INDUSTRIAL GROWTH AND WORLD TRADE

An Empirical Study of Trends in Production, onsumption and Trade in Manufactures from 1899-1959 with a Discussion of Probable Future Trends

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INTRODUCTION AND SUMMARY OF FINDINGS

1. AIMS

The main aim of this book is to analyse the long-term relationship between industrial growth and international trade in manufactured goods. Several distinct aspects of this relationship can be separately considered. In particular, it is useful at the outset to distinguish the problems of industrialization in a primary-producing country such as India or Brazil, and the impact of such industrialization on that country's trade, from the continuing industrial advance of a mature industrial country and the consequent effects of this on trade. In the first example, industrialization sets in motion quite new economic forces, involving a greater or lesser transformation of the social and economic balance of the country. Such profound changes may substantially affect the export potential as well as the import demand, of the industrializing country; and are likely to do so in different ways, or to a significantly different extent, from the continued economic development of an industrial country with a population enjoying a relatively high level of income.

Since the intention was to analyse the main trends in world trade since the end of last century, it was necessary to consider the economic growth of all the main trading countries. In general, the experiences of the industrializing primary-producing countries are separated from, and contrasted with, those of the industrial countries of Western Europe, North America and Japan, and—wherever possible—with those of a selection of less-developed countries which have not yet begun to industrialize. To some extent, also, the development experiences of some of the present industrial countries in the early years of this century may be a pointer to how some of the present primary-producing countries might develop in the future, though clearly much caution is needed before any conclusions can be drawn from the analogy.

The method of approach has thus been to attempt to explain the trends in world trade in manufactured goods by industrial and economic changes in the main importing countries. Such changes are not, of course, the only factors influencing trade; in certain periods, other factors—changes in trade restrictions or in a country's foreign exchange earnings due to changes in the terms of trade, or in foreign demand conditions, for example—may be the major influences. The outstanding analytical problem is to eliminate, if possible, the influence of such extraneous factors, so that the net effect of industrial growth on imports can be adequately assessed. Since the imports of manufactures into both the industrial and primary-producing countries are supplied very largely by the industrial countries themselves, the analysis of import trends is, in effect, an explanation of trends in exports of manufactures from the industrial countries.

A secondary objective has been to analyse the trends in exports from each

of the main industrial countries separately. The industrialization of the primary-producing countries has resulted not only in a shift in the pattern of their import trade which has affected all the industrial countries generally; it has also resulted in a substantial degree of import-substitution which has adversely affected the export trade of some of the industrial countries much more than that of others. Here it is necessary to distinguish the effects of such import-substitution from the effects of competition between the industrial countries, and from the indirect effects of industrialization on imports through its effects on real incomes.

Finally, it was hoped that the underlying relationships between economic growth and imports of manufactures which were found for the past half-century could be used, with suitable modifications, to assess the prospects for growth and trade over the coming decade or so. Such an assessment has been made on the basis of alternative assumptions about the future rates of economic growth in the main industrial countries and about the probable future relationship between imports and consumption of manufactured goods.

2. THE ANALYTIC BACKGROUND

The general problem of how the industrialization of primary-producing countries affects the economies of the older industrial countries has been discussed on many previous occasions since the beginning of the century. Curiously enough, views on the problem have tended—with few exceptions—to polarize into opposing schools of thought: those who viewed the industrialization of primary-producing countries with some alarm, and those who welcomed it as a basis for the further expansion of the world economy. The exponents of the former view usually based their argument on one or both of the following propositions: that as primary-producing countries industrialized, Britain and other industrial countries lost their traditional export markets for manufactured goods; and that, at the same time, local industries in primary-producing countries absorbed raw materials which would otherwise be used by the industrial countries.

In Britain, the loss of traditional markets for textiles was, indeed, a major and obvious cause of the economic difficulties of the 1920's. 'The most obvious and immediate effect' of the growth of local manufacture, stated the Balfour Committee in 1925, 'is, of course, a restrictive one. Goods that formerly found a ready sale in a particular market are now wholly or partially excluded by the competition of the locally produced article under the protection of an import tariff'[1]. The Committee considered, however, that two qualifications were necessary to their main thesis. The first was that new manufacturing industries set up in Britain's main export markets were likely to be concentrated

[1] *Survey of Overseas Markets*, Committee on Industry and Trade, H.M.S.O., London, 1925.

on the production of the simpler classes of manufactures. This would lead to a shift in the pattern of overseas demand towards higher-quality goods, in which Britain specialized. The second qualification was that new industries create new needs for plant and materials and that, as income grows with expanding production, expenditures will increase and this will tend to increase the demand for imports. The Committee's view was that the growth in the demand for plant and materials would not of itself be sufficient to offset the loss of the market for the final product, but they were careful to leave open the crucial question of whether the subsequent increase in incomes would offset the effect on imports of the process of import-substitution.

This generally pessimistic view of the effects of industrialization in 'overseas markets' appeared to be confirmed by the events of the 1930's. The world economic crisis of 1931 was immediately followed by a host of trade restrictions of all kinds. At the same time, local manufacturing was greatly stimulated in many important markets outside Europe and North America, and in the older industrial countries a number of industries (particularly textiles) were adversely affected by this development. The link between unemployment in the export industries and the growth of secondary industry abroad inevitably coloured the thinking of many British economists at that time.

Very similar arguments to these were, in fact, put forward by the Economic Committee of the Royal Commission on Population in 1950[1]. The Committee argued that industrialization in countries suffering from rural over-population 'offers by far the most promising means of raising the standard of life . . . The improvement in the standard of life may give rise to a demand for imports of new types; and it is sometimes argued that by supplying this demand, and also by supplying the investment goods required during the process of industrialization, Great Britain might obtain compensation for the loss of her traditional lines of export trade. But this compensation is most unlikely to be more than partial. It cannot be assumed that the total imports of the country in which industrialization takes place will be maintained in undiminished volume. Still less can it be assumed that the new imports will be obtained from the particular countries which supplied the old imports displaced by industrialization. Nor is it probable that the new imports will be wholly industrial products; insofar as they consist of food or other primary commodities, the difficulties of an industrial exporting country will be aggravated rather than relieved'.

These views were paralleled in the academic discussions by arguments, such as those put forward in the 1930's by the late Lord Keynes and Professor D. H. Robertson, based on the doctrine of comparative costs[2]. Keynes argued, for

[1]Papers of the Royal Commission on Population, Vol. III, *Report of the Economics Committee*, H.M.S.O., London, 1950, pp. 10–13.

[2]These arguments can be traced back to Robert Torrens (*An Essay on the Production of Wealth*, London, 1821), who argued that as 'newer' countries progress in population,

example, that the spread of technical progress among the nations of the world tends to narrow the differences in relative costs of production between one country and another, and thus reduces the scope for specialization through international trade[1]. Robertson used a similar argument to explain the shrinkage in world trade in textiles[2].

More recently, Dominguez[3] has argued that the process of economic growth will lead to a reduction in the division of labour between industrial countries. Economic growth involves changes both in the pattern of demand and in the pattern of output. Since resource-endowments are likely to differ, economic growth implies a different pattern of demand for the products of each country. Assuming that each country has an initial specialization, the change in demand pattern implies the emergence of surplus capacity in one country, provided that labour is not mobile between countries. This surplus capacity can be taken up only if the range of production is extended into the speciality of the other country; such an extension would, however, imply a contraction in the trade between the partner countries. This argument is, however, based wholly on the effects of growth on the *pattern* of demand; but economic growth implies also an increase in the *level* of demand, and if aggregate demand rose rapidly enough, this could offset the effects of the change in pattern, and prevent the emergence of surplus capacity.

Dominguez also argues that, to the extent to which the primary-producing countries succeed in industrializing, their imports of certain simply-fabricated manufactures will contract, and this will make it somewhat more difficult for the older industrial countries to obtain primary commodities in the desired volume[4]. This line of thought is similar to that expressed by the Economics Committee of the Royal Commission on Population.

These various arguments have all been belied by the course of events since the early 1950's. The past decade has witnessed a faster rate of industrial growth and a faster rate of increase in the intra-trade of the industrial countries than at any previous period since the beginning of the century. The view that industrialization of the primary-producing countries (especially the less-

the law of diminishing returns will ensure that the cost of their primary produce will rise, while with rising productivity of labour the cost of production of manufactures in such countries will fall. Thus, relative differences in costs between old and new countries become evened up, and international trade is eventually 'confined to those peculiar articles, in the production of which immutable circumstances of soil and climate give one country a permanent advantage over another'. See Professor J. Viner's address to the Manchester Statistical Society (*The Prospects for Foreign Trade in the Post-War World*, June 1946), in which he discusses Torrens' argument at some length.

[1]J. M. Keynes, 'National Self-Sufficiency', *Yale Review*, June 1933.

[2]D. H. Robertson, 'The Future of International Trade', *Economic Journal*, March 1938. See also Professor J. Viner, *op. cit.* for a critical review of the arguments put forward by Keynes and Robertson.

[3]L. M. Dominguez, *International Trade, Industrialization and Economic Growth*, Pan-American Union, Washington, D.C., 1954.

[4]L. M. Dominguez, *op. cit.*, page 153.

developed ones) is ultimately to the benefit of the older industrial countries (as well as to the industrializing countries themselves) is one that is now generally accepted both by governments and by economists.

