changes.

It follows that, in order to expand a more capital-intensive industry and to make its costs cheaper relative to other industries, it would be effective to determine factor-price differentials in such way as to let that industry choose its production method from a more rationalised production set and to let the price of capital (the factor used more intensively in that industry) be cheaper than in other industries.

In this paper, constant returns to scale for each industry was assumed. If the expansion of output in capital-intensive Y -industry induces economies of scale and/or technological progress¹ in that industry, difficulties in structural changes are mitigated; the capital-intensive Y -industry can expand much more than indicated above, and its relative cost will be much lower even if it offers higher rewards both to labour and capital than other industries.

VI. SUMMARY

An attempt has been made to build a model which shows that the course of economic development changes according to the economy's choice either of diversification of industry or of rationalisation of industry as the capital-labour ratio increases for the economy as a whole. The Japanese economy chose first the diversification course and then the rationalisation course, and accomplished a rapid development. It has also been suggested that factor-price differentials among industries are helpful, as in the case of the Japanese economic development, in transferring resources during periods of structural change and in making stronger the international competitive power of the industries which are intended for expansion. It is believed that a further study, both of the model and of optimum factor-price differentials, is worth pursuing for the economic development of under-developed countries.

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¹ The effects of technological progress are clarified by R. Findlay and H. Grubert, "Factor Intensity, Technological Progress, and the Terms of Trade," *Oxford Economic Papers*, New Series Vol. 11, No. 1, February 1959, pp. 111-21.

PROPORTIONS OF EXCHANGE¹

The price of every good is accompanied by an invisible inscription for the buyer:

"Just try to produce this good cheaper."

BEFORE the days of money the goods were exchanged for goods. Thus an analysis of prices is really an analysis of ratios of exchange of goods. Prediction of the prices, for a free market, or their fixing, for a planned economy, are of a great importance, because the actions of buyers, as well as of sellers, and the activity of the variant branches of industry and agriculture, and of whole countries depend on the level of prices.

The simplest way in which many authors have tried to analyse the relations of exchange is by analysis of the case when there are only two partners in the market who have no previous experience of exchange. In other words, they have analysed the so-called "first step," the first act of exchange when the partners must work out the ratio of exchange for themselves. (One may suppose that such cases really did take place in the beginning of civilisation.)

This work is not an exception. Its contents may be divided into the following parts:

- (1) analysis of the equality of the partners;
- (2) the formula of exchange;
- (3) analysis of the formula of exchange;
- (4) a brief historical reference;
- (5) supplement.

I. APPRAISEMENT OF GOODS BY MEANS OF OWN LABOUR

It is necessary to postulate the following by way of preliminary: every partner produces not only the goods he offers for exchange, but he produces the goods he wishes to acquire also. In fact, as we know, before the beginning of trade every economy was "natural" and it independently produced every product required—apart from some things which might be obtained from subjugate countries as a tribute. Hence, every partner takes part in

¹ The following submission, coming from the Soviet Union, has been accepted, although it appears to be deficient in knowledge of the further developments of the theory of international interchange that have sprung from the work of the classical authors whom it cites. But whereas this later work, following J. S. Mill, has traced out what may be expected to happen in consequence of the balance between supply and demand, and, subject to important reservations, has held that the terms and flow of trade that occur, when supply and demand are in equilibrium, should secure the maximum gain for the two partners to the trade taken together, Dr. Shaynin, starting from the same basic assumptions, viz., inequality in the comparative productive capacities of two countries, has analysed the course that trade should take according to the criterion of equality of net gain, in some sense, for the two partners. [Ed.]

the exchange not to acquire something that he cannot produce by himself, but to receive this something for a smaller quantity of his own labour.

This thesis allows one to understand how the partners appraise each other's goods. Let two natural economies take the path of exchange. Each economy produces wheat and meat, but the first economy offers to give wheat in exchange, and the second one offers meat. Let us name the first economy the Farmer's economy, and the second one the Hunter's economy. Let us suppose that the Farmer requires 2 days of labour for the production of a bushel of wheat and 4 days for the production of a centner of meat. Let us suppose that the Hunter requires 6 days of labour for the production of a bushel of wheat and 1 day for the production of a centner of meat. Here is the corresponding table:

TABLE I

Name of economy.	Productivity of daily labour.	
	Production of wheat, bushels.	Production of meat, centners.
1. Farmer	$\frac{1}{2}$	$\frac{1}{4}$
2. Hunter	$\frac{1}{6}$	$\frac{1}{1}$
The mean productivity	$\frac{1}{3}$	$\frac{1}{2}$

The Farmer has an advantage over the Hunter in wheat production, and the Hunter has an advantage over the Farmer in meat production. This may result from the following differences between the partners:

- (1) geographical conditions;
- (2) material structures of the means of production;
- (3) personal features of the producers.

As will be shown below, the causes of differences between the partners regarding the proportions of exchange are a matter of indifference.

The Extremal Values of Equivalents of 1 Bushel of Wheat and of 1 Centner of Meat

Let us suppose that the Farmer offers for exchange 1 bushel of wheat. What equivalent may satisfy him?

1 bushel of wheat takes the Farmer 2 days of his labour. For this time he may produce $\frac{1}{2}$ centner of meat. Hence, he will agree to receive for 1 bushel of wheat any quantity of meat more than $\frac{1}{2}$ centner of meat. On the other hand, 1 bushel of wheat takes the Hunter 6 days of labour. For this time he may produce 6 centners of meat. Hence, he may offer for a bushel of wheat any quantity of meat less than 6 centners. This dependence may be expressed by means of inequalities:

$$\frac{1}{2} < X < 6 \quad . \quad . \quad . \quad . \quad . \quad . \quad (1)$$

where X (centners of meat) is an equivalent of 1 bushel of wheat. Similarly, one may demonstrate that the equivalent of 1 centner of meat must be more

than $\frac{1}{6}$ and less than 2 bushels of wheat. This may be also expressed by means of inequalities:

$$\frac{1}{6} < Y < 2 \quad . \quad . \quad . \quad . \quad . \quad . \quad (2)$$

where Y (bushels of wheat) is an equivalent of 1 centner of meat ($Y = \frac{1}{X}$).

Analysis of Relations of the Partners when an Exchange Occurs According to the Formula: "I Give You a Product of my daily Labour and You Give Me a Product of your daily Labour in Exchange."

Let us analyse any case of exchange subject to (1). Let us analyse the following proportion of exchange:

$$1 \text{ bushel of wheat} = 2 \text{ centners of meat} \quad . \quad . \quad . \quad (3)$$

i.e., a case, when each of the partners gives the other the product of 2 days of his labour. What is a result of this exchange?

The Farmer gives 1 bushel of wheat, i.e., a product of 2 days of his labour. For this time he could produce $\frac{1}{2}$ centner of meat. He receives in exchange 2 centners of meat. Hence his net gain is:

$$2 - \frac{1}{2} = 1.5 \text{ centners of meat}$$

This gain may be also expressed in days of his labour:

$$1.5 : \frac{1}{4} = 6 \text{ days}$$

This gain may also be expressed in bushels of wheat:

$$\frac{1}{2} \text{ bushel} \times 6 = 3 \text{ bushels}$$

The Hunter gives 2 centners of meat, i.e., also a product of 2 days of his labour. For this time he could produce $\frac{1}{3}$ bushel of wheat. He receives in exchange 1 bushel of wheat. Hence his net gain is:

$$1 - \frac{1}{3} = \frac{2}{3} \text{ bushel}$$

This gain may be expressed in days of his labour:

$$\frac{2}{3} : \frac{1}{6} = 4 \text{ days}$$

This gain may be also expressed in centners of meat:

$$1 \text{ centner} \times 4 = 4 \text{ centners}$$

Thus the results of exchange are profitable for both of the partners, although the gains are not equal. If the gain is appraised in wheat, then the Farmer's gain (3 bushels) is more than the Hunter's ($\frac{2}{3}$ bushel). If the gain is appraised in meat, then the Hunter's gain is more than the Farmer's (4 centners against $1\frac{1}{2}$ centners). If the gain is appraised in days of labour, then the Farmer's gain, 6 days, is more than the Hunter's, 4 days.

Hence, an exchange made according to the formula stated at the title of this section does not secure an equality of gain for the partners. It is necessary to note this because according to "common sense" the equality takes

place only in the case when each of the partners gives the other one a product of the same time of labour. In particular, such an interpretation of equality was defended by P. J. Proudhon in his *Système des contradictions économiques ou philosophie de la misère* and by an American author Carey in his *Manual of Social Science*.

How It Is Necessary to Understand Equality

The partners are equal in the relation of exchange. From where does this equality derive? Apparently this equality is based on the ground that each of the partners may give his partner no chance of receiving any gain by means of refusing the exchange. As experience shows, such an equality of a negative criterion leads to a situation, when the gain resulting from the exchange is divided in two (the principle "fifty-fifty").

It is sufficient to note here that the equality of exchange does not mean that an equal quantity of labour time is contained in the exchanged goods, but it means that as a result of exchange both of the partners receive an equal gain. Thus, the results of exchange (not something contained in the goods themselves!) allow both goods to be placed on the same footing.

The Indices of Gain

As was explained above, the partners' gain may be expressed in wheat, in meat or in days of labour. According to the conditions of Table I, an equality in wheat does not secure an equality in meat or an equality in days of labour, and vice versa. In fact, if the partners receive the same gain in wheat their gain in days of labour cannot be the same, because their productivity in wheat production is different.

Thus the material indices of gain may show a discrepant picture of mutual gains of the partners. But the index of gain in days of labour is free from this contradiction because this index is of a more general order than the material indices. The index of gain in days of labour is more universal as compared with the material indices. So this is the index that must be used for comparison of the gains of the partners.

Two Main Cases of Exchange

Two main cases of exchange may take place:

- (1) Each of the partners knows the amount of gain that the other receives as a result of exchange (the case of Conscious exchange).
- (2) The partners do not know the amount of this gain (the case of Unconscious exchange).

The strict historical approach would demand the case of Unconscious exchange to be analysed before the Conscious one. But according to our methodical point of view, the case of Conscious exchange is to be analysed before the case of Unconscious exchange, because the last may be reduced to the first.

II. FORMULA OF EXCHANGE—ARITHMETICAL EXAMPLE

Let us suppose that equality between the partners takes place if X centners of meat are exchanged for Y bushels of wheat. It is necessary to determine the ratio of X to Y .

The Farmer receives X centners of meat, i.e., a product of $X : \frac{1}{4}$ days of his labour. He gives the Hunter Y bushels of wheat, i.e., $Y : \frac{1}{2}$ days of his labour. His net gain is:

$$X : \frac{1}{4} - Y : \frac{1}{2} \text{ days of labour} \quad (4)$$

Similarly, one may demonstrate that the net gain of the Hunter is:

$$Y : \frac{1}{8} - X : 1 \text{ days of labour}$$

According to conditions of the problem,

$$X : \frac{1}{4} - Y : \frac{1}{2} = Y : \frac{1}{8} - X : 1 \quad (5)$$

Hence $X = \frac{3}{8}Y$, and $Y = \frac{8}{3}X$. $X/Y = \frac{3}{8}$, and $Y/X = \frac{8}{3}$. Thus 5 bushels of wheat, for instance, are equivalent to 8 centners of meat, or 1 centner of meat is equivalent to $\frac{5}{8}$ bushel of wheat.

$$1 \text{ bushel} = \frac{8}{5} \text{ centners} \quad (6)$$

$$1 \text{ centner} = \frac{5}{8} \text{ bushel} \quad (7)$$

The General Formula of Exchange

Let us suppose that productivities of labour of the Farmer and of the Hunter are as follows:

TABLE II

Name of economy.	Productivity of daily labour.	
	Wheat production, bushels.	Meat production, centners.
1. Farmer	M	P
2. Hunter	N	K

Let us suppose that the equivalent of 1 bushel of wheat is X centners of meat. If the Farmer gives the Hunter 1 bushel of wheat and received in exchange X centners of meat, then his net gain in days of his labour is equal to:

$$X : P - 1 : M$$

Similarly, the net gain of the Hunter in this case expressed in days of his labour is equal to:

$$1 : N - X : K$$

According to conditions of the problem

$$X : P - 1 : M = 1 : N - X : K \quad (8)$$

Hence

$$X = \frac{PK(M+N)}{MN(P+K)} \quad \dots \quad (8a)$$

or

$$X = \frac{PK}{P+K} \times \frac{M+N}{MN} \quad \dots \quad (9)$$

This is the required formula for the exchange of 1 bushel of wheat (here one does not pay attention to the problem of the *quantity* of exchanged product; it may be both more and less than 1 bushel, but the proportion of exchange between wheat and meat will remain constant).

III. ANALYSIS OF THE FORMULA OF EXCHANGE

The greater is the fraction, $\frac{PK}{P+K} \times \frac{M+N}{MN}$, the greater is the equivalent of every bushel of wheat. Let us analyse this fraction as to its increase. The fraction increases if P and K (i.e., the partners' productivity in meat production) $\rightarrow \infty$, and M and N (i.e., the partners' productivity in wheat production) $\rightarrow 0$.

It seems that the Farmer's interest demands P and K to be as great as possible and M and N to be as small as possible. But the conclusion about the Farmer's interest in a low M , i.e., in a low productivity in his wheat production, is not correct.

Diminution of M makes the proportion of exchange more profitable for every bushel of wheat, but the same diminution leads to a reduction in the quantity of bushels. So one may compare the Farmer's gain resulting from an improvement in the ratio of exchange, for every bushel of wheat, with his loss resulting from the diminution of his productivity in wheat production.

Let us suppose that the productivity of the Farmer's labour in wheat production diminishes from M to M' ($M' < M$). The ratio of exchange in this case improves for every bushel of wheat and its equivalent makes $\frac{PK}{P+K} \times \frac{M'+N}{M'N}$ centners of meat. Comparing this equivalent with the former expression, when productivity of the Farmer's labour was M bushels per day, one may note that the Farmer's additional gain resulting from improvement of the ratio of exchange is equal to:

$$\frac{PK}{P+K} \times \frac{M'+N}{M'N} - \frac{PK}{P+K} \times \frac{M+N}{MN} \dots \frac{PK}{P+K} \left(\frac{1}{M'} - \frac{1}{M} \right)$$

centners of meat for every bushel of wheat exchanged. This additional gain may be expressed in his days of labour:

$$\frac{PK}{P+K} \left(\frac{1}{M'} - \frac{1}{M} \right) : P = \frac{K}{P+K} \left(\frac{1}{M'} - \frac{1}{M} \right)$$

On the other hand, the diminution of productivity of the Farmer's labour in wheat production increases the labour time that is necessary to produce

1 bushel of wheat. Formerly 1 bushel of wheat took the Farmer $1/M$ days of his labour. Now it takes him $1/M'$ days of his labour. The Farmer's loss because of the diminution of his labour productivity is equal to $(1/M' - 1/M)$ days of his labour for every bushel of wheat produced. One may compare the Farmer's loss with the additional gain resulting from the same cause—diminution of Farmer's productivity in wheat production from M to M' bushels per day:

$$\frac{1}{M'} - \frac{1}{M} \text{ and } \frac{K}{K+P} \left(\frac{1}{M'} - \frac{1}{M} \right)$$

The second expression differs from the first one by the coefficient $\frac{K}{K+P}$.

This coefficient is less than 1, as $K < K+P$. Hence the second expression is less than the first one, i.e., the Farmer's loss from diminution of his productivity of labour is more than his additional gain from the improvement in the ratio of exchange. Thus the Farmer has no interest in diminishing his productivity of labour in his market branch, wheat production.¹

Similarly, one may demonstrate that the Hunter has an interest in increasing (not diminishing) his labour productivity in his own market branch, meat production.

Generalising all that is stated above, one may formulate the following rule: The partners have a mutual interest in increasing the productivity of labour in their market branches, but each partner has an interest in increasing that of his own consumers' branch and has an interest in his partner diminishing that is his consumers' branch.

Formula of exchange (9) shows us that the ratios of exchange are *fully relative*. They depend on the productivity of labour of every partner not only in the market branches but also in the consumers' branches to the same extent.

The Problem of the Primary Development of either Market or Consumers' Branch

Let us suppose that one of the partners has an equal opportunity to increase his labour productivity in market goods production and in consumers' goods production. Let us suppose that the Farmer may double his labour productivity both in wheat and in meat production. What variant is more advantageous for him?

Let us suppose the Farmer to produce, instead of M bushels, $2M$ bushels per day. This gives him a gain of 1 day for every day of his labour. But this gain diminishes, since the ratio of exchange for every bushel of wheat (according to equation (9)) becomes worse. It is sufficient to note here that the Farmer's double productivity in wheat production brings him *less*

¹ One may demonstrate, that by the diminution of his labour productivity from M to M' bushels of wheat per day, the Farmer receives less quantity of meat from the Hunter in exchange for all his wheat that he may produce per day according to his new productive capacity. This is another way of demonstrating that the Farmer has no interest in diminishing labour productivity in wheat production.

than double gain. Now let us suppose that the Farmer produces, instead of P centners of meat, $2P$ centners of meat per day. This also makes his gain 1 day for every day of his work. But this gain is increased even more, since the ratio of exchange for 1 bushel of wheat, according to equation (9), must improve. Suffice it to say here that the Farmer's double productivity in meat production brings him *more* than a double gain.

One may make the following conclusion: the increase of labour productivity in consumers' goods production, other things being equal, is more profitable for every partner than the same increase in market goods production.¹

The Problem of Conversion of Consumers' Branch into Market Branch (Formula of the Net Gain of Every Partner Resulting from Exchange)

According to equation (8), the Farmer's net gain, expressed in days of his labour is equal to $X : P - I : M$. The value of X is known from equation (9). Let us substitute the value of X in this expression:

$$X : P - I : M = \frac{PK(M + N)}{MN(P + K)} : P - \frac{1}{M} = \frac{KM - PN}{MN(P + K)}$$

days of labour. This is the Farmer's gain, resulting from exchange, for every bushel of wheat exchanged. Expression $KM - PN$ is positive; otherwise the fraction $\frac{KM - PN}{MN(P + K)}$ would be negative, *i.e.*, the partners, instead of having a gain, would receive a loss. K and M are indices of labour productivity in the market branches, P and N are those in the consumers' branches. Hence the product of the indices of market branches must be more than that of the consumers' branches. This is impossible if the Farmer, having preference over the Hunter in wheat production, offers meat, while the Hunter, having preference over the Farmer in meat production, offers him wheat in exchange. The partners' gain would be negative in this case, it would be "an inside out exchange."

If the Farmer offers wheat for exchange, and the Hunter offers meat for exchange, and if

$$M : N > P : K \quad . \quad . \quad . \quad . \quad . \quad (11)$$

then the partners receive gain from exchange.

If
$$M : N = P : K \quad . \quad . \quad . \quad . \quad . \quad (12)$$

then we have a case of equilibrium, when the partners receive from the exchange no gain and no loss.

If
$$M : N < P : K \quad . \quad . \quad . \quad . \quad . \quad (13)$$

then the exchange is unprofitable.

¹ Instead of the formula of exchange one may analyse the formula of net gain of every partner; this formula is set forth below. The outcome in any case is the same.

It is necessary to keep in mind that these three rules are correct in the case when M and K are indices of productivity of labour in market branches and P and N are those in consumers' branches. M , N , P , K may be constant, while an exchange may be advantageous or not—according to the product offered for exchange by each partner. Incidentally somebody may acquire goods that he produces cheaper than that partner who offers it for exchange.

There is an example below, derived from David Ricardo, about this same case of exchange between England and Portugal according to conditions by which Portugal acquires English cloth though it produces cloth cheaper than England.

The Case of Unconscious Exchange

As has been demonstrated, proportions of Unconscious exchange must conform to inequalities (1) or (2). Within the limits of these inequalities any proportion of exchange may take place with the same degree of probability. The problem is: is it possible to deduce a formula of exchange from many independent acts of exchange? Is there a tendency that governs all these acts?

The Aim of Exchange

Naturally, such a tendency really exists because it tends to take place at every act of exchange. Every partner tries to create the most favourable proportion of exchange for every unit of his goods and to receive a maximum gain from exchange. The gain of every partner may be expressed in days of his labour. So every partner conducts his exchange in such a way as to try to win the maximum number of days of his labour. As the preponderance of one partner at any act of exchange is of the same degree of probability as that of the second, one may expect that the gains of the partners, resulting from many acts of exchange, become equal. It follows from this that all the Farmers (the Joint Farmer) receive the same gain as all the Hunters (the Joint Hunter) do. But this is a condition that really lay in the ground of the Conscious exchange. Hence one may convert the case of Unconscious exchange to the case of Conscious one. Thus the formula of exchange for many acts of Unconscious exchange is to coincide with that of the Conscious one.

IV. A BRIEF HISTORICAL REFERENCE

Deduction of the formula of exchange is based on two principles: (1) appraisalment of the goods by both of the partners by means of their own labour; (2) equality of gains, received from exchange by each partner.¹ These two principles (which may be united in one rule, formulated as follows: "appraisalment of goods according to the mutual gain of the partners") are

¹ Without this conception it is impossible to explain, why slag, scrap, dung and other waste and garbage from production really have a price (to say nothing of natural resources, land, for instance), though no labour was spent for their actual producing.

not original. Adam Smith was the first who pronounced that the real price of a thing does not coincide with the producer's time, but that it is equal to the quantity of labour necessary for the buyer himself if he produces this thing himself. (It is necessary to note, however, that Smith has not mentioned such appraisement to be THE HIGHEST LIMIT of price of goods.) Smith affirmed that a good householder must not acquire anything that he may produce cheaper at home. Smith was the first who paid attention to the principle "fifty-fifty," according to which the gain received by the partners from the exchange is divided in two, when he wrote that the normal level of interest for the lent capital had been equal to half of the profit.¹

Both of these principles were applied by Ricardo when he analysed the case of exchange between England and Portugal. According to Ricardo's conditions, England offers for exchange its cloth, and Portugal offers its wine. For producing some quantity of cloth and wine England needs 100 and 120 man-years of its labour, and Portugal 90 and 80 man-years accordingly.

The way in which Ricardo expressed the problem is distinguished from that in the case of exchange between the Farmer and the Hunter. But the problem about cloth and wine and the problem about wheat and meat are similar, and they are solved by means of the same rule. Ricardo offers such a proportion of exchange:

100 man-years of English labour, expressed in cloth =
80 man-years of Portuguese labour, expressed in wine² (14)

But the proportion offered by Ricardo does not secure the exact equality of the partners. In fact, England receives from Portugal wine for production of which 120 man-years of its labour are needed. England gives Portugal the cloth, production of which takes England 100 man-years of its labour. England's net gain is $(120 - 100) = 20$ man-years of its labour. On the other hand, Portugal receives from England cloth, production of which takes Portugal 90 man-years of its labour and gives in exchange the wine, production of which takes it 80 man-years of its labour. Portugal's net gain is $(90 - 80) = 10$ man-years of its labour, *i.e.*, less than England's.

Equality between England and Portugal would take place if the proportion of exchange was the following:

$105\frac{5}{8}$ man-years of English labour, expressed in cloth =
80 man-years of Portuguese labour, expressed in wine (15)

In fact, in this case England receives a quantity of wine, the production of which takes it 120 man-years. Its net gain is $(120 - 105\frac{5}{8}) = 14\frac{3}{8}$ man-years of its labour. On the other hand, Portugal receives a quantity of English cloth, the production of which takes Portugal $94\frac{1}{8}$ man-years of its labour. (The calculation is made in the following way: according to the

¹ *Wealth of Nations*. The same idea about appraisement of the goods by means of buyer labour was stated by J. C. de Sismondi in his *New Principles of Political Economy*.

² *The Principles of Political Economy and Taxation*.

conditions of the problem, the same quantity of cloth that takes England 100 man-years of its labour, takes Portugal 90 man-years. Hence the same quantity of cloth that takes England $105\frac{5}{8}$ man-years of its labour, takes Portugal $94\frac{1}{8}$ man-years of its labour.) The net gain of Portugal is $(94\frac{1}{8} - 80) = 14\frac{1}{8}$ man-years of its labour (Q.E.D.).

The principle of appraisement of another's goods by means of one's own labour was applied by John Stuart Mill. Mill's example concerns the exchange between England and Germany according to the following conditions:

10 yards of cloth = 15 yards of linen (in England) (16)

10 yards of cloth = 20 yards of linen (in Germany) (17)

Thus Mill's problem is not formulated in the way of Ricardo, nor in the way used in the case of exchange between the Farmer and the Hunter. But it is solved by means of the same rule.

Mill himself has been satisfied with the assertion that any quantity of German linen more than 15 and less than 20 yards may be an equivalent of 10 yards of English cloth.¹

According to the conditions of Mill's problem, one does not know the time of production of linen and cloth in England nor in Germany. So one cannot define the gain of the partners in the way needed for the formula of exchange.²

One may deduce the formula of exchange if it is assumed that production of 10 yards of cloth takes, for instance, the same time of labour both in England and in Germany. In this case the proportion of exchange is such:

10 yards of cloth = $17\frac{1}{2}$ yards of linen . . . (18)

(Deduction of this formula is omitted.)

In fact, supposing the unit of labour time to be such as is necessary for production of 10 yards of cloth, England receives $17\frac{1}{2} : 15$ units of time of its labour, and gives in exchange 10 yards of cloth, *i.e.*, a unit of time of its labour. Its net gain is $(17\frac{1}{2} : 15 - 1) = \frac{1}{2}$ units of labour time. On the other hand, Germany receives 10 yards of cloth, *i.e.*, a unit of its time of labour, and gives in exchange $17\frac{1}{2}$ yards of linen, *i.e.*, a product of $17\frac{1}{2} : 20$ unit of time of its labour. Germany's net gain is $(1 - 17\frac{1}{2} : 20) = \frac{1}{2}$ unit of time of its labour (Q.E.D.).

To deduce the formula of exchange some other authors in different connections and at different times have used the principles of appraisement of the goods by means of own labour and/or of dividing in two the gain resulting from exchange. (For instance, Henry George, in his *Progress and*

¹ *The Principles of Political Economy*.

² The conditions of Mill's problem suggest, however, an idea about another possible interpretation of equality, namely, that equality between two partners consists in the same ratio of net gain of both of the partners, expressed in their time of labour, to the time necessary for production of their market goods. This interpretation of equality is analysed in more detail in the Supplement.

Poverty, Sismondi and Carey in the above-mentioned works, the authors of the so-called school of the Final Degree of Utility (Karl Menger and others).

The rule about appraisement of goods according to the mutual gain of partners was noticed by the outstanding Russian writer, N. V. Gogol, and it had its reflection in the gambling with "dead souls," when Sobakevitch has appraised his unusual goods (dead serfs, still registered as living) exclusively according to the proposed partner's profit at this operation ("Dead Souls," "Mortviye Dushi").

The rule about appraisement of goods or services according to the mutual gains of the partners is *openly* used for railroad transport. The tariffs of goods of the same weight and size are different and depend upon the profit received as a result of conveyance by the senders of goods. (See C. Y. Vitte, *The Principles of the Railroad Tariffs*, Russia (1910), *Printzipi Shelesnodorshnikh Tarifov*.)

Possible Direction of Further Analysis

In order to demonstrate the universality of the rule of mutual appraisement of goods according to the partners' gain, it is necessary to complicate the conditions of the simplest case of exchange discussed in this text. It is necessary to analyse the case, when more than two partners take part at exchange and there exists money in the market. Apparently the separate analysis of the case of exchange of instruments and means of production, and of the case of exchange between specialised economies is necessary. But such a work requires a specific investigation.

V. SUPPLEMENT

We have analysed two interpretations of equality in this text:

(1) Interpretation of equality in Proudhon's spirit when an exchange is subjected to the following rule: "I give you a product of my labour per day, and you give me a product of your labour per day in exchange." It is an equality of what is given. It was demonstrated that such an interpretation of equality is not correct.

(2) Interpretation of equality as equality of time of labour, gained as a result of exchange. This interpretation of equality has been used throughout the text.

There are at least four other interpretations of equality:

(3) An equality of exchange may be understood as an equality of *what is received*. In this case the formula of exchange may be expressed as follows: "I give you a product of *your* labour per day, and you give me a product of *my* labour per day." According to the condition of Table I, such an equality takes place, when proportion of exchange is:

$$\frac{1}{4} \text{ bushel of wheat} = \frac{1}{4} \text{ centner of meat}$$

Such an interpretation takes into account, however, the gross receipt of partners, and ignores the main result of exchange.

(4) One may understand an equality of exchange as equality of the ratio between what is received and what is given, expressed in the time of labour of both the partners. According to the conditions of Table I, such an equality takes place when the proportion of exchange is

$$\frac{1}{\sqrt{3}} \text{ bushel of wheat} = 1 \text{ centner of meat} \quad (19)$$

(Deduction is omitted. Ratio of what is received to what is given is $2\sqrt{3}$ in this case.)

But such an interpretation of equality is hardly correct, because it ignores the main result of exchange, to the attainment of which the partner's efforts are directed, namely, the net gain.

(5) One may understand an equality as the same ratio of the net gain of each partner to the time of labour, spent on the production of his market goods. Such an interpretation of equality is important if the productivity of one partner's day of labour is not equal to that of another. According to the conditions of Table I, the productivity of the Hunter's day of labour is more efficient than the Farmer's one. In fact, the Farmer excels the Hunter in wheat production by three times ($\frac{1}{3}$ bushel and $\frac{1}{9}$ bushel), while the Hunter excels the Farmer in meat production by four times (1 centner and $\frac{1}{4}$ centner). Such an interpretation of equality leads to a worse ratio of exchange for the Hunter comparatively with equation (9), based on the principle of the same gain for both of the partners, expressed in days of their labour.

In fact, such an interpretation of equality, according to the conditions of Table II, and supposing that X centners of meat are equivalent to 1 bushel of wheat, gives the following equality of exchange:

$$\frac{\frac{I}{N} - \frac{X}{K}}{\frac{X}{K}} = \frac{\frac{X}{P} - \frac{I}{M}}{\frac{I}{M}} \quad (20)$$

The left hand side of this equation is the ratio of the Hunter's net gain to the time of his labour necessary for producing X centners of meat. The right hand side is that of the Farmer to the time of his labour necessary for producing 1 bushel of wheat. Hence

$$X = \sqrt{\frac{PK}{MN}}, \text{ i.e., } 1 \text{ bushel} = \sqrt{\frac{PK}{MN}} \text{ centners} \quad (21)$$

According to the conditions of Table I, such an interpretation of equality leads to the following proportion of exchange:

$$1 \text{ bushel} \approx 1.73 \text{ centners} \quad (22)$$

as a counterbalance of the proportion

$$1 \text{ bushel} = \frac{8}{5} \text{ centners} = 1.6 \text{ centners} \quad (6)$$

sponding data for the United States. Furthermore, the lead-lag relationships of the endogenous variables included in the model and the indices of conformity of the specific series to the overall business cycle also resembled closely the analogous features of our society. All in all, the shocked Klein-Goldberger model approximated the cyclical behaviour of the United States economy extremely well.

But the fact that the shocked Klein-Goldberger model corresponds so well to economic experience does not prove either that the model itself is a good representation of the fundamental interactions among the several sectors of our economy or that random shocks are the prime cause of business cycles. For the close agreement with reality is, *a priori*, a consequence of both the model and the shocks. How much of this agreement is due to the basic structure of the underlying economic relations, and how much to the stochastic features superimposed upon the model remains to be determined.

This study is designed to shed some light upon this question. We shall proceed in the following way: First of all, in a manner analogous to that used in the previous study, we impose random, uncorrelated shocks upon a set of economic time series related only by accounting definitions, and study the oscillations which result. The degree to which these fluctuations approximate the business cycle observed in the United States economy will then be compared with the corresponding results of our Klein-Goldberger study. We will see that the superposition of shocks upon a model with minimal economic content leads to a reasonable facsimile of a business cycle. However, the approximation will be seen to be distinctly inferior to that derived from the shocked Klein-Goldberger system.

II. THE NAÏVE MODEL

The simplest model of an expanding economy that one can generate is to extrapolate all the endogenous variables of the system linearly, having regard only for the accounting identities inherent in the choice of variables. To facilitate comparison with the Klein-Goldberger model, our "naïve" model was derived in the following fashion. All the variables and the accounting identities of the Klein-Goldberger model were retained. However, all the behavioural equations of the system were replaced by simple extrapolations based on least-squares fits to the post-war (1946-52) data. For consumption (C), investment (I), government expenditures (G), corporate savings (S_p), corporate profits (P_c), indirect taxes less subsidies (T), depreciation (D), private (W_1) and government (W_2) employee compensation, the number of wage and salary earners (N_w), the index of hourly wages (w) and the price index (p), simple linear fits were used. Since the short (i_s) and long-term (i_L) interest rates and the index of hours worked per year (h) exhibited no obvious trends during this period, they were taken to be constant. On the other hand, farm income (A_1), government payments to farmers (A_2) and private (L_1) and business (L_2) liquid

assets all had declining trends during the sample period. For these quantities it therefore seemed more appropriate to use a fit of the form

$$X = a + \frac{b}{t - \alpha}$$

in order that they never become negative. This procedure yielded a basic set of twenty-five equations in an equal number of variables. Five of these equations are accounting definitions, while the rest express each variable as a function only of time.

In order to see what effects random perturbations may have upon this "naïve" model, a random term δy_t was then inserted into those extrapolations which replace *behavioural* equations of the Klein-Goldberger model. For this purpose the value of a variable y_t at time t was defined as its trend value, $\bar{y}_t$, plus a shock term δy_t . And y_t was assumed to have a Gaussian distribution with a mean of zero. (The resulting system of equations appears in Appendix A2.) In order that the shocks inflicted upon the system be of a realistic order of magnitude at all times, the standard deviation of δy_t was evaluated over that portion of the data for which the least-squares fit was made. And, for the subsequent calculations, the ratio of the standard deviation of δy_t to $\bar{y}_{t-1}$ was maintained at a value independent of time. It is interesting to note that these standard deviations (see Appendix A3) are, in general, quite small; in fact, only four of them exceed 10% of the trend value of the corresponding variable.

Given the size of the standard deviation, the technique employed to determine the magnitude and sign of the exogenous shock upon each variable was to divide the normal curve of error into 100 regions of equal area. To each region was assigned both the normal deviate associated with the mid-point of its interval and a previously unassigned integer between 00 and 99, inclusive. Then the selection of a two-digit random number effectively specified at random a particular region of the Gaussian distribution and its corresponding normal deviate. Multiplying this deviate by the standard deviation of δy_t , the magnitude and direction of a shock upon the variable y at time t were established. Since the selection of an interval in this manner was thus purely random, and since all intervals define the same area under the curve, this method produced a normally distributed *random* shock upon the variable in question. The repetition of this procedure for each of the variables of equations (1)-(14) yielded a series of random, normally distributed, uncorrelated shocks of realistic size.

Using this technique for the evaluation of the magnitudes and signs of the random terms, the shocked "naïve" model was solved for 100 years with the aid of an I.B.M. 650 calculator. The typical behaviour of the time series generated by this process is portrayed in Fig. 1. The solid lines in this graph describe the computed time paths of national income, investment and corporate profits, while the dotted lines represent the actual time

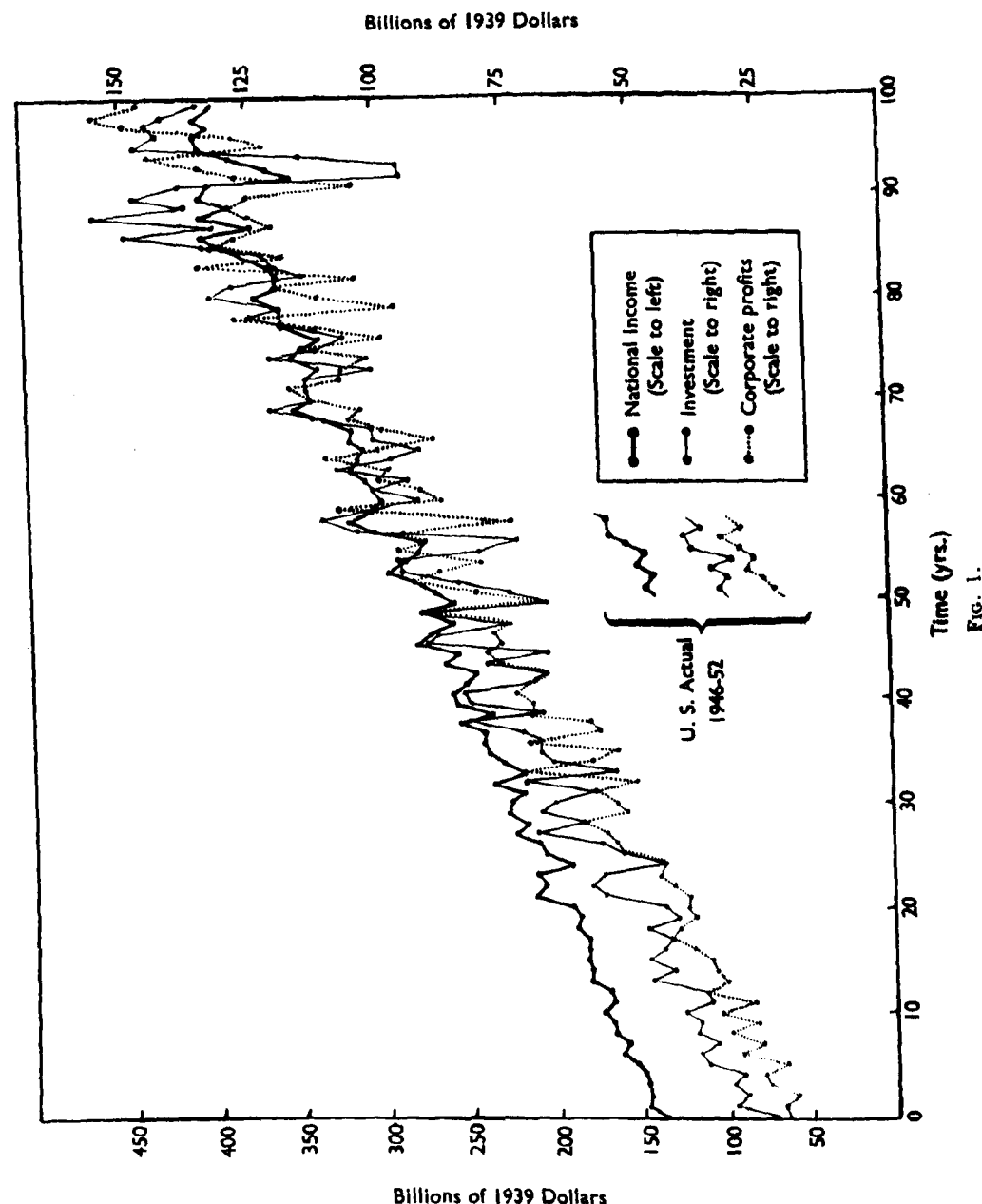


FIG. 1.

paths of the same variables during the post-war period in the United States. As apparent from this figure, under the impact of random shocks the individual variables of the system exhibit cyclical swings of more or less realistic durations and amplitudes.

The presence of qualitatively correct oscillatory movements in the individual variables of this system is but to be expected, however. This much agreement with reality is merely a *necessary* condition of an adequate simulation of the cyclical fluctuations of a real industrial economy. We must investigate further to find out whether or not the shocked version of this "naïve" model really produces business cycles in the technical sense. Specifically, how nearly all-pervasive are the cumulative movements which arise? Are the various oscillations correlated? Is there any consistent phase relationship among the several economic series? Do the time-paths of the individual variables of the model correspond to those observed in the United States economy? To answer these questions, the techniques developed by the N.B.E.R. for the analysis of business cycles were applied to the data.

One property of cyclical fluctuations in an industrial economy is a marked tendency for a clustering of peaks and troughs of individual economic time series about particular reference dates. It is, in fact, precisely this characteristic of business cycles that Burns and Mitchell¹ use as their criterion for the dating of turning-points in the United States economy. And, inasmuch as the oscillations in our model occur in response to random non-correlated perturbations, a study of the simultaneity of occurrence of peaks (and troughs) provides us with quite stringent a test of the realism of this system.

As in the normal N.B.E.R.² procedure, the specific cycles were dated first; *i.e.*, all the turning-points of each of the time series were determined. Then, to establish reference dates for the turning-points of the *overall* business cycles, the data were examined for bunching (in time) of specific cycle peaks and troughs. A reference peak (trough) was said to occur in our data during any year in which the modal number of specific cycle peaks occurs, provided that at least 10 peaks (troughs) are found in a 2-year period which includes the modal year.

Table I is a summary of some of the relevant characteristics observed in the shocked naïve model. The first two columns give the reference dates for the peaks and troughs, respectively. Since one can identify 20 complete business cycles (measured either from trough to trough or from peak to peak) occurring in the 90 years included in the calculation, the average length of a cycle is 4.5 years. This result is in startling agreement with the

¹ A. F. Burns and W. C. Mitchell, *Measuring Business Cycles* (National Bureau, 1946), and W. C. Mitchell, *What Happens During Business Cycles* (National Bureau, 1951), pp. 10-11.

² The methods and results of the N.B.E.R. are summarised in Burns and Mitchell, *op. cit.*, and in Mitchell, *op. cit.*

4-year post-Second World War cycles in the United States economy, as well as with the mean length of American peace-time business cycles since 1864.¹ The longest cycle in our data as measured from trough to trough was

TABLE I
Reference Dating for the Shocked Naïve Model

Reference dates.		Elapsed time, years.		Number of series at peaks which:			Number of series at troughs which:		
Peaks (P).	Trough (T).	T - P.	P - T.	Lead, one year.	Co-incide.	Lag, one year.	Lead, one year.	Co-incide.	Lag, one year.
11	8	3	1	4	5	2	4	6	1
22	12	10	3	1	8	3	2	7	3
28	25	3	2	0	8	3	3	8	1
33	30	3	1	4	8	3	5	6	2
39	34	5	1	3	7	2	5	7	3
41	40	1	3	2	5	5	3	7	2
47	44	3	2	3	7	2	2	8	2
50	49	1	2	3	9	2	3	7	3
53	52	1	4	1	8	2	5	7	1
61	57	4	1	3	7	2	3	8	1
63	62	1	1	2	8	8	5	8	2
72	66	6	3	5	6	1	4	7	4
75	73	2	2	4	7	4	4	5	4
78	77	1	2	2	6	5	6	7	2
82	80	2	1	4	8	1	2	8	2
85	83	2	1	4	7	3	2	10	0
87	86	1	1	3	5	5	5	6	3
89	88	1	1	5	5	5	3	6	4
91	90	1	1	6	6	3	4	7	4
96	92	4	2	2	7	4	2	8	4
—	98	—	—	—	—	—	2	7	4
TOTALS		56	34	61	137	65	74	150	57
Average per cycle		2.80	1.70	3.05	6.85	3.25	3.70	7.50	2.85
% of specific cycles represented		—	—	17.9	40.2	19.1	21.8	44.1	16.8

13 years in duration; the shortest lasted 2 years. The corresponding figures for the United States economy were 9.2 and 2.2 years respectively.

The computed cycles are broken down, in columns 3 and 4, to indicate the duration of the expansion and contraction phases of each cycle. The average expansion covered 2.8 years, while the normal contraction took 1.7. The agreement with the observed figures for the United States (2.0 and 1.8 respectively) is surprisingly good, considering the fact that, in our computations, the length of a single business-cycle stage can be estimated only to an integral number of years.

The validity of this comparison of United States and computed business cycles is dependent, of course, upon the degree of reliability with which the

¹ Computed from the N.B.E.R. dating for the period 1854-1949. We omitted from our averages the Civil War cycle and those corresponding to the two World Wars.

reference dates have been determined. One criterion which can be used is the extent to which specific cycle peaks (troughs) tend to cluster at times coincident with the turning-points of the overall business cycles. In our results 40% of the individual series, on the average, have maxima coincident with an upper turning-point of general business activity, and 44% have minima which coincide with a reference trough. The corresponding figures for the United States economy are 58 and 52%, respectively.¹ In addition, the percentage of specific cycles which lead or lag the business cycle in our computed data are 17.9 and 19.1% at the peaks, and 21.8 and 16.8% at the troughs. The analogous numbers for the United States economy lie between 13 and 16%.¹ Thus, while the computed specific cycles definitely tend to cluster at business-cycle turning-points, the degree of bunching is significantly less in the shocked naïve model than in the United States economy.

All in all, it would appear that there is a fair correspondence between the characteristics of the fluctuations generated by the superposition of random shocks upon economic time series related only through accounting definitions and the nature of the business cycles which actually occur in the United States economy. The mean duration of the cycles and the relative length of their expansion and contraction phases are in close numerical agreement with empirical evidence. The degree of bunching of peaks and troughs, however, while significant, does not approximate actual experience as closely as might be desired. We must therefore study the computed cycles in greater detail.

Table II summarises some of the significant features of the specific cycle patterns observed in the variables of the perturbed naïve model. Columns 2-5 and 10-13 give the data which lead to our grouping of the economic variables into leading, coincident and lagging series. As apparent from these columns, the number of turning-points of the specific cycles which occur in the "other" column is generally comparable to the modal number of events in the leading, coincident or lagging columns. As a result, it was generally impossible to classify the variables of the model unambiguously according to the timing of their turning-points relative to those of the reference cycle. Of the twenty variables listed in Table II, five were completely irregular in their behaviour at the turning-points of the general business cycle (see columns 6 and 14 of this table). Twelve series were classified as coincident-irregular, and one (consumption) as coincident-lagging. Only a single variable, national income (Y), tended to have peaks and troughs which coincided consistently with those of the overall reference cycle. It should be noted, though, that, as can be seen by comparing columns 6 and 14 with 7 and 15, except for the tendency towards more erratic behaviour in the computed series, the classification of the variables of

¹ These percentages were estimated from Chart 3 (pp. 16-17) of G. H. Moore, *Statistical Indicators of Cyclical Revivals and Recessions* (National Bureau Occasional Paper 31, 1950).

TABLE II
Comparison of Computed and N.B.E.R. Specific Cycles

Variable	Properties at peaks.							Properties at troughs.							Re- marks.		
	One- year lead.	Co- incide	One- year lag.	Other.	Our classification.	N.B.E.R. classification.	Our index of con- formity, %.	N.B.E.R. index of con- formity.	One- year lead.	Co- incide.	One- year lag.	Other.	Our classification.	N.B.E.R. classification.		Our index of con- formity, %.	N.B.E.R. index of con- formity.
C	3	5	5	3	Coinc.-Lag	Coinc.	70	+100	3	3	3	7	Irreg.	Coinc.	-80	+50	Inverse
I	1	11	5	12	Coinc.-Irreg.	Coinc.	50	+100	4	14	4	7	Coinc.	Coinc.	+60	+100	
P	4	11	5	12	Coinc.-Irreg.	Coinc.	40	+100	7	7	3	9	Irreg.	Coinc.	+30	+50	
D	3	6	8	13	Coinc.-Irreg.	Coinc.	30	+100	4	12	4	13	Coinc.-Irreg.	Coinc.	+70	+100	
W	1	3	4	9	Lag.-Irreg.	—	40	—	5	4	8	5	Lag	—	0	—	
N ₁	6	8	3	9	Coinc.-Irreg.	Coinc.	60	+100	1	7	6	8	Coinc.-Irreg.	Coinc.	-50	+50	
N ₂	2	8	4	10	Coinc.-Irreg.	Coinc.	60	+100	4	8	3	12	Coinc.-Irreg.	Coinc.	-70	+100	
Δ	3	12	2	5	Coinc.-Irreg.	Lagging	50	+50	2	6	1	5	Coinc.-Irreg.	Coinc.	+20	+60	
Δ ₁	3	3	5	13	Irreg.	Coinc.	10	—	3	11	6	9	Coinc.-Irreg.	Coinc.	5	—	
Δ ₂	3	9	5	15	Coinc.-Irreg.	Coinc.	50	+60	5	4	4	10	Coinc.-Irreg.	Coinc.	+40	+12	
L ₁	2	7	2	13	Irreg.	—	30	—	9	11	1	14	Irreg.	—	+20	—	
L ₂	1	13	3	14	Coinc.-Irreg.	Coinc.	30	+100	1	10	3	14	Coinc.-Irreg.	Coinc.	+60	+50	
P	1	13	3	6	Coinc.-Irreg.	Coinc.	60	+100	3	13	3	4	Coinc.	Coinc.	+60	+82	
Δ	6	7	3	11	Irreg.	Coinc.	40	—	4	11	4	11	Coinc.-Irreg.	Coinc.	-50	—	
Δ ₁	0	6	3	6	Coinc.-Irreg.	—	70	—	1	8	1	3	Coinc.	—	-20	—	
Δ ₂	1	1	1	0	Irreg.	—	100	—	2	1	0	0	—	—	-80	—	
K/T	2	12	4	10	Coinc.-Irreg.	Coinc.-Irreg.	20	—	4	9	4	5	Coinc.	Coinc.-Irreg.	-10	—	
w/p	3	8	4	12	Coinc.-Irreg.	—	+20	—	4	9	4	5	Coinc.-Irreg.	—	—	—	

the model into leading, coincident and lagging quantities is generally similar to that of the N.B.E.R.

Columns 8-9 and 16-17 of Table II present the indices of conformity of the specific cycles to the expansions and contractions of the business cycles for both the computed time series and the N.B.E.R. statistics. These indices measure the correlation between the direction of movement in the individual series and that of the overall business fluctuations. As can be seen from this table, there is fairly poor agreement between the indices of conformity of the computed series and those of the N.B.E.R., especially during contractions.

Generally speaking, then, the cycles generated by random uncorrelated shocks upon a system in which the only relationships among the variables are due to accounting procedures bear a certain amount of resemblance to the cycles found in the United States economy. The mean length of the cycles, and the average duration of prosperity and recession, agree fairly well with United States experience. On the other hand, the tendency towards a clustering of turning-points of specific cycles at reference peaks and troughs is significantly weaker in the computed cycles than it is in practice. And, in addition, the computed time series were much more erratic in their lead-lag behaviour than their counterparts in the United States economy.

III. THE KLEIN-GOLDBERGER MODEL

To help us assess these results, let us see how they compare with those obtained when the dynamic behaviour of the shocked 1954 Klein-Goldberger econometric model of the United States economy was studied in the same manner. The details of the Klein-Goldberger investigation are discussed in the October 1959 issue of *Econometrica*, and will not be given here.

Table III summarises the characteristics of the reference cycles in the shocked Klein-Goldberger economy in a form similar to that of Table I. As before, the mean duration of the computed cyclical swings (4.0 years) and the relative length of the average expansion and contraction (2.6 and 1.5 years respectively) are in close agreement with the actual data for the United States. Unlike in the shocked naïve model, however, the specific cycle peaks and troughs of the Klein-Goldberger system tend to cluster more markedly at reference turning dates: In the Klein-Goldberger calculations 51% of the specific cycle peaks and 52% of specific cycle troughs occurred at reference extrema, as compared to only 40 and 44% for the naïve model. Thus, the substitution of the economic interactions of the Klein-Goldberger system for the simple extrapolations of the naïve scheme leads to a decided improvement in the characteristics of the reference cycle.

However, for an adequate description of actual experience we must require, in addition, that the specific cycle patterns observed be realistic as

TABLE III
Reference Dating for Shocked Klein-Goldberger Model

Reference dates.		Elapsed time, years.		Number of series at peaks which:			Number of series at troughs which:		
Trough (T).	Peak (P).	T - P.	P - T.	Lag, one year.	Co-incide.	Lead, one year.	Lag, one year.	Co-incide.	Lead, one year.
—	27	—	2	—	—	—	—	—	—
29	31	2	1	2	8	6	1	6	4
32	37	5	1	1	8	5	4	7	4
38	42	4	1	1	10	0	1	13	1
43	45	2	1	2	7	4	0	10	0
46	51	5	2	2	11	1	3	8	3
53	54	1	2	4	12	1	2	10	4
56	59	3	1	1	10	1	1	11	4
60	63	3	1	2	7	6	4	6	2
64	68	4	2	6	6	3	5	7	1
70	72	2	1	2	7	3	1	13	1
73	74	1	1	2	9	1	2	8	2
75	77	2	1	2	8	4	0	10	2
78	79	1	1	2	8	2	3	9	3
80	83	3	2	2	12	1	1	7	3
85	86	1	2	4	12	2	2	11	2
88	90	2	1	2	12	2	1	11	4
91	94	3	2	3	10	1	3	11	3
96	98	2	4	5	8	3	1	9	3
102	106	4	1	3	12	2	3	10	2
107	109	2	1	4	9	1	5	11	2
110	113	3	1	2	11	4	5	7	1
114	116	2	1	5	7	4	3	13	0
117	119	2	1	1	8	8	4	9	3
120	—	—	—	—	—	—	—	—	—
TOTALS		59	34	60	212	65	55	217	54
Average per cycle		2.56	1.48	2.61	9.22	2.82	2.39	9.43	2.34
% of specific cycles represented		—	—	14.5	51.2	15.7	13.3	52.4	13.0

well. Table IV presents a comparison of the Klein-Goldberger and N.B.E.R. specific cycles, in a form analogous to that of Table II. As can be seen by comparing columns 6 and 14 of the two tables, the Klein-Goldberger model succeeds in removing the indeterminacy present in the naïve system. Only agricultural incomes (A_1) remain irregular in their pattern of behavior in the Klein-Goldberger data. But, in view of the low index of conformity reported by the N.B.E.R. for this variable, this may not be unrealistic. In addition, there is also extremely close agreement between the N.B.E.R. and the Klein-Goldberger classification of variables into leading, lagging and coincident series. Eleven Klein-Goldberger variables are classified as coincident at both peaks and troughs. These are: national income (Y), gross investment (I), private employee compensation (W_1), non-wage, non-farm income (P), employment (N_W), corporate profits (P_C), corporate savings (S_P), corporate surplus (B), capital stock (K), the

TABLE IV
Comparison of Klein-Goldberger and N.B.E.R. Specific Cycles

Variable.	Properties at peaks.							Properties at troughs.							Re- marks.
	One- year lead.	Co- incide.	One- year lag.	Other.	K-G. classifi- cation.	N.B.E.R. classifi- cation.	K-G. index of con- formity, %.	One- year lead.	Co- incide.	One- year lag.	Other.	K-G. classifi- cation.	N.B.E.R. classifi- cation.	K-G. index of con- formity, %.	
$T + T + D$	1	21	1	1	Coinc.	Coinc.	+100	2	21	0	1	Coinc.	Coinc.	+92	+50
T	1	21	1	1	Coinc.	Coinc.	+100	1	22	0	1	Coinc.	Coinc.	+100	+50
C	1	8	3	0	Coinc.	Coinc.	+100	5	5	1	1	Leading- Coinc.	Coinc.	-17	+50
I	4	20	0	3	Coinc.	Coinc.	+100	0	23	1	3	Coinc.	Coinc.	+100	+100
W_1	2	10	3	2	Coinc.	Coinc.	+83	1	10	3	3	Coinc.	Coinc.	+8	+12
A_1	6	8	7	7	Irreg.	Coinc.	+60	8	5	5	10	Coinc.	Coinc.	+33	+12
P	4	19	0	4	Coinc.	Coinc.	+91	0	22	1	4	Irreg.	Coinc.	+100	+100
N_W	4	18	2	2	Coinc.	Coinc.	+100	3	19	2	2	Coinc.	Coinc.	+100	+100
P_C	4	20	0	4	Coinc.	Coinc.	+100	3	20	1	4	Coinc.	Coinc.	+92	+100
S_P	4	16	0	4	Coinc.	Coinc.	+83	0	17	1	3	Coinc.	Coinc.	+100	+50
B	0	5	1	1	Coinc.	—	+100	1	5	1	0	Coinc.	—	-42	—
K	1	9	6	0	Coinc.	—	+87	0	11	3	3	Coinc.	—	+33	—
L_1	10	6	3	6	Leading	Leading	+22	10	7	4	5	Leading- Lagging- Irreg.	—	+25	—
L_2	14	4	3	3	—	—	+13	5	6	9	5	—	—	+8	—
L_3	4	15	0	4	Coinc.	—	-65	2	17	3	1	Coinc.	—	83	-82
P_A	3	17	2	0	Coinc.	Coinc.	+100	0	20	2	0	Coinc.	Coinc.	83	+60
w	4	17	9	5	Coinc.	Coinc.	+100	6	14	4	4	Coinc.	Coinc.	+42	+50
w/K	0	1	9	1	Lagging	Lagging	+63	0	4	7	0	Lagging	Coinc.	-67	—
K/Y	2	17	5	5	Coinc.	—	-74	0	21	0	0	Coinc.	—	-100	—
	4	19	1	4	Coinc.	—	-100	5	19	1	3	Coinc.	—	-100	—
Inverse															Inverse
Inverse															Inverse
Inverse															Inverse

general price index (p) and the index of agricultural prices (p_A). Consumption (C) coincides at peaks, but has a tendency to lead at troughs. And corporate liquid assets (L_2), real wages (w/p) and the capital/output ratio (K/Y) are in inverse coincidence with the business cycle in the sense that their troughs tend to occur at reference peaks, and vice versa. All of these results are in accord with N.B.E.R. experience (when available), except that United States specific cycles for consumption coincide, rather than lead, at the troughs. In addition, as evident from columns 8-9 and 16-17 of this table, the indices of conformity calculated for the Klein-Goldberger statistics are quite consistent with those given by Mitchell for the United States economy.

Generally speaking, then, it would appear that the specific cycles generated in the Klein-Goldberger model by random shocks resemble the cycles found in the United States economy much more closely than do those of the naïve model. Since, in addition, the characteristics of the reference cycles of the Klein-Goldberger model are also more satisfactory, we conclude that the shocked Klein-Goldberger equations offer a better approximation to United States cyclical experience than does the shocked naïve model.

IV. DISCUSSION

When the work described in this paper on a minimal stochastic model of a complex industrial economy is compared with the earlier investigation on the Klein-Goldberger system three facts stand out:

- (1) a minimal stochastic model is reasonably satisfactory in simulating business fluctuations in the United States;
- (2) the Klein-Goldberger equations by themselves describe a non-oscillatory economy;
- (3) the superposition of random shocks upon the Klein-Goldberger system leads to an extremely close representation of the cyclical fluctuations of American business activity.

These results suggest that it is the stochastic features of the shocked Klein-Goldberger model, rather than the interactions described directly by the Klein-Goldberger equations themselves, which are responsible for the excellent agreement with reality mentioned above. We have not, of course, proved that business cycles are stochastic in origin, but it is my belief that the evidence presented here creates a strong presumption in favour of this hypothesis. This is especially significant in view of the absence (to date) of a completely satisfactory endogenous theory of business cycles.

It would also appear that there is some validity to the Klein-Goldberger description of the interactions which take place among the several sectors of the economy. That is to say, the interrelations which exist among

economic units must be incorporated in a reasonable manner into any rational description of the dynamic behaviour of an industrial complex. A purely stochastic theory of cyclical fluctuations constitutes merely a first approximation to reality.

The implications for the student of business cycles are quite clear. The theorist need not explain a determinate economic path with observable oscillations at predetermined points of time. If he accepts the stochastic hypothesis he knows how and why business cycles arise: the normal perturbations upon the day-to-day operation of an economy suffice to generate a persistent oscillatory process of the observed magnitude. The primary task of the business-cycle analyst is to investigate the reaction patterns of an economic system to various shocks, for it is in this sphere of activity that his efforts are likely to be most significant.