Yet this conclusion had already been reached nearly twenty years ago by the late Folke Hilgerdt in his classic study of the effects of industrialization on international trade[1]. This study provided, for the first time, a systematic review of the empirical evidence on the subject, from the beginnings of the modern industrial era in the 1870's to the outbreak of the second World War. The more important of Hilgerdt's conclusions can, perhaps, be summarized as follows:

1. Industrialization increases the productivity of labour, and the resulting greater supply of manufactured goods tends to stimulate the production of primary produce for sale. Thus, industrialization tends to increase a country's ability to export and in this way it helps to finance increased imports of manufactures.
2. This process of simultaneous industrial growth and trade expansion was disrupted in the 1930's by the disintegration of the world economy. The real danger to the further growth of trade, therefore, is not industrialization but the failure to abolish restrictions on international trade.

Hilgerdt's *schema* of industrialization leading to increased exports, which are then used to finance a greater volume of imports, was founded—securely enough—on the historical development of the main industrial countries up to 1930. Yet it is precisely this assumption of the necessary inter-action of industrialization and export growth which has seemed most open to question from the experiences of many industrializing primary-producing countries since 1945. The major limitation on growth in these countries has generally been the insufficiency of foreign exchange to purchase essential 'developmental' imports. Hilgerdt's conclusion thus appeared to need re-examination in the light of the post-war evidence which is now available.

Moreover, the statistical material presented by Hilgerdt suffered from major limitations which inevitably restricted the scope of his analysis. The first was that the statistics related essentially to the more advanced industrial countries of Europe and North America, only five primary-producing countries—Australia, Chile, India, New Zealand and the Union of South Africa—being included in the analysis. Second, Hilgerdt's material related solely to the movements in production and trade of manufactured goods as a whole, though shifts in the commodity pattern of trade in manufactures have been no less significant than changes in the total. The present study attempts to extend Hilgerdt's analysis in both these directions: a fairly wide range of 'less-developed' countries is included in the analysis, while separate series have been compiled for the main groups of manufactured goods.

[1] *Industrialization and Foreign Trade*, League of Nations, Geneva, 1945.

Much of the statistical analysis in this book is based on least-squares regression techniques. This approach owes a good deal in inspiration to Professor H. B. Chenery's well-known analysis of cross-country differences in output and trade patterns in a recent period[1]. The new trade data compiled during the present study have allowed the calculation of time-series regressions, as well as cross-country ones; the results indicate fairly conclusively that the latter are, in some important cases, misleading guides to the changing pattern of international trade.

Professor Chenery's has hitherto been the only comprehensive attempt, since Hilgerdt's study, to analyse the relationships between industrial growth and foreign trade. There have, however, been a number of valuable studies of particular aspects of the development of world trade, especially its changing commodity-pattern and changes in the share of world exports held by individual industrial countries. Among these latter studies, those by Baldwin, Cairncross, Kindleberger, Svennilson and Tyszynski are worthy of special mention: detailed references and comment will be found in Chapters 7 and 8. Several detailed studies in this field have also been made in recent years by the United Nations and its regional Economic Commissions[2], as well as by the G.A.T.T. secretariat[3].

3. PLAN OF THE BOOK

The greater part of the analysis in this book is based on two new sets of statistical series. The first, described in Appendices A to D, consists of a detailed subdivision of exports of manufactures from the main industrial countries by commodity group, distinguishing a wide range of countries of destination. These 'Trade Network' tables relate to selected years of relatively good trade from 1899 to 1959. The figures are, as near as possible, internationally comparable, being derived by re-classifying the original trade statistics of the exporting countries on to the basis currently in use by the United Nations. The original figures in national currencies have all been converted into U.S. dollars at current prices, by using the average rates of exchange for the relevant years; and into 'constant' prices by deflating the current value series by indices of export unit values (see Appendix B).

The countries of destination were chosen so as to include all the main industrial countries and a majority of the industrializing primary-producing countries. In addition, a selection of primary-producing countries which have

[1]H. B. Chenery, 'Patterns of Industrial Growth', *American Economic Review*, Vol. 50, No. 4, Sept. 1960.

[2]See, in particular, *Processes and Problems of Industrialization in Under-Developed Countries*, United Nations, New York, 1955; *World Economic Survey, 1956* and *1961*, United Nations, New York, 1957 and 1962; *Economic Survey of Latin America, 1956*, United Nations, New York, 1957.

[3]Annual Reports (particularly *International Trade, 1956, 1957–58* and *1959*, G.A.T.T., Geneva, 1957, 1959 and 1960, respectively).

not yet begun to industrialize was included in order to contrast their trading experience with that of the industrializing group. The Soviet Union was also distinguished separately in view of its very different development over most of the period considered.

In order to confine the considerable volume of statistical extraction, classification and computation work within manageable limits, some countries had to be excluded from the Trade Network tables, although their inclusion would otherwise have been desirable. The most important of these exclusions, measured in terms of value of their foreign trade, are some of the smaller European countries: Austria, Denmark and Finland, for example, in Western Europe, and the countries of Eastern Europe outside the Soviet Union. Thus, the new statistical series for the 'industrial countries' relates to a rather narrower definition of countries than is usually adopted, though this is not likely to have distorted, to any significant extent, the broad trends over the past half-century, nor the relationships found between trade and economic growth. The excluded countries are, however, included in their appropriate groups in some parts of the analysis.

The second set of statistics consists of estimates of gross domestic product, the net output of manufactures and the gross value, free of duplication, of consumption of non-food manufactures for those countries included in the Trade Network tables for as many of the selected years as possible (see Appendices E and F).

The construction of these basic series allowed an analysis to be made of the relation between import growth and economic expansion in the various importing areas. Before starting such an analysis, however, it seemed necessary to inquire into certain aspects of industrialization and economic growth which form the general setting of the whole study. This inquiry is the main purpose of the three chapters in Part I.

The first aspect considered is the relation between the expansion of manufacturing industry and general economic growth, which is discussed in Chapter 1. This is followed by an examination of historical patterns of change within the manufacturing sector, together with an attempt to deduce from the evidence a 'typical' historical pattern (Chapter 2). The third aspect considered is whether the material assembled could be used in some way to classify countries according to the level of industrialization that they have achieved. In Chapter 3, a broad classification is suggested, based both on the statistics of manufacturing output and on the composition of the export trade of different countries.

Having examined the evidence on industrial growth, and classified countries into broad groups, the stage is set for an analysis of the main trends and of the various influences at work insofar as these can be quantified. This is the purpose of Parts II and III. The discussion in Part II is confined to the more general aspects, the commodity groups being left over for detailed treatment in Part III. A broad review is first made of the long-term trends in inter-

national trade with which the book is mainly concerned (Chapter 4). This is followed by a discussion of the effects of industrialization on exports from primary-producing countries (Chapter 5) and of industrial growth on imports of manufactures (Chapter 6). The next chapter deals with trends in commodity trade patterns, distinguishing the main markets, while Chapter 8 considers secular changes in the share of the world market for manufactures held by each of the main industrial countries. Part III, as already mentioned, deals in greater detail with the main commodity groups (Chapters 9-14). The following chapter (Part IV—Chapter 15) attempts to assess possible future trends in world trade in manufactures on the basis of the past relationships already revealed, and of a number of specific assumptions, and discusses the implications of these trends for the economic policies of the industrial countries. Finally, in Chapter 16, some general conclusions suggested by the study are reviewed.

4. SUMMARY OF FINDINGS

Industrialization and economic growth

There have been several 'rounds' of industrialization in the primary-producing areas of the world since the beginning of the century. Shortages in supplies of manufactured goods during the two World Wars stimulated local production, while during the 1930's the deterioration in the terms of trade of these countries and the network of trade restrictions which grew up forced many governments to foster secondary industries behind tariff protection to safeguard living standards and to keep down unemployment. Since 1945, there has been another spurt of industrial development, partly as a result of economic planning in many of the less-developed countries. Nevertheless, manufacturing production in the 'low income' continents of Latin America, Africa and Asia by 1959 totalled little more than 10 per cent of that in North America, Western Europe and Oceania.

Though industrialization may not be the appropriate policy for economic growth in every country, it seems that in many—probably the majority—of the less-developed countries, industrialization is the key to economic progress. The main causal connection, as suggested in Chapter 1, is that industrialization tends to raise physical output per head in the economy. There are several ways in which this comes about, and these tend to operate simultaneously. First, with industrialization the share of manufacturing in national output increases. Since the average product per worker is higher in manufacturing than in agriculture in low-income countries, this shift in the pattern of output will raise total commodity output per head in the economy. Second, with the progress of industrialization, productivity in the manufacturing sector itself tends to increase relatively rapidly, compared with progress in other sectors.

Increasing manufacturing output will often be accompanied by economies of scale (within plants and in industry generally), by increases in capital assets employed, and by the development of new skills and attitudes to work. Finally, the level of productivity in the rest of the economy may be raised as a result of industrialization (by increasing the supplies of farm equipment and fertilizers to agriculture, for example; or, more indirectly, by improving transport facilities, educational levels, and so on).