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APPENDIX A

1. Explanation of Symbols

$Y + T + D$	Gross national product, 1939 dollars
C	Consumer expenditures, 1939 dollars
I	Gross private domestic capital formation, 1939 dollars
G	Government expenditures for goods and services, 1939 dollars
p	Price index of gross national product, 1939: 100
W_1	Private employee compensation, deflated
W_2	Government employee compensation, deflated
D	Capital consumption charges, 1939 dollars
P_C	Corporate profits, deflated
S_P	Corporate savings, deflated
T	Indirect taxes less subsidies, deflated
K	End-of-year stock of private capital, 1939 dollars from arbitrary origin
p_A	Index of agricultural prices, 1939 = 100
p_1	Index of prices of imports, 1939 = 100
N_p	Number of persons in the United States
N	Number of persons in the labor force
N_w	Number of wage-and-salary-earners
N_g	Number of government employees
N_f	Number of farm operators
N_e	Number of non-farm entrepreneurs
h	Index of hours worked per year, 1939 = 100
w	Index of hourly wages, 1939 = 122.1
P	Non-wage, non-farm income, deflated
A_1	Farm income deflated
A_2	Government payments to farmers, deflated
i_L	Average yield on corporate bonds, %
i_S	Average yield on short term commercial paper, %
L_1	End-of-year liquid assets held by persons, deflated
L_2	End-of-year liquid assets held by businesses, deflated
t	Time trend, years, $t = 2$ in 1952
B	End-of-year corporate surplus, deflated, from arbitrary origin

2. The Naïve Model

- (1) $C_t = 111.9 + 2.72t + \delta_c$
- (2) $I_t = 26.2 + 1.17t + \delta_I$
- (3) $S_{Pt} = 2.85 + 0.20t + \delta_{Sp}$
- (4) $P_{Ct} = 18.53 + 1.23t + \delta_{pc}$
- (5) $D_t = 18.76 + 1.21t + \delta_D$
- (6) $(W_1)_t = 77.25 + 2.69t + \delta_{W_1}$
- (7) $(Nw)_t = 54.68 + 1.13t + \delta_{Nw}$
- (8) $W_t = 326.8 + 17.92t + \delta_W$
- (9) $(p_A)_t = 305 + 7.07t + \delta_{pa}$
- (10) $i_s = 2.5 + \delta_{is}$
- (11) $i_t = 3.5 + \delta_{it}$
- (12) $(A_1)_t = 7.3 + \frac{2.5}{t+7} + \delta_A$
- (13) $(L_1)_t = 92.44 + \frac{16.76}{t+7} + \delta_{L_1}$
- (14) $(L_2)_t = 35.88 + \frac{6.69}{t+7} + \delta_{L_2}$
- (15) $G_t = 32.933 + 0.567t$
- (16) $(W_2)_t = 15.114 + 0.578t$
- (17) $T_t = 14.146 + 0.514t$
- (18) $(A_2)_t = 0.108 + \frac{0.0746}{t+7}$
- (19) $h_t = 1.062$
- (20) $Y_t = C_t + I_t + G_t - T_t - D_t$
- (21) $P_t = Y_t - (W_1)_t - (W_2)_t - (A_2)_t - (A_1)_t$
- (22) $p_t = \frac{h_t w_t (Nw)_t}{(W_1)_t + (W_2)_t}$
- (23) $K_t = K_{t-1} + I_t - D_t$
- (24) $B_t = B_{t-1} + S_p$

3. Standard Errors Used for Shocks

Variable	% Standard deviation
C	1.07
I	9.79
S_p	61.4
P_c	9.43
D	3.97
W_1	2.41
N_w	2.89
w	1.49
p_A	7.29
i_s	20.00
i_L	14.28
A_1	10.2
L_1	3.0
L_2	3.57

EARNINGS ON RAILWAY CAPITAL

THE main purpose of this article is to classify the various sources from which net earnings from railway capital may be derived, net earnings being defined as any surpluses earned in excess of current working expenses and depreciation. It will be shown that whereas two kinds of surplus reflect real economic or "opportunity" costs, the earning of which is indispensable to the sustained and profitable operation of any railway undertaking, another kind, however much it was expected to be earned by past lenders and investors, is a surplus earned rather than an economic cost incurred, the realisation of which is by no means a requirement of that sustained and profitable operation referred to, even in the long run: and that much the greater part of all these earnings, so far from being a central charge, overhead to the railway as a whole, can be clearly identified with particular services, types of equipment and localities. Whilst no attempt is made to deal fully with all the implications for policy of such an analysis, the article does conclude with some discussion both as to the extent to which interest on railway capital should be regarded as an item "properly chargeable to revenue" and of the economic consequences of protecting undertakings whose financial fortunes have failed to come up to expectations. It is also hoped that it does throw some light on the nature of the capital burden for which the British Transport Commission have assumed responsibility in respect of British Railways¹ and London Transport (railways) since the passing of the Transport Act of 1947. A brief description of the various sources from which earnings on railway capital may derive will be followed by a much fuller account of them.

¹ The proportion of all the Central Charges of the Commission (much the greater part of which consists of interest on British Transport Stock), which, in the Commission's view, can be allocated to British Railways "cannot be made by reference to some precise formula but is a matter of judgement based on the relevant circumstances" (*British Transport Commission's Annual Report and Accounts 1959*, Volume II, p. 10). But from the start the sums so allocated have been substantial. In 1948 the figure stood at £32 million. By 1955 it had risen to £40 million. And only by means of a system of deficit financing and capital advances under the Transport (Railway Finances) Act 1957 was the figure held at £42 million for 1959. But in future interest charges are going to be considerably greater. In the words of the Select Committee on Nationalised Industries (British Railways), "Central charges (allocated to the railways) are expected to have risen by nearly 50% by 1963, to £62 million, and will go on rising. In addition, the deficit advances must begin to be repaid in 1963, and the interest on the deficit advances will all become chargeable to Revenue Account at the beginning of 1965" (para 145). That the railways and the Commission are not in fact going to meet all these commitments was recognised by the Chancellor in his last Budget Statement (April 1960), when he transferred the sum of £90 million from below the line to above the line, thus meeting out of revenue a sum sufficient to cover the deficit in the Consolidated Revenue Account of British Railways for the year 1959.

First, they may derive from land and property¹ required for providing railway services but which also have a value in uses other than for running the railway. Particularly in built-up areas, our railways occupy much land which could command a high value in other uses. Unless a railway undertaking can earn a surplus from this land commensurate with what it could earn by selling or letting it out for other purposes, it is suggested that it should be so sold or let.

Second, there is the interest earned on all wasting assets, such as rolling-stock or any other equipment or stores that require renewal or replacement, and therefore the investment of resources from time to time. Interest earned from this type of investment simply reflects the cost of financing the provision of all wasting assets, and as will be seen later is highly variable in amount.

Third, there are the earnings from the first class of assets (land, etc.) apart from and in excess of their value in other uses: earnings that is to say from assets which are not only technically durable such as is land but also specific to providing railway services. Much of the capital invested in tunnels, embankments and cuttings has created assets of this kind. In view of the large proportion of the initial capital invested in railways (especially underground or tube railways), which may be accounted for by the creation of these kinds of assets, and the importance therefore which attaches to the question as to whether this class of surplus earned should or should not be regarded as a cost "properly chargeable to revenue," special attention will be given to it.

Fourth, there are earnings that reflect some degree of monopoly that may be possessed by a railway. Whether it is possible or useful to separate the earnings derived from this monopoly element from other earnings is doubtful. Finally, some net earnings may be in lieu of and in reward for past risk-taking.

We shall now examine and assess the significance of these potential sources of net revenue in more detail.

I. OCCUPATION OF LAND WHICH HAS A VALUE IN USES OTHER THAN FOR RAILWAYS

Owners of railway undertakings have from the start owned land on an extensive scale, and have therefore, from an economic point of view, assumed the role of both landlord and tenant. Some indication of the extent of the land owned by the British Transport Commission in respect of their railway business in the County of London alone was given in the late Sir Patrick Abercrombie's *County of London Plan*, in which he wrote: "A conservative

¹ We are here considering only land and property which are essential for providing railway services proper. We are not therefore considering such assets as hotels or other properties which can be valued apart from their contribution to the running of the railway undertaking as a whole.

estimate of the acreage of railway property within the County boundary is 3,350 acres, *i.e.*, nearly half the total area of public open space" (p. 66, para. 254).¹ There can be little doubt that much of the land referred to, as well as that in other parts of Great Britain, has considerable value in uses other than for railway purposes, whether for housing schemes, open spaces or business premises. And the sums for which such land or property could at any time be let, sold or leased to others for such purposes are a measure of the cost to the Commission of their retaining it for railway purposes. For potential net revenue is being foregone, and unless the land in question is deemed by the Commission to be earning, directly or indirectly, at least as much as that potential revenue it would presumably be to its financial advantage to let it go. The holding on to it for railway purposes is also a cost to society, in that such land is being withheld from other, possibly dearly wanted, purposes. It would seem, therefore, that it is in the interests both of the Commission and of the community that such land should be retained for railway purposes only if the services rendered to the public by so doing are wanted sufficiently to earn a surplus or ground rent commensurate with or in excess of the surplus that could be earned (after transfer costs have been incurred) by letting it out for other purposes. This first class of earning, then, represents a very real and comparatively short-run cost, measuring as it does the cost, both to the Commission and the community, of occupying land for which there are alternative uses and demands.

II. INTEREST ON INVESTMENT IN ALL WASTING ASSETS

The second type of surplus earning to be noted is that required to finance the provision of all wasting assets whose economic lives are known to be limited, and which, therefore, require to be replaced from time to time in order to maintain a given standard of service. Just as road vehicles are required to earn a rate of interest if investment and re-investment is to be undertaken, so also in the case of capital investment in such assets as railway rolling-stock, and all the many other kinds of railway equipment which require physical and periodic replacement. Now an outstanding characteristic of much railway equipment is not only its technical longevity² but also that it may have a very long revenue-earning life too. But all railway assets are not long-lived, either technically or commercially. Indeed, it can be said

¹ Such estimates should not be taken as implying, far less as proving, that British Railways occupy "too much" land. Indeed, in respect of some of their operations such as the handling of freight at particular depots and terminals, they may well be in need of more space for manoeuvre. Similarly on the passenger side, the purchase of additional land for the provision of more parking space for private cars at suburban railway stations might well be a sound investment, and, incidentally, promote the true co-ordination of road and rail transport.

² Which may all too easily lead to unduly optimistic assumptions as regards its revenue-earning life.

that there is an almost infinite variety of assets in this respect, ranging from station buildings, viaducts and rolling-stock which may "last" for half a century or more before requiring replacement, to the provision of such short-lived assets as upholstery, brake-blocks and rails at curves and junctions. What is common to them all is that to maintain them, in the sense of having to replace them from time to time, requires some saving and investment, some "financing," and that unless the services for which they are required are wanted sufficiently to cover the cost of that saving and investment, represented by the interest payment required to evoke them, such services are not "paying their way." In short, this second class of interest is also essentially a cost of provision "property chargeable to revenue" both in the short and long run,¹ and incidentally can be highly variable.

In the case of the railway industry the fact of longevity can be of special importance. For, as already mentioned, among the assets employed, although some are short-lived, others are exceptionally long-lived, both technically and economically. For safety's sake alone, great "strength" and technical durability must be given to rolling-stock, parts of the permanent way, embankments, bridges and viaducts, and they may also remain real revenue-earning assets for many decades. *In the end*, however, if continued operation is intended and financially justified, it is assumed they require replacement. During the life of the original asset, say as much as fifty years or more, any interest earned is in the nature of a surplus—a measure of its profitability, the opportunity cost of using it being the shorter-run costs of working and maintaining it in a state of efficiency. But when and if replacement is ultimately required, then unless this replacement investment again holds out prospects of earning a rate of interest commensurate with earnings elsewhere, the investment will presumably not be undertaken. The constant drive to "reduce stocks" of all kinds, including the total amount of rolling-stock required, is mainly an effort to economise on this capital account, *i.e.*, to save interest on money borrowed for providing such assets. This second type of surplus earned is therefore very much of a cost of running a railway, and, in view of the immense sums which are necessarily locked up in railway rolling-stock and other wasting assets, not to mention the relatively high "real" rate of interest prevailing in this country at the present time, is an item of cost of considerable magnitude.

From the "cost" point of view it is significant that this important kind of cost is anything but a cost overhead or fixed in relation to the railway as a whole. On the contrary, it is highly allocatable to the provision of specific types and kinds of rolling-stock, passenger or freight. And in so far as it can be associated with other types of assets, such as signalling equipment, rails,

¹ It should be noted, however, that only over periods longer than the economic life of any one of these kinds of assets should this class of surplus earning be regarded as an avoidable cost of provision. What is deemed to be a "short" or "long"-run cost depends on the length of time one chooses to ascribe to the terms "long" and "short."

sleepers and ballast, and many terminal facilities, it would appear that it is for the most part a *local* cost of provision, *i.e.*, anything but a "central charge." In view of the wide differences in traffic density that can be commercially justified in different circumstances, thereby calling for widely different amounts of rolling-stock to be maintained, this cost can also be regarded as highly variable in amount.

It would seem that so long as revenue earned is sufficient to cover the two classes of surplus earning so far mentioned, all the costs *required* to justify financially the continued operation of a railway are being covered.

III. EARNINGS FROM ASSETS WHICH ARE BOTH TECHNICALLY DURABLE AND SPECIFIC TO RAILWAY TRANSPORT

The third type of earning to be considered and explained is that which reflects the value or earning power of those durable¹ assets referred to under Category I above, *less* the latter's value or earning power in uses other than a railway: earnings that is to say on assets which are not only durable as in I, but are also specific in that they do *not* have any value other than for purposes in connection with running the railway. Yet they were indispensable to the construction of the railway as a whole, and had there not been prospects of earning a rate of interest on the money invested, the investment would not have taken place. Although the assets associated with this third class of earning may be physically indistinguishable from those associated with the first, the earnings therefrom are separate from and irrespective of what such assets could earn in uses other than for railway transport. In a sense, the earnings referred to as Category I represent the scrap or outside value of the assets with which we are now concerned.

Examples of this sort of capital expenditure are the initial purchase of land and rights of way (including legal and Parliamentary expenses) and a large part of the expenditure involved in the boring of tunnels, the excavation of cuttings and the building of embankments.² Such initial expenditure is normally charged to capital account, and in the case of building an underground railway may account for as much as 50% of the total initial capital expenditure incurred. It reflects the magnitude of investors' hopes and expectations of earning net revenue. But the assets so created may have virtually no value in uses other than for a railway. Nor does that part of

¹ The fact that they are durable does not, of course, imply that they will, or are even expected to maintain indefinitely their economic efficiency, *i.e.*, value. Indeed, they may require to be drastically depreciated in a relatively short time. On the other hand, they may have been expected at the time of the first investment to maintain their revenue-earning capacities for a very long time, if not indefinitely. It is the interest earned or expected to be earned on this class of capital with which we are here concerned.

² In the case of the construction of railways in insufficiently mapped parts of the world extensive and expensive surveys may be required before alignments are determined. Once this expenditure has been incurred, it need never be incurred again. Yet it may have substantially increased the initial capital expenditure and therefore the financial commitments entered into.

the initial expenditure that we are now considering ever have to be undertaken a second time.¹ The future cost of keeping the line technically "efficient" consists of whatever is required to maintain it in that condition, which does *not* include the meeting of commitments in respect of Bond or Debenture issues. Although man-made, once created, these physical assets are from an economic point of view indistinguishable from land, or such "natural" features of the landscape as valleys. Once excavated, there is no difference from an economic point of view between a valley which was man-made (a cutting) and one that was carved out by Nature over a period of a million or more years. It is suggested that the earnings from this class of asset, other than what is earned under I, in no sense reflect or measure current or future opportunity costs proper, either in the short or long run. They are *surpluses earned* over and above short- and long-run costs, expected and hoped for by investors, but manifestly *not* a *sine qua non* to the continued and profitable use of the assets concerned. For so long as the revenue earned from the services rendered are sufficient to cover the full costs of maintenance and operation, together with the rent and interest referred to under Sections I and II above, which together may fall far short of original expectations, it is more profitable to continue to operate and earn some surplus on the class of capital in question, however small, rather than close down and thus earn no surplus whatever. Indeed, even if no surplus whatever was earned upon it, it would still be worth re-investing in wasting assets and incurring operating costs, so long as revenue-earning prospects justified such re-investment and operation. It has sometimes been represented that if an undertaking is allowed, as the result of competition, to fall into difficulties to the extent of failing to earn net revenue commensurate with original expectation the public will, as a result, be deprived of "much needed facilities." And of course there have been cases of services becoming so unremunerative as to justify the withdrawal of services, *e.g.*, the closing of branch lines. But it is altogether wrong to assume that because an undertaking gets into financial difficulties, even to the extent of failing to meet interest payments on Debenture stock, it therefore follows that it is no longer to anybody's interest to continue to provide the services in question, and that the public will accordingly be deprived thereof.

The figures which are set out in Tables I and II below illustrate this point.

¹ As might be expected, similar circumstances obtain in the construction of new roads. In their First Report (Session 1958-59) dealing with the cost of Trunk Roads, the Select Committee on Estimates said "earth moving accounts for half the cost of road construction and . . . if a shilling per ton could be saved, the cost of the London-Birmingham motorway would be reduced by £1 million (Q.163)." The relevant passage in the question referred to ran as follows: "I have a letter from Sir Owen Williams, the engineer on roads, who pointed out that on a job like the London-Birmingham motorway the cost of excavation does amount to roughly half the total cost, just shifting dirt; and that if the contractors could find a way of saving a shilling a ton on the dirt they would save £1 million. This, I think, is quite a telling figure. It shows that this dirt shifting does really mean something." Here also it can be assumed that for the most part such dirt shifting will never be required to be done over again.

It will be seen that in spite of financial failure and legal insolvency, it still "paid" to run the railway. Let us suppose that a railway (or part of a railway) has been built for the total capital cost of £1,000,000 and that the hoped for earnings on the investment were at the rate of 5%, *i.e.*, £50,000 per annum. Of that total of £1,000,000 as much as £500,000 had been required in respect of the purchase of land and rights of way and the construction of those permanent and durable assets such as tunnels, cuttings and embankments referred to above. But the "outside" residual value of these assets, once created, amounted to the sum of £100,000 only, *i.e.*, an assumed annual rental of £5,000. The annual opportunity cost, therefore, of the continued occupation of this "land" can be said to be £5,000. Superimposed upon this land so purchased and suitably moulded for railway purposes was added at a cost of £200,000 rails, ballast, signalling equipment and station buildings, all of which in due course were assumed to require replacement and the re-investment of funds from time to time if operation on the scale contemplated in the first instance was to be maintained. Unless, therefore, these wasting assets were capable of earning at least £10,000, or 5% on that £200,000, replacement would not be justified. In other words, one of the long-run "costs" of maintaining such assets was an interest payment of some £10,000. The remaining £300,000 were invested in rolling-stock, which also required replacement from time to time and an interest payment of some £15,000 per annum to justify such replacement.

The above figures illustrate the significance of cases where a large part of the initial capital outlay has been spent in ways which, even to maintain output indefinitely, need never be spent over again. They show that the larger the proportion of the original capital that was spent in this way, the larger may be the shortfall from expectations to earn, before the undertaking is failing to cover those costs, including some capital costs, which must be covered to justify financially the continued operation of the line. They explain and illustrate why railways, whilst they may only be able to earn 3 or 3½% on their *original* capital investment, have no reason to close down, even though the rate of borrowing both at the time of construction and thereafter was (say) 5%. For the wasting assets may well be earning a full 5% or more, and so justifying their replacement. They also provide a simple explanation of why railways can go bankrupt (a common phenomenon in American history) without *necessarily* closing down or ceasing to provide a public service. For supposing the £1,000,000 required for the undertaking in question had been raised in the proportions of £750,000 in the form of Debenture 5% Stock, and £250,000 in the form of Ordinaries (see Table II), then a net earning of £37,500, would be required to meet the interest requirements of Debenture Stock holders and avoid bankruptcy. But the net earnings required to justify continued operation was only £30,000 (see Table I). Thus, failure to meet the requirements of

Debenture Stock holders would not in this case have involved the withdrawal of the public services in question. In short, they demonstrate that there may be a substantial difference between: (i) the earnings required to

TABLE I

Figures showing the Proportion of the Total Amount Spent on the Construction of a Railway that may go into (a) Land and Other Non-wasting Assets, and (b) and (c) Wasting Assets, and the Consequent Divergence there may be between (i) Original Expectations to Earn, (ii) Earnings Required to Justify Financially the Continued Provision of Services and (iii) Actual Earnings

Type of asset created.	Initial capital expenditure on each class of asset.	(i) Expected earnings at time of original investment at 5%.	(ii) Earning required to justify retention and replacement of assets.	(iii) Supposed actual earnings.	Shortfall from expectations.
(a) Land, property and other non-wasting assets Value of these assets in other uses (£100,000) expressed as foregone annual rent, i.e., opportunity cost of retention	£ 500,000	£ 25,000	£ 5,000	£ 10,000	£ 15,000
(b) Those parts of the permanent way, including signalling equipment and other wasting assets, which require replacement from time to time	200,000	10,000	10,000	10,000	
(c) Rolling-stock	300,000	15,000	15,000	15,000	
TOTALS	£1,000,000	£50,000	£30,000	£35,000	£15,000

TABLE II

Showing Means by which Railway was Financed, and Comparison between Expected and Actual Earnings

	Amount.	Expected earnings.	Actual earnings.
Debenture 5% Stock.	£ 750,000	£ 37,500	£ 35,000
Ordinary Stock	250,000	12,500 (minimum)	Nil
	£1,000,000	£50,000	£35,000

cover the future economic costs of running a railway, and (ii) the earnings required to meet all the original hopes and expectations to earn.

What significance, if any, has the above analysis, either to our way of thinking about the nature of railway costs or to other matters of transport

policy generally? First, it shows that in so far as interest earned on railway capital constitutes a genuine economic cost at all (and nothing I have said implies that the amount of saving and investment required to maintain the provision of services on British Railways at current levels is small), most of it is anything but a cost "overhead to the railway system as a whole." On the contrary, it can be identified with particular types of equipment, services and localities. If at any time, therefore, an attempt was made to make British Railways or London Transport, or parts thereof, financially viable (in the sense of covering all economic or opportunity costs) such interest would be among the costs that could to a large extent be identified with particular assets and localised. In so far, however, as there are at any one time, and in addition to these capital "costs," substantial financial commitments entered into in respect of the durable and specific assets referred to, the important question of principle as to whether and to what extent the service of such debts should be regarded as an item "properly chargeable to revenue" remains. In coming to any decision on this matter a distinction should be made between the position *before* any particular investment has taken place and after that event. As regards the position before the event, in so far as it is policy to rely on private enterprise to provide the kind of facilities and services we have in mind, a Government really has no choice in the matter. For unless there are reasonably good prospects of being allowed to earn revenue sufficient to cover not only the costs of operating and maintaining the services for so long as they are required but also interest and depreciation on the *whole* of the investment, including that part of it that is going into those durable and specific assets to which attention has been specially drawn, such an investment would presumably not be undertaken. By the same token, if it is the duty of a nationalised undertaking both to pay its way and balance its financial budget as a whole, and also (so far as is practical) to justify every particular investment on financial grounds, such an undertaking would not be able to go ahead with many important projects, unless assured of the right to earn sufficient to cover all costs incurred, including interest and depreciation on the *whole* of the investment. If, therefore, it is policy that the costs, including the capital costs, of providing transport services should normally be incurred only if there are reasonably good prospects of earning back revenue sufficient to cover them, then the question raised does not arise. This is not to deny, however, that such a policy does imply that the charges for and revenues from the services to be rendered may stand at levels well above opportunity costs proper for an indefinite period of time, an eventuality to which some would no doubt take exception. Suffice it to say here that there may well be circumstances in which a government or municipal authority may decide to shoulder the debt or part of a debt in the interests of cheaper transport in spite of the fact that the transport undertaking might be perfectly able to do so itself (the circumstances we are now considering). Such a choice is essentially a matter

of distribution. But there does seem to be an element of "rough justice" in placing this burden upon the users of the facilities provided. For not only are the latter enjoying the benefits accruing from the investment but are also showing themselves willing and able to pay for such benefits on a scale sufficient to meet all the current costs and past financial commitments involved. Those who prefer that whenever possible public corporations should be financially self-sufficient and separate from national or municipal budgets must inevitably take this view.

But it is the circumstance in which major investments have already taken place which have turned out, from a financial point of view, to have been unwise which calls for decisions of policy of so highly controversial a character. And it is to this last situation that we shall now turn our attention. Let us suppose that to whatever levels prices and services are adjusted, revenues are insufficient to meet original expectations, to the extent of the case illustrated in Tables I and II above. What should be the attitude of those responsible for overall transport policy towards such a situation? Only from a purely financial point of view are the services being run "at a loss." All economic costs are being covered. There is no threat to the public of the services being withdrawn.

It is clear that in essentially competitive conditions there would be no alternative to insolvency or bankruptcy, probably followed by a scheme of capital reconstruction. The burden of the "mistake" would inevitably fall upon those who took the risk—the investors. When, however, degrees of monopoly exist, or can be established (by law or otherwise), for the purpose of protecting the interests of investors against the full consequence of financial failure, it then becomes a matter of policy as to what, if anything, should be done about it. Historically, one can distinguish at least three different lines of action to which resort has been taken.

First, when the earnings of publicly owned tramways or railways have failed to earn sufficient to meet in full the financial commitments entered into in respect of such transport, the burden of failure has been taken over by the local authority or government concerned. In such cases the capital had been raised and repayment guaranteed by the authorities concerned. The ratepayers or taxpayers, having willingly (or unwillingly!) been put in the position of risk-bearers, and, having lost, have shouldered the burden. This would seem to be a natural and inevitable result of schemes of municipalisation or nationalisation which link the financial fortunes of transport undertakings with municipal or national finance. Compared with other methods of dealing with the situation, *it has the great merit of not interfering with the development of those newer and more preferred means of transport which were in many cases the cause of the financial failure itself.*

A second line of action has been the unashamed protection of the financially disappointing undertakings against the competition of the newer and more preferred forms of transport, by means of deliberately preventing the

unfettered development of the latter in response to public demand. The economic consequences of this second line of action, if successful, are clear. The financial results of the older form of transport are "improved" at the expense of all those additional members of the public who would have patronised and become employed by the newer forms, had the latter been permitted to develop unhampered and in response to technical advance and public demand only.

A third line of action which has been permitted, if not actually encouraged, over the last half century has been the acquisition or control of the newer forms of transport by the old, whereby the financial success of the newer form has been used as a means of relieving the financial embarrassments of the old. Again, if the plan succeeds, among those who gain are those whose financial interests lie with the older form of transport, whereas among the losers are those who are denied the fullest possible benefits, in terms of lower fares, better services and employment, of the new. For the new forms are being asked to earn more than what would have been required of them in the absence of the scheme of joint-ownership. Most schemes of "pooling" receipts are likely to have similar consequences.

Whereas the first of these three cases places the burden of the mistake upon the general body of tax or rate payers, the last two, by means of restraining (and/or postponing) the fullest possible development of the new forms of transport, throw the burden upon the would-be providers and users of those forms. That present policy (as opposed to what was normal practice in the inter-war period) is inclined towards the first of these alternatives is, in the writer's view, to be welcomed.

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THEORY OF INCOME GENERATION AND ECONOMIC GROWTH¹

THE purpose of this paper is to present a theory of equilibrium economic growth based on the process of when and how income is *generated* and how much of it is spent, in the aggregate, regardless of the fact whether it is spent on consumption or capital goods. The following model differs from the usual ones, where a distinction is made between capital and consumption goods, and which are based on how income is *spent* on these two categories of goods. We shall not make any such distinction and follow the procedure adopted by Professor Harrod.²

We define *outlays on investment* as all the expenditure that is made on circulating and fixed capital to bring into existence plants³ that produce in a period the required quantity of capital goods as well as consumption goods. All the outlays on investment are expressed in net terms. This is to say that once a plant has been created, it will continue to produce the same amount of goods in each period till infinity. In the period of the creation of the plant the income generated will be equal to the expenditure made on all the circulating and fixed capital needed for it. In the following periods, however, the income generated by operating this plant will be equal only to the value of goods produced by it.⁴ If we define fixed capital as items on which expenditure is made once for ever, and circulating capital as items on which expenditure will have to be made in each period to operate the fixed capital created, then the expenditure on circulating capital will be equal to the value of goods produced by the fixed capital in successive individual periods. In other words, expenditure on fixed capital is equal to the value added in the process of creating a plant, and expenditure on circulating capital is equal to the value added in the process of operating it.

We shall denote the total income generated in a period t by Y_t . The effective demand in a period t , denoted by X_t , shall be assumed to form a constant proportion δ of the income generated in the preceding period, so that $X_t = \delta Y_{t-1}$. We shall denote the outlays on investment in period t by O_t . The ratio between the outlays on investment and the value of

¹ I am grateful to Professor J. Tinbergen and members of the Division of Balanced International Growth, Netherlands Economic Institute, Rotterdam, for their valuable comments and suggestions for clarification in collective and individual discussions on this paper. Mr. L. B. M. Mennes also checked the solution of the equation and the table.

² R. F. Harrod, *Economic Essays* (London: Macmillan, 1952), pp. 258-9; and "Domar and Dynamic Economics," *Economic Journal*, Vol. LXIX, September 1959, p. 460.

³ "Plants" is used here in a comprehensive sense. It includes all the apparatuses and paraphernalia that are required to produce a certain amount of goods. "Plants" is related to all types of goods consumption as well as capital.

⁴ This corresponds to Professor Oshima's "income originating effect." Cf. H. T. Oshima, "Income Originating in Models of Harrod and Domar," *Economic Journal*, *op. cit.*, p. 445.

goods produced thereby in a period shall be assumed constant and equal to β . The value of δ cannot exceed unity;¹ and, in general, it cannot fall below 0.8 or so. The minimum value that β can take is unity; it will equal unity in the case of existence of idle capacity, when the outlays on investment will equal expenditure on circulating capital only in order to operate the already existing idle fixed capital. The existence of such capacity is the characteristic feature of depressions, and in such periods β may be small approaching unity. When there is no idle capacity the outlays on investment will include expenditure on both fixed and circulating capital, and then β may rise up to 4-5 or even higher. In the following discussion we assume the prices to be constant and ignore all gestation lags. All other things which are not mentioned remain the same.

We start from a given amount of income Y_0 at the end of period 0. The effective demand in period 1 will be

$$X_1 = \delta Y_0 \quad . \quad . \quad . \quad . \quad . \quad . \quad (1)$$

As we are starting from scratch, meaning thereby that no production was carried out in period 0, the whole of X_1 value of goods will have to be produced by fresh outlays on investment. Hence the total outlays on investment in period 1,

$$O_1 = \beta X_1 \quad . \quad . \quad . \quad . \quad . \quad . \quad (2)$$

βX_1 is the total income generated in period 1, for there is no productive plant possessed from period 0 whose operation can generate any more income. Hence:

$$Y_1 = \beta X_1 = \beta \delta Y_0 \quad . \quad . \quad . \quad . \quad . \quad . \quad (3)$$

The effective demand in period 2

$$X_2 = \delta Y_1 \quad . \quad . \quad . \quad . \quad . \quad . \quad (4)$$

Out of X_2 , X_1 value of goods can be produced by the plants created in period 1, and while X_1 value of goods is being produced, the same amount of income is being generated. Hence investment outlays in period 2 will be made to produce an amount of goods equal in value to $X_2 - X_1$, so that

$$O_2 = \beta(X_2 - X_1) \quad . \quad . \quad . \quad . \quad . \quad . \quad (5)$$

The outlays on investment in period 2 will generate an income equal to O_2 . Hence the total income generated in period 2,

$$\begin{aligned} Y_2 &= O_2 + X_1 \\ &= \beta(X_2 - X_1) + X_1 \quad . \quad . \quad . \quad . \quad . \quad . \quad (6) \end{aligned}$$

¹ It may be contended that δ may exceed unity in some period, through dishoarding. This contention is obviously irrelevant in the long run. In any case, excess spending over that given by $\delta = 1$ should be treated as autonomous.

Proceeding in the same manner, we can write down the income generated in period t .

$$Y_t = O_t + X_{t-1} \\ = \beta(X_t - X_{t-1}) + X_{t-1} \quad \dots \quad (7)^1$$

The right-hand side of equation (7) consists of two elements; the first, O_t , is the total outlay on investment in period t which is equal to β times the excess of effective demand of period t over that of period $t-1$, and the second, X_{t-1} , is the effective demand of period $t-1$ and is equal to the value of goods produced and the corresponding income generated by all the plants created till the end of period $t-1$.

In other words, X_{t-1} is the value added in the process of operating in period t , all the plants created till the end of period $t-1$ (or till the beginning of period t), and O_t is the value added in period t in the process of creating and operating the plants created in period t .

Substituting $X_t = \delta Y_{t-1}$ in equation (7), we have the fundamental equation of income generation

$$Y_t = \beta\delta Y_{t-1} + \delta(1-\beta)Y_{t-2} \quad \dots \quad (8)$$

equation (8) is a linear homogeneous difference equation of second order; the initial values are Y_0 and $Y_1 = \beta\delta Y_0$.²

The following table gives the values of national income for selected values of δ and β over 10 periods, initial income being 100 units of money.