Changes in the pattern of output

Industrialization also involves changes in the pattern of manufacturing output. As income levels rise, the pattern of demand changes and the growth of industry responds to this. The main features of the typical change in demand pattern are a relatively rapid growth in demand for capital goods, chemicals and durable consumer goods, and a relatively slow expansion in demand for food, textiles and clothing (Chapter 2). Apart from demand influences, changes in the pattern of output also depend on the resource endowments of the industrializing country—which are likely to vary substantially from one country to another—and the extent to which economies of scale accrue as output is expanded in particular industries.

However, the influence of the indigenous natural and human resources on the pattern of economic growth can be greatly modified by the relative ease or difficulty of transporting resources to and from other countries, and of increasing the population by immigration, as well as by government intervention. With so many variable influences at work modifying the effects of the uneven distribution of resources among different countries, it might be expected that the pattern of industrial growth which actually develops in any one country would differ significantly from that of other countries. However, there are other influences which tend to make the industry-pattern of growth broadly similar in countries at similar stages of industrialization. First, as already mentioned, the pattern of demand tends to change in a similar way in such countries. Second, manufacturing tends to be restricted in the earlier phases of industrialization by the available level of skill and organizational ability to the simpler processes, which are typical of the consumer industries. Third, the size of the market tends to be too small in the earlier stages of industrialization to justify the establishment of optimum-sized plants in a number of industries, particularly in the chemicals and capital goods field. With the progress of industrialization, new skills and organizational abilities emerge, while the expanding market allows new industries to be profitably established.

The industrial development of the economically advanced countries provides empirical evidence of the existence of a common broad pattern of growth. Taking the historical changes in output patterns in the industrial countries since the end of last century, regression equations were computed to show the

association between the rate of growth in each main industry group and the rate of growth in the gross domestic product. This provides a quantitative assessment of the association between economic growth and the pattern of manufacturing output. The results show a fairly sharp fall in the relative importance of food processing and textiles in the earlier stages of growth, with a continued, though reduced, rate of decline thereafter. Metals and engineering products show the reverse movement, with a declining rate of growth (relative to the total) as the later stages of development are reached. Chemicals production shows an uninterrupted rise, while the miscellaneous group of manufactures first rises and then tends to fall slowly in relative importance.

This picture is based on the common evolution of manufacturing in the main industrial countries; the calculation thus presupposes a wide variety of resources and an expanding market. It does not necessarily describe how industry will develop in any given country, particularly where resources are limited or where the market is restricted. Nor does it imply any necessary sequence in the pattern of growth. Now that aid and technical know-how are available in substantial amounts to less-developed countries, a wider choice of development-pattern is possible, including development of some engineering industries in the earlier stages of industrialization. Such development on a broad industrial front would accelerate the changes in the industrial pattern revealed by the present analysis.

A broad classification of countries

The net value of manufacturing production per head of the total population is taken as a statistical measure of the level of industrialization in any country (Chapter 1). This is combined with an indicator of the degree of industrialization of exports (taken as the proportion of 'finished' manufactures in total exports) to derive a broad classification of countries into 'industrial', 'semi-industrial' and 'non-industrial' which is convenient for the analysis of international trade trends (Chapter 3). The following criteria, admittedly arbitrary, have been used (based on the position in 1955):

	Industrial	*Semi-industrial*	*Non-industrial*
Net value of manufacturing production per head ($ *at* 1955 *prices*) ..	Over 150	30–350	Under 15
Finished manufactures as proportion of total exports (*percentage*) ..	Over 15	Under 15	Negligible

In the industrial group are both large countries like the United States, Britain and West Germany, and small ones like Belgium and the Netherlands. Canada and Japan are both borderline cases but are included here in the industrial area. Other borderline cases are India and Israel, both of which are classed as semi-industrial, while Pakistan is also included here since the pre-war figures

for undivided India cannot be split to compare with present boundaries. The semi-industrial group thus contains countries at very different levels of industrialization. The two main sub-groups included, apart from India/Pakistan, are (a) the 'countries of recent settlement', such as Australia, New Zealand and South Africa, which have already reached a relatively mature phase of industrialization, and (b) countries where industrialization is a much more recent development, such as Brazil, Chile, Turkey and Yugoslavia. In the later analysis, the various sub-groups are discussed separately wherever possible. The non-industrial group includes countries such as Southern Rhodesia and Egypt, which have already begun to industrialize, as well as a large number of under-developed countries, which have not, or whose manufacturing output is still very small. The countries in the Soviet group are excluded from this classification, and are treated separately wherever possible.

The industrial countries as here defined contained 28 per cent of the total population of the world outside the Soviet countries in 1959, but consumed about 82 per cent of all non-food manufactures in that year. The semi-industrial countries had 40 per cent of the total population and accounted for some 13 per cent of consumption of non-food manufactures. The corresponding proportions for the non-industrial areas were 32 per cent for population and only 5 per cent for consumption. The relative importance of the non-industrial areas was, however, considerably greater in terms of imports of manufactures. In 1959, they took in aggregate about 25 per cent of world imports of manufactures (excluding imports by the Soviet area), compared with about 20 per cent by the semi-industrial countries, and 55 per cent by the industrial countries.

The main trends

In a review of the movement in world trade over the past half-century (Chapter 4), four main trends became apparent. First, the long-term movement in world trade in manufactures has been closely related to that in world manufacturing production. There was a break in the relationship in the 1930's, but in historical perspective this appears as a discontinuity due to special factors (trade and currency restrictions) which depressed the level of trade in those years.

Second, before 1939, a relative increase in the volume of trade in manufactures, compared with primary products, was normally associated with a reverse movement in the relative prices of these two groups. Since the second World War, however, a relative expansion in the volume of trade in manufactures has been accompanied by a worsening of the terms of trade for primary products. Some of the possible reasons for this are examined in Chapter 4, and the implications of this recent trend for the future are discussed in Chapter 15.

Third, trade between the industrial countries has increased faster since 1950 than any other sector of world trade. It seems likely that this was, in part, a reversion to a more 'normal' relationship between the intra-trade of the industrial countries and their total output of manufactures. Trade in manufactures *within* the industrial continents (i.e. between Canada and the United States, and between countries of Western Europe) has increased faster than that *between* these continents. Of exports of manufactures to outside countries, those to semi-industrial countries have risen much more slowly than those to non-industrial ones.

Fourth, against this background of secular expansion, imports of manufactures into three important trading countries—Britain, India and Argentina—have tended to stagnate over the period covered by the analysis[1], thus helping to retard the rate of growth in world trade. The fact that India and Argentina are also important examples of industrializing primary-producing countries has appeared to support the view that industrialization in such countries necessarily tends to reduce exports (or, at least, reduces the potential growth in exports) and so limits the increase in imports which can be achieved.

Effect of industrialization on exports

This view is examined (in Chapter 5) in relation to the experience of the semi-industrial countries, comparing a pre-war period (1937–38) with a post-war one (1955). Two methods of analysis were used. The first considers the movement in exports from each semi-industrial country from pre-war to post-war, in relation to (a) the movement in world trade in the same 'bundle' of goods, and (b) the movement in that country's average export prices (unit values) compared with that in world trade in the same 'bundle' of goods[2]. A regression analysis shows that the very different movement in exports from different industrializing countries since pre-war is closely related to the different commodity-patterns of their exports. The introduction of an index of manufacturing production, or an index of the relative importance of manufacturing in the gross domestic product, did not improve the statistical result. It seems reasonable to conclude that, in general, the secular change in exports of these countries from pre-war to post-war was not significantly associated with their rate of industrialization.

The second approach was to contrast the experience of the semi-industrial countries as a group with that of the non-industrial countries. The results gave striking confirmation of the previous conclusion. The volume of exports from the non-industrial countries in 1955 of commodities directly competitive

[1]The period covered here generally ends in 1959. British imports of manufactures rose substantially in 1960 and 1961.

[2]This approach has been subject to some criticism, which is further discussed in Chapter 5 (page 125).

with the exports of the semi-industrial countries was only 5 per cent above the 1937–38 level. This is not significantly different from the 1 per cent increase calculated for the semi-industrial countries. By contrast, the exports of other primary products from the non-industrial countries rose by over 120 per cent in volume in the same period.

This evidence does not support the view that the rate of export growth of the semi-industrial countries was, as a general rule, retarded by the process of industrialization. If there was a 'supply limitation' due to industrialization, why then were the exports of similar products from the non-industrial countries affected in similar degree? This is not to claim that in particular countries, at particular periods, industrialization has not, in fact, retarded exports—several well-known examples can in fact be quoted of industrialization resulting in a retarded growth in exports—but it cannot be claimed that it must necessarily do so.

Effect of industrial growth on the total volume of imports of manufactures

Changes in the volume of imports of manufactures are considered here as the resultant of two influences: changes in the level of consumption of manufactures and changes in the proportion of consumption which is met by imports. Levels of consumption per head are closely related to levels of real income per head. Estimates are presented in Chapter 6 of apparent consumption of manufactures per head in a wide range of countries for selected years back to 1899. Regression calculations indicate that in most countries consumption of manufactures rises at an appreciably faster rate than real income.

The discussion of the relative share of imports in consumption is conducted, for technical reasons, in terms of the import-content of 'supplies', which are defined as production plus imports of manufactures. It is shown that the import-content declines with the progress of industrialization, at least up to a point where a fairly mature level of industrialization has been reached. The rate of decline is likely to be influenced by a number of different factors; those considered here are (1) the size of the country, (2) the degree of import restrictions, (3) the relative importance of exports in the economy, and (4) the level of industrialization.