TABLE I

Formula: $Y_t = \beta\delta Y_{t-1} + \delta(1-\beta)Y_{t-2}$; $Y_0 = 100$

t	$\delta = 1$ $\beta = 1$	$\delta = 1$ $\beta = 3$	$\delta = 0.8$ $\beta = 1.2$	$\delta = 1$ $\beta = 2$	$\delta = 0.9$ $\beta = 2.9$	$\delta = 0.9$ $\beta = 1.5$	$\delta = 0.8$ $\beta = 2.5$	$\delta = 0.9$ $\beta = 2.1$	$\delta = 0.8$ $\beta = 1.6$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
0	100	100	100	100	100	100	100	100	100
1	100	300	96	200	261	135	200	189	128
2	100	700	76	300	510	137	280	258	116
3	100	1,500	58	400	885	124	320	301	87
4	100	3,100	44	500	1,438	106	304	313	56
5	100	6,300	33	600	2,240	87	224	293	30
6	100	12,700	25	700	3,387	70	83	244	12
7	100	25,500	19	800	5,010	53	-103	171	1
8	100	51,100	14	900	7,284	40	-306	52	-4
9	100	102,300	10	1,000	10,444	32	-488	-15	-6
10	100	204,700	7	1,100	14,803	23	-609	-110	-6

¹ The equation $Y_t = O_t + X_{t-1}$ should not be confused with Keynesian identity $Y_t = I_t + C_t$. The former is based on how income is generated and the latter on how it is spent. In the former O_t relates to both capital and consumption goods, so does X_{t-1} . See Harrod, *op. cit.*

² The solution of (8) can be written

$$Y_t = \frac{Y_0}{\sqrt{(\beta\delta)^2 + 4\delta(1-\beta)}} \left[\left\{ \frac{\beta\delta + \sqrt{(\beta\delta)^2 + 4\delta(1-\beta)}}{2} \right\}^{t+1} - \left\{ \frac{\beta\delta - \sqrt{(\beta\delta)^2 + 4\delta(1-\beta)}}{2} \right\}^{t+1} \right]$$

The table shows that the national income is constant in col. (1), steadily explosive in cols. (2) and (5), steadily declining in cols. (3) and (6), steadily increasing in col. (4), oscillating (assuming positive and negative values) with amplitudes increasing in col. (7), with amplitudes declining in col. (9) and with amplitudes tending to be regular and constant in col. (8).

The trends in cols. 7-9 are not clear, as 10 periods are too few to show them.

Equation (8) can be written as

$$Y_t - \beta\delta Y_{t-1} - \delta(1-\beta)Y_{t-2} = 0 \quad \dots \quad (9)$$

As equation (9) is a linear homogeneous difference equation of second order, we try $Y_t = \lambda^t$ to get ¹

$$\lambda^2 - \beta\delta\lambda - \delta(1-\beta) = 0 \quad \dots \quad (10)$$

$$\therefore \lambda_1 = \frac{1}{2}(\beta\delta + \sqrt{(\beta\delta)^2 + 4\delta(1-\beta)})$$

and

$$\lambda_2 = \frac{1}{2}(\beta\delta - \sqrt{(\beta\delta)^2 + 4\delta(1-\beta)}) \quad \dots \quad (11)$$

The roots, λ_1 and λ_2 , may be real and different when $(\beta\delta)^2 + 4\delta(1-\beta) > 0$, real and equal when $(\beta\delta)^2 + 4\delta(1-\beta) = 0$ or conjugate complex when $(\beta\delta)^2 + 4\delta(1-\beta) < 0$.

Case I: $(\beta\delta)^2 + 4\delta(1-\beta) > 0$

In this case the roots of (9) are real and different. The general solution is then:

$$Y_t = A_1\lambda_1^t + A_2\lambda_2^t \quad \dots \quad (12)$$

where A_1 and A_2 are arbitrary constants which can be found in terms of initial values Y_0 and Y_1 . The right-hand side has two terms $A_1\lambda_1^t$ and $A_2\lambda_2^t$. Each term can be explosive or damped. The value of Y_t will depend on the dominant root and the corresponding dominant term. From (11) it is obvious that λ_1 is the dominant root and $A_1\lambda_1$ is the dominant term. We have, therefore, for large t 's

$$Y_t \text{ grows explosively if } \lambda_1 > 1 \quad \dots \quad (13)$$

$$Y_t \text{ is damped towards zero if } \lambda_1 < 1 \quad \dots \quad (14)$$

In the table equation (13) is represented by col. (2) and equation (14) is depicted by col. (3).

Case II: $(\beta\delta)^2 + 4\delta(1-\beta) = 0$

In this case

$$\lambda_1 = \lambda_2 = \frac{\beta\delta}{2} \quad \dots \quad (15)$$

¹ In the solution of equation (9) we have followed R. G. D. Allen, *Mathematical Economics* (London: Macmillan, 1956), pp. 187-90.

The solution of equation (9) now is ¹

$$Y_t = (A_1 + A_2 t) \left(\frac{\beta \delta}{2} \right)^t \quad . \quad . \quad . \quad (16)$$

where A_1 and A_2 are arbitrary constants which can be determined in terms of initial values. Equation (16) shows that for large values of t the right-hand side is swamped by $\left(\frac{\beta \delta}{2} \right)^t$. Hence

$$Y_t \text{ grows explosively if } \beta \delta > 2 \quad . \quad . \quad . \quad (17)$$

$$Y_t \text{ is damped to zero if } \beta \delta < 2 \quad . \quad . \quad . \quad (18)$$

The relative values of δ and β which make this case relevant must satisfy $(\beta \delta)^2 + 4\delta(1 - \beta) = 0$. It is so if

$$\beta = \frac{2}{\delta} \{1 \pm \sqrt{1 - \delta}\} \quad . \quad . \quad . \quad (19)$$

Or if when

$$\begin{array}{ll} \delta = 1 & \beta = 2 \\ \delta = 0.9 & \beta = 2.9 \text{ or } 1.5 \end{array}$$

In the special case when $\delta = 1$ and $\beta = 2$, $\lambda_1 = \lambda_2 = 1$. In this case Y_t grows steadily by equal amounts as shown in col. (4) of the table. When $\delta = 0.9$, $\beta = 2.9$ or 1.5 . In case $\delta = 0.9$, $\beta = 2.9$, $\beta \delta > 2$ and it corresponds to equation (17), so that Y_t grows explosively as shown in col. (5) of the table. In case $\delta = 0.9$, $\beta = 1.5$, $\beta \delta < 2$ and it corresponds to equation (18), so that Y_t is damped to zero, as shown in col. (6) of the table.

Case III: $(\beta \delta)^2 + 4\delta(1 - \beta) < 0$

In this case the roots are conjugate complex. The general discrete solution is ¹

$$Y_t = A r^t \cos(\theta t - \epsilon) \quad . \quad . \quad . \quad (20)$$

Equation (20) is the general sinusoidal function of an oscillatory form. The arbitrary constants A and ϵ can be found from the initial values. The structural constants r and θ are given by

$$r \cos \theta = \frac{\beta \delta}{2}; \quad r \sin \theta = \frac{1}{2} \sqrt{-4\delta(1 - \beta) - (\beta \delta)^2} \quad . \quad (21)$$

$$\therefore r = \sqrt{\delta(\beta - 1)} \quad \text{and} \quad \theta = \cos^{-1} \frac{\beta \delta}{2\sqrt{\delta(\beta - 1)}} \quad . \quad (22)$$

The amplitude and damping of the oscillation is given by $A r^t$. A defines the initial amplitude and

the amplitude grows if $r > 1 \quad . \quad . \quad . \quad (23)$

it declines if $r < 1 \quad . \quad . \quad . \quad (24)$

and is regular and constant if $r = 1 \quad . \quad . \quad . \quad (25)$

¹ Allen *op. cit.*

From (22) we can see

$$r \geq 1 \quad \text{if} \quad \delta \geq \frac{1}{\beta - 1} \quad . \quad . \quad . \quad (26)$$

Subject to the condition of case III, and the limits of δ ($0.8 \leq \delta \leq 1$) and β (≥ 1) ¹

r is definitely greater than one when $\beta > 2.3$

r may be equal to, less or greater than one when $2 < \beta < 2.3$

r is definitely less than one when $\beta < 2$

In the table col. (7) represents equation (23), col. (8), equation (25) and col. (9), equation (24).

The period of the oscillation is $\frac{2\pi}{\theta}$. Since θ lies between 0 and π , the

period is at least 2 intervals of t . Unlike the amplitude, the period is fixed by the structure of the original equation; it does not change from one oscillation to another, as t changes. The smaller the value of θ , the longer the period.

The upshot of the present analysis is that there are numerous possibilities for the behaviour of income movement depending on the relative values of δ and β . We have briefly indicated only a few of them. National income may grow explosively, decline towards zero and oscillate with amplitudes rising, falling or becoming regular and constant. The interesting point is that all these possibilities exist even when we assume that the warranted rate coincides with the actual rate of growth, *i.e.*, when the producers and the entrepreneurs accurately estimate the volume of demand and all their undertakings are successful.

When we allow for a divergence implied in that of Professor Harrod's warranted and actual rates of growth the movement of income may assume still more numerous ways. In fact, Harrod's instability principle can be explained very clearly and effectively by the present analysis. Suppose, for example, that the producers and entrepreneurs overestimate the effective demand. Given β , they will make larger outlays on investment which will increase the national income higher than it would have been otherwise, and their optimism will be fully (or even more than fully) justified. This buoyant state may continue till the limitations set by the natural growth rate begin to be felt or some extraneous events shake the confidence of the producers and entrepreneurs and they begin to doubt their judgment.² The reverse will happen when the producers underestimate the effective demand. Thus the instability principle stressed by Professor Harrod is admirably supported by the theory presented here.

The theory has been presented here in its most essential and crudest form. A number of autonomous developments that do take place in the actual world have not been taken into account. Introduction of new

¹ When we assume a change in the limits of δ and β the limits following will change.

² Professor Harrod has pointed out other important cases for the reversal of the trend (*op. cit.*).

techniques of production, openings of fresh markets and potential increase in effective demand, discovery of additional resources, state decision to increase national spending directly or indirectly, some spontaneous wave of optimism or pessimism on the part of entrepreneurs and people, etc., may change the course of income movement. Particularly, state fiscal policy, broadly interpreted, is nothing but a mechanism to keep the movement of income at the desired path.

A theoretical model is, after all, a highly idealised form of reality. The need for simplicity and clarity dictates that we should assume the basic parameters β and δ to be constant. In the real world they are not so; on the contrary, they are ever changing. For example, the same area of land (say in India) can be irrigated either by digging wells, in which case β will be slightly greater than one, or by gigantic multi-purpose projects, in which case β will be many times larger. δ also changes with the state of the economy, or more correctly, with the state of the economy as the entrepreneurs and the people believe it to be. When we envisage changing parameters the possibilities of varying courses which the movement of income may take become infinitely large. It should be remembered, however, that the influences of changes in β and δ on the movement of income may counteract each other.

The above discussion has an important bearing on the decision-making about the size of investment by various countries. In the traditional framework the most debatable point is what proportion of income should be spent on consumption and what on investment. For it is argued, in the light of $Y = C + I$, the more that is spent on consumption, the less remains for investment, and vice-versa. It is agreed, though, that the greater the proportion of investment in the current period, the greater will be the consumption possibilities in the future. But the limit is very often set by the Keynesian identity, in which the volumes of consumption and investment can be increased at the cost of each other. According to the present approach, this identity is not relevant and is replaced by an equation $Y_t = O_t + X_{t-1}$. In period t the value of X_{t-1} cannot be changed, but O_t is open, and it can be raised or lowered, and Y_t will correspondingly change. This is not to say that Y_t can be raised to any level at will. It is certainly not so. O_t and, correspondingly, Y_t can be raised to the limit at which the income generated in period t can be sustained in period $t + 1$, ($t = 1, 2 \dots \infty$), with due allowance for δ . In other words, the economy must be capable of making outlays on investment in period $t + 1$, equal to $\beta(X_{t-1} - X_t)$, given the value of β . This will obviously depend on the natural endowment of the country, energy, efficiency and the will of the people, foreign assistance and international lending, etc., etc. Thus there takes place a major shift of emphasis from a static identity to a dynamic equation.

A word may be said also about the controversy on labour and capital-intensive methods of production to be adopted in the underdeveloped countries. It is, roughly speaking, argued that labour-intensive methods

will increase the consumption demand, and hence leave less for investment. The answer of the present theory is again different. According to it, labour-intensive methods are all right, if the increase in effective demand can be met by goods produced by *fresh* investment outlays in successive periods. Provided this condition is fulfilled, the natural course for a country would be to adopt the methods of production which employ relatively more of the factors which are in surplus supply.

These are only a few of the modifications in outlook that the present analysis suggests. There may be several other possibilities where this new approach may be helpful. A final remark may be made on the distinction between capital and consumption goods. Such a distinction has certainly an analytical convenience and pragmatic advantage. Such a division can be made in the present model too, if it is desired, by splitting each of O_t and X_{t-1} in two parts,¹ one representing capital goods and the other consumption. It is, however, felt that not much is lost by not making such a distinction. A trifling but stubborn fact of the present-day world is that the countries which are in short supply of capital goods are also in short supply of consumption goods. This shows that there is a large degree of interdependence and substitution between the two. Whatever that may be, capital and consumption goods have to be lumped together here for "the purpose of formulating the dynamic theorem in its most general possible form." The present approach is more comprehensive and realistic at least in one important respect. The usual models,² which are sensitive to changes in consumption only, cannot account for developments that are initiated by changes in the demand for capital goods (to start with). This may happen (as it often does in the real world) just owing to changes in the state of entrepreneurs' psychology distantly related, perhaps, to some favourable or unfavourable turn of events that may or may not take place, not to speak of many state controlled projects (mostly intended for producing capital goods) which have become so common these days. The present model covers also such developments, which are initiated by changes in the demand not for consumption but for capital goods.

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¹ The proportion of capital and consumption in X_{t-1} in period t is fixed, but it is variable in O_t according to the pattern of effective demand and the techniques that are intended to be employed. It must be stated here that $Y = C + I$, interpreted correctly, is not limitational. But being just an identity, it is not operational. The error is committed when it is consciously or unconsciously used operationally.

² Cf., in particular, Paul A. Samuelson, "Interaction between the Multiplier Analysis and the Principle of Acceleration," *Review of Economic Statistics*, Vol. XXI, May 1939. There is some apparent similarity between the equation contained in this paper and that of Samuelson but the two are essentially different based on different premises and reasoning.

REVIEWS

Capital, Interest and Profits. By B. S. KEIRSTEAD. (Oxford: Basil Blackwell 1959. Pp. viii + 171. 22s. 6d.)

It is difficult even nowadays to realise how deeply economic theory has lain under the spell of classical (physical) mechanics and its appropriate mathematical ways of thinking, and has accepted calculable nature as a model of human affairs. The almost perfect predictability of celestial events, the stability of the planetary movements depending on a balance of forces, the subtle power and mystery of the differential calculus (as the old view saw it), needed only the notion of "marginalism" to make plain the relevance of these things to economics, and show the immense and all-embracing scope of an explanatory system which could be constructed on the lines thus suggested. I cannot think that such a picture of the emergence of the general equilibrium idea is altogether fanciful. Nor would any detached thinker dream of denying its character of genius. So much explained, so universal a filing system for every possible question, so great a generalness of the answers, so sweeping and magnificent a scope, so simple and beautiful an essential basis; all these compelling glories of the general equilibrium conception gave it its deserved authority and, until thirty years ago, made questioning of its sufficiency almost disgraceful.

The question since then, in face of the catastrophes of the 'thirties, has been whether to abandon it and start afresh (such a thing, is, of course, always impossible, but we sometimes think it must be attempted) or whether to seek to transform it so that the grossly unmanageable questions, such as massive unemployment and great fluctuations, can be brought within its scope. By Keynes' great *tour de force* it was made to seem that the old tools would do, used differently. The static frame, the marginal equalisations, all the Marshallian apparatus of analysis were retained, only some parts of the machine were released from their dependence on others, and thus disconcerting things were enabled to happen in the Keynesian model which the Marshallian machine did not allow. Keynes built with the tools he had been given. He played upon an old instrument, and produced the sounds of a new one. Virtuosity carried to an extreme achieved the *General Theory*. Then the War came and stopped the debate.

Afterwards, when economic theoreticians had recovered their breath and taken their noses away from the grindstone of day-to-day necessity, some wanted to show that Keynes need not have bothered: the old instrument could play all the necessary (or at least, all the *desirable*) tunes; some wanted an entirely new instrument to play econometric tunes, or theory of games tunes. Only one or two have wanted to complete the Keynesian task itself,

to replace the *General Theory* with a model which should go the whole hog in those directions which Keynes pointed out. Amongst these few, Professor Keirstead wears the Marshallian and Keynesian mantle with high distinction.

He has carried to its logical conclusion the Keynesian principle of release, of admitting the dominant influence, in the working of the economy, of those loose ends which are held by politicians, by inventors, by Schumpeterian innovators, by Madison Avenue and by the electorate itself. Keynes freed *investment* from its theoretic dependence on the gradual exhaustion of a given stock of technical "investment opportunities," or on the accelerator, or what not, and stood it up on its own autonomous feet, with only expectations whispering in its ear. Professor Keirstead has similarly released the interest-rate from its dependence on the feelings and desires of individuals and made it a primarily political entity. How obviously, in these times, it is just that.

His book carries the debate of the 'thirties towards completion in another sense. That debate was a many-sided affair, involving theories of money, of capital or investment, of employment and of the process of change in an economy. It began, perhaps, with Sir Dennis Robertson's *Banking Policy and the Price Level* in 1926. Just at this time (the year of Wicksell's death) the new Swedish School of Lindahl and Myrdal, unheard of in England, was getting into its stride, producing a radically new economics of expectation and successive differing equilibria. While the Swedes were transforming Wicksell, Hayek in Vienna was transforming Böhm-Bawerk and showing that not only the amount, not only the speed of growth, but also the *structure* of capital (equipment) mattered. A few years later, Hicks sitting as it were on the shore watching the incoming Keynesian flood did not quite prevent it from erasing Hayek's ideas from men's minds. It was a pity, for even to-day, the Cambridge- and Oxford-School (Hicks apart) do not fully understand the importance and high topical relevance of what Hayek was saying in 1931. What are the right kinds of equipment to build first, in an underdeveloped country? How can the developers know how ambitious or cautious to be in their plans? What will happen if they are too much in a hurry? How harshly authoritarian must a Government be, to drive a primitive country into the effort and sacrifice needed to get it off the ground into sustained growth of wealth? Into the ultimate basis for answering these questions Hayek had a profound vision which he failed to convey. *Prices and Production* was fearfully confusing, even perhaps confused, but it had a germ which now, in Professor Keirstead's hands, has been shown to be fruitful. Professor Keirstead mentions, too, the name of a Hayekian whose penetrating work in this field has been too little recognised, Professor L. M. Lachmann.

The Austrians and Irving Fisher considered that interest is the reward of consuming, during some interval, less than one has the power to do. But saving is done, either by those with very large incomes who already consume everything they have a mind to, and who save a large part of their incomes

because they have no unsatisfied needs for consumption, or else by those who, being members of an impotent crowd of unorganised shareholders, or of a still larger crowd of still more helpless taxpayers, save willy nilly that part of their incomes which is never placed in their hands to do anything else with. Or finally, saving is done by those upon whom capital losses are imposed by State-generated inflation, their money depreciating while they wait to spend it. The case is strong, and Professor Keirstead does well to make it, he is justified even in that slight exaggeration which a neglected view requires if it is to be drummed successfully into ears pre-empted by other theories.

Nonetheless, interest is paid for something, and necessarily for something scarce. For what? Professor Keirstead appears to treat "free capital" as something whose available quantity is the rather arbitrary or accidental upshot of a complex of forces and purposes primarily directed towards non-economic or only semi-economic ends. Interest, it therefore seems (Professor Keirstead does not say so) is a kind of rent, arising from the competition of entrepreneurs for the use of a resource whose total quantity does not respond to changes of its price. Nevertheless, there is no exact equalisation of a precisely measurable "marginal efficiency of capital" and the interest rate payable for loans. The appeal to such a tendency, the desire for such clear-cut, simple theoretic precision is, we may think, a consequence or vestige of Keynes' training in *orthodox* maximisation economics, wherein maximisation was synonymous with the equating of a derivative or differential to zero. For his generation and even for later ones, economic theory worked in terms of continuity, divisibility and the calculus. Professor Keirstead points the need for something looser-jointed, dealing (we may venture to interpret him) in inequalities, a theory in which the comparanda are discrete, technically crystallised, masses or plans or policies, call them what we will. The motive for investment is profit, and profit is not "the marginal efficiency of capital," it is not something that can be looked up in the Stock Exchange list or worked out on a computer, it is a hope, a figment, powerful but undemonstrable, and only by convention reducible to arithmetic.

Let us be just to Keynes. He, if anyone, was fully seized of this problem. He was the first to give it emphasis, and he stated it in the final capstone of all his work on the theory of employment, his article called "The General Theory of Employment" in the *Quarterly Journal of Economics*. But this solution was to regard the *schedule* of the marginal efficiency of capital as highly unstable, capable of sweeping up and down abruptly through a great range, and thus of *representing* those strong tides of sentiment that characterise the inducement to invest.

In the second half of his book Professor Keirstead draws upon a rich historical and geographical erudition to illustrate his theory of the necessary and sufficient conditions for the transformation of a technically stagnant or "conventional" society into a progressive and capital-accumulating one.

His case histories, especially that of Newfoundland, of which he has such intimate knowledge, give the practical problem of capital a desperate realism and poignancy which explain the author's change of style between the two halves of his book: the first urbane, detached and abstract despite the author's business knowledge, the second passionate and alive with a savage wit.

It is a fact to which we, as economic theoreticians, do not give sufficient thought, that the greater part of modern economics is founded upon a theory, the theory of maximisation, marginalism and equilibrium, which was contrived in the most orderly and tranquil period of one of the most orderly and tranquil societies the world has ever known, that of Victorian middle-class England and certain countries of the Continent in the generation after 1870. Even to-day, after the wars, revolutions, purges and depressions, the inflations, menaces and cynical political criminality of fifty years, we still base ourselves ultimately on the perfectly competitive, rational and calculable Victorian model. This fact need not surprise us. It is useless and impossible to throw overboard the thoughts ingrained in us by the literature of our subject, we can only change them by stages from within. Of this process Professor Keirstead has given us a deeply persuasive example.

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The Growth of British Industrial Relations. A Study from the Standpoint of 1906-14.
By E. H. PHELPS BROWN. (London: Macmillan, 1959. Pp. xxxvii + 391. 42s.)

THE scope of Professor Phelps Brown's book can best be seen from the chapter headings: Chapter I is entitled "The Condition of the People"; Chapter II, "The Conditions of Work"; Chapter III, "The Development of Industrial Relations"; Chapter IV, "The Development of Public Policy"; Chapter V, "Institutions and Procedures in 1906"; Chapter VI, "Strife, 1906-14"; Chapter VII, "Sequel and Survey." The work is rounded off by a series of very brief biographical notes on about 125 of the principal *dramatis personae*; a useful Appendix on sources; and an excellent index.

Although the study is chiefly focused on the period from 1906 to 1914, the author inevitably has to deal at some length also with the events and trends of the twenty years prior to 1906. Throughout, Professor Phelps Brown draws on his wide knowledge of the available statistical data; and the interest of his work is much enhanced by his ability to express many aspects of his material in quantitative terms.

His judgments are forthright, if perhaps occasionally somewhat surprising: he rarely (except when actually quoting) refers to his sources; so the reader has

to take a good deal on trust, since he has no means of assessing the weight of the evidence on which the statements are based. Some of them indeed seem to depend upon a certain amount of hind-sight; and it is possible that a more appropriate sub-title would have run: "A Study of the Period 1906-14 from the Standpoint of 1959." One small detail, where 1959 should have served the writer better, is that having defined full employment as being "attained when the rate of unemployment is below three per cent," he applies this term to certain phases of the trade cycle in the second half of the nineteenth century and to particular years, e.g., 1889, without mentioning that this percentage figure is taken from the trade-union returns which were virtually confined to skilled men. Moreover, he himself points out elsewhere that: "The unskilled man was under-employed at the best of times. He worked on short engagements and there were gaps between them. The sort of work he did fluctuated from day to day and the fluctuations were thrown on him." Surely the use of some other term, such as "maximum employment," would have been preferable; or at the least the words "full employment" placed in inverted commas to show that the term is being used in a very special sense.

Taken as a whole, the book represents a notable achievement: it is clearly based on very extensive research, and it is extremely well written. The present reviewer has found it fascinating reading: it has renewed for him many half-forgotten memories of the years immediately before the outbreak of the 1914-18 war; and, particularly in Chapter VI, "Strife, 1906-14," it throws a vivid light on the domestic anxieties which darkened the horizon of those last years of international peace.

Everyone interested in current industrial relations should read this book for the insight it will give him into their historical background, and for the realisation it affords of the continuity of so much that might otherwise appear to be peculiar to our own times.

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Histoire des Théories Économiques Spatiales. By CLAUD PONSARD. (Paris: Librairie Armand Colin, 1959. Pp. 202.)

SPATIAL economics has recently followed economic dynamics in emerging as a separate, even if still incomplete, branch of economic theory. A history of its evolution is therefore most welcome to-day, particularly if written by an author who demonstrated in his *Économie et Espace* (1955) his impartiality towards the various schools. As spatial economic theories require a high degree of abstraction, many students also may prefer this historical approach, which traces the lines of development from author to author, to a more comprehensive direct treatment of the whole subject.

The high degree of abstraction assists in explaining the slow evolution of these theories. Although many mercantilist and physiocrat writers were concerned with the effect of space on the structure of the economy, Thünen (1826) was the first to formulate the basic problems of spatial economy (town and country relations, spatial price formation, distance and production relations with the associated problems of rents and incomes), and thus produced his famous circular pattern of supply-demand relationships. M. Ponsard regards Thünen, despite his intellectual isolation in Germany, as the heir of much eighteenth-century thought. For this reason, some of the earlier work, especially that of Cantillon (1755), is evaluated. Indeed, these contributions, although not systematic, are quite outstanding in forecasting both modern regional theories as well as conditions of spatial equilibrium. As M. Ponsard's work is focused on Thünen and his successors, the discussion of the earlier works is not complete and, for example, the important work of Sir James Steuart (1767) is not mentioned.

M. Ponsard stresses that, due to the impact of Ricardo's ideas on differentials in the fertility of land, Thünen's concepts of space did not receive much attention in the following century. Despite the growing significance of overseas trade, neither English-speaking (for example, Marshall) nor French writers considered problems of space systematically, and thus spatial economics remained virtually a German monopoly. Even there, progress was slow. Weber (1909) added weight analysis, and thus prepared the way both for gravity models and considerations of spatial equilibrium. However, his assumptions on elasticities of demand and supply and on the location of labour and demand (pre-determined) were unsatisfactory. Despite these defects, M. Ponsard notes that Weber's ideas still hold some attraction for countries that desire forms of autarkic industrial development, such as India. However, he does not refer to the interesting controversy on Weber's theory contained in S. S. Balzak's *Economic Geography of the U.S.S.R.*

Predoehl (1926) added marginal substitution concepts of these theories. American and British authors (Fetter, 1931; Chamberlin, 1933; Robinson, 1931; Lerner and Singer, 1937; etc.) are shown to have made quite independently spatial economic observations in investigations of monopoly. Again independently, but partly influenced by Thünen, Ohlin (Sweden, 1933) contributed from international trade theory. These various threads, as well as the earlier work of Launhardt (1882, a reciprocal of Thünen's circles resulting in definitions of market areas), are taken up by Palander (Sweden, 1935), who was thus able to consider the spatial effect of markets. However, his theories based on Weber's punctiform location of production remained very incomplete. Loesch (Germany, 1940) overcame some of these difficulties with his theories of regions (incorporating differences between agricultural and industrial distributions, hexagonal patterns of spatial organisations, significance of boundaries) and trade, and thus arrived at a scheme of spatial equilibrium. To achieve this Loesch had to adopt an

extreme rigidity in his exposition. This M. Ponsard regards quite rightly as premature in view of the limited material available. For this reason, Loesch's work is a substantial progress report rather than a definite work on spatial economy. As progress since then has been limited to mathematical contributions (Beckmann, 1950) and applications of modern economic analysis (Isard, 1956; described as the main intellectual heir of Loesch), Loesch's work still remains the most comprehensive presentation of spatial theory.

Despite thorough references to German literature, M. Ponsard does not mention the work of Christeller (1933), who pioneered in the discovery of hexagonal patterns of spatial organisations and hierarchies. These and other defects are, however, of minor significance. The work describes admirably the evolution and integration of a complex body of theory. An English translation of benefit to the growing number of students of spatial economics is recommended. The book also contains a good mathematical appendix and a useful chronological bibliography.

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A Textbook of Money. By S. KORTEWEG and F. A. G. KEESING. (London: Longmans, 1959. Pp. xx + 308. 35s.)

The Economics of Money. By A. C. L. DAY. (London: Oxford University Press, 1959. Pp. vii + 248. 7s. 6d.)

MERCIFULLY for the reviewer these two text-books are not quite on the same subject, in spite of a minimal differentiation of title. Mr. Day's, which is an introductory version of his *Outline of Monetary Economics*, covers the field of macro-economic theory with only a little banking thrown in. On the other hand, the book of the two Dutch authors, who are here offering us a translation of the seventh Dutch edition of their work, is concerned far more with the institutions and practices of the monetary superstructure and how these lubricate, clog or thrust the capitalist economy. Old acquaintances, such as Gresham's law, $MV = PT$ and purchasing-power parity, occupy a moderately prominent place in the Dutch offering—dressed, where necessary, to conform with more recent fashions—but are entirely excluded by Mr. Day, who, *per contra*, leaves money out even from the trade cycle, confining himself in this matter to recounting the marriage of the multiplier and accelerator which Samuelson promoted and Hicks endowed with floor and ceiling.

Methodologically too the approaches are different. Mr. Day adheres strictly to comparative statics. Except in the chapter on the trade cycle, his model moves from one plateau to another in response to selected disturbances. Professors Korteweg and Keesing, on the other hand, consider that the *raison d'être* of monetary economics as a separate branch of study lies

in the fact that the system does not settle down to any equilibrium. Consequently, their model is in perpetual motion. It is doubtless largely due to Mr. Day's skill that his work is of a tighter, neater construction, imparting a clear idea of cause and effect and laying the foundations of disciplined thinking. But in some part, it is perhaps also due to greater familiarity with and the easier handling properties of a static model—which is a reason why we should make allowances for those who tread a less familiar but ultimately more promising path.