Small countries are likely to be more dependent on imports than large ones, both because their range of natural resources available for industrial development is likely to be more restricted, and because they may have too small a home market for the efficient operation of optimum-sized plants. In general, it seems that the import-content is inversely associated with population size in countries in a similar stage of economic development.

Import restrictions (protective tariffs, quotas, discrimination, exchange regulations, etc.) are a major method of influencing the import-content of supplies. Though statistical difficulties of measuring the degree of restriction

applied prevent any precise conclusions being drawn, it appears from a relatively crude analysis for a sample of countries that the height of the duty on imports of manufactures is not related to the import-content of supplies. Country differences in tariff heights tend to reflect differences in costs of manufacturing production, so that where production is high-cost, tariffs tend to be relatively high also.

Countries which have relatively large export sectors will tend to rely more heavily on imports for their supplies of manufactures than will countries with relatively small export sectors. A statistical analysis for a recent year confirms this relationship.

The influence of the fourth factor—the level of industrialization—is obscured by the effect of the other three on the import-content of supplies. To find the net effect of industrialization, multiple regression equations were calculated, based both on time series and on cross-country data for a recent year.

The results of the analysis can be summarized as follows. Industrialization leads to increased real income per head (unless abnormal circumstances are at work), and this in turn raises demand for manufactures per head (which rises by $1\frac{1}{2}$–2 times the rate of growth in real income per head). With the progress of industrialization, the import-content falls until—as already mentioned—a fairly mature level of industrialization has been reached. The rate at which the import-content has fallen in the industrial and semi-industrial countries in the past is in the region of 40–60 per cent of the rate of increase in manufacturing production per head. For example, if the import-content was 40 per cent, an increase of 100 per cent in manufacturing production per head would tend to be associated with a reduction in the import-content to about 15–25 per cent; had the initial import-content been, say, 33 per cent, the final proportion would have been 13–20 per cent. Thus, a 10 per cent increase in real income per head would be associated with an increase of some 15–20 per cent in consumption of manufactures per head. The corresponding rise in production of manufactures per head would, however, result in a fall in the import-content of supplies by some 6–9 per cent from its initial level, or considerably less than the percentage rise in per caput consumption. The implication is that there would be an increase of 4–8 per cent in the volume of imports of manufactures per head. These are, of course, average relationships based on past trends on the assumption that industrialization has no adverse repercussions on the capacity to import; they do not necessarily show how imports would move in the future with continued industrial growth.

The estimates of consumption levels, combined with the long-term series for foreign trade, enable the movement in imports of manufactures to be divided into two parts. The first, a positive factor, is the effect of the growth in demand for manufactured goods on the level of imports. The second, normally negative, results from the substitution of home production for imports.

Over the period from 1913 to 1959, the import-substitution effect was

considerably greater in the semi-industrial countries than in the industrial ones, while the expansion in demand was less. For both reasons, therefore, the increase in the volume of imports was much larger for the industrial countries. For the period 1950–59, about one-half of the increase in the imports of manufactures into the industrial countries can be attributed to the expansion in demand, the other half resulting from the rise in the import-content (which was artificially depressed by trade and currency restrictions in the early 1950's) to more 'normal' levels. This suggests that in the 1960's, if we can assume that 'normality' had been approximately restored by 1959, this sector of trade might grow at only about half the rate of the past decade, in relation to the rate of growth in real income in the industrial countries. However, a new factor which might result in a more rapid growth in trade is the move towards closer economic integration on a regional basis, at any rate in Western Europe; the possible impact of such integration on the import-content of supplies is discussed further in Chapter 15.

Trends in the commodity-pattern of trade in manufactures

Changes in the commodity-pattern of world trade in manufactures since the beginning of the century have been drastic and unambiguous. The outstanding trends, in volume terms, have been a relatively rapid growth in trade in machinery, transport equipment and chemicals, and a relatively rapid decline in textiles and clothing. Of the remaining groups, metals and miscellaneous manufactures have shown little change relatively to the total, but 'other metal goods' have been declining.

These results, which are discussed in Chapter 7, are generally similar to those arrived at in several previous studies based on current values of exports. The main difference is that on the current value basis, chemicals show no significant upward trend as a percentage of the total, while there is only a moderate uptrend for transport equipment. This method of analysis thus gives a distorted picture of the underlying trends in 'real' (or volume) terms. The difference arises because unit values of exports of chemicals and transport equipment have fallen appreciably in relation to those of other manufactured goods over the past 30 years or more.

Fundamentally, this is because technological progress tends to be faster in expanding industries than in stagnant or contracting ones, with consequent effects on relative unit costs, and on relative export prices. In the transport equipment industry, for example, the mass production of passenger cars and trucks in the 1920's resulted in a substantial decline (some 20 per cent) in export unit values between 1913 and 1929, whereas there was a rise of about 45 per cent in the unit value of exports of all other manufactures. The rapid expansion in production, allied with technological progress, in the chemical industry since the early 1950's is another example of the same process; in this

period, there were price reductions for several important chemical products.

Though the groups which are relatively stagnant or contracting tend not to be involved in new technical developments to the same extent as the expanding groups, even in textiles there have been notable technical advances since the war in the development of synthetic fibres and improved finishes for cotton fabrics.

These general trends in the world trading pattern are reflected in the patterns of imports into the main groups of countries. The shift in pattern towards the expanding groups has, however, been much sharper in the semi-industrial countries than in the industrial or non-industrial groups in the period since 1950. This is due essentially to the beginnings of industrialization in India and Pakistan and to industrial growth in Latin America, and to restrictions in these, and other, semi-industrial countries on imports of 'less essential' goods such as textiles. The pattern of import duties imposed by industrializing countries generally reinforces this trend; duties tend to be relatively low on capital equipment and chemicals and relatively high on consumer manufactures.

The earlier analysis has shown that for manufactured goods both the pattern of demand and the pattern of output are systematically related to the process of economic growth. The implication is that the pattern of imports of manufactures is also related to growth. This has been demonstrated directly by a series of regression of import volume per head on real income per head for the industrial and semi-industrial countries. The regression for each commodity group related to the 'selected years' from 1899 to 1955. The results for the industrial countries show that per caput imports of transport equipment (other than passenger road vehicles) rose, on average, some 2½ times as fast as per caput real income; passenger road vehicles rose 1.8 times as fast, while machinery and chemicals rose 1½ times as fast. At the other extreme, there was an absolute decline in imports of textiles and clothing per head, but no significant statistical relationship with real income changes appeared. In the semi-industrial countries, the pattern of change is much more diversified, though very generally the pattern is similar to that for the industrial countries; as was to be expected, the decline in textiles has been much greater in relation to economic growth in the semi-industrial than in the industrial countries.

The general commodity pattern of change in supplies of manufactures which is associated with economic growth is not, however, causally related to the tendency of the import-content of supplies to fall in the earlier stages of industrialization. This is because there is no necessary or unique relationship between a country's import dependence in any one commodity and the rate at which supplies of that commodity increase as the economy expands.

Competition and import-substitution in the world market

Trends in world trade in manufactures are examined in Chapter 8 from the

point of view of the several exporting countries. The outstanding change since 1899 has been the secular decline in Britain's share of the total, from one-third before the first World War to about one-sixth by 1959. The principal gainer has been the United States (one-eighth to one-fifth of the total). Both the United States and Britain have lost ground since 1950 to Germany and Japan. Of the other main industrial exporters, France suffered a severe relative decline in the inter-war period, but her share of the total recovered after the devaluations of the franc in 1958 and 1959.

These changes in relative market shares reflect, in the main, changes in the competitive positions of the different exporting countries; the influence of variations in the area and commodity patterns of trade in manufactures has generally been small. Price is an essential element in competitive power, but there are considerable difficulties in measuring changes in the relative export prices of different countries. The approach used here—the limitations of which are discussed in some detail in Chapter 8—is to construct for each main industrial country new series of unit values of exports from competing countries, based on a standardized commodity group weighting. The results of some regression calculations showed that relative shares of the world market were negatively associated with movements in relative export prices. These results do not imply, however, that price is necessarily the predominant component of competitive power. The non-price factors—technological progress, quality and design, delivery delays, credit terms, sales push, and so on—also play a major part in the competitive process.

A general hypothesis advanced is that long-term shifts in relative competitive power in the widest sense may reflect changes in the rates of economic growth of the various industrial countries. Since exports are also an important part of total demand for final output in most industrial countries, a change in competitive power—which implies a change in export sales—will itself affect the rate of growth in industrial production. Thus, exports interact in a dynamic way with the growth of the whole economy.

There has, in fact, been a remarkably close relationship over the past 60 years in the relative growth rates of the main industrial countries and their shares of the world export market in manufactures. This may have arisen, in part, because faster growth tends to be associated with higher productivity and lower costs, and with an increased range and variety of new products; the more slowly growing country will thus tend to become less competitive. At the same time, the movement in exports will tend to reinforce the underlying trend in the economy. Thus, the relative stagnation in British exports in the inter-war period had a major retarding effect on the growth of the British economy, while the retardation in growth itself reacted adversely on Britain's competitive position. The connection between economic growth and competitive power can also work through changes in government policy. Countries which are growing relatively fast will tend to have a relatively fast growth in imports and

government policy may have to be adjusted—by a currency devaluation, in the last resort—to achieve the required increase in exports to finance this growth.

Changes in the export performance of the different industrial countries have also been influenced by import-substitution arising from industrial growth in the importing countries. The burden of import-substitution, in this sense, has fallen very unequally on the different industrial countries. In the semi-industrial countries, Britain has been easily the main loser. Before the second World War, the development of the Indian textile industry, with the consequent sharp contraction of a main market for British cotton textiles, had been the major influence. Since 1950, the industrial expansion of Australia has been the biggest single element in the import-substitution against British exports.

The relatively severe loss through import-substitution suffered by Britain in the semi-industrial markets may well have had an important depressive influence on her competitive position generally. If, as argued earlier, a slowly growing economy is likely to be less competitive than fast growing ones, part of the loss in Britain's competitive share of world exports may have been an indirect result of import-substitution. The United States, by contrast, though also suffering a large import-substitution loss (mainly in Latin America), has improved its competitive position appreciably since the first World War. The major factor here has been the rapid expansion of the United States economy which, because exports are relatively very small (unlike the position in Britain), was not significantly retarded by the import-substitution overseas.

PROSPECTS AND POLICIES

What are the future prospects for trade in manufactures? Two main aspects considered in Chapter 15 are, first, the prospects for the total volume of such trade and, second, the commodity pattern which is likely to emerge.

Total volume of trade in manufactures

A quantitative assessment of probable trends in the volume of trade in manufactures can be made on the basis of some of the relationships found for the past, and of specific assumptions about the future growth of real income and of likely changes in the import-content of supplies. Assuming that the import-content in the industrial countries will continue to rise over the next decade, mainly as a result of economic integration in Western Europe, it is estimated that the imports of manufactures by the industrial countries—in effect, their intra-trade—in the period 1970–75 would be 100–103 per cent higher than in 1959, if real income per head in each country rose by 3 per cent per annum, compound, that is, by almost 50 per cent over the period as a whole. If the rate of growth continued to be slower in the United States (where the import-content is low) than in Western Europe, though the average remained at 3 per cent, the rise in imports of manufactures would be greater than this,

possibly as high as 150 per cent above the 1959 level.

Estimates of imports by the primary-producing countries are even less definitely related to income trends. However, if real incomes per head rise by 2 per cent per annum, compound, that is, by about 30 per cent over the whole period, the volume of imports of manufactures in 1970–75 might be in the range of 125–175 per cent of the 1959 level for the semi-industrial countries and perhaps 150–190 per cent for the non-industrial ones.

On the basis of the various assumptions made, the total volume of world trade in 1970–75 might average about double the 1959 level; this compares with an assumed increase of about 70 per cent in total real income of the industrial countries. The greater part of the expansion in trade is likely still to be in the intra-trade of the industrial countries.

Even if the rate of growth in real income per head in the primary-producing countries is only 2 per cent per annum, compared with the 3 per cent assumed for the industrial countries, they will face a major problem in finding adequate foreign exchange to pay for the imports of capital goods and other manufactures they will require. Their exports of primary produce (other than oil) to the industrial areas are unlikely to rise more than two-thirds as fast as the rise in the real national income of the industrial countries in total. On this basis—which is probably an optimistic one—a rate of growth of 2 per cent per annum would require the net capital inflow into the primary-producing areas to be almost doubled from the level of some $7 billion a year in the late 1950's to about $13 billion in the period 1970–75. For the rate of growth of real income per head to be increased to 3 per cent a year, the net capital inflow in 1970–75 would then have to be in the region of $18 billion.

Commodity patterns

Past trends in the commodity pattern of trade in manufactures can be projected into the future in various different ways. Alternative methods used in Chapter 15 show broadly similar results, though with one important exception—textiles. For this group, a mechanical projection of past trends would show the extinction of all trade by 1975. But it is more plausible to assume that trade in textiles will continue to be of some importance; indeed, the textile trade among the industrial countries might well expand, rather than decline.

Generally, however, past trends in commodity patterns may be expected to continue. By 1970–75, machinery and transport equipment might represent 45–50 per cent of total trade in manufactures (39 per cent in 1959), while for chemicals the proportion might rise to 16–18 per cent from 13 per cent in 1959. The various estimates depend to some extent, however, on the pattern of economic growth in the various main importing regions. A faster rate of growth in the United States than in the other industrial countries, for example, would tend to reduce the relative importance of capital goods and chemicals in world trade. A higher rate of growth in the small, compared with the large,

industrial countries would accentuate the present general trends in the commodity pattern of trade in manufactures.

Policies in the industrial countries

There are three fields in which policy changes by the industrial countries would benefit the balance of payments of the primary-producing countries and so make possible an increase in their rate of economic growth.

The first line of action would be to introduce, or reinforce, policies designed to speed up growth in the industrial countries themselves. An increase in the average annual rate of growth in the industrial countries from, say, 4 to 5 per cent per head per annum would probably lead to a rise of some $3 billion (at 1959 prices) in the total export earnings of the primary-producing countries by the early 1970's. This should be sufficient to meet about half the latter's payments gap so long as the assumed rate of growth in their real incomes per head does not exceed 2 per cent per annum. This is a purely arithmetical calculation, which ignores the difficulties which would be caused by a continuing widening of the income gap between the industrial and primary-producing areas.

A second approach would be the reduction in government restrictions on imports from the primary-producing countries. In 1958, about 9–10 per cent of consumption of food and feedingstuffs in North America and Western Europe was imported. If tariffs and quotas on imports were relaxed to allow the import proportion to rise to 16–17 per cent, this would have added another $5–6 billion in 1959 to the export earnings of the primary-producing countries, while by 1970–75 the additional income would be about $8 billion. A further gain—though a relatively small one as yet—would result from relaxing restrictions on trade in manufactured products.

Finally, the flow of capital to the less-developed areas might be increased. In 1959, the net capital outflow from the industrial countries represented little more than 1 per cent of their total national product. An increase by a further ½ per cent would imply an addition by 1970–75 of $6 billion (at 1959 prices) to the capital outflow that can otherwise be assumed. However, interest payments on the mounting total of capital investments may well grow so large as to threaten the external viability of the developing countries. Some concerted effort, possibly of an international character, therefore seems required to minimize the future burden of interest charges on the less-developed countries.

Of these various measures, the relaxation of trade restrictions on imports from primary-producing countries appears to be the most immediately practicable. Indeed, in the context of world economic growth, such relaxation seems a more important objective than economic integration among the industrial countries themselves. However, in the longer term, even complete freedom of trade would need to be supplemented by industrial development in many of the primary-producing countries for them to ensure the achievement of a fast rate of economic growth.

APPENDIX A

THE TRADE NETWORK TABLES

The primary objective of this set of tables was to arrive at long-term series representing imports of different classes of manufactured goods, as well as a total for all manufactures, for a wide range of countries in different stages of development. An essential condition, from the viewpoint of analysing the results, was that the commodity groupings chosen for the trade of each country should be identical, so far as the limitations of the trade statistics permitted. This condition in effect ruled out an analysis of the import returns of the countries to be covered, since this would have involved an enormous task of reclassifying the detailed import headings of each of 30–40 countries on to a comparable basis. Apart from the labour involved, it is somewhat doubtful whether in fact the results would have been comparable for many countries, especially for the earlier part of the century. There were, in addition, other difficulties which made the approach from the import side unattractive[1].

On the other hand, a compilation from the export returns of the main industrial countries offered several advantages. Since 12 countries account for some 90 per cent of world exports of manufactures, the trend in their aggregate shipments to any country can reasonably be taken as indicating the trend in the latter's imports of manufactures. On this basis, the commodity reclassification is very considerably reduced compared with what would have been necessary had the import approach been adopted. Apart from this, the analysis of export returns provided a set of network tables which show not only the total exports of manufactures to individual countries, but also the share of each market held by each supplying country. The same tables thus provide a basis for an analysis of competition between the main industrial countries in the world market, and also a statistical basis for analysing the long-term relation between industrial growth and imports of manufactures.

Exporting countries

The countries whose export statistics were used for these network tables were: Belgium-Luxembourg, France, Germany, Italy, Netherlands, Sweden, Switzerland and the United Kingdom; Canada and the United States; India and Japan.

[1]For example, several important countries recorded imports at official valuations up to fairly recent years (Argentina did so up to 1941); while in others, multiple exchange rate practices make conversions to a common currency unit rather dubious (e.g. Chile). For a discussion of these technical difficulties, see *International Trade Statistics* (ed. R. G. D. Allen and J. E. Ely), 1953, Chs. 5 and 18.

No attempt has been made to adjust the recorded figures for boundary changes. For example, the pre-war figures for Germany relate to exports from the pre-war area of the Reich; those for post-war are exports from West Germany only. Similarly, the post-war figures for India relate to exports from the Republic of India, whereas the pre-war ones were exports from undivided India.

The most important exporting countries not included in the detailed network tables of trade in manufactures are some of the smaller countries of Western Europe (Austria, Denmark and Finland), the Soviet Union, the African copper-exporting countries (Rhodesia and the Congo) and Hong Kong. However, exports from these countries are discussed separately at various appropriate places in the text.