With remarkable self-effacement the Dutch authors attach no preface to their book, so we have to fall back on the blurb for a statement of intent. From this we gather that their claim to a niche in the overcrowded library shelf labelled "monetary text-books" rests on their elucidation of the "practical complexities" of money, as distinct from the esoteric disputations about it. If this means that they offer a more detailed description of the mechanics of monetary operations and give greater prominence to the technical specifications of the monetary machine than is usual in a general text-book addressed to the uninitiated, the claim is well founded. From routine rules, designed to adjust the circulation of notes and coin in such a way that parking meters, say, do not cause a scarcity of sixpences, to the complexities of exchange control, a vast range of technical matter is covered. The range under the heading of payments restrictions is particularly wide, including such things as Schachtian clearing agreements and multiple exchange-rate practices. This is a valuable feature of the book which is enhanced by the fact that the practices described are invariably shown to have consequences which are fit objects for economic analysis. But as the authors take the world as their province, they occasionally give the wrong impression about practices in Britain. Here is an example at the trivial level: "In a bank's balance sheet cash and call money are normally lumped together" (p. 23). More serious is the absence of any reference to liquidity ratios or to open-market operations in other than bills. What is trivial and what is serious will, of course, differ from one part to another of the English-speaking market towards which this translation is aimed.

In the light of Radcliffe controversies, the Dutch authors' distinction between credit operations of banks and those of other financial institutions bears quoting: "A credit operation will expand the volume of money, if the amount obtained by the borrower does not reduce anybody else's purchasing power" (p. 33). Not that these issues are consciously ventilated in the book.

Neglecting differences of opinion and of interpretation with the two authors, attention may be drawn to one—as far as it could be ascertained, the only one—outright fallacy. It is illustrated in the following passage: "The increase of M that occurs in that case [full employment] will raise prices and thereby reduce [real?] spending, thus restoring the *ex post* equality between national income and expenditure" (p. 90). This talk of restoring an identity reflects a confusion between *ex post* identity and *ex ante* equilibrium

which crops up in a number of contexts but miraculously turns out to be a virtually harmless lapse. In the region of doubt between fallacy, odd definition and misprint falls the equation on p. 49, which makes MV equal to factor payments plus expenditure on final goods.

The translator is anonymous. On the whole he has done a very competent job. A few things which sound strange do nevertheless occur. "... inflation will be deemed to exist when there occurs an increase in MV that is not caused by a growing number of stages of production" (p. 91) may mean something in Dutch, but what does it mean in English? Again, "commodities whose absence does not appreciably upset economic planning are called non-essentials" (p. 211) may sound less pedantically earnest in the original. Or perhaps these specimens are just as bad in any language and should not be laid at the translator's door.

How Mr. Day's book will read in a Dutch translation is anybody's guess. In English, it reads so well that it will establish Mr. Day as an introductory expositor of a high order. A book designed for the most elementary level inevitably involves drastic selection and painful compromises. Not everyone will agree with Mr. Day's judgment in every instance. This reviewer would be inclined to warn students to whom he recommends the book that the reconciliation of conflicting economic objectives and interests is not as easy as Mr. Day makes it appear. If, to take but one example, growth had been included among the objectives, the effect would have been less soothing but more salutary. The main point, however, is that the book can be recommended unhesitatingly as an excellent first introduction to Keynesian economics.

Chapter Nine is on a rather different plane of discourse from the rest. There Mr. Day argues why a "bills only" approach to open-market operations, a cash ratio convention and an unlimited commitment of the central bank to discount bills at bank rate cannot be expected between them to have any effect on bank deposits except through the change in the structure and level of interest rates, or in so far as the bills are sold to or purchased from holders outside the banking system. That this should have dawned so late in many quarters is indeed surprising, and it is no doubt Mr. Day's justification for changing the level of the argument in the middle chapter of the book. But Professors Korteweg and Keesing, at any rate, do not give the impression of ever having been guilty of the fallacy that, with unlimited discounting at bank rate, open-market sales of bills force a contraction of bank deposits with a multiplier equal to the reciprocal of the cash ratio.

In conclusion two untypical oddities in Mr. Day's book. First, the line between "autonomous" and "accommodating" capital movements is drawn in such a way that all short-term movements come under the heading of "accommodating" (pp. 153-8). Second, the gold standard is said to have worked tolerably well in the pre-1914 days because price flexibility in traded goods was greater thanks to the fact that a greater proportion of total

international trade was in primary products (p. 204). (Were the elasticities commonly associated with primary products different in those days?)

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Economia Internazionale. By GIUSEPPE UGO PAPI. (Turin: Unione Tipografico-Editrice Torinese, 1959. Pp. 524. Lire 4,500.)

THIS book is one of a recently planned series of major works by Italian economists on different aspects of economics. Although Professor Papi's weighty volume is entitled *International Economics*, its contents range over a widely different field from that covered by most works with a somewhat similar title.

The first 280 pages are devoted to general topics, such as the basic factors which make for economic growth; the causation of economic fluctuations; the measures that can be adopted for securing greater stability. These matters are dealt with more on national than on international lines, although the interdependence of countries is stressed throughout. In the course of his discussion of economic fluctuations Professor Papi engages in some rather shadow boxing with Keynesian theories, on the lines of the controversies of the late 1930s, the dust of which it might have been hoped would be laid by now. However, it is clear that his main preoccupation is with the perversions to which Keynesian doctrines have been subjected in countries where productivity and the economic utilisation of resources are sacrificed on the altar of "full employment."

With regard to theory, Professor Papi is very much a classical economist: it is with the underlying long run principles of economics that he is primarily concerned. His classicism is, however, tempered by his insistence on the immense importance of the role of the State in economic systems to-day. While, on the one hand, his treatment may often give the appearance of being elementary—he certainly, for example, leaves out of account the recent work which has been done in this country and elsewhere on the theory of growth—on the other, what he has set out to do is to concentrate on fundamentals; and, as Marshall showed long ago, statements which appear to be simple and straightforward may none the less be profound. In addition to a long working life as a writer and teacher of economics, Professor Papi, who is Rector of the University of Rome, holds an important post in the Italian Ministry of Agriculture, and for many years has been consulted by his Government on matters of general economic policy. His views command respect (even if not invariably acceptance), since they represent the outcome of long-continued observance of economic events and active participation in large issues of policy.

In the second half of this large volume Professor Papi sets out at length

and in considerable detail the efforts which have been made in recent years in the direction of economic co-operation in Europe. Much space is devoted to the Common Market; and here he can speak with the authority of one who has himself taken a considerable part in the negotiations which led up to its formation. It would be difficult to find a more sober or realistic appraisal of the opportunities, but also of the hindrances and dangers, attendant on this imaginative and courageous adventure.

In writing this book Professor Papi has deserved well of the cause which he himself has so much at heart—the unity of free Europe, with the object of achieving “greater prosperity and an enduring peace.”

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Social Accounting and Economic Models. By RICHARD STONE and GIOVANNA CROFT-MURRAY. (London: Bowes & Bowes, 1959. Pp. 88. 9s. 6d.)

THIS slim volume may be conveniently described as a sum of A + B where A and B are pamphlets. A is a successor to that useful guide, Meade and Stone on *National Income and Expenditure*, which is somewhat too brief on social accounting. It is very desirable that the student should use the aggregates in the National Income Blue Books with a proper feeling for their inter-connections, and should in fact see them, not as elements in separate accounts, but as a description of an economic system. He will be helped to do this by the simple flow diagrams and accounts in Chapter I of pamphlet A, and by the idea of a “social accounting matrix” introduced and illustrated in Chapter II. From this he is led gently to the idea of input-output analysis. Pamphlet A is written in a style appropriate for the ordinary first- or second-year student, and the publishers would do well to consolidate it with the earlier work of Meade and Stone when this is next revised.

Pamphlet B, however, is addressed to a much more restricted readership—those who are interested in economic model-building and who can understand matrix algebra. It describes some simple models of production and of consumers' behaviour; the former are linked to the social-accounting ideas previously presented, while the chapter on consumer behaviour summarises some of the work for which Professor Stone and his collaborators are well known, and presents a selection of its practical results. The exposition is quite clear, but it is not light reading—perhaps in part because it does not use the skill of the typographer to guide the eye through the jungle of vectors and matrices; and it may well be thought that anyone capable of understanding the mathematics would wish to get it from more extensive primary sources. The chapter on models of consumer behaviour will, however, find a very useful place as a guide to some of the literature, and it

leads up to an interesting discussion of a “dynamic linear expenditure system,” with an illustration from post-war United Kingdom data.

The puzzle remains: why should those who need A be forced to buy B? Why should those who want B have to buy A, which will probably be well known to them already? The “package deal” is not usually advantageous to the consumer. But in this case it may surely be said that it is a bumper package, offering two for the price of one.

C. F. CARTER

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Problems of Capital Formation: Concepts, Measurement, and Controlling Factors. Studies in Income and Wealth, Volume Nineteen. By the CONFERENCE ON RESEARCH IN INCOME AND WEALTH. (Princeton, New Jersey: Princeton University Press for the National Bureau of Economic Research (London: Oxford University Press, 1957. Pp. 609. 60s.).

THIS is a collection of fifteen papers presented at the Conference in October 1953, together with discussions. In the four years between the Conference and publication—too long even by the standards of this series—the best papers were circulated and lost the attraction of novelty; while some were published as parts of monographs and should be read in that form. (But the reviewer is to blame for the delay between the date of publication and the date of this review.)

The volume, as expected, displays the scale of American research in this field, with an obvious difference between detailed notes and points of general interest. Part I is on conceptual and statistical problems and contains, *inter alia*, an interesting essay on certain changes in accounting techniques during the last fifty years by G. O. May, the doyen of the profession. E. F. Denison's essay points to a fundamental difficulty in measuring capital which is due to quality change. For an economic theorist this is an important paper, as it emphasises the unsatisfactory nature of many of the estimates with reference to the requirements of economic theory.

Part II is devoted to the measurement of capital coefficients and capacity, and is of interest, since Western economists tend to rely, for want of anything else, on American coefficients, though many of them are based on shaky data. Anne P. Carter, F. T. Moore, R. T. Bowman, Almarin Phillips and J. E. Hodges deal with different industries. Even in a narrowly defined industry there are large differences in capital coefficients. Part of these differences can be explained by taking into account quality differences in the product, differences in scale of production or geographical differences, but part remains unexplained. While the detailed problems of measurement appear formidable, one cannot help feeling that the more economists study these problems empirically, the better will become the planning decisions of

industry and government. This part is concluded by a valuable essay by B. G. Hickman, in which he demonstrates the existence of a relationship between the level of utilisation and the rate of growth of capacity in some industries. He shows that capacity begins to grow long before it is fully utilised.

Part III contains papers on problems of inventory investment by Ruth P. Mack and F. Modigliani. These raise debating points rather than make important new contributions to the subject. The concluding paper by R. Eisner on interview and other survey techniques of investment behaviour is, however, comprehensive and thoughtful. It should help economists to interpret the results of surveys, and it should especially help in reconciling results obtained by different methods. There is even a possibility that by looking more carefully at the results of interviews the rate of interest may once again recover its status as a factor in investment decisions.

T. BARNA

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Pioneering in Industrial Research. By KENDALL BIRR. (Washington D.C.: Public Affairs Press, 1957. Pp. 204. \$4.50.)

IN recent years the subject of industrial research and, in particular, its significance as a variable influencing economic progress, has attracted increasing attention from economists. For the most part, however, the literature so far published has been confined to the discussion of the wider aspects of the problem, such as the principles governing research and the conditions under which it is most likely to flourish. It is thus with considerable expectancy that one turns to Dr. Birr's book, which is virtually a case-study of the role which research and development have played in the twentieth-century history of one of America's largest firms, and the reputed pioneer of the modern research laboratory—the General Electric Company (G.E.C.). Here, of all places, one would surely expect to find a wealth of empirical evidence concerning the vicissitudes associated with the origin and development of a research programme, and an assessment of the economic variables upon which the success or failure of research depends.

Unfortunately, if the reader is seeking answers to questions of this kind he will be disappointed. Not that one can censure Dr. Birr for his comparative lack of interest in economic affairs, as he is writing primarily as an academic historian "with a special interest in the development of science and technology." In consequence, only here and there, recorded almost as *obiter dicta*, will those well grounded in the Carter and Williams approach to the subject matter find much of direct appeal to them: well over one-half of the book, for example, is taken up with descriptions of the more im-

portant technical discoveries of the laboratory and the personalities behind them.

This does not mean, however, that there is nothing of interest to the economist in this study. Chapter 1, for example, contains an admirable summary of the rise and present-day importance of industrial research in both the leading European countries and the United States. In Chapter 2, which deals specifically with the problems associated with the formation of the G.E.C. laboratory, there are some illuminating reflections concerning the policy of personnel recruitment. Apparently some forty-two of the sixty-five prominent members in the early days had Ph.D.s, of whom twenty-two were recruited from academic posts. Analytical ability, curiosity, imagination and receptiveness were the qualities most sought after in applicants, and by careful selection, the payment of good salaries and the provision of first-class research facilities, the research institution, under the leadership of Willis Whitney, an able young chemistry instructor from the Massachusetts Institute of Technology, soon acquired a nation-wide reputation. Between 1906 and 1918 the total numbers employed rose from 102 to 198, and by this latter date, with its basic policies and main lines of research decided, the laboratory was firmly established within both the life of the G.E.C. and the electrical equipment industry in general.

After the First World War the laboratory both consolidated its work on earlier discoveries, on light and X-rays, for example, and pioneered new lines of research, as in metallurgy and chemistry. Employment continued to rise and reached a peak of 555 in 1929. The depression necessitated some cuts in staff, but on the whole, save that perhaps rather more attention was concentrated upon projects likely to yield quick returns, the work of the laboratory continued unimpeded. At no time was the national importance of the laboratory more clearly demonstrated than during the Second World War. Even by 1941, over one-half of its staff were engaged upon defence projects, and many and varied were its contributions towards the winning of peace. Since 1945 the laboratory has shared in the general expansion of research, and by 1956 it employed more than 1,300 people, of whom some 400 were professional scientists.

How far is it possible to assess the impact of the research laboratory either on the life of G.E.C. in particular or on that of United States industry in general? Dr. Birr does not shrink from admitting that though from every viewpoint the prosperity of the former has been marked and continuous during the past fifty years, it is virtually impossible to say how far such success can be attributed to the growth of its research and development facilities as such. But he is able to suggest four main reasons for the outstanding pioneering work which the laboratory has undertaken: first, the sympathetic support, unobtrusive guidance and solid financial backing of G.E.C.'s management; second, the exceptional quality of the laboratory's personnel and leadership; third, the sensible balance of the laboratory's

research programme between basic and applied research and the diversification of interests, as befits the needs of the electrical equipment industry; fourth, the ability of the parent company and its associates to exploit and commercialise promising inventions. "The research laboratory started an idea along the road but it was G.E.C.'s engineering skill, financial resources and marketing competence that created profitable lines of merchandise" (p. 182).

Based on documentary sources, which incidentally are extremely well annotated in a special appendix, Dr. Birr is to be congratulated for producing a very readable study. He is a lively writer, gifted with the ability—all too rare—of sustaining his readers' interest amidst a wealth of technical detail. As a purely descriptive history of the development of the G.E.C. research laboratory, its major contributions and the personalities behind them, there is little with which one can find fault. Indeed, it may seem a little ungracious for an economist to offer any criticism at all. Nevertheless, one cannot but feel a sense of disappointment that Dr. Birr did not allow himself to offer any kind of critical evaluation of his subject matter nor think it profitable to relate his findings to the wider interests of industry in general.

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JOHN H. DUNNING

The Ministry of Labour and National Service. By SIR GODFREY INCE. (London: Allen & Unwin, 1960. Pp. 215. 25s.)

SIR GODFREY INCE held the most important posts in the Department and is able to speak of them. He begins with the foundation of the Department in 1916. But even the Ministry was not self-created. The Board of Trade, with Sir William Beveridge, developed the Labour Exchanges Act in 1910; with a tentative form of unemployment insurance in 1912. In the Trade Boards Act, Mr. Mallon produced the reasons for Trade Boards; and Sir George Askwith was Chief Conciliation Officer in the Board of Trade. Sir George Askwith had established a semi-independent post as Chief Industrial Commissioner, and later the Ministry changed the old concept of the Conciliation Officers and placed those officials under the Regional Controllers.

The other matter which Sir Godfrey fails, I think, sufficiently to stress is the significance of Mr. Bevin as Minister of Labour. It was he who put the Department into the centre of Whitehall, especially during the Second World War. The International Labour Office was established in 1930. The Board of Trade had agreed that after it was created, its relations with the Government should be through the Ministry of Labour.

Sir Godfrey Ince, here, is emphatic on man-power. All persons, men or women, who were in employment, or could be caught into employment, either in industry, commerce, the professions or the Armed Forces became

the concern of the Ministry. In 1944, it is true, the Board of Trade took over questions of industrial policy and took from the Ministry the powers in connection with Special Areas and the development of Trading Estates. Against this, it is the Ministry who train unemployed workers in expanding industry or are responsible for the transfer of workers from one area to another.

In 1939 the National Service Act was passed and the Ministry took over the job of recruiting. Here the object of a Master Plan had been worked out and the Ministry decided on the distribution between the Armed Forces, Civil Defence and civilian war industries. Mr. Bevin, as Minister, directed that women should be given the option of going into the Armed Forces or directed to war work. Von Speer, the first director of man-power and industry under Hitler, said, after the conflict, that the United Kingdom had made a complete and magnificent call-up of its civilian labour, and he wished he had had the same fortune.

Mr. Bevin depended on the Lord President's Council, under Lord Waverley, which was the final arbiter for war, to hold the balance between work for the Forces and economic affairs. In due time, Mr. Bevin organised a Committee of the British Employers' Federation and the Trades Unions into a Council. All important matters of man-power and industrial relations went to the Council, which in most affairs reached an agreed policy. In time, Mr. Bevin, as Member of the Lord President's Council, was able to say "what industry could do and would do" to meet the frequent changes of the "load on industry."

This primary duty on the Ministry made the Department suitable for demobilisation and resettlement. Indeed, the plans for demobilisation, based on age and length of service, or special qualifications for work of National importance, was that of the Ministry. In time, the Ministry joined the Board of Education and the Ministry of Agriculture, opened a further Education and Training Scheme and created local Resettlement Advice Officers which could give special help, beyond the general question of the Employment Exchanges.

In May 1944 the Government announced their intention of maintaining a high and stable level of employment. It was under these auspices that the Ministry developed its training plans to fit labour for the expanding, and often highly skilled, employment; it also organised foreign workers and spare schemes for older workers at a time when the older worker was becoming an important factor in a man-power policy; and a special attack was made on the problems of men disabled during the War. An official Youth Employment Service was created, and in 1948 a report, drawn up by the Ministry, the Board of Education and the School Education Department devised the Youth Employment Service, which was incorporated in the Employment and Training Act. It is part of Sir Godfrey Ince's reputation that this report was called the Ince Report.

An Order of 1940 making strikes and lock-outs illegal and demanding
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compulsory arbitration was revoked in 1951. At some stage also, the Industrial Relations Officers were placed under the Regional Controllers of the Ministry. It may have been thought that a local settlement was more possible with officers who knew the employers and trade-union officials. This doctrine differed from that under Sir George Askwith's job—he had special Conciliation Officers who were "Expert" in their functions. The next step in the Ministry of Labour was the transfer to them of the Factory Department from the Home Office. Finally, the Department took on the responsibility of the International Labour Office, which included Labour Attachés to the large Embassies. The I.L.O., set up in the Versailles Treaty, survived the Second World War and has been associated, as a Special Agency, with the United Nations.

Sir Godfrey Ince gives special attention to the place of the Employment Exchanges in "employment policy." Their service has been a major test, for their continued existence depended upon their success, and the assistance given to employers, to agriculture and to local trade-union officials is freely supplied. Persons claiming an unemployment benefit must sign on at an Exchange, but many who are seeking work can find the prospects at the Exchange. It is significant that an Exchange, submitting labour for a vacancy, must do so, irrespective of race, colour, sex or belief.

The arrangements for dealing with higher appointments are not complete, for there are many professions and many industries which have a recruitment officer for jobs which are claimed to be nearer to the vacancy or the applicant. But out of this branch of the Employment Exchanges has come the contact with the regular officers of H.M. Forces and with younger men who are suitable for executive posts in industry. Again it is part of the service to deal with the other men and women and with ex-regular members of the Forces.

The story of the Ministry of Labour since 1916 is, in fact, part of the organic structure of the State, and nearly every factor of employment and the care of it is found in its pages. Fortunately, except for claims for unemployment benefit requiring a signature, all parts of it are voluntary. It did not happen at once. It grew up when factors demanded that it should grow up. The Second World War, when all the man-power resources had to be used, broadened the Ministry under the activities of Mr. Bevin. But Appendix II tells the story of the many different Ministers who fitted into each chapter of the story, and of other high permanent officials, among whom Sir James Masterson Smith curiously seems to have escaped mention.

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The Brewing Industry 1886-1951. By JOHN VAIZEY. Published for the Economic Research Council with a foreword by P. SARGANT FLORENCE. (London: Pitman, 1960. Pp. xix + 173. 30s.)

THIS book is to be welcomed because it is the first serious investigation by a professional economist of an industry whose own professional mystique has combined with political prejudice to discourage rational analysis. The author's perception and intelligence will ensure that his text will not be neglected. In essence, there are two inquiries in short compass: a brief history since 1886 (50 pages) and a more detailed examination of "the industry today" (110 pages). Such a juxtaposition of historical and contemporary investigation, linking analysis of the dynamics of change with that of structure and operation is completely justified, particularly for the brewing industry over which the past hangs so heavily. No economic historian can afford to neglect the conclusions revealed by the latter type of analysis, while the economist cannot be fully articulate in such an inquiry without awareness of the process of evolution which lies behind the present.

It is a pity that brevity limits the historical section to being in the main an orderly narrative of the sequence of trends in the industry, clearly related, without much room for the analytical investigation (from internal as well as printed sources) shown in the later chapters to be applied to the historical evidence. In fact, there is compensation for this in the considerable retrospective analysis contained in the second part of the book. From this later section the dominant reasons for the trends in historical evolution appear as conclusions. Many factors worked progressively in favour of the larger brewery and increased concentration in the industry: economies of scale in size of plant, the urge to employ plant to capacity, improving transport methods making mass distribution more economical over a widening area, rising fixed costs (particularly those of bottling plant) and aggressive national advertising after 1928. Other forces, more peculiar to the industry, provided great inertia against these trends: the economics of location determined siting almost completely at the market (except for the Burton brewers and Guinness); rail, lorry and recently bulk transport counteracted only by stages the inherent disadvantage of marketing a relatively cheap, bulky and delicate product over long distances; the markets were consolidated at an early stage in the industry's evolution by entrenched local brewers in control of retail outlets, enjoying the added defence of restricted licensing after 1869 and immobilised by all the non-economic motivations of family tradition. Although closely linked, there remain separate influences operating on the numbers of plants in operation and the numbers of firms possessing an independent existence.

The chapter on costs and efficiency in the industry show the author at his best. They are rigorous in analysis, subtle and penetrating in argument. Mr. Vaizey has obviously talked at length with brewers and studied the

figures they have provided to excellent purpose. Brewers should be fascinated by these comments no less than economists. Essentially, the methods used and the answers sought depend for success upon quantitative evidence being available in comparable form from several firms. Hence, it is no wonder that the attempt to submit the concept of profits to scrutiny does not yield as much precision. The complications arising from reticence about figures, differing accounting conventions and non-brewing income would need a Royal Commission to unravel. Even so, the tables drawn up from firms' records are amongst the most valuable evidence in the book. Events have been moving so rapidly in the brewing industry in the past decade that some parts of these investigations, which were completed in 1953, have dated a little, particularly those about the structure of the industry. The last detailed figures used are those of Leak and Maizels (based on the 1935 Census), where the industry proved to be "below average" in concentration. The count of subsidiaries and breweries up to 1951 has been overwhelmed by the stampede of firms into each other's arms since then, latterly encouraged by Mr. Clore wanting Watneys and the Canadian invasion. One or two other recent moves by some of the most influential firms also modify a little certain generalisations made here, such as Guinness spreading their capital and interests beyond the brewers' traditional fields of soft drinks, wines and spirits. It is a little odd to read in 1960 that "attempts to sell continental style lager have failed." Time and history impose their hazards on all judgment, however, and one can only regret the long delay in publication. In a book that sets out to judge and analyse one might beg leave to dispute some less contemporary assertions. Has modernity of equipment in fact proved "not especially important" (or does the truth of this in regard to vats and boilers break down when it comes to bottling plant and transport)? Did the return of better times to the industry in the 1930s first come with rearmament (production was moving up steadily after 1932 and expenditure on beer by the end of 1934)? Does the high degree of family control depend "primarily" on the tied house (for what of Guinness, the wine merchant and distilling dynasties and other examples)? Must the general decline in beer consumption between the wars be just a function of relatively higher beer prices, without benefit of changing social habits? More remotely the firm and family of Home were not among the major London firms in the eighteenth century. If Mr. Vaizey provokes arguments, that is a consequence of the main asset possessed by any book which provokes thought.

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The Schuman Plan. A Study in Economic Cooperation, 1950-1959. By WILLIAM DIEBOLD. (New York: Frederick A. Praeger for the Council on Foreign Relations, 1959. Pp. xviii + 750.)

MR. DIEBOLD is no newcomer to the study of European economic integration. His speciality are the early stages of integration that led to more. His first volume on the subject (*Trade and Payments in Western Europe*, reviewed in the June 1954 issue of this JOURNAL, pp. 367-8) dealt with the various European payments agreements which eventually led to the formation of the European Payments Union. The present volume deals with the "transitional period" of the European Coal and Steel Community from 1953 to 1958. In the event, this turned out to be not only a transitional period from economic nationalism in coal and steel towards a firmly entrenched E.C.S.C., but also a transitional period from integration by sectors towards the fairly comprehensive integration commenced by the European Economic Community.

Mr. Diebold starts at the beginning. He traces the "idea" to what everybody said about everything that seems relevant. Some of the *mots* he collected may help harassed examiners in search of questions, such as: "The difficulties of the realization of the Schuman Plan begin where the economic problems start." While all this is well told, one wonders whether greater economy of words in the first and last parts of the books would not have helped to convey the author's findings more effectively. For instance, tucked away amongst the 136 pages of Part One is one of the best summaries of the functions and powers of the High Authority extant in English literature on the subject (pp. 79-81). Similarly, the 150 pages of Part Four contain, on pp. 649-51, a clear and concise comparison of the powers and functions of E.C.S.C. and E.E.C. However, the book was not written for political scientists and economists alone, and these two groups of readers will find much meat in Parts Two and Three (pp. 139-564), which deal with the actual processes of integration by sector.

The history of E.C.S.C., as here recorded, shows the gradual ascendancy of the Council of Ministers over the High Authority. The High Authority's decisions just could not be implemented unless the national governments concerned at least accepted them. In practice, the High Authority had most authority when it negotiated with national governments and persuaded them of the desirability of a decision before such decision was actually taken. The High Authority has not really become a "supra-national" authority, but the hand-maiden of six governments with the will to co-operate within a specified sphere.

Such political limitation also limits the degree of economic integration which is practical in coal and steel. True, there is no more discrimination as far as infra-Community trade in coal and steel is concerned. At the same time, coal and steel cannot be treated in isolation. Governments could not

be, and were not, expected to adjust all laws and administrative practices just for the sake of perfecting integration in two trades. There was no co-ordination of transport policies, fiscal policies and policies relating to monopolistic practices. The consequence was that the conditions for intra-Community trade in coal and steel did not become altogether identical with the conditions for domestic trade in coal and steel—though the conditions for intra-Community trade became more like the conditions for domestic trade and less like the conditions for foreign trade.

Thus, Mr. Diebold shows how the abolition of discriminatory railway rates did away with differences in the treatment of national and Community coal and steel, but the rates applicable to the conveyance of coal and steel continued to be decided by each national railway system in the light of purely national considerations. Taxation continued to be determined by the needs of national budgets, so that countries with higher turnover taxes levied equalising charges. Before E.E.C., even external tariffs were only made more alike and did not become exactly equal, so that the degree of protection against third-party competition continued to vary (though less than before). National governments could no longer apply discriminatory price controls as far as coal and steel are concerned, but they could control prices of goods containing coal and steel. These, however, are minor blemishes, even from an idealised free trade point of view, compared with the difficulties in conferring freedom upon those who did not want it. In this sphere the High Authority could only provide some elementary education, but appears to have produced no graduates. Steel firms could be made to write down and publish their prices at various basing points, but nobody seemed surprised when all firms quoting at a particular basing point quoted the same prices. Coal owners who liked to sell through a marketing board could not be made to compete. The High Authority could do no more than to split the largest of these boards into three boards, in the hope that some competition might develop.

In all this, the High Authority had to tread warily in order to survive. It survived. On laying down Mr. Diebold's interesting volume, one has gained the impression that the High Authority, throughout the transitional period "did nothing in particular and did it very well."

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F. V. MEYER

Economic Development. By BENJAMIN HIGGINS. (New York: W. W. Norton, 1959. Pp. 803 + xviii. 60s.)

THIS book adopts a pattern that has now become almost standard for a development text-book: an introductory discussion of the general nature of the development problem and the characteristics of underdeveloped countries, followed by chapters on various theories of development, some historical

lessons, explanations of the continued poverty of poor countries and finally policy proposals. In covering all this, Professor Higgins' book, like most others on development, is overly ambitious and inevitably superficial in parts, but it is superior to most texts in its strong and persistent emphasis on the analytical basis of the development process. While its foremost concern is the search for strategic functional relations, it never loses sight of the complexity and variability of development forces.

Not only are there the usual chapters on "general theories of development" from the classicists to post-Keynesians, but in addition various explanations of the current problems of underdeveloped countries are examined analytically by way of such "theories of underdevelopment" as geographic determinism, sociological dualism, technological dualism, colonialism and the "backwash effects" of international trade, and balanced growth and the "big push." The historical and policy discussions are also based on theoretical foundations.

Although this analytical emphasis is commendable, the content of the analysis is disappointing in several respects. An inordinately large part of the theoretical material consists simply of summaries from the existing literature—despite Professor Higgins' prefatory claim that this book reflects his own conclusions "rather than those of other writers in the field and is less of a digest of the literature than most textbooks." These condensations frequently take the form of long direct quotations, are presented with little explication or extension, and range rather indiscriminately from the esoteric to the most elementary. Many of the summaries will be meaningless to most undergraduates, and the original sources themselves would be more stimulating for advanced students.

Where the author's own conclusions do enter, they may be less than fully convincing to many readers. It is stated that "the major thesis of this book is the need to break out of the traditional mold of economic thought when we come to analyze the process of economic growth." To accomplish this Professor Higgins lists his own requirements of growth theory (pp. 766–7): we must "handle discontinuous functions"; "work with multisector models"; deal with "feedback mechanisms, not equilibrating adjustments"; "population growth, technological progress, and perhaps cultural change must be included as integral parts of the analytical system"; "analysis must be conducted in terms of group reactions rather than individual choice"; "every significant problem has to be handled in terms of a general system rather than by a partial equilibrium analysis"; and "the process must always be put into time and analyzed in terms of model sequence and linkages."

One may agree to all these requirements, but this book actually provides only a slight advance towards their realisation. The formidable list of *desiderata* is disposed of more by resort to metaphors and picturesque phrases than by conclusive argument. What Professor Higgins has done in a negative

vein, however, is to cast extreme doubt on traditional marginal analysis and equilibrium theory. In so doing, he places most emphasis (too much emphasis in this reviewer's opinion) on capital accumulation and capital-output ratios, technological dualism, entrepreneurial motivation and the "backwash effects" of international trade. From his own synthesis of theories of underdevelopment, Professor Higgins concludes that "there are only two ways of accelerating economic growth. One is to increase the level of per capita investment, the other is to reduce the incremental capital-output ratio" (p. 471). He also argues that "only a rapid change to extensive, mechanized agriculture, with enough industrialization to absorb the population displaced from the rural sector, will assure a take-off into steady growth" (p. 455).

In general, the policy discussion is rather narrow in its attack on "gradualism" as an approach to development policy, and in its alternative support of a "big push" through government intervention in the decision making process. Although the case for heavy development planning may be pertinent for some countries, its advocacy in this book falls short on two counts. On the analytical side the case has been biased by reducing almost all the required improvements to the requirement of capital formation. Other requirements are mentioned, but the emphasis on investment is so strong that a reader may be left with the impression that all that the poor country needs is capital expenditure and that the major, or even only, policy question is to find ways by which the capital expenditure can be financed. And on the applied side, the ability to plan and the capacity to administer a long-range development program are simply assumed to exist, with little pause over recent experiences that have revealed the premature character of planning and the resultant poverty of planning in many poor countries.

In short, students who rely on this text should also be made to realise how much relevance traditional analysis can have in illuminating development problems, and they should be aware of the counter-arguments against development planning. Provided this balance is achieved, this text may serve as a lively and competent survey of the economics of development.

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An Economic Survey of Northern Ireland. By K. S. ISLES and NORMAN CUTHBERT. (Belfast: H.M. Stationery Office, 1957. Pp. xxvi + 646. 35s.)

No economist who has visited Ulster could fail to be fascinated by the economic problems of this remoter part of the United Kingdom. Unfortunately, once back in Great Britain, it is very easy to forget Northern Ireland's special problems. Most official statistics lump Ulster in with the

rest of the United Kingdom and, as we page through the *Monthly Digest of Statistics*, the only significant fact about Northern Ireland which strikes us is the (inevitably high) unemployment percentage. This book deals with the economic problems of Northern Ireland and, in addition to the main text, there are seven appendices on such topics as saving and changes in the labour force. Perhaps the most interesting of these is Appendix G on cyclical variations in the linen industry, mainly during the inter-war years, by William Black.

The survey originated in a suggestion by Sir Roland Nugent that it might be helpful to make a study of the Ulster economy based on independent academic research. There is no attempt to make policy recommendations, nor to show why, with all Northern Ireland's disadvantages, real income and employment are as high as they are. One important result of the survey is that the authors have been forced to fill some serious gaps in Northern Ireland's economic statistics, for example, the absence of indices of wages, earnings, export prices and estimates of such aggregates as total personal incomes or investment. This task has been carried out with great diligence and efficiency, enabling the authors to make a detailed comparison of the economies of Great Britain and Northern Ireland.

Judged purely by its success in assembling the main facts about Ulster's economy, this is a first-rate piece of work. Though the authors did jib at the difficult task of calculating the invisible items in the balance of payments, they have made useful additions to statistical knowledge in their studies of civilian income and savings for Ulster. From these figures and from previously existing ones, the essentials of Ulster's economic problem are clear.

Income per head is low, even though the assertion (p. 16) that in 1949/50 44% of incomes in Ulster were below £50 per annum turns out to be merely a rather delightful misprint. The unemployment percentage as we know only too well is high, and the industrial structure very narrow. As much as 25% of the population is engaged in agriculture. In manufacturing industry, nearly half the men are in shipbuilding and engineering, including marine engineering; nearly half the women are in the linen industry. This concentration of employment in industries which have always been prone to depression and which now probably rank among Britain's declining industries, explains the unemployment problem of Northern Ireland and gives little hope for the future. Location policy has helped to move new firms to Ulster; indeed, it accounts for a very high percentage of extra employment created since the War. Even so, too few extra jobs have been created so far.

The basic reasons for Ulster's paucity of manufacturing industries lie in her lack of a large domestic market and the virtual absence of raw materials and of indigenous fuel—except peat. As a result, transport costs, especially for coal, are high, and indeed coal is subsidised for large industrial users.

The authors display great thoroughness in analysing and explaining these facts and considerable courage in their attacks on "monopoly" prices charged by Cross-Channel carriers and Belfast coal distributors, and in the virtual admission that large-scale migration to Great Britain must and will continue (p. 348). For the rest, they are forced to prescribe more subsidies or more public works and even to toy with such desperate remedies as a cut in real wages intended to increase employment in the export industries. However, they conclude that, when multiplier effects are allowed for, the net result even on employment might well be negative, particularly in view of their interesting conclusion that the income multiplier in Ulster is probably not greater than one and may be less.

One comes away from this book resigned to accepting Ulster for the foreseeable future as Britain's nearest poor relation and with the distinct impression that being debarred from making policy recommendations represented no real hardship to the authors of such a depressing study. Unfortunately, the authors' assiduity in collecting and analysing information is not matched by an ability to present it in a clear, concise and attractive way. The reader finishes the book feeling that what has been said could have been put infinitely better and more effectively in a book of about half the length. The authors cannot fairly be accused of being unable to see the wood for the trees; they do at various points pick out the key problems and set out possible solutions. Yet they manage to present the book so that these occasional attacks of clear-sightedness are swamped by a flood of verbosity.

One reason for this is an inability to prune. The book must surely contain every fact about Ulster that the authors have collected, whether important or merely mildly informative. Some of the ninety-odd statistical tables and the thirty-four charts in the text might have been relegated to the appendices or else scrapped altogether. The 429 closely-printed pages of the main text could have been cut to about half this length without the loss of any vital point of substance. For the whole is unforgivably prolix, and there is a great deal of repetition, some of it unnecessary and some caused by the inevitable need to remind the reader of what was said before, several thousand words back.

The student of Northern Ireland will find this book a mine of information. For anyone else, the task of struggling through it will probably prove too frustrating and exasperating. Fortunately, Chapters 17 and 18 contain the essence of the facts about Ulster and an analysis of their policy implications. They are also much better written—probably because the authors finally appear to abandon their unequal struggle to keep out jargon, presumably in a vain attempt to make the book attractive to the general reader. Anyone who does read these chapters will find the problems of Northern Ireland compelling and saddening. Ulster represents both a disappointment and a challenge; her problems, once understood, have immense intellectual fascination. It is unfortunate that Messrs. Isles and Cuthbert, despite all

their undoubted effort and persistence, should have failed so lamentably in presenting these problems in a stimulating and challenging way.

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The Canadian Economy: Prospect and Retrospect. By RICHARD E. CAVES and RICHARD H. HOLTON. (Cambridge: Harvard University Press (London: Oxford University Press), 1959. Pp. xxii + 676.)

HARD on the heels of the many-volumed Royal Commission on Canada's Economic Prospects (Gordon) Report, John Stovel's revision of the Viner literature on Canada's 1900-13 boom, and Firestone's giant statistical study of the four-score years since confederation, comes this independent view of almost two hundred years of development, ten of them still in the future. The second half of the present volume consists of a series of chapters based on reports to the Canadian Pacific Railway, who in 1955 retained a team of economists to estimate the location of economic activity and demand for railway transportation in 1970. The authors, leading members of that team, have condensed the numerical estimates, bolstered them with analytical and historical material, and prefaced the whole with Part I, a 250-page "Retrospect" of Canadian economic development. Indeed, if they had done nothing more than this threading together, on the strong strand of their analytical versatility, the anarchic Canadian historical and theoretical literature, they would have performed a great service.

In Chapter 2 they isolate three "strategic factors" in Canadian development: the role of staple exports; the absorption of population growth; and the meaning of "maturity" in a primary-producing economy. Of these, the staple theory of development (that newly settled countries are not transformed from self-sufficient agriculture to a balanced blend of primary, secondary and tertiary production, but specialise at once in exporting a "staple" which is replaced or augmented by later staples; and that the pattern of national development is explainable by the requirements and characteristics of the staple trade) forms the mortar for most of the volume. Its implications are ingeniously worked into a short-run theory of year-to-year fluctuations (Chapter 3) and two impressive statistical studies in Chapter 4. The first of these depends on a condensation and inversion of the forty-two-sector 1949 input-output table. The natural resource industries are left unaggregated, and tables are presented to show the strong sensitivity of the secondary industries to fluctuations in export demand for primary products and the weakness of the opposite linkage. The second is an econometric model for 1901-55, which applies Chapter 3's short-run relations established to long-run growth. While shortage of data frustrates this attempt, the attendant discussion does give proportion to the authors' view

of the determinants of both fluctuations and growth. (However, I would object that, contrary to Sutton, industrial productivity *increased* during most of the period 1945-50; see the Hood-Scott study for the Gordon Commission, Appendix 5 F. And I doubt the gain from an input-output study of compensatory fiscal policy based on the non-compensatory 1949 pattern of government capital expenditure.)

In Chapters 5 and 6 (after some hit-and-run history which must leave the foreigner still confused about the Hudson's Bay Company, colonial status and the various transcontinental railways), the authors consider systematically the changing structure and fortune of four main regions by isolating each region's manufacturing-employment multiplier for each primary staple. Tertiary-employment multipliers are also estimated. The successive booms in Alberta respond well to this treatment, as does agricultural central Canada. Some promising pages on the persistently slow growth of the Maritimes use foreign-trade multipliers on Ontario-Maritime trade, but end inconclusively. (Keirstead's analyses are not referred to; and on p. 168 surely the multiplier $E/(s + m) > 1$, if $m = 0$ and $s < 1$ —in any case have not Regions A and B reversed their roles?) Indeed, the meaning of a staple employment multiplier is not made clear. If it includes makers of farm machinery should it not also include supplies to the petroleum and the Maritime logging industries? And should it include employment that would have grown without the staple, in Alberta oil processing or British Columbia's grain-trade? But these are caveats—the authors' use of the staple approach is very skilful and stimulating here, as in the succeeding Chapter 7 on government policy affecting development.

The 400-page "Prospect" in Part II (introduced earlier by Chapter 1, on methodology) rises logically from Part I. There is no space to mention the detailed procedures and assumptions, which are admirably explained throughout. Population and labour force are forecast, multiplied by expected productivity, and the resultant gross national product estimate divided among final-demand items, including exports. These in turn are multiplied by an inverted 1970 input-output table to obtain estimates of the output of each of sixteen industries, and imports—a most impressive undertaking. These then become the controls for six chapters forecasting (in regional detail) the main lines of development of each industry. Three comments may be suggestive of their content.

First the population prediction (from 1955) seems verified by preliminary 1960 data: growth by about 15% to almost 18 millions. Now the authors forecast it will grow to 21 millions in 1970, at only half the previous rate. They argue that by then the staple economy can absorb only 40,000 net immigration per year. This seems low, for recent figures show that even 1959 (with 9% unemployment) absorbed 58,000 net.

Second, the authors' discussion of their forecast of output per man year, which gives the impression that their 1970 gross national product will also

be on the bearish side, is slightly misleading. First, their rate of productivity increase is lower than that of the Gordon Commission, not because they are more pessimistic, but because they have stated it in *years* instead of man *hours* (neglecting the declining hours in the work-year). Second, they predict a drastic migration, by 1970, of 20% of the farm labour force into more productive occupations. Consequently their 1970 gross national product is a scant 4% less than the Gordon Commission's.

Third, government expenditure, investment, consumption, exports and many particular industrial items are forecast from trends fitted to past data. Where statistics are too skimpy, parameters are expertly transplanted from foreign (chiefly United States) studies. Procedures are clearly set forth, and difficult assumptions convincingly rationalised. I feel, however, that, as exemplified by the service- and forest-industries chapters, there was rather too resigned an acceptance of poor official series on employment or output. After all, census studies of distribution and provincial reports and micro-economic studies of forestry do exist. Even if these cannot be used to carry United States parameters forward, they are better than fitting trends to inconsistently defined national totals.

By reconciling in Chapter 20 their regional estimates, the authors provide three consistency checks on growth of production: geographically, by input-output and by expenditure. Although they recognise that consistency may only mean circularity, it is an astonishing achievement even to avoid being grossly inconsistent. But an astonishing achievement cannot by itself make Part II interesting except to specialists, even when a bright style is adopted. The retrospective Part I of the work, on the other hand, will be consulted for some years, for it is a first-class study of national and regional growth.

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Dynamic Changes of Income and its Distribution in Japan. By C. TAKAHASHI, in collaboration with R. IOCHI and K. EMI. (Tokyo: Kinokuniya Bookstore, 1959. Pp. 182.)

PROFESSOR TAKAHASHI and his collaborators have made a painstaking effort to collect and analyse all available data on income distribution in Japan. The information is based mainly on tax statistics. Modern forms of taxation were not introduced until the last years of the nineteenth century, following the break-up of the feudal system, and the scope of taxation became gradually wider. Data became abundant after the Second World War, when tax statistics were supplemented by family-budget surveys and welfare surveys.

The authors lean heavily on the application of Gibrat (log-normal) distributions which appear to fit the data, at any rate for the higher ranges

of income to which tax statistics relate; it is interesting that Gibrat himself commented upon pre-1914 Japanese data in his celebrated work.

The results of the analysis are difficult to interpret because of the gradual change in the nature and scope of the data. On the whole, the authors feel that there has been no long-term change in income distribution. Wars and calamities tended to cause increased inequality, which was then in subsequent years reduced. The post-war radical measures probably brought about increased equality but, as taxable income increased from 16% to over 50% of national income, the authors are not quite sure of this. Most of the analysis concerns the cyclical pattern of income distribution, and on balance evidence is adduced to support the view that in boom years inequality is higher, chiefly because profit incomes fluctuate more than wage incomes.

This is an authoritative work, and as such it is written for the specialist. In spite of the imperfections of data, it is possible to draw some conclusions, and it would have been useful had the authors done so more clearly.

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The Economic Growth of Hong Kong. By E. SZCZEPANIK. (London: Oxford University Press for the Royal Institute of International Affairs, 1958. Pp. xiv + 186. 25s.)

FEW regions have shown more rapid economic growth and structural change in the decade or so after the end of the Second World War than Hong Kong. Despite the decline of the Chinese entrepot trade, the scarcity of land and raw materials, the economic and social problems accompanying a population increasing rapidly through natural increase and refugee immigration, despite, above all, the uncertain political status of the area, Hong Kong has become one of the most industrialised and prosperous regions in Asia. It is Mr. Szczepanik's aim to provide both a descriptive outline of the economy, statistically illustrated, and an interpretation of the causal forces in the industrial revolution.

The picture that emerges is of an economy shocked into growth and change by certain powerful stimuli. The author sees the main stimuli in the pressure of population and the necessity to replace the lost entrepot trade by a new trade in exports indigenously manufactured. The leading sectors were building and textiles. About the latter we in Britain need little reminding. In 1956 textiles accounted for one-third of the working force in registered factories and 60% of the value of exports. The manifest inadequacy of Hong Kong housing, however, tends to make one forget the amount of building which has been undertaken. Between 1948 and 1956 no less than 5% of the national income went into building and construction. In the

wake of this boom followed ancillary industries such as cement, bricks, furniture, paint and electrical appliances. Hong Kong, like Japan, has also been quick to adopt new industries ranging from cameras to plastics.

Even allowing for the dubious accuracy of some of his figures, Mr. Szczepanik's evidence of economic expansion is convincing. The reasons for the remarkable response of production factors to the demand stimuli are more interesting. Apart from the provision of some essential social overhead capital, the government's role was passive. To private enterprise must go the chief credit for economic progress. The key to Hong Kong's achievements seems mainly to be found in three facts. First, the colony was fortunate in having an adequate supply of vigorous, innovating Chinese entrepreneurs, some of whom came from the mainland. Second, the labour supply was elastic, wages comparatively low and stable and the workers diligent and well trained. Third, much of the capital for development has apparently come from abroad, not in the form of aid from international bodies, but from non-government investors. On the sources and motives of this foreign investment the book, unfortunately, throws little light.

There are some criticisms one might make of Mr. Szczepanik's study. Covering as it does so wide a field in so short a space it is bound at times to be very superficial. The author has a penchant for Rostowian jargon which adds little to his argument, and he wrongly places the British industrial "take-off" in the mid-nineteenth century (p. 71). In the last section there is an attempt to apply sophisticated growth analysis to the Hong Kong situation, which suffers from the inadequacy of the data. I doubt, for example, whether the estimate of a capital-output ratio of 2 is meaningful or realistic in view of the extent of investment in building and social overhead capital. Despite limitations of this sort, the book is a valuable pioneering contribution on a neglected and worthwhile topic.

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The Road to Self-Rule: A Study in Colonial Evolution. By W. M. MACMILLAN. (London: Faber and Faber, 1959. Pp. 296. 35s.)

PROFESSOR MACMILLAN claims that his book fills a gap in that there has hitherto been no broad historical assessment of the British impact on what he calls the "less mature" peoples. The existence of the gap is beyond dispute. So far, most interpretative studies of British colonial policy towards dependent peoples have made generalisations from purely regional data. Furnivall, for example, built up his concept of the colonial plural society from an analysis of the effects of the western impact on South-East Asia. Yet Professor Macmillan falls into the same trap. He limits his grand review of British colonial policy and practice over the course of three centuries to

those particular countries he has lived in, visited or knows especially well. Most of his book is about South, East and Central Africa and the West Indies. Ghana and Nigeria get only very cursory treatment and the Asian dependencies have been omitted altogether. Professor Macmillan's reasons for disregarding Asia are idiosyncratic, to say the least. The claim that "British rule in India was never colonial" (p. 26) seems to be based on an original though bizarre concept of empire. This exclusion of Asia makes his ambitious survey extremely lop-sided, especially when he comes to discuss the British response to colonial nationalism.

Even as a work on Africa the book is rather a disappointment, coming as it does from so distinguished a pioneer of social studies in South Africa. The no-man's land between Hailey's giant survey and the microcosmic case studies being proliferated by the social scientists in the field badly needs to be put into focus for both the student and the general reader. Unfortunately, Professor Macmillan's survey is too personal and discursive in approach to make a good text-book and too much of a recital of well-established facts to interest informed students of African politics and economics. There is also much in the didactic and rather self-opinionated style of writing which may irritate those who have hitherto admired the vigour with which the author usually expresses himself.

The central argument of the book is that the colonial question is basically social and economic. On the tacit assumption that the British impact on "backward" peoples has been wholly beneficent by raising them to Western standards and values, Professor Macmillan argues that two right courses of action have always been open in the two main situations that have arisen. In societies with large white-settler groups the "less mature" peoples can throw off their backwardness by gradual absorption into the society of the settlers. This is what was intended by the Cape Liberals and the policy has failed only because of an insensate conflict within the white community itself. In countries without large settler groups only a very long colonial apprenticeship can lay a proper basis for the apparatus of modern states. This is what has happened in the West Indies, where Professor Macmillan thinks British colonial policy has achieved its most striking successes.

There is, of course, much truth in what Professor Macmillan says. Both British and African leaders have tended to view colonial rule too much in the purely political terms of the American revolution. There should be no false modesty about asserting that the under-developed countries best fitted to survive as reasonably well-run new states are precisely those which have experienced the longest period of political subjection to British colonial rule. And economic growth has undoubtedly been rapid in those territories with large settler groups. The difficulty is that Professor Macmillan is a rationalist who defends his position by shutting his eyes to the force of irrationalism. He refuses to accept the strident anti-colonialism and racialism of to-day and the final conviction of the colonial powers that modern empires do not

pay as significant factors in his rather simply formulated equation. It is surely too late in the day to remind those responsible for the future of East Africa that recent experience in other parts of Africa may suggest that good government is better than self-government. And as for Cape liberalism as the way out of the tragic imbroglio in the African plural societies, is it not being flatly rejected by Europeans and Africans alike? It is a pity that instead of lamenting that British colonial rule was not amended rather than ended Professor Macmillan did not give us a proper analysis of African nationalism. His treatment of it is decidedly sketchy. Little is said about urbanisation and the uprootedness of the *élites*. Nothing is said about regional economic disparities. And the analysis of indirect rule breaks no new ground.

There are also a few slips. It is not true to say that debt-slavery was "an almost peculiarly Spanish American phenomenon" (p. 13). It was widespread over much of South-East Asia. The grant of universal adult suffrage to Jamaica in 1944 was not an "unprecedented step" (p. 214). It was given to Ceylon as early as 1931. And can it be said that "the broodings" of Marx "took no account whatever of the colonial field" (p. 25) when there is so much evidence to suggest that he was engrossed by the impact of British rule on Indian society?

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NOTES AND MEMORANDA

SCHEDULE "A" INCOME TAX

AN agitation for the abolition of Schedule "A" Income Tax on houses occupied by their owners has gained much strength recently. All Labour and Liberal M.P.s support it, and some Conservative Back-Benchers. Abolition is defended on the ground that it would encourage a "property-owning democracy" by inducing tenants to buy their homes. Would it have this effect, and is it in other ways justified? Let us see. As an illustration I assume three men Tom, Dick and Harry, each earning £1,500 a year, and living in houses rented at £100, purchase price £2,000, and tax £20 per annum. Tom has nothing apart from his salary, Dick gets a legacy of £2,000 from an aunt and buys his house, Harry has saved enough (having no family) to buy stocks yielding £100 a year. Why should not Dick pay the same tax as Harry? Each has £100 more than Tom.

Dick was fully aware of the £20 tax when he bought his home, and he paid so much less for it in consequence. Free of tax it would have been worth £20 multiplied by, say, fifteen years' purchase, or £2,300. Is there any reason why the House of Commons should make him a present of this £300, which other tax-payers will have to make up? Note at this point that abolition will not encourage tenants to buy, because they will have to pay the extra £300. If the Chancellor of the Exchequer announces on a Monday that he is abolishing Schedule "A" tax all saleable houses will at once be worth so much more to their *present* owners. Therefore abolition will mean an immense endowment of property at the tax-payer's expense, an odd proposal to come from Socialists. With some six million owner-occupiers it is, no doubt, a vote-catching proposal.

Most people, probably, think of Schedule "A" as a special tax on houses; it is in fact only the first of five schedules under which incomes are assessed. *Whitaker* explains that the assessment is made on the "annual value of Houses, Lands, Tenements, etc., including houses occupied by the owner." Allowances may be claimed for repairs, whether executed or not, as well as for insurance and agent's charges. Up to £40 the allowance is one-quarter, then it falls gradually to one-sixth. From recent statements in the Press it appears that many owners fail to claim these allowances; but this can hardly be made a reason for abolishing the tax.

All persons who draw an income from property of any kind have one general grievance—the high rate of Income Tax in time of peace. One hundred years ago the rate was 9d. in the pound; it sank to 2d. in 1875–77, and rose to 1s. 3d. during the Boer War. Even the Kaiser War did not send it above 6s.; why should it now be as high as 7s. 9d. in the £, the awkward

fraction of $\frac{3}{4}$ of a pound? No doubt there are two chief reasons: (1) the huge Government expenditure on Defence, Education and the "Welfare State"; (2) the large proportion of individual income which escapes assessment and taxation. "Differentiation," i.e., a higher rate of tax on "investment income," was introduced because a Select Committee reported that it was "certain," while "earned income" was "precarious." This was in 1906, and the distinction had some meaning then. But the two World Wars and the depreciation of the pound sterling have altered the case entirely. Much property was destroyed by the two Wars, many old investments, e.g., Consols, pay the same nominal interest or dividend in depreciated pounds and less seven times as much tax. Wages and salaries, on the other hand, have been raised constantly to balance the fall in the buying power of the pound.

One objection to Schedule "A" is that it is assessed on what the objectors call "notional income." Perhaps this argument might be carried much farther, so that other notional income may be brought under assessment. Tax is, as a rule, levied only on income received in cash, yet many workers get most, or a large part, of their remuneration by indirect payments. Thus secretaries, managers, schoolmasters, Fellows of Colleges, matrons, employees who "live in," and others, are paid "indirectly" by free board and lodging, free meals or rooms and so on.

For many persons the cost of board and lodging is the first and largest call on their income, and if they "live in" it may also be their main remuneration. But it escapes assessment; consequently, other tax-payers have to make up the revenue thus lost. Am I wrong in asserting that the most urgent change in our Income Tax law is the assessment of all forms of income?

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SIR ROY HARROD'S SECOND ESSAY

WHEN you believe you have successfully laid a ghost,¹ it is always a little disappointing, even after a lapse of ten years, to return to the empty house it once haunted and find it still rattling its bones. The bones to which I refer are described by Sir Roy Harrod as "an inexpugnable yardstick for cardinal measurement of the rate of decline in the utility of income as income rises";² and the rattle is achieved by taking a worker, fixing a target output to be produced in a working day of given length and then varying both the

¹ J. de V. Graaff, "Mr. Harrod on Hump Saving," *Economica*, February 1950, pp. 81–90.

² R. F. Harrod, "Second Essay in Dynamic Theory," *ECONOMIC JOURNAL*, June 1960, para. 21.

basic rate of pay and the piece-rate in such a manner that the target output is just maintained.

It usually seems less pretentious to attempt the impugment of inexpugnable things in small print. That is the course I shall adopt.¹ It will be seen that the bones rattle noisily only if the marginal disutility of work is assumed independent of income. In general, of course, this assumption is inadmissible. I leave the matter there.

The fundamental "supply" equation of the *Second Essay* depends for its interest on the possibility of guessing the size of the ghost, ϵ , correctly defined in para. 14 as the elasticity, over the relevant range, of the schedule depicting the marginal utility of *consumption*, but incorrectly referred to almost everywhere else, and especially when it comes to rattling the bones, as the elasticity of the schedule depicting the marginal utility of *income*. The distinction, surely, is fundamental, and of particular relevance when what one really wants to know about is the behaviour of savings, defined as the *difference* between income and consumption. That, too, I leave there.

I turn instead to view the "supply" equation as a whole. It states that, in equilibrium, the natural rate of interest is equal to the natural rate of growth of income (it should actually be "consumption") *per caput*, divided by ϵ . It is, of course, quite irrefutable. Not one of these quantities is observable. Not one occurs in nature. We have not one ghost, but three. Two have no bones to rattle. The third is condemned to rattle silently. What are we to make of it all?

What we should make of it is this. Dynamic economics will not itself experience the growth it professes to deal with unless its equations are set out, and its theorems stated, in terms that have some empirical content, so that they may, in principle at least, be tested against the facts they purport

¹ Let the basic rate be q and the piece-rate be p , so that the worker's income, y , is $px + q$ when x units are produced. The target output is fixed at $x = x_0$.

The worker maximises $U(x, y)$ subject to

$$px - y + q = 0 \quad (1)$$

The first-order conditions are:

$$U_x + p\lambda = 0 \quad (2)$$

$$U_y - \lambda = 0 \quad (3)$$

where λ is a Lagrange multiplier.

Now the elasticity of the schedule depicting the marginal utility of income is

$$-\frac{dy}{y} \cdot \frac{U_y}{U_{yy}}$$

so what we want is an expression for U_y/U_{yy} in terms of observable quantities.

We proceed by differentiating (1), (2) and (3) totally and then setting $dx = 0$, as the target output is to be maintained at x_0 . Solving, we readily obtain

$$-U_y/U_{yy} = (p + U_{xy}/U_{yy})(\partial y/\partial p)x_0$$

Experimental variation of p and q can tell us all about $\partial y/\partial p$, but nothing about the elasticity unless $U_{xy} = 0$ —that is to say, unless the marginal disutility of work is independent of income.

to explain. Failing that, we might just as well squat down on our haunches, like real witch-doctors, and throw bones instead of rattling them. I wonder if our predictions would be noticeably worse.

J. DE V. GRAAFF

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COMMENT

1. I HAD rashly supposed that it was intuitable that my analysis implied that the marginal disutility of work of variable intensity, *always supposing that the length of the working day (or of the working year) is rigidly fixed*, is independent of income; but I am glad to see this confirmed with the aid of a Lagrange multiplier. While many quantities in economics are mutually interdependent, some are taken to be exogenous. I would suppose that the marginal disutility of work, subject to the above proviso, is one of the latter. I therefore take the "of course" in Mr. Graaff's second paragraph as unwarrantable.

2. I fully admitted in my article that it is a defect in ϵ that it is not precisely measurable. I suggest that the limits within which its value is conjecturable are not too wide to defeat most practical policy proposals. This cannot be stated of all the values used in theoretical discussions. It is true that the natural rate of interest depends on the value of growth of consumption, not on that of income; but it was stated (p. 282, top) that in a dynamic equilibrium the rate of growth of consumption is equal to the rate of growth of income; and that was taken for granted in what followed.

3. In his penultimate paragraph Mr. Graaff refers to three quantities not observable. As two of these are *desiderata*, they are naturally not observable.

However, if policy makers are to influence the current rate of interest on the lines of my analysis, they must frame some *estimate* of the prospective natural rate of growth. They will, of course, be subject to margins of error here. Values that can be assessed only with margins of error of a certain size may be of far greater importance, both for economic theory and practice, than the values having smaller margins of error. All values have some margin of error, including the value data given in records of the past.

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RESPONSE TO PRICE IN AN UNDER-DEVELOPED ECONOMY

MESSRS. BAUER AND YAMEY's note ¹ in the December 1959 issue of this JOURNAL, which used the changing composition of cocoa and palm-oil purchases in Nigeria during the lifetime of the national Marketing Boards as a counter illustration to the "well known and serious difficulties in measuring the degree of responsiveness of producers to price changes," is an over-simplification of the case. It is also unfair to the efforts of the many officials of the Ministry of Agriculture, Research Stations, Produce Inspection Service and other agencies of the Boards involved.

In the same issue of the JOURNAL Professor Lundberg ² warned that "it is always dangerous to pick out and isolate one relation within a system of interdependent variables and draw conclusions of causal significance." Messrs. Bauer and Yamey have done just this, by taking the differential prices paid to producers for the various grades of the crops, and, apparently, assuming "the *ceteris paribus* of the theoretical formulations of functional relationships in economics." ³ The environment in which these price changes took place was not static. The increased output was not solely because the producer "knew the additional returns for improving his output by more careful tending of the trees, gathering of the produce and preparation for sale to the boards." ⁴ He had to be shown and convinced of this by propaganda in the form of pamphlets and posters; by demonstration plots and field experiments; by agricultural shows; by the subsidised spraying and cutting out of diseased trees (often against the farmer's wishes); by strict produce inspection standards and "measures to guard against adulteration, contamination, substitution, weight shortage, wrong grading and many other forms of chicanery"; ⁵ by intensive and skilled research (e.g., £2.5 million was spent on the West African Oil Palm Research Institute up to 1954). Without the advance-payment arrangements "it is doubtful whether the Board's licensed buying agents (and in particular the Nigerian licensed buying agents) could have found the ready money to finance purchases" ⁶ at the high levels of producer prices paid.