Countries of destination

In order to limit the labour of extracting and assembling a mass of detailed statistics, countries of destination were selected mainly so as to include countries 'representative' of different stages of development. It was also thought desirable to include a number of colonial territories as well as independent countries in the under-developed areas. The countries selected have been grouped into the three broad categories of industrial, semi-industrial and non-industrial countries distinguished in Chapter 3. It has not, however, been possible to compile results for other kinds of country groupings, such as the currency blocs (the Sterling area, the Franc area, etc.); nor were the present members of the Soviet area distinguished as a group, though separate information for the Soviet Union has been extracted.

The countries of destination included are:—

1. *Industrial countries:* The exporting countries mentioned above (except India), plus Norway.
2. *Semi-industrial countries:* Australia, New Zealand and the Union of South Africa; India, including Pakistan; Argentina, Brazil, Chile, Colombia and Mexico; Palestine/Israel; Turkey and Yugoslavia.
3. *Russia/U.S.S.R.*
4. *Non-industrial countries:*

   Africa: Belgian Congo, Egypt, French Morocco, Nigeria, Southern Rhodesia.

   Asia: Indonesia, Iran and the Philippines.

   Latin America: Cuba, Peru and Venezuela.

   Others: All other countries, as a group, can be obtained as a residue after deducting the figures for the selected countries from the world total. This group includes some European countries (such as Austria, Denmark and Finland, and Czechoslovakia and East Germany), as well as non-industrial primary-producing countries.

Once again, boundary changes have been ignored. In particular, no attempt has been made in the trade network tables to adjust the pre-war figures for exports to Germany to the present territory of West Germany; estimates of trade in manufactures by pre-war Germany, adjusted to post-war territory are, however, given in Chapters 8, 11, 13 and 14. Similarly, Japanese shipments to Formosa and Korea before the last war were excluded from the Japanese export statistics (being considered internal trade), but similar shipments since the war have been included. In all, 37 separate countries of destination are distinguished and together they accounted for 77 per cent of the total exports of manufactures from our 12 exporting countries in 1955.

Before the first World War, some countries recorded their exports according to the country of shipment, rather than the country of consignment or ultimate destination. The United Kingdom was, perhaps, the most important example, the shipment basis being in use until 1904. Before that date, shipments destined for land-locked countries were recorded as exports to the country in which the goods were unshipped. British exports to Switzerland, for example, were recorded as exports to Belgium, France, Germany or the Netherlands, according to the foreign port involved. Thus, exports to the four latter countries shown in the trade network tables for 1899 are inflated in comparison with the figures for 1913 and later years.

Commodity classification

Exports of manufactures from each of the 12 countries of origin to each of the separate countries of destination were classified into seven major groups and nine sub-groups. The major groups were metals, machinery, transport equipment*, other metal goods, chemicals*, textiles and clothing* and other manufactures*. The four asterisked groups were divided into two or three sub-categories. The complete classification is set out in Appendix D[1], which also gives the definition of each group and sub-group. The totals correspond as nearly as possible to Sections 5 to 8 inclusive of the United Nations' *Standard International Trade Classification*[2], excluding 'special category' exports from the United States. This is the definition of 'manufactures' which is now generally accepted[3].

Exports relate to 'special trade', that is to exports of goods manufactured or processed in the exporting country, and exclude re-exports.

[1]See page 518.

[2]*Statistical Papers*, Series M, No. 10, 2nd ed. (1951); indexed edition (1953); United Nations, New York. The revised edition (Series M, No. 34), which was published in 1961, was not used here.

[3]This is, for example, the definition used by the United Nations Statistical Office in computing an index of the volume of world trade in 'manufactures'.

Choice of years

In view of the amount of statistical work involved, the compilation of network tables on an annual basis would have been completely outside the resources available. The choice of selected years to represent a long-term trend is inevitably an invidious one. No individual year is fully representative of its immediate period, and a 'boom' year in one period may not, in fact, be really comparable with a 'boom' year in another, if the degree of utilization of resources is significantly different, for example, or if there is a substantial difference in the extent of restrictions on the free movement of trade. Nevertheless, a choice had to be made, and it seemed preferable to select years of prosperous trade rather than ones of recession.

The years chosen were 1899, 1913, 1929, 1937, 1950 and 1955. For each of these years a detailed set of trade network tables has been assembled. These have been supplemented in certain cases by adding comparable figures for 1957 and 1959, taken from United Nations' publications. The first two years reasonably represent the trend in the period prior to the first World War; 1929 was the peak year of the boom before the world economic depression, and 1937 the peak year of the recovery of the late 1930's. 1950 is included in the series as perhaps the first reasonably 'normal' year following a period of post-war reconstruction, while 1955, 1957 and 1959 were all years of expanding world trade.

A major qualification, however, needs to be made at the outset. World trading conditions were very different in 1937 and, to some extent also in 1950, from those in the other years selected. The depression of the 1930's had been followed by an extensive system of import restrictions, exchange controls, multiple currency practices and various other measures of trade control and restriction, all of which were in full operation in 1937. In 1950, too, many countries operated quantitative import restrictions, usually of a discriminatory character, to protect their external payments positions. Moreover, in that year there were still significant supply shortages, particularly in metals and many types of engineering equipment. The Korean War, which began in the summer of 1950 did not, however, seriously distort the pattern of world trade until the following year.

By contrast, trading conditions in 1955 were generally more favourable than in any previous post-war year. The campaign in O.E.E.C. for trade liberalization had been largely completed and restrictions against dollar imports had by then also been significantly reduced both in Western Europe and in many other non-dollar areas. In these respects, therefore, world trade in the period 1955–59 was much more comparable with that in 1929 than with any of the intervening years. A comparison of 1955–59 with 1929, rather than with 1937, is thus more revealing of the underlying long-term trend in world trade; the particular conditions of the world economy in 1937 must always be

borne in mind when comparisons involving that year are made.

For the industrial and semi-industrial countries as defined earlier, the trade network tables were constructed for all the selected years back to 1899. By deduction of these two groups from the world total, a table for the 'rest of the world' has also been constructed for each selected year. For the eleven separate countries distinguished as 'non-industrial' (see above), the network tables were carried back only to 1929.

All but two of the tables in this Appendix relate to the selected years up to 1955 or 1957. Comparable data for 1959 were compiled in summary form only, and are given in the last two tables (A.80 and A.81).

Valuation

All the trade network tables were first expressed in terms of current United States dollars, using the mean rates of exchange in force in each of the selected years[1]. In addition, a set of tables has been constructed in terms of 'constant' dollars, so that changes in the volume of trade can be revealed.

The construction of any volume series from trade statistics is an operation which by its nature cannot produce unique answers, but only a range of probabilities. The range is inevitably widened the longer the period covered. The difficulty is inherent to some extent in the nature of the trade statistics themselves, insofar as the 'unit value' of an individual statistical heading may change not only because of a change in price, but also because of a change in the relative importance of the different items included. In addition, there is the usual difficulty of index number construction, that of the changing relative importance of the statistical headings themselves.

The latter difficulty can be overcome to a large extent by changing the weighting system with the period to be compared. However, when the period extends over half a century, as in the present case, and includes five or six links of years, a complete investigation of volume changes would require two weighting systems for each link, i.e. ten or twelve sets of calculations at 'constant' prices. Moreover, the problem of linking through the various results to give a continuous volume series for the whole period would present many difficulties, particularly of consistency between commodity and country detail. On the other hand, to revalue the trade of each year by the weights of a single year would certainly involve some distortion in the results. In the end, a compromise was adopted whereby a comparison of the years 1899, 1913 and 1929 was made at 1913 prices; and a separate comparison of 1929 with the later years was made at 1955 prices. This greatly simplifies the presentation of the tables, though it may have resulted in some small distortions of the

[1]See Appendix F, Exchange Rates, page 545, for the rates of exchange used.

movements between 1929 and 1937[1].

One other discontinuity in the series should be mentioned here. Before 1919, the Netherlands recorded foreign trade at official valuations which were established in 1845 and added to in subsequent years[2]; moreover, the export figures were considerably inflated by the inclusion of goods in transit. For 1899 and 1913, the recorded figures were undoubtedly substantially higher than the true current valuations[3]. Accordingly, the network tables for the two earlier years exclude exports from the Netherlands. For purposes of comparison, Netherlands exports are also excluded from the 1929 totals whenever these are linked to 1913.

Unit value series

The network tables in current values were converted into tables at 'constant' values by using a series of unit value index numbers. The series used are given in Appendix B.

Exports, imports and 'imports'

It was mentioned above that one of the advantages of the network form of table was that it yielded totals representing, in effect, world exports of manufactured goods to individual countries. The movement in this total can reasonably be taken to represent the movement in total imports of manufactures (or of particular classes of manufactures) into each of the countries of destination distinguished. However, the total arrived at in this way is not the same as the true import figure, and the total arrived at from the network table is here denoted by the term 'imports', the quotation marks being used to distinguish this concept from the actual import total.

'Imports' as now defined may differ from true imports for several reasons. In the first place, 'imports' come only from the twelve exporting countries included in the network analysis. It is true that these twelve account for some 90 per cent of world exports of manufactures; but the coverage may be significantly lower in particular commodity groups (metals being the outstanding case) and for particular countries of destination (the United Kingdom being especially affected). Second, since 'imports' of one country are arrived at from the export returns of other countries, the valuation is on an f.o.b.