They also seem to assume that the transport facilities remained unchanged. Large expenditures were incurred in each year in transport subsidies to bring the produce to the ports by uneconomic routes in order to

avoid evacuation delays and the subsequent deterioration of quality or loss of the produce. The Boards themselves contributed large sums to the expansion and the improvement of the road system, which in turn made it

Palm Oil Purchases by Nigeria Oil Palm Marketing Board 1949-54 and Producer Price Per Ton According to Grade Purchased.

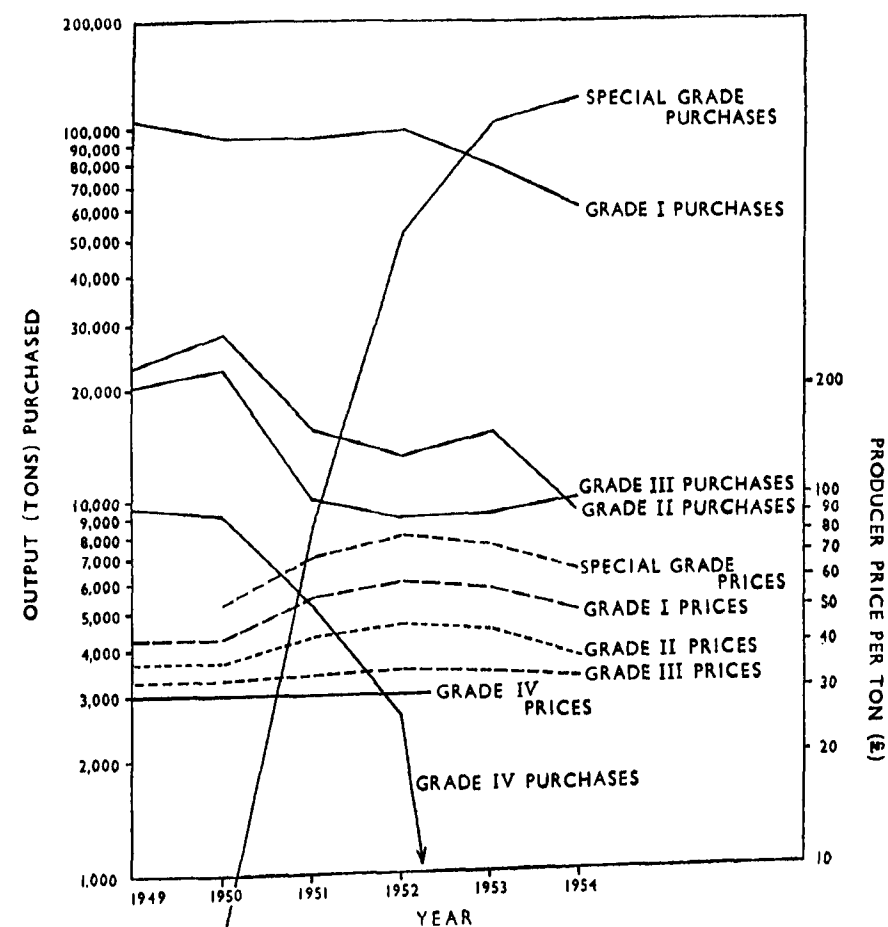


FIG. 1

possible for the producers "to respond." Special Grade palm oil, for example, only remains "special" if it is evacuated speedily and efficiently after being expressed by the subsidised hand presses and Pioneer Oil Mills. The increasing use of road transport as opposed to water or rail transport, together with the valuable work done by the United Africa Company's Bulk Oil plants at the ports is of importance and cannot be ignored.

¹ P. T. Bauer and B. S. Yamey, "A Case Study of Response to Price in an Under-developed Country," ECONOMIC JOURNAL, December 1959.

² E. Lundberg, "The Profitability of Investment," ECONOMIC JOURNAL, December 1959.

³ Bauer and Yamey, *op. cit.*, p. 800.

⁴ *Ibid.*, p. 801.

⁵ "Statement on the Activities of the Department of Marketing and Exports," Sessional Paper No. 6, 1953, Government Printer, Lagos.

⁶ *Ibid.*, pp. 3-4.

Finally, their tables showing the percentage changes in the share of the different grades of produce take on a different look when they are displayed graphically. Figs. 1 and 2 below are more helpful in visualising "the

Cocoa Purchases by Nigeria Cocoa Marketing Board 1947/8 to 1953/4 and Producer Price Per Ton According to Grade Purchased.

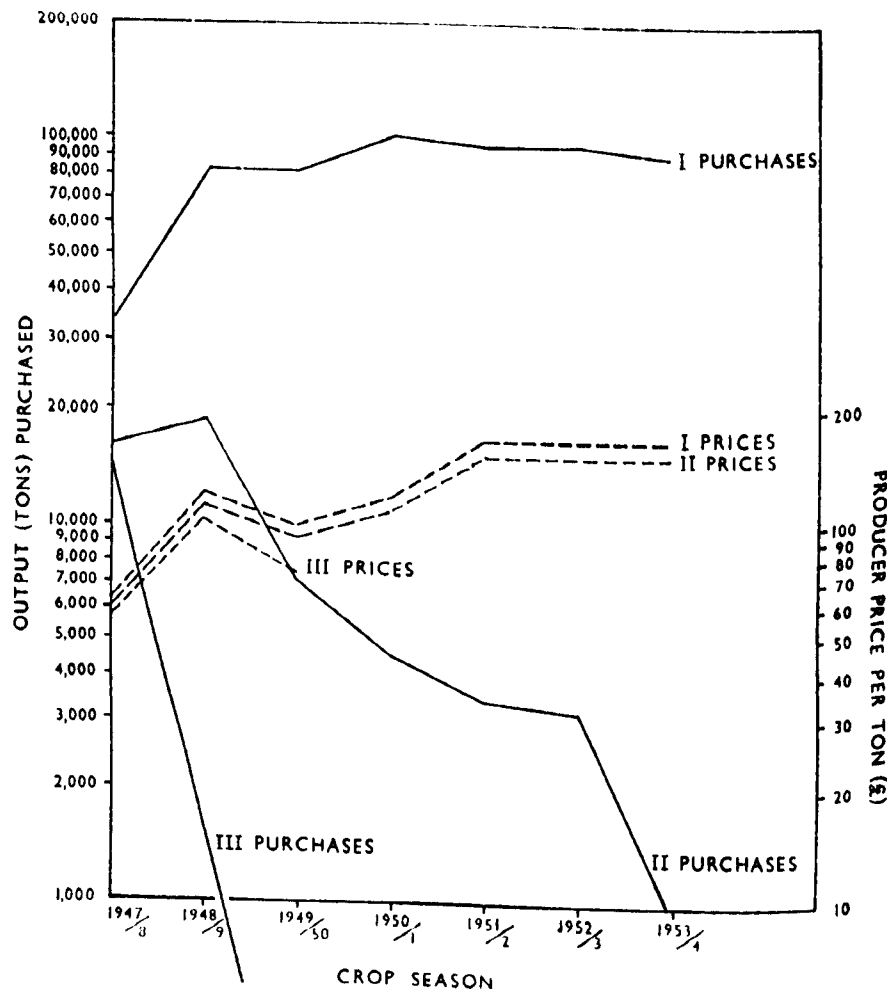


FIG. 2

degree of responsiveness" of output to the given price changes. It will be seen that the output increases are quite variable, and in some cases negative when looked at in absolute terms rather than in the changing percentage compositions within the total which they use.

The purpose of this note is not to deny the phenomena to which Messrs.

Bauer and Yamey draw attention, but rather to suggest that they should not allow their antipathy to these statutory export monopolies to over-emphasise the economic rationality of peasant producers. They should give at least some credit to the institutional changes in which the experiment took place and to the arduous efforts of the many officials involved in stimulating an interest in quality changes among the producers.

The true test of "the method of observation and experimentation in the natural sciences"¹ would have been for the Boards to have raised prices and controlled all the other variables and waited for the results of the experiment—which is, of course, unrealistic and unsound as a method of promoting economic development.

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RESPONSE TO PRICE IN AN UNDER-DEVELOPED ECONOMY: A REJOINDER

1. MR. HOGG's strictures would have been justified if in our original Note we had said that the changes in the inter-grade price differentials were the *sole* cause of the improvement in quality of produce bought by the marketing boards, or that no other changes had taken place. But we did not say this; and our Note does not imply it. There is no cause for Mr. Hogg to write that we "apparently" assume "the *ceteris paribus* of the theoretical formulations of functional relationships in economics." (In his next sentence but one, our critic again takes one of our sentences out of its context and, by being placed in a different context, it implies something we did not say.) We did not think it necessary in a journal of economics to belabour the point that in the real world other things are rarely equal, especially as we made this point in our second paragraph. Our Note described a situation "exhibiting sharply the response of producers to a change in an economic variable," a response deliberately induced and repeatedly remarked on by the marketing boards, whose administrators were well placed to assess the relative effectiveness of the price inducement and of other influences. The boards made it quite clear that in their view the price differentials were the major factor, and often did not even mention other factors. Several extracts from their reports to this effect are in our Note. Further quotations from many similar passages in their reports would be otiose. Moreover, the responsiveness of the producers to price incentives is also illustrated unequivocally by other experiences

¹ Bauer and Yamey, *op. cit.*, p. 800.

reported by the boards, one of which was noted in our concluding paragraph.¹

2. Our confidence in the soundness of the boards' assessment of the price inducement is somewhat strengthened by the fact that most of the other influences mentioned by Mr. Hogg have little or no bearing on the distribution of producers' efforts between production of different grades, which is the subject-matter of our Note. These irrelevant influences include: the control of tree disease; strict produce inspection; measures against malpractices; research; the financing arrangements of the boards; and improvement in port facilities. One or two of the other influences (e.g., speedier transport making it possible to avoid deterioration in the best quality of palm oil) would have had a differential effect as between different grades. But this does not refute anything we—or the boards—have written.²

3. Mr. Hogg concludes by saying that the purpose of his Note "is not to deny the phenomena" to which we drew attention, but rather to suggest that we should not allow our "antagonism" to the marketing boards "to over-emphasise the economic rationality of peasant producers." But if it be meritorious to agree with the views expressed by these boards, then on this occasion at least we are on the side of the angels. For we agree with the boards that their inter-grade price differentials were a major factor in achieving the results desired by them. We have, it is true, elsewhere questioned the economic merits of the policy of the boards in raising the standard of their purchases by prescribing inter-grade price differentials far in excess of the differentials obtaining in the world market, and refusing to buy some produce which they could have re-sold. But our analysis of the merits of this policy is not relevant to the subject under discussion, which is the responsive of producers to price differentials.

P. T. BAUER

B. S. YAMEY

London School of Economics.

¹ Yet another example is provided by the decision in 1953-54 of the Nigeria Cocoa Marketing Board to discontinue the payment of higher prices for "main crop" than for "light crop" cocoa. The differential had encouraged the mixing of "light crop" cocoa with the succeeding "main crop" cocoa, a practice which the Board did not like, and sought to discourage by removing that particular price differential.

² It should occasion no surprise—nor merit specific discussion—that marketing boards (and other government departments) which were anxious to raise the quality of output should not only introduce inter-grade price differences to provide incentives, but also do other things to facilitate the production of the more desired grades. (The first of our quotations from the boards' reports refers to the "necessary instruction" of the producers.)

CURRENT TOPICS

THERE is an unsatisfied demand for copies of the ECONOMIC JOURNAL for March and June 1960. The Society will pay 5s. for any copies returned in good condition to the Secretary at the Marshall Library, Downing Street, Cambridge. No other issues than those mentioned above are required or will be purchased.

THE Annual Conference of the International Economic Association was held at Konstanz in Germany during the first fortnight of September 1960. The subject of the conference was "The Economics of Take-off into Sustained Growth." Professor W. Rostow (Harvard, U.S.A.) was Chairman of the Programme Committee, and it was his theories that were principally under critical examination. The participants were drawn in the main from economic historians and statisticians concerned with the measurement of economic growth. Among those who contributed papers were Professor Rostow himself, Professor Gerschenkron and Professor North from the United States; Professor Habakkuk (who had collaborated with Miss Deane), Professor Cairncross and Mr. Berrill from the United Kingdom. The conference was able to draw substantially on the statistical studies of economic growth made in recent years in a number of countries under the general direction of Professor Kuznets. He himself was present and contributed one of a number of papers based on this material. It was no part of the objectives of the Conference to endorse or to reject Professor Rostow's theories. There can be no question, however, that the vigorous and hard-hitting discussion helped to clarify many of the issues that were under consideration. The papers and a brief summary of the discussion will be published during 1962 by Messrs. Macmillan (London).

Houblon-Norman Awards. The Trustees of the Houblon-Norman Fund invite applications for Fellowships or Grants in aid of research into the working of industry and finance in Great Britain and elsewhere and the economic conditions affecting them. Fellowships, which are intended for experienced research workers, are awarded for full-time research for one year, which may be renewed for a second year. Grants are awarded for either full-time or part-time work. The amount of the awards, which will take effect from October 1, 1961, will depend upon the circumstances of the candidate and the probable expenses of his work. Applicants must be British subjects and normally resident in the United Kingdom. The Trustees are prepared to relax this rule only in exceptional circumstances. Forms of application,

which may be obtained from the Secretary of the Fund, c/o the Bank of England, London, E.C.2, should be returned not later than March 1, 1961.

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VOL. 123, PART 3, 1960. *The Economics of Building Designs*: P. A. STONE. *The Present Position of Econometrics: A Discussion*: J. ROBINSON, J. DOWNIE and C. B. WINSTEN. *Notes on Sequential Sampling Plans*: F. J. ANSCOMBE. *Some Experiments in Methods of Conducting Family Expenditure Surveys*: W. F. F. KEMSLEY and J. L. NICHOLSON. *Wholesale Prices in 1959*.

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VOL. 31, No. 4, OCTOBER-DECEMBER 1960. *India Revisited*: W. A. ROBSON. *Coercion and Economic Growth in the Light of Soviet Experience*: S. SWIANIWICZ. *Planning in the 1960s*: W. THOMAS. *The Struggle for British Aluminium*: S. HATCH and M. FORES. *Totalitarian Democracy*: D. MACRAE. *The Public Accountability of Industry*: G. L. MCVEY.

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JULY 1960. *The Economic Efficiency of Capital Investment and Its Statistical Analysis*: N. SHCHADILOV. *The Role of Imported Consumer Goods in the Supply of the Population*: I. FENYŐ. *The Selection of Indicators Used for International Comparisons of the Standard of Living*: L. CSÉH-SZOMBATHY. *The Statistical Examination of Fixed Assets in the Engineering Industry—1*: M. SÁGI. *Urban Migratory Movements with Special Reference to the Principal Cities*: E. PALLÓS. *Loading Operations in Transport by Lorry*: L. CSÉNTES. *An International Comparison of Systems of National Accounts*: Z. KENESSEY. *The Report of the Berlin Conference on the Compilation of a Uniform Product Nomenclature*: F. NYITRAI.

Probleme Economice (Rumanian text, English, French and Russian summaries)

- No. 5, 1960. *The Draft Directives of the Third Congress of the Rumanian Workers' Party on the Economic Plan for 1960-65 and the Long-term Economic Programme. On the Nature and Content of the Cost of Production under Socialism*: GH. CREȚOIU. *The Development of Short-term Credit in Our Country*: GH. POPOVICI. *The Reactionary Character of the Conceptions of V. Madgearu on Rumanian Economic Development*: S. DUMITRESCU. *The Working Class of Western Europe Struggling Against "Integration"*: I. ANGHEL. *The Development of the Czechoslovak National Economy*: J. VLČEK. *Rising Living Standards in Czechoslovakia*: O. ŠIK. *Aspects of Trade Relations Between Socialist and Capitalist Countries*: E. BIBIRI.
No. 6, 1960. *Current Problems in Increasing Labour Productivity and the Rational Utilisation of Man-power*: I. BATI. *The Importance of the Utilisation of Productive Capacity in Industry*: A. IANCU. *Increasing Profits Is an Important Task of State Farms*: B. ȘCHIOBU and E. JIANU. *Socialist Accumulation—The Basis of Production Expansion and the Increase in Popular Welfare*: I. TULPAN. *On the Amortisation of Fixed Assets*: I. IȚICOVICI. *Some Aspects of the Exploitation of the Working Peasantry in Bourgeois-landlord Rumania*: O. POPESCU, N. TOMA and N. DAVID. *The Anti-working-class Aspect of Contemporary Bourgeois Theories on Inflation*: B. COMISIONER. *Economic Results of the Utilisation of Maize for Silage in Some State Farms*: GH. IONIȚA and E. POPESCU.

NEW BOOKS

British

ABRAMS (M.) and ROSE (R.). *Must Labour Lose? A Penguin Special, with a commentary by R. HINDEN*. Harmondsworth, Middlesex: Penguin Books, 1960. 7". Pp. 127. 2s. 6d.

[This reprints the well-known articles by Dr. Mark Abrams on voters' attitudes, which originally appeared in *Socialist Commentary*. Dr. Abrams' report on the survey is followed by essays by Richard Rose, of Nuffield College, Oxford, and by Rita Hinden, the editor of *Socialist Commentary*. Dr. Rose considers the findings of the survey in a broader context of studies of how people vote and how the party system works, and Dr. Hinden discusses the implications for the Labour Party.]

AUBURN (H. W.) (Ed.). *Comparative Banking in Austria, Belgium, Denmark, Finland, France, Germany, Greece, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, United Kingdom, U.S.A., U.S.S.R.* London: Waterlow, 1960. 9". Pp. x + 118. 17s. 6d.

[This brings together in book form a series of articles which appeared in *The Banker's Magazine*. These articles provide a brief description of the banking systems of each of the chief countries of Europe and the United States. The contributing authors are in all cases practical bankers.]

BENHAM (F.). *Economics*. 6th edition. London: Pitman, 1960. 9". Pp. xvi + 575. 20s.

[The substantially revised new edition of Professor Benham's text-book was reviewed in the *Economic Journal* of March 1956 by E. A. G. Robinson. The present re-issue embodies only minor revisions, mainly to bring the facts and figures up to date.]

BLACK (R. D. C.). *Economic Thought and the Irish Question, 1817-1870*. London: Cambridge University Press, 1960. 9½". Pp. xiv + 299. 37s. 6d.

[To be reviewed.]

BLYTH (C. A.). *The Use of Economic Statistics*. The Minerva Series, No. 5. London: Allen & Unwin, 1960. 9". Pp. 249. 28s.

[To be reviewed.]

BODLESEN (C. A.). *Studies in Mid-Victorian Imperialism*. London: Heinemann, 1960. 8½". Pp. 226. 25s.

[This is a photographic reprint of a historical classic which first appeared in 1924.]

Britain's Coal. *Report of a Study Conference organised by the National Union of Mineworkers*. London: National Union of Mineworkers (222 Euston Road, N.W.1), 1960. 9½". Pp. 90.

[This pamphlet prints three papers presented to the sessions of a short conference organised by the National Union of Mineworkers and attended by some forty experts drawn principally from the fuel and power industries, from politics, from economics and from industrial journalism. The first paper, by Mr. E. F. Schumacher, entitled "Coal—the Next Fifty Years," deals principally with the longer-term problems of energy supply, the importance of coal as the largest national reserve of energy, the difficulties of attaching meaning to such words as "economic" and "un-economic" as applied to non-renewable resources which must be conserved and used at some time, sooner or later. He argues the case for great caution in abandoning usable coal or even in applying a "best-scams-first" policy. Not all of his audience would appear to have been ready to go all the way with him in this respect. The second paper, by Mr. S. Kessler, Research Officer of the National Union of Mineworkers, is on "Coal—the Present Situation." The author describes recent policies and argues strongly the case for a clear national fuel policy and for "fair" pricing; the last he is concerned, in particular, at the low price of fuel oil imported into this country. The last paper, by Dr. T. A. Townsend, is on "Coal and Science" and describes in terms intelligible to a layman some of the research that has been proceeding into the constitution of coal and into the problems of gasification and of methods of improving steam-raising.]

CAMPBELL (R. W.). *Soviet Economic Power*. Its organization, growth and challenge. London: Stevens, 1960. 8½". Pp. xii + 209. 30s.

[To be reviewed.]

CROFT (M.). *Apprenticeship and the "Bulge."* Fabian Research Series, No. 216. London: The Fabian Society (11 Dartmouth Street, S.W.1), 1960. 8½". Pp. 20. 2s. 6d.

[The author describes from her experience as a Youth Employment Officer the present situation regarding apprenticeship, in which only a small proportion of boys who would like to be taken on as apprentices are successful in finding a place, notwithstanding that there is a shortage of skilled labour in many industries. She considers the reasons for this situation and the various proposals that have been made to deal with it before it is aggravated by the bulge. She ends by suggesting a number of different measures, all of which she considers to be feasible in present circumstances, even if they are not necessarily what would be regarded as ideal if one were starting from a clean sheet.]

DUSENBERRY (J. S.) and PRESTON (L. E.). *Cases and Problems in Economics.* London: Allen & Unwin (New York: Prentice-Hall), 1960. 9". Pp. xv + 195. 15s. [To be reviewed.]

Economics. National Book League Reader's Guide. London: Cambridge University Press for the National Book League, 1960. 8½". Pp. 30. 3s. 6d.

[This is a list of books on economics suitable for recommending to non-economists. They are classified under subjects, and brief notes are given on each book. The list is quite a long one, comprising well over a hundred titles, but the arrangement is such that the reader can pick and choose, and some indication is given of the level of difficulty by the order in which the books are listed in each section.]

EDEY (H. C.). *Business Budgets and Accounts.* London: Hutchinson, 1960. 7½". Pp. 174. 12s. 6d. [To be reviewed.]

EINZIO (P.). *In the Centre of Things.* London: Hutchinson, 1960. 8½". Pp. 319. 30s. [To be reviewed.]

ELKAN (W.). *Migrants and Proletarians. Urban labour in the economic development of Uganda.* London: Oxford University Press for the East African Institute of Social Research, 1960. 9". Pp. 149. 21s. [To be reviewed.]

FAY (C. R.). *The World of Adam Smith.* Cambridge: Heffer, 1960. 9". Pp. vii + 97. 15s. [To be reviewed.]

FERNS (H. S.). *Britain and Argentina in the Nineteenth Century.* London: Oxford University Press, 1960. 9". Pp. 517. 63s. [To be reviewed.]

GRANICK (D.). *The Red Executive. A study of the organization man in Russian industry.* London: Macmillan, 1960. 8". Pp. 334. 21s. [To be reviewed.]

GUENAU (P. H.) and JACKSON (J. M.). *The Control of Monopoly in the United Kingdom.* London: Longmans, 1960. 9". Pp. ix + 197. 25s. [To be reviewed.]

HADFIELD (C.). *The Canals of South Wales and the Border.* Cardiff: University of Wales Press; London: Phoenix House, 1960. 8½". Pp. 272. 30s.

[The author is an enthusiast on canal history, and he has already written several books on the subject. He here provides detailed histories of each of the main canals of the region, from the time of their construction up to the present day, based on painstaking and extensive researches in British Transport Commission Historical Records and elsewhere. The narrative is by no means confined to the geographical development of the canals, and much interesting material is included on their finances and on the traffic they carried. Mr. Hadfield in his preface himself very fairly describes the character of the book and what it achieves when he writes: "I do not conceive myself to be writing economic history, but describing for the ordinary reader interested in canals or in the locality how the canals came to be built where we find them. There is here . . . material for the economic historian, but it is for him to describe how canal development fits into the pattern of general economic growth."]

HANNAN (E. J.). *Time Series Analysis. A Methuen Monograph on applied Probability and Statistics.* London: Methuen, 1960. 7½". Pp. viii + 152. 21s.

[To be reviewed.]

HUGHES (J.). *Nationalised Industries in the Mixed Economy.* Fabian Tract 328. London: The Fabian Society (11 Dartmouth Street, S.W.1), 1960, 8½". Pp. 40. 4s.

[The general burden of this vigorous essay is that, as things are at present, nationalised industries are constrained to follow policies that are to their own disadvantage in order to make life easier for the private sector. Particular aspects of policy which are criticised include the principle of break-even pricing, the absence of competition in awarding contracts to private firms, the obstacles in the way of nationalised industries developing profitable new lines of production and the excessive use of the public sector as a stabiliser.]

HUNT (K. E.) and CLARK (K. R.). *The State of British Agriculture, 1959-60.* Oxford: Oxford University Agricultural Economics Research Institute, 1960. 8½". Pp. 150. 15s.

[This is a most convenient and useful collection of statistics relating to British agriculture and its place in the economy. It is one of an annual series. In addition to the data for the current year and other recent years, charts are included showing the movement of the more important magnitudes over long periods. Certain changes have been made from previous years' editions: the brief commentaries which previously accompanied the statistical data have been dropped, and the foolscap format has been replaced by a much handier one.]

HUTTON (G.). *Inflation and Society.* London: Allen & Unwin, 1960. 9". Pp. 161. 15s.

[Mr. Hutton has written a hard-hitting popular pamphlet against the iniquities of inflation. The remedies, as he sees them, are two: "to cut down the pressure of new money and credit, by cutting Government and State expenditure to fit reasonable tax revenues (such as give people of all classes and incomes incentives) and to fit the available savings which the State and private enterprise can borrow at free market rates of interest, at medium or long term"; and secondly "to raise productive efficiency (productivity) in all walks of economic life by cutting down restrictive practices of all kinds, by improving managerial techniques . . . and machines and then letting them turn out all they are capable of producing."]

KALDOR (N.). *Essays on Value and Distribution; Pp. 238; 35s. Essays on Economic Stability and Growth; Pp. 302; 42s.* London: Duckworth, 1960. 9".

[To be reviewed.]

KAYE (B.). *Upper Nankin Street, Singapore. A sociological study of Chinese households living in a densely populated area.* Singapore: University of Malaya Press (London: Oxford University Press), 1960. 9". Pp. xvi + 439. 50s.

[The main purpose of this sociological survey of an exceptionally overcrowded (22 square feet of space per equivalent adult on average) street in Singapore is to assess the degree of "neighbourliness" among the inhabitants and the factors affecting it. The survey methods adopted and the resulting data are given in extreme detail, partly to assist in designing future inquiries. The result is a rather indigestible volume, and the results are not made to stand out in the clear way that would have been most useful to economists. However, much of the material is of interest, and the preparatory surveys which are described give a great deal of information on general living conditions.]

Land Ownership and Resources. A course of lectures given at Cambridge in June 1958. Cambridge: Department of Estate Management, University of Cambridge, 1960. 9". Pp. 136. 15s.

[This contains a group of lectures given in Cambridge in 1958. The speakers and their subjects were: Sir Solly Zuckerman on Natural Resources and the National Estate; J. Enoch Powell on Development Policy and the National Estate; Lord Parker on the Report of the Franks Committee and the Rights of the Individual; C. H. J. Maliepaard on Development of Land in the Netherlands; P. A. Stone on Building Economics; and D. R. Denman on The Estate in Land and the Employment of Resources.]

LEYS (C.) and PRATT (C.) (Eds.). *A New Deal in Central Africa.* London: Heinemann, 1960. 9". Pp. xiv + 226. 21s.

[To be reviewed.]

LINKE (L.). Ecuador. Country of contrasts. 3rd. edition. London: Oxford University Press for the Royal Institute of International Affairs, 1960. 8". Pp. ix + 193. 25s.

[This is a revised edition of a book which first appeared in 1954. It provides a mainly descriptive but interesting account of the country's history, politics, social structure and economy.]

MACDONALD (D. F.). The State and the Trade Unions. London: Macmillan, 1960. 9". Pp. vii + 199. 21s.

[To be reviewed.]

McINNIS (E.), HISCOCKS (R.) and SPENCER (R.). The Shaping of Postwar Germany. London: Dent, 1960. 9". Pp. 195. 21s.

[The first 150 pages provide a factual survey of the development of the German problem in East-West relations since the war. In a concluding chapter Mr. MacInnis discusses the problem more analytically and considers future prospects.]

MEYER (F. V.). The Seven. A provisional appraisal of the European Free Trade Association. London: Barrie & Rockliff with the Pall Mall Press, 1960. 9". Pp. viii + 140. 18s.

[To be reviewed.]

MYRDAL (G.). Beyond the Welfare State. Economic planning in the welfare states and its international implications. London: Duckworth, 1960. 9". Pp. xiv + 214. 21s.

[To be reviewed.]

NEALE (A. D.). The Antitrust Laws of the U.S.A. A study of competition enforced by law. London: Cambridge University Press for the National Institute of Economic and Social Research, 1960. 9½". Pp. xvi + 516. 45s.

[To be reviewed.]

NORTCLIFFE (E. B.). Common Market Fiscal Systems. London: Sweet & Maxwell, 1960. 10". Pp. 90. 21s.

[This contains a description of the taxation systems of Italy, Belgium, Holland, France and Western Germany. It has been prepared partly for the guidance of business-men trading with those countries, and partly as a background to discussion about harmonisation of tax systems within the Common Market. The author's lucid treatment is not limited to mere description of the law, and includes also brief discussions of the merits in theory and practice of the various systems described. It is therefore of interest to the student of taxation in general. The contents previously appeared as a series of articles in the *British Tax Review*.]

Oxford Regional Economic Atlas. The Middle East and North Africa. Prepared by the Economist Intelligence Unit and the Cartographic Department of the Oxford University Press. London: Oxford University Press, 1960. 10½". Pp. 135. 42s.

[This is the second regional atlas to appear in this series, the first having dealt with the U.S.S.R. and Eastern Europe. It is divided about equally into maps and text (notes, statistics and gazetteer). The maps include fairly large-scale general maps of the more important parts of the region, and topic maps of the whole region, dealing with oil, agriculture, irrigation, communications, etc. The text brings together useful summary statistical indicators of the economic conditions of the various countries in the region and also particulars about development schemes.]

PARES (R.). Merchants and Planters. Economic History Review Supplements, No. 4. London: Cambridge University Press for the Economic History Society, 1960. 10". Pp. 91. 10s. 6d.

[To be reviewed.]

PARKINSON (J. R.). The Economics of Ship-building in the United Kingdom. University of Glasgow Social and Economic Studies VI. London: Cambridge University Press, 1960. 9½". Pp. xii + 227. 40s.

[To be reviewed.]

RICH (E. E.). Hudson's Bay Company, 1670-1870. Volume II: 1763-1870. London: The Hudson's Bay Record Society, 1959. 9½". Pp. 975.

[To be reviewed.]

RICHARDSON (J. H.). Economic and Financial Aspects of Social Security. An international survey. London: Allen & Unwin, 1960. 9". Pp. 270. 30s.

[To be reviewed.]

ROBERTSON (D. J.). Factory Wage Structures and National Agreements. University of Glasgow Social and Economic Studies V. London: Cambridge University Press, 1960. 9½". Pp. xii + 260. 40s.

[To be reviewed.]

ROBINSON (JOAN). Collected Economic Papers, Vol. II. Oxford: Blackwell, 1960. 9". Pp. viii + 281. 30s.