[1]Separate revaluations of the trade in 1929 at 1937 prices, and of 1937 at 1929 prices, were also made, and some of the summary results are given in Appendix C, pages 515-6.

[2]See the discussion on the pre-1919 Netherlands trade returns in C. P. Kindleberger, *The Terms of Trade: A European Case Study*, 1956, pp. 330 and 359.

[3]P. L. Yates, *Forty Years of Foreign Trade*, 1959, p. 201, postulates that the overvaluation in 1913 may have been of the order of 25 per cent.

basis, whereas imports are normally valued c.i.f.[1]. Third, there is always some time-lag between the export of a commodity and its recording as an import in the receiving country.

[1]Except for a minority of countries, including Canada and the United States, where imports are valued f.o.b., or near-equivalent of f.o.b.

EXPORT UNIT VALUES

As mentioned in Appendix A, the value series of trade at current prices were deflated by a set of appropriate unit value indices to obtain value series at 'constant' prices. The ideal solution is to deflate separately the value series for each commodity group distinguished for each exporting country. Since there are 12 exporters (11 in 1899 and 1913), 12 commodity groups (excluding group totals where sub-groups are distinguished) and five links of years (excluding 1957 and 1959 for which trade network tables were constructed in a less detailed form), a complete system would involve the use of some 700 unit value index deflators. The compilation of such a large number of indices was clearly beyond the scope of the present study. Fortunately, a recent work by Professor Kindleberger[1] has covered a good proportion of the field, though the Kindleberger indices are confined to European countries and do not relate precisely to the years covered here; nor are they subdivided into as many commodity groups as are distinguished here. These indices were adjusted to allow for the differences in years and have been used in this study; in some cases, however, where a particular Kindleberger index looked suspiciously out of line with the corresponding commodity group indices for the majority of countries, a new calculation was made directly from the national export returns.

For the United Kingdom, the Kindleberger indices were not used; instead, the unit value series were based on the official index numbers published by the Board of Trade. For the United States, for which none of the official series are applicable, the unit value indices were derived in part by special computation from the export returns[2] and in part from the movement in wholesale prices. For both India and Japan, special unit value indices were computed back to 1899 for each commodity group. In all, about 400 separate unit value deflators were used[3].

These unit value indices relate to exports to *all destinations* of a particular commodity group from each exporting country. Since the network tables distinguish countries of destination, it could be argued that different deflators should be used for each. To do this systematically would require something like 20,000 deflators to convert all the network tables to constant prices! Once again, the sheer magnitude of the task necessitated the use of some simplifying assumption. The assumption made here is that the unit value index for a given commodity group applies equally to every country of

[1]Kindleberger, *op. cit.*

[2]For the period 1899–1913, the unit value series were based on detailed commodity indices kindly made available by Mr R. E. Lipsey of the National Bureau of Economic Research, Inc., New York; see footnote to Table B.1.

[3]For the period 1950–59, the indices for Continental European countries were based on detailed unit value series kindly supplied by the United Nations' Economic Commission for Europe, Geneva.

destination within that group[1]. This assumption was applied throughout, and the calculations were made for each exporting country separately.

The assumption is not an unreasonable one, since it is to be expected that prices at which goods are exported to one destination would move broadly in line with prices of similar goods exported by the same country to another destination. There may, of course, be cases in which this will not occur; for example, if the exporting country has a monopoly of sale in one market and not in another. But, by and large, the assumption is unlikely to result in much distortion of the true unit value movement over a period of years. Moreover, there is likely to be some offsetting of errors, since the aggregate exports to a single destination consist of totals of commodity groups for twelve exporting countries. Nevertheless, the unit value index for all exports of manufactures to a single destination may well be significantly different from a corresponding series derived from national import statistics.

In the following tables, the majority of the unit value indices have either been specially computed from data in the relevant national export returns, or have been adapted from series published elsewhere. In a minority of cases, however, it was not found practicable to compute indices, for example, for commodity groups for which no quantitative data were available in the export statistics. These were usually cases where exports were relatively small; assumed indices were used in such cases, and these were based on the indices for countries exporting similar classes of goods. For passenger road vehicles the construction of separate unit value indices was not attempted. Instead, the value series for this group was deflated by the unit value indices for all transport equipment.

[1]For a discussion of the relative merits and demerits of the various assumptions which could be made to derive unit value indices for exports to a given country or area *see* A. Maizels, 'Unit Value and Volume Index Numbers of Inter-Area Trade', *J. Roy. Stat. Soc.*, Series A (General), Vol. 120, Pt. II, 1957.

Table B1. *Export unit value indices*, 1913 (1899 = 100)[a]

	Belgium-Luxbourg	France	Germany	Italy	Sweden	Switzerland	United Kingdom	Canada	United States	India	Japan	Total 1899 weights	Total 1913 weights
Metals	93	121	126	..	85[b]	59	108	161[b]	94	—	124	106	107
Metal goods			108	..	..	..	104	..	116	..	..	109	108
Machinery	78	102	136	126[b]	..	134[b]	106	..	103[c]	—	..	111	108
Transport equipment	47	105	70[b]	..	..	..	95	143[b]		—	..	89	86
Chemicals	121	106	81	105	..	70[b]	127	182[b]	128	..	141[b]	106	99
Textiles and clothing[d]	109	117	130	109	..	102	147	320[b]	137	154	137	132	131
Other manufactures	105	108	103	146	95	107	120	133	143	..	96	114	112
TOTAL MANUFACTURES													
1899 weights	99	113	112	116	93	104	129	143	117	144	127	118	—
1913 weights	93	112	108	115	96	101	125	132	112	151	111	—	114
NON-MANUFACTURES	109	111	112	116	119	135	115	119[e]	147[e]	..	120[e]	124[f]	..
TOTAL EXPORTS	105	112	112	116	110	112	128	121	138	..	123	121[f]	..

[a]In terms of U.S. dollars.
[b]Based on small sample.
[c]This index was based on the preliminary results of Mr Lipsey's investigation (see footnote on page 506). Mr Lipsey's final results indicate that the correct index for machinery and transport equipment in 1913 (1899 = 100) would be about 94. Unfortunately, these final results became available too late for the appropriate amendment to be carried through the Trade Network tables.
[d]Indices for sub-groups, where available, are as follows (in the order yarns, fabrics, made-up goods): India—151, 151, 154; Japan—185, 92, 91.
[e]Residual.
[f]Excluding India.

Table B2. *Export unit value indices*, 1929 (1913 = 100)[a]

	Belgium-Luxbourg	France	Germany	Italy	Sweden	Switzerland	United Kingdom	Canada	United States	India	Japan	Total 1913 weights	Total 1929 weights
Metals	118	136	123	130[b]	141	137	121	120	135	124	112	126	126
Metal goods	120			..		150	129	..	164[b]	132	..	133	133
Machinery	128	112	164	192	134	146	188	..	148	—	..	163	155
Transport equipment	81[b]	50	83	42	120	..	102	..	79	—	..	84	75
Chemicals	100	181	123	122	106[b]	186	128	140[b]	153	117	122	135	135
Textiles and clothing[c]	126	148	146	116	176[b]	145	179	110[b]	180	140	154	161	153
Other manufactures	141	140[b]	145	151	174	148	150	170	127	162	127[b]	144	145
TOTAL MANUFACTURES													
1913 weights	119	140	137	125	152	150	159	142	140	149	157	145	—
1929 weights	122	128	136	111	147	148	151	136	120	141	144	—	133
NON-MANUFACTURES	141	128	134	126	147	139	179	124[d]	130[d]	..	130[d]	..	137[e]
TOTAL EXPORTS	126	128	136	117	147	146	159	128	125	..	136	..	134[e]

[a]In terms of U.S. dollars.
[b]Based on small sample.
[c]Indices for sub-groups, where available, are as follows (in the order yarns, fabrics, made-up goods): India—175, 139, 140; Japan—224, 157, 127.
[d]Residual.
[e]Excluding India.

Table B3. *Export unit value indices*, 1937 (1929 = 100)[a]

	Belgium-Luxbourg	France	Germany[b]	Ita	Nether-lands	Sweden	Switzer-land	United Kingdom	Canada	United States	India	Japan	Total 1929 weights	Total 1937 weights
Metals	108	142	153	67	88	95	94	108	89	98	93	76	115	107
Metal goods								76	..	97		63	117	107
Machinery	199	140	135	139	136	68	128	114	..	95	—	73	115	110
Transport equipment	167	116	90	108	77	108	..	94	..	89	—	70	95	93
Chemicals	94	112	115	83	88	70	149	90	85	94	68	65	102	99
Textiles and clothing[c]	74	66	72	54	72	74	64	79	79	85	58	55	71	67
Other manufactures	71	86	106	81	87	79	120	89	77	95	78	50[d]	91	86
TOTAL MANUFACTURES														
1929 weights	96	96	116	66	93	81	102	90	84	93	63	55	94	—
1937 weights	92	96	113	68	91	82	102	90	84	94	62	57	—	89
NON-MANUFACTURES	87	93	100	67	87	79	74	75	90[e]	69[e]	..	80[e]	79[f]	78[f]
TOTAL EXPORTS	90	94	111	68	89	80	98	84	87	80	..	62	88[f]	84[f]

[a]In terms of U.S. dollars.
[b]Based on the overvalued official rate of exchange in 1937 (*see* Appendix F, page 542).
[c]Indices for sub-groups, where available, are as follows (in the order yarns, fabrics, made-up goods): France—72, 64, ..; India—77, 59, 53; Japan—63, 54, 54.
[d]Based on small sample.
[e]Residual.
[f]Excluding India.