[To be reviewed.]

ROBSON (W. A.). Nationalized Industry and Public Ownership. London: Allen & Unwin, 1960. 9½". Pp. 544. 50s.

[To be reviewed.]

ROSE (H. B.). The Economic Background to Investment. London: Cambridge University Press for the Institute of Actuaries and the Faculty of Actuaries, 1960. 9". Pp. xi + 661. 40s.

[To be reviewed.]

RUBNER (A.). The Economy of Israel. A critical account of the first ten years. London: Cass, 1960. 8½". Pp. xxiii + 307. 25s.

[To be reviewed.]

The Soviet Seven Year Plan. A survey of economic progress and potential in the U.S.S.R. London: Phoenix House, 1960. 7½". Pp. 126. 10s. 6d.

[To be reviewed.]

STAMP (L. DUDLEY). Applied Geography. Harmondsworth, Middlesex: Penguin Books, 1960. 7". Pp. 208. 3s. 6d.

[This little book attempts to demonstrate, in simple, non-technical language, what geographers have done towards the interpretation and solution of such practical problems as land-use planning and industrial location. It does so mainly by setting out a series of examples, liberally illustrated with the maps which Professor Stamp regards as the special tool of the geographer.]

Study of the Japanese Wool Textile Industry. London: The Economist Intelligence Unit (22 Ryder Street, S.W.1), 1960. 11". Pp. vi + 40.

[The purpose of this study is to consider possible implications of developments in the Japanese woollen industry for British exports and for British imports from Japan. It contains two main parts: a descriptive analysis of the industry and an analysis of Japan's trade policy in respect of wool and wool textiles. A brief third part assesses likely future trends of Japanese wool textile exports. Large surplus capacity in the industry and widespread discrimination against it by foreign countries are among the most important features of the present situation.]

Tew (B.). International Monetary Co-operation, 1945-60. Fifth Revised Edition. London: Hutchinson, 1960. 7½". Pp. 192. 12s. 6d.

[The first edition of Professor Tew's admirable and widely used text-book was reviewed in the *Economic Journal* of September 1953 by P. D. Henderson. Since then several revised editions have appeared, and this is the latest. New material has been added to bring it up to date, and the concluding chapter is now significantly entitled "Back to the Gold Standard." The author here points out the unsatisfactory features of present international monetary arrangements and discusses the so-called Triffin plan as a possible way out. Although the new material incorporated on the recent events adds considerably to the usefulness of the book, some readers may feel that the author has not yet submitted it to the large-scale rewriting that would be needed to shift the emphasis decisively away from the 1940s towards the 1950s and 1960s. Thus few readers of the sort for whom the book is mainly intended are now likely to be very interested in the details given about the Intra-European Payments Agreements. Perhaps Professor Tew will feel moved to undertake a more thorough-going revision next time a new edition is called for.]

VAJDA (S.). An Introduction to Linear Programming and the Theory of Games. London: Methuen (New York: John Wiley), 1960. 9". Pp. 76. 9s. 6d.

[Linear programming and the theory of games are here dealt with in two separate essays. Both are very clearly written, but the one on game theory is the better suited to the needs of the economist who wants to know what it is all about. The essay on linear programming is essentially an elementary account of how to set about solving a linear programming problem, and though the author clearly explains what a linear programming problem is, he does not try to relate it to the concepts with which traditionally educated economists are more familiar.]

WHETHAM (EDITH). *The Economic Background to Agricultural Policy.* London: Cambridge University Press, 1960. 9". Pp. xii + 147. 22s. 6d. (paper edition 13s. 6d.).

[To be reviewed.]

Canadian

IRVING (J. A.). *The Social Credit Movement in Alberta*. Toronto: University of Toronto Press, 1959 (London: Oxford University Press, 1960). 9½". Pp. xii + 369. 48s.

[This is a narrative and analysis in social and political terms of the process by which the Social Credit movement came to power in Alberta. The author sets out to assess the relative importance in promoting the success of the movement of social and economic conditions, of the philosophy of Social Credit itself, and of the personality and tactics of its leader Aberhart.]

Indian

BERNA (J. J.). *Industrial Entrepreneurship in Madras State*. Bombay and London: Asia Publishing House for the International Industrial Development Center, Stanford Research Institute, 1960. 9". Pp. xvi + 239. 45s.

[To be reviewed.]

RAJ (K. N.). *Some Economic Aspects of the Bhakra Nangal Project.* A preliminary analysis in terms of selected investment criteria. Bombay and London: Asia Publishing House, 1960. 9". Pp. xii + 140. 28s.

[To be reviewed.]

Pakistani

FEI (J. C. H.) and RANIS (G.). A Study of Planning Methodology with Special Reference to Pakistan's Second Five-year Plan. Monographs in the Economics of Development, No. 1. Karachi: Institute of Development Economics (Old Sind Assembly Building, Bunder Road, Karachi), 1960. 8 $\frac{1}{2}$ ". Pp. 27.

[This is a taxonomic survey of the problem of deciding what should be treated as a variable and what as a given in drawing up development plans. In Pakistan's second five-year plan the projected level of national income is taken as politically given, and a number of behavioural relationships are also assumed to be given, but foreign aid is treated as a variable which will adjust itself to the needs of the rest of the plan. The authors compare this with various other possible combinations of assumptions.]

South African

HOUGHTON (D. HOBART) (Ed.). *Economic Development in a Plural Society. Studies in the Border Region of the Cape Province.* Cape Town and London: Oxford University Press, 1960. 10". Pp. xv + 401. 60s.

[To be reviewed.]

American

AHMAD (J.). *Natural Resources in Low Income Countries. An analytical survey of socio-economic research.* Pittsburgh, Ohio: University of Pittsburgh Press, 1960. 11". Pp. xxi + 118. \$2.50.

[This is a classified bibliography of the work so far done on the subject. The 502 items included are drawn from a wide range of sources, and many of them are of the official or semi-official kind that tend to elude conventional library classifications. The title of each item is followed by a fairly full summary of its contents. There is a general introduction surveying the field as a whole.]

ALLEN (R. L.). Soviet Economic Warfare. Washington, D.C.: Public Affairs Press, 1960. 94'. Pp. x + 293. \$5.00.

[To be reviewed.]

BACH (G. L.). Economics. An introduction to analysis and policy. Third edition. Englewood Cliffs, New Jersey: Prentice-Hall, 1960. 9 $\frac{1}{2}$ ". Pp. xiv + 850.

[This is a very substantially revised edition of one of the best-known American text-books.]

BAKKE (E. W.), KERR (C.), and ANROD (C. W.). *Unions, Management, and the Public*. Second edition. New York: Harcourt, Brace, 1960. 9 1/2". Pp. xviii + 650. \$6.50.

[This is the second edition, greatly altered, of a work which first appeared in 1948. The authors explain that they planned the structure of the book and the chapter headings as they would have done had they set out to write a systematic text-book themselves; but they then made each chapter consist of extracts from the writings of leading authorities in the part of the field concerned. The result is a selection of 141 readings, arranged in a logical order, with introductions to each chapter by the editors to indicate the nature of the issues under discussion and their context.]

BELL (J. W.) and SPAHR (W. E.) (Eds.). *A Proper Monetary and Banking System for the United States*. New York: The Ronald Press, 1960. 8 $\frac{1}{2}$ ". Pp. viii + 239.

[This is the joint work of the following group of authors: J. W. Bell, F. A. Bradford, D. L. Kemmerer, F. R. Niehaus, M. Palyi, R. T. Patterson, C. W. Phelps, W. E. Spahr and G. C. Wiegand. These authors share the same general attitude to monetary problems, and they here put forward proposals for reforms which would get rid of what they consider to be the present grave faults of American monetary policy. Chief of these faults are "the departure by our Federal government from the integrity of a redeemable currency; the use by our central government of the Federal Reserve System and commercial banks to finance activities by devices favourable to itself. . . ; the pronounced depreciation of the purchasing power of the United States dollar; and the persistent agitation for another devaluation of the dollar."]

BRAZER (H. E.). A Program for Federal Tax Revision. Michigan Pamphlets No. 28. Ann Arbor, Michigan: Institute of Public Administration, University of Michigan, 1960. 84". Pp. 50. \$1.50.

[This is a brief and well-argued statement of a comprehensive programme for rationalising the federal tax structure and eliminating the more serious anomalies and inequities which it now contains. The author is particularly concerned with the growth of concessions of one sort or another which serve to erode the tax base.]

BREDO (W.). *Industrial Estates: tool for industrialization*. Glencoe, Illinois: The Free Press for the International Industrial Development Center, Stanford Research Institute, 1960. 9". Pp. xvi + 240. \$6.00.

[This study is designed especially for planners in newly industrialising countries who have responsibility for the development of small- and medium-scale industrial enterprises. Industrial estates, which are familiar in this country as an instrument of location policy, have played an important part in industrialisation in Puerto Rico and have now been adopted as part of the Indian programme to encourage small-scale industry. Dr. Breido has brought together a great deal of useful information from the experience of many countries. He deals with questions of organisation, siting, design, finance and so on, looked at from the practical point of view rather than as an academic study.]

BRYCE (M. D.). *Industrial Development.* A guide for accelerating economic growth. New York and London: McGraw-Hill, 1960. 9½". Pp. xvi + 282. 58s.

[To be reviewed.]

CLARK (J. M.). *The Wage-Price Problem*. New York: The American Bankers Association, 1960. 91". Pp. vi + 68.

[In 1959 the American Bankers Association launched a long-range programme to promote economic growth and to combat inflation. They succeeded in persuading Professor J. M. Clark to write for them this monograph. Professor Clark has produced a very valuable simple statement of the underlying problems of securing that money incomes rise only in proportion to the increase of real wealth produced. He explains clearly the difficulties of changing differentials and of the unsatisfactory consequences for differentials of wages designed to reflect increases of productivity in particular industries. He ends with a discussion, naturally in terms of the American background, of possible forms of organisation that might contribute to a more satisfactory wage and distribution policy. The outcome is somewhat too similar to that of the original concept of the Cohen Council for most English readers to feel great confidence in its full efficacy without a very strong fiscal policy behind it.]

DAVIDSON (P.). *Theories of Aggregate Income Distribution*. New Brunswick, New Jersey: Rutgers University Press, 1960. 9". Pp. x + 151. \$5.00.
[To be reviewed.]

DERNBURG (T. F.) and McDUGALL (D. M.). *Macro-economics. The measurement, analysis and control of aggregate economic activity*. New York and London: McGraw-Hill, 1960. 9½". Pp. x + 267. 50s. 6d.
[To be reviewed.]

ERLLS (R.). *The Meaning of Modern Business. An introduction to the philosophy of large corporate enterprise*. New York: Columbia University Press (London: Oxford University Press), 1960. 9½". Pp. xi + 427. 60s.
[To be reviewed.]

FOURASTIÉ (J.). *The Causes of Wealth*. Translated and edited by T. CAPLOW. Glencoe, Illinois: The Free Press, 1960. 8½". Pp. 246. \$5.00.
[To be reviewed.]

FRIEDMAN (M.). *A Program for Monetary Stability*. New York: Fordham University, 1960. 9½". Pp. viii + 110. \$2.75.
[To be reviewed.]

GALE (D.). *The Theory of Linear Economic Models*. New York and London: McGraw-Hill, 1960. 9½". Pp. xxi + 330. 74s.
[To be reviewed.]

GALESON (W.). *The CIO Challenge to the AFL. A History of the American Labor Movement, 1935-41*. Cambridge, Mass.: Harvard University Press (London: Oxford University Press), 1960. 9½". Pp. xx + 732. 78s.
[To be reviewed.]

HALL (C. A.). *Fiscal Policy for Stable Growth. A study in dynamic macroeconomics*. New York: Holt, Rinehart and Winston, 1960. 8½". Pp. vii + 311. \$5.00.
[To be reviewed.]

HARBERGER (A. C.) (Ed.). *The Demand for Durable Goods*. Chicago, Illinois: Chicago University Press (London: Cambridge University Press), 1960. 9". Pp. vi + 274. 48s.
[To be reviewed.]

KARP (M.). *The Economics of Trusteeship in Somalia*. Boston University African Research Series, No. 2. New York: New York University Press, 1960. 8½". Pp. x + 185. \$4.50.
[To be reviewed.]

KNIGHT (F. H.). *Intelligence and Democratic Action*. Cambridge, Mass.: Harvard University Press (London: Oxford University Press), 1960. 8½". Pp. vi + 177. 30s.
[To be reviewed.]

KUZNETS (S.), MILLER (ANN R.) and EASTERLIN (R. A.). *Population Redistribution and Economic Growth, United States 1870-1950. Volume II: Analyses of Economic Change*. Philadelphia, Pennsylvania: The American Philosophical Society (104 South Fifth Street, Philadelphia 6), 1960. 12". Pp. xiv + 289. \$5.00.
[To be reviewed.]

LEIBENSTEIN (H.). *Economic Theory and Organizational Analysis*. New York: Harper & Brothers, 1960. 8½". Pp. x + 349. \$6.00.
[To be reviewed.]

LONG (C. D.). *The Labor Force under Changing Income and Employment*. Princeton, New Jersey: Princeton University Press for the National Bureau of Economic Research, 1958 (London: Oxford University Press, 1959). 9". Pp. xxiv + 439. 80s.
[To be reviewed.]

Long-range Projections for Economic Growth. *The American Economy in 1970*. Washington, D.C.: National Planning Association, 1959. Pp. viii + 96. \$2.00.

[The projections herein contained are optimistic ones and show a compound interest rate of growth of gross national product of 4.2%. The reasons for this optimism are stated in rather general terms, with reference to the increased tempo of research and the retarding influences exerted in the past by depressions, which in the future governments may be expected to prevent.]

MARCSON (S.). *The Scientist in American Industry. Some organizational determinants in manpower utilization*. Princeton, New Jersey: Industrial Relations Section, Princeton University, 1960. 8½". Pp. 158.

[The author is professor of Sociology at Rutgers University. He undertook a field study on the organisation of research and the working environment of scientists in a large corporation. In this monograph he analyses the career development of scientists in the corporation, the stresses they are exposed to and the fundamental problem of authority. He argues that scientists do not easily accommodate themselves to the pattern of authority that is normal elsewhere in the corporate enterprise. He suggests that a proper blending is needed of "executive authority" of the usual sort and of what he calls "colleague authority," which is the sort of professional independence, within limits, enjoyed by university staff.]

MARTIN (D. D.). *Mergers and the Clayton Act*. Berkeley, California: University of California Press, 1959 (London: Cambridge University Press, 1960). 9½". Pp. xii + 351. 48s.
[To be reviewed.]

NATIONAL BUREAU OF ECONOMIC RESEARCH. *A respect for Facts, by SOLOMON FABRICANT. 40th Annual Report*. New York: National Bureau of Economic Research (261 Madison Avenue, New York 16), 1960. 10½". Pp. viii + 72.

[This report contains, as usual, a full description of the National Bureau's current activities, and gives substantial and informative summaries of the provisional findings of work in progress. In his introductory essay Mr. Fabricant takes the title phrase as his text in presenting an overall view of the National Bureau's current work and aims.]

NELSON (R. L.). *Merger Movements in American Industry 1895-1956*. Princeton, New Jersey: Princeton University Press for the National Bureau of Economic Research, 1959 (London: Oxford University Press, 1960). 9½". Pp. xxi + 177. 40s.
[To be reviewed.]

NORTON (F. E.) and JACOBY (N. H.). *Bank Deposits and Legal Reserve Requirements*. Los Angeles, California: Graduate School of Business Administration, University of California, 1960. 9½". Pp. xiv + 139.

[The authors have made a sample study of the relationships between various characteristics of banks in the United States (size, location, form of organisation) and the structure and behaviour of their deposits. Their researches also include a similar comparison between branch banks and unit banks. The object of these inquiries is to suggest a fairer and more effective structure of legal reserve requirements than exists at present. The system which the authors favour, at least on theoretical grounds, is one by which banks would be divided into categories according to the rate of turnover of their deposits, and the legal reserve ratios differentiated accordingly. They also consider some other schemes, which though cruder would still be an improvement on present arrangements. Despite its technical nature, this monograph raises some interesting questions in the theory of banking and monetary control.]

PESSEMIER (E. A.). *The Management of Grocery Inventories in Supermarkets*. Pullman, Washington: Bureau of Economic and Business Research, State College of Washington, 1960. 9". Pp. viii + 192. \$2.00.

[This describes and analyses current practices and proposed alternatives. The concluding chapter is designed to provide a practical and self-contained inventory control manual for store managers and their assistants.]

Population Trends in Eastern Europe, the U.S.S.R. and Mainland China. *Proceedings of the thirty-sixth annual conference of the Milbank Memorial Fund*. New York: Milbank Memorial Fund, 1960. 9". Pp. 334.

[This contains the proceedings of a conference held in November 1959. Those contributing papers were Jerry W. Combs, John F. Kantner, Warren F. Eason, John S. Aird, Leo A. Orleans, Alexander Eckstein, W. Parker Mauldin, Demetri B. Shimkin, Irene B. Tacuber and Nai-chi Wang. F. Lorimer, F. W. Notestein and other leading demographers took part in the discussions.]

Proceedings, International Conference on Control of Restrictive Business Practices. Glencoe, Illinois: The Free Press for the Graduate School of Business, University of Chicago, 1960. 8½". Pp. xix + 380. \$10.00.

[To be reviewed.]

RAPKIN (C.) and GRIGSBY (W. G.). The Demand for Housing in Eastwick. Prepared for the Redevelopment Authority of the City of Philadelphia. Philadelphia, Pennsylvania: Institute of Urban Studies, University of Pennsylvania, 1960. 9". Pp. xii + 83. \$2.00.

[Eastwick is a large area in Philadelphia scheduled for redevelopment. This is an attempt to estimate what the demand is likely to be for housing there at various possible prices. In addition to the usual considerations about size and growth of population, distance from places of work and so on, which take up most of the authors' space, an interesting element in these calculations is the interaction of demand between whites and non-whites. If prices are fixed low, demand from non-whites is stimulated, but the presence of non-whites lessens demand from whites, so the net result is likely to be that a low price lessens total demand, unless the whites' own price-elasticity of demand for housing is sufficiently high.]

ROSTOW (E. V.). Planning for Freedom. The public law of American capitalism. New Haven, Connecticut: Yale University Press, 1959 (London: Oxford University Press, 1960). 9½". Pp. xii + 437. 48s.

[To be reviewed.]

SCHELLING (T. C.). The Strategy of Conflict. Cambridge, Mass.: Harvard University Press, 1960. 8½". Pp. vii + 309. 50s.

[To be reviewed.]

SHOUP (C. S.) and others. The Fiscal System of the Federal District of Venezuela. A report. New York: 1960 (published privately). 9½". Pp. x + 162.

[To be reviewed.]

Small Industry. An international annotated bibliography compiled by M. C. ALEXANDER-FRUTSCHI. Glencoe, Illinois: The Free Press for the International Industrial Development Center, Stanford Research Institute, 1960. 9". Pp. xviii + 218. \$10.00.

[This carefully compiled selective bibliography lists over a thousand items, with informative summaries of contents. They are well classified and indexed. Particular emphasis is given to items that cast light on the role that small firms can play in the industrialisation process, but this does not prevent a very ample coverage being given to the literature on small businesses in advanced countries as well.]

STEIN (M. R.). The Eclipse of Community. An interpretation of American studies. Princeton, New Jersey: Princeton University Press (London: Oxford University Press), 1960. 9". Pp. xii + 354. 48s.

[To be reviewed.]

STEPANEK (J. E.). Small Industrial Advisory Services. An international study. Glencoe, Illinois: The Free Press for the International Industrial Center, Stanford Research Institute, 1960. 9". Pp. xiv + 193. \$6.00.

[This is a practical study, written by an author with wide experience in industry in under-developed countries. It contains much information and advice on the best ways to organise these services, based on the author's own experience and on the literature of the subject.]

TAYLOR (O. H.). A History of Economic Thought. New York and London: McGraw-Hill, 1960. 9". Pp. xix + 524. 60s.

[To be reviewed.]

THEOBALD (R.). The Rich and the Poor. A study of the economics of rising expectations. New York: Clarkson N. Potter, 1960. 8½". Pp. xii + 195. \$4.50.

[To be reviewed.]

TRIFFIN (R.). Gold and the Dollar Crisis. The future of convertibility. New Haven, Connecticut: Yale University Press (London: Oxford University Press), 1960. 9½". Pp. xiii + 195. 38s.

[To be reviewed.]

ULMER (M. J.). Capital in Transportation, Communications, and Public Utilities: Its Formation and Financing. Princeton, New Jersey: Princeton University Press for the National Bureau of Economic Research (London: Oxford University Press), 1960. 9½". Pp. xxxviii + 548. 96s.

[To be reviewed.]

Dutch

FOO (B.). Industrial Pricing Policies. An analysis of pricing policies of Danish manufacturers. Amsterdam: North-Holland Publishing Company, 1960. 9". Pp. viii + 229. 35s.

[To be reviewed.]

JOHANSEN (L.). A Multi-sectoral Study of Economic Growth. Contributions to Economic Analysis, XXI. Amsterdam: North-Holland Publishing Company, 1960. 9". Pp. 177.

[To be reviewed.]

LEVY (M. E.). Income Tax Exemptions. An analysis of the effects of personal exemptions on the income tax structure. Amsterdam: North-Holland Publishing Company, 1960. 9". Pp. xii + 148.

[This is based on a doctoral dissertation at Columbia University. In it the author carefully analyses the effects of alternative schemes of tax exemption and tax-rate changes on the average rate of tax, on tax progressivity and on incentives.]

RÖPKE (W.). International Order and Economic Integration. Dordrecht: Reidel, 1960. 9". Pp. viii + 276. D. fl. 22.50.

[To be reviewed.]

WIJNHOLDS (H. W. J.). The Budget Theory of Money. Amsterdam: The Academic Press (151 Warmoesstraat), 1960. 9". Pp. 227.

[This is mainly designed as a general text-book on the theory of money, including a description of the various types of money, the history of monetary systems, the relation between money and the price level and the theory of the foreign exchanges. The author is aware that a text-book written on these lines may appear to many readers rather old-fashioned, and he devotes an introductory chapter to answering this charge. Most of the book follows straightforward lines. In his treatment of effects of change in the quantity of money, however, the author follows a line of his own, and it is from this that the book takes its title. He draws a distinction between the quantity of money and the "possession of money," the latter being apparently calculated after allowance for changes in other assets or liabilities. The terminology used is not wholly clear, and "money" sometimes seems to bear its normal meaning and sometimes to mean the whole of an individual's assets. The conclusions drawn from the theory emphasise the importance of fiscal policy.]

Danish

HENRIKSEN (O. B.) and ØLGAARD (A.). Danmarks Udenrigshandel 1874-1958. Copenhagen: Institute of Economics, University of Copenhagen (Studiestraede 6, Copenhagen K), 1960. 10". Pp. 133.

[This is a collection of statistics relating to the development of Danish foreign trade since 1874. The headings and notes to the tables are given in English as well as in Danish. A short introduction in English comments on some of the trends revealed.]

Swedish

ÅKERMAN (J.). Theory of Industrialism. Causal analysis and economic plans. Lund Social Science Studies, No. 19. Lund: Gleerup, 1960. 9½". Pp. 332. Sw. kr. 25.

[To be reviewed.]

NORR (M.) and SANDELS (C.). The Corporate Income Tax in Sweden. Stockholm: Stockholms Enskilda Bank, 1960. 8½". Pp. 60.

[This is a brief survey designed for the use of those who contemplate doing business in or with Sweden.]

Italian

SYLOS-LABINI (P.). *Economic capitalistiche ed economic pianificate*. Bari: Editori Laterza, 1960. 8". Pp. 246. L. 2000.

[To be reviewed.]

Japanese

ISLAM (NURUL). *Foreign Capital and Economic Development, Japan, India, and Canada. Studies in some aspects of absorption of foreign capital*. Tokyo and Rutland, Vermont: Charles E. Tuttle Company (15 Edogawacho, Bunkyo-ku, Tokyo), 1960. 8½". Pp. 254. \$5.00.

[To be reviewed.]

Rumanian

RICARDO (D.). *Opere Alese, Vol. I*. Bucarest: Academia Republicii Populare Romine, 1959. 9½". Pp. 333.

[This is a Rumanian edition of Ricardo's *Principles*. The translation does not appear to be based directly on Mr. Sraffa's edition, but the long introduction by C. Murgescu on "David Ricardo—A Classic of Bourgeois Political Economy" contains extensive references to the materials in that edition.]

Official

BRITISH

MINISTRY OF AGRICULTURE, FISHERIES AND FOOD. *Domestic Food Consumption and Expenditure, 1958. Annual Report of the National Food Survey Committee*. London: H.M. Stationery Office, 1960. 9½". Pp. vii + 185. 10s.

[The main part of this annual report follows the usual form, and provides data on the diets of households of different income levels and family composition. A new feature is that for the first time demand-analysis based on time-series is undertaken to give estimates of price- and income-elasticities of various foodstuffs. The methods used are those developed by J. A. C. Brown. Income-elasticity of demand is found to be generally lower than it was before the War, whereas price-elasticities in many cases turn out to be quite high.]

SOUTH AFRICAN

A Survey of Rent-paying Capacity of Urban Natives in South Africa. A report of the Committee on Socio-economic Surveys for Bantu Housing Research. Pretoria: South African Council for Scientific and Industrial Research, 1960. 9". Pp. xvi + 123.

[This records the findings of a sample survey. Data are given on the age- and sex-compositions of native households in a number of towns, and inferences are drawn as to the type of accommodation required (hostel, one-room, two-room, etc.). A comparison is then made between incomes and the cost of what are reckoned to be "necessary" purchases of food and other items, so as to yield the margin available for paying rent. It turns out that on the basis chosen, a large proportion of households have a zero or negative margin available. The authors therefore recommend that extensive provision of subsidised housing is needed, with rents discriminating according to means. While the data collected are useful and interesting, any economist reading the report is bound to feel doubts about the assumptions underlying the policy recommendations and about the implicit doctrine that housing is necessarily to be treated as the residual item which is to receive whatever subsidy is necessary to prevent people falling below the poverty line.]

AMERICAN

Treasury-Federal Reserve Study of the Government Securities Market. Part I: Report on Consultations; An Organized Exchange or a Dealer Market; 1959; pp. 108. Part II: Factual Review for 1958; 1960; pp. 159. Part III: Supplementary Studies; 1960; pp. 112. Washington, D.C.: Federal Reserve System. 9".

[These three small volumes constitute a *post-mortem* on the collapse of the Government security market in the United States in mid-1958. Part I consists of a general report on the consultations conducted by the joint Treasury-Federal Reserve study group, together with a special study on the merits of an organised exchange for Government Securities. Part II is a detailed factual study of the Government securities market in 1958 and Part III contains some supplementary studies on such matters as margin requirements. Although principally of interest to the specialist, all three volumes manage to combine the qualities of analytical competence and simplicity of presentation.]

EUROPEAN COAL AND STEEL COMMUNITY. *Eighth General Report on the Activities of the Community*. Luxemburg: European Coal and Steel Community, 1960. 9". Pp. 456.

[This report contains a chapter on supply and demand for energy within the Community countries, as well as a full account of the activities of the Community itself during the year.]

INTERNATIONAL LABOUR OFFICE. *Job Evaluation*. Geneva: International Labour Office, 1960. 9½". Pp. 146. 7s. 6d.

[This publication both discusses the functions and usefulness of job evaluation and provides an outline account of the methods it uses, with reference to experience in a number of particular cases. The authors' general attitude to the economic background of the subject is a sensible one, viz., that, whether rightly or wrongly, people have a deeply-rooted idea that as a matter of "fairness" wages should bear some relation to the characteristics of the job; that this is bound to be one of the considerations affecting relative wages, though not necessarily the most important one; and that in view of this it is useful to have these characteristics measured as scientifically as possible.]

ORGANISATION FOR EUROPEAN ECONOMIC CO-OPERATION. *Europe and the World Economy. Eleventh Annual Economic Review*. Paris: O.E.E.C., 1960. 9½". Pp. 138. 9s.

[This extremely useful succinct review deals with developments in 1959. Special features include a chapter on recession and recovery in individual industries, with particular attention to industries that are not sharing in the general buoyancy of the European economy. More than half of the review deals with the external trade and payments of member countries, and it is suggested that it would now be appropriate for industrial countries to act together to provide increased outlets for the products of less-developed countries.]

UNITED NATIONS. *Economic Survey of Asia and the Far East 1959*. Bangkok: United Nations, 1960. 11". Pp. xii + 169. 21s.

[Part I of this report gives a preliminary view of the economic situation in the region in 1959. Part II is devoted to a review of foreign trade in the primary exporting countries in the region, including long-term trends (1928-57) and future prospects and problems.]

UNITED NATIONS EDUCATIONAL, SCIENTIFIC AND CULTURAL ORGANISATION. *International Bibliography of Economics, Vol. VII*. Paris: UNESCO, 1960. 9½". Pp. 528. 53s. 6d.

[This contains a classified unannotated list of the titles of 8379 books or articles published in 1958. All countries and languages are included. How far does this gigantic compilation, and the series of which it is a part, go towards providing the documentation service that economists require? There is no doubt that it is a tremendously valuable source of reference, and its weaknesses are largely due to the scale on which it is planned. Thus the delay between the period covered and publication is by no means unreasonable in view of its size, but it is still enough to prevent it from serving to keep economists systematically abreast with the latest work. Similarly, although the system of classification and indexing makes it easy to find items dealing with a well-defined field in applied economics, such as a particular industry of country, it is much more difficult to find the items that matter in economic theory, especially since a considerable proportion of those listed are in languages like Japanese which make them inaccessible to most readers. In sum, this is a most useful piece of work, but its existence should not be taken as an argument against pressing on with efforts to secure a truly up-to-date documentation service, preferably quarterly, with abstracts.]

UNITED NATIONS FOOD AND AGRICULTURE ORGANIZATION. *The Economic Role of Middlemen and Co-operatives in Indo-Pacific Fisheries*. Vol. 1. Edited by E. F. SZCZEPANIK. Rome: F.A.O., 1960. 9". Pp. viii + 133. 7s. 6d.

[This volume is one of a series dealing with the general subject indicated in the title. It contains two separate essays, the first, by M. D. D. and P. R. Baichyn, on the fishing industry in Thana District, Bombay State, and the second, by E. F. Szczepanik, on the fishing industry in Hong Kong. Both essays contain general surveys of the fishing industry in the places concerned as well as of the particular problems of marketing and co-operatives.]

UNITED NATIONS FOOD AND AGRICULTURE ORGANIZATION. *Production Yearbook, Vol. 13, 1959*. Rome: F.A.O., 1960. 11". Pp. xii + 484. 25s.

UNITED NATIONS FOOD AND AGRICULTURE ORGANIZATION. *Trade Yearbook 1959, Vol. 13*. Rome: F.A.O., 1960. 11". Pp. xvii + 349. 17s. 6d.

[These two complementary volumes of statistics follow similar lines to previous issues in their series.]

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