Table B4. *Export unit value indices*, 1950 (1937 = 100)[a]

	Belgium-Luxbourg	France	Germany	Italy	Nether-lands	Sweden	Switzer-land	United Kingdom	Canada	United States	India	Japan	Total 1937 weights	Total 1950 weights
Metals	205	173	155	200	190	184	118	134	192	171	182	185[b]	171	170
Metal goods					240			135		167	227	179	161	158
Machinery	356	215	129	233	187	144	221	146	213	167	—	256	156	166
Transport equipment	149	125	105	403	125	165	..	129		200	—	250	176	153
Chemicals	130	188	125	209	200	..	152	144	135	157	357	196	151	152
Textiles and clothing[c]	210	220	130	250	244	200	254	212	233	200	286	289	229	226
Other manufactures	157	142	125	160	161	196	280	137	262	182	217	316[b]	179	176
TOTAL MANUFACTURES														
1937 weights	193	180	132	251	198	178	221	163	223	178	294	254	182	—
1950 weights	190	174	132	235	186	172	216	149	215	175	277	253	—	173
NON-MANUFACTURES	175	172	243	148	193	210	212	190	177[d]	170[d]	..	300[d]	189[e]	179[e]
TOTAL EXPORTS	187	173	149	188	190	188	215	155	190	173	..	259	183[e]	174[e]

[a]In terms of U.S. dollars.
[b]Based on small sample.
[c]Indices for sub-groups, where available, are as follows (in the order yarns, fabrics, made-up goods); France—250, 210, ..; Netherlands—167, 294, 189; India—270, 256, 417; Japan—222, 303, 250.
[d]Residual.
[e]Excluding India.

Table B5. *Export unit value indices*, 1955 (1950 = 100)[a]

	Belgium-Luxembourg	France	Germany	Italy	Netherlands	Sweden	Switzerland	United Kingdom	Canada	United States	India	Japan	Total 1950 weights	Total 1955 weights
Metals	133	150	144	112	133	135	112	140	129	133	123	169	138	138
Metal goods	128	126	128	112	122	136	100	143		130	..	146	133	131
Machinery	109	144	124	117	122	126	85	134	117	126	..	119	126	124
Transport equipment	118	140	142	117	122	139	95	123		124	—	..	126	127
Chemicals	95	90	98	97	109	113	73	111	110	115	87	108	106	103
Textiles and clothing[b]	89	101	108	91	96	113	97	125	94	97	81	96	101	99
Other manufactures	102	131	117	111	120	130	109	127	112	119	92	118	119	118
TOTAL MANUFACTURES														
1950 weights	112	124	124	102	114	116	95	128	117	122	83	117	119	—
1955 weights	113	124	122	105	116	130	92	127	117	122	81	115	—	119
NON-MANUFACTURES	101[d]	98[d]	105[d]	100[c]	99[d]	143[d]	100[d]	97[d]	115[d]	104[d]	..	128[d]	107[e]	..
TOTAL EXPORTS	109	113	121	104	106	136	99	120	116	114	..	111	116[e]	..

[a]In terms of U.S. dollars.
[b]Indices for sub-groups, where available, are as follows (in the order yarns, fabrics, made-up goods): France—103, 98, 107; Germany—105, 109, 110; Italy—89, 89, 108; Switzerland—94, 98, 100; United Kingdom—114, 112, 170; United States—98, 96, 98; India—82, 83, 75; Japan—110, 95, 95.
[c]Based on small sample.
[d]Residual.
[e]Excluding India.

Table B6. *Export unit value indices*, 1957 (1955 = 100)[a]

	Belgium-Luxembourg	France	Germany	Italy	Netherlands	Sweden	Switzerland	United Kingdom	Canada	United States	India	Japan	Total 1955 weights	Total 1957 weights
Metals	115	112	108	111	102	102	120	107	106	113	..	130[b]	111	111
Metal goods	112	115	98	127	99	103		113		115	..		111	110
Machinery	117	112	106	97	102	108	102	112	117	121	..	102	113	112
Transport equipment	113	107	101	93	101	108		102	113	114	..	97	106	105
Chemicals	91	102	96	105	104	101	101	98	99	102	..	93	99	99
Textiles and clothing	105	105	103	101	100	101	98[c]	101	106[c]	98	101	101[c]	101	101
Other manufactures	113	102	98	105	100	103	103	103	103	114	..	99	105	104
TOTAL MANUFACTURES														
1955 weights	111	107	102	102	101	105	103	105	105	113	101	106	107	—
1957 weights	111	108	102	102	101	105	102	105	105	114	101	102	—	106
NON-MANUFACTURES	101[d]	109[d]	140[d]	129[d]	109[d]	101[d]	87[d]	133[d]	101[d]	99[d]	..	120[d]	..	106[e]
TOTAL EXPORTS	109	108	106	110	105	103	101	109	103	107	..	104	..	107[e]

[a]In terms of U.S. dollars.
[b]Metals and metal products.
[c]Excluding clothing.
[d]Residual.
[e]Excluding India.

EXPORT VOLUME INDICES

The detailed trade network tables given in Appendix A show the movement in the volume of trade in terms either of 1913 prices, or of 1955 prices, and this is also the basis of the various volume series given in the text. As already explained (see page 423), this was essentially a device to reduce the amount of statistical calculation while, at the same time, simplifying the presentation of the results.

The use of only two base years in such a long period might, however, result in some distortion of the volume indices for years far from the base and, as a guide to the possible distortion, volume indices have been computed for each link of years using the weighting, first of the earlier year, and then of the later. These dual series are given in the following two tables for individual country totals of exports of manufactures (Table C1) and for commodity group totals for all countries combined (Table C2).

In addition, for the comparisons of 1929 with 1937 and of 1937 with 1950, indices based on 1955 prices are also shown. In the majority of cases, the differences between the various sets of indices for these two periods were very small—under 2 per cent. Indices of export volume for individual countries in 1957 and 1959 are given in Tables 8.2 and 8.7, and for the main commodity groups in Table 7.2.

Table C1. *Volume indices of exports of manufactures by country*

	Series[a]	1913 (*1899 = 100*)	1929 (*1913 = 100*)	1937 (*1929 = 100*)	1950 (*1937 = 100*)	1955 (*1950 = 100*)
Belgium-Luxembourg	E	201	167	102	110	154
	L	189	170	97	109	155
	1955	..	..	94	108	
France	E	157	132	42	211	124
	L	156	120	43	205	125
	1955	..	..	42	214	
Germany[b]	E	229	107	71	55	294
	L	221	106	69	55	290
	1955	..	..	68	56	
Italy	E	166	192	101	104	144
	L	164	171	103	97	148
	1955	..	..	109	97	
Netherlands	E	..	..	100	118	171
	L	..	..	98	111	174
	1955	..	..	99	109	
Sweden	E	324	160	138	141	121
	L	330	155	139	136	135
	1955	..	..	138	137	
Switzerland	E	162	111	76	150	155
	L	157	110	76	146	150
	1955	..	..	74	143	
United Kingdom	E	152	93	79	178	103
	L	148	88	79	161	103
	1955	..	..	78	162	
Canada	E	256	752	125	132	140
	L	236	699	125	127	140
	1955	..	..	124	128	
United States	E	209	245	76	177	123
	L	200	211	77	174	123
	1955	..	..	80	165	
India[c]	E	140	129	114	120	89
	L	146	122	112	113	88
	1955	..	..	113	113	
Japan	E	287	216	238	43	219
	L	251	198	244	39	214
	1955	..	..	249	43	

[a]E = series using weights of earlier year; L = series using weights of later year; 1955 = series using 1955 weights.

[b]West Germany in 1950 and 1955.

[c]Republic of India in 1950 and 1955 (exports of manufactured goods from Pakistan being negligible).

Table C2. *Volume indices of exports of manufactures by commodity group*[a]

	Series[b]	1913 (*1899 = 100*)	1929 (*1913 = 100*)	1937 (*1929 = 100*)	1950 (*1937 = 100*)	1955 (*1950 = 100*)
Metals	E	234	128	92	111	139
	L	234	128	85	110	142
	1955	..	..	87	112	
Machinery	E	240	157	78	174	144
	L	246	150	75	178	143
	1955	..	..	78	169	
Transport equipment	E	347	426	88	192	140
	L	335	400	85	172	142
	1955	..	..	87	173	
Other metal goods	E	180	125	78	108	122
	L	179	125	71	106	121
	1955	..	..	72	108	
Chemicals	E	232	124	95	145	172
	L	218	124	92	146	168
	1955	..	..	94	152	
Textiles and clothing	E	134	100	85	91	112
	L	133	96	82	90	109
	1955	..	..	84	88	
Other manufactures	E	185	130	82	111	148
	L	182	130	78	109	147
	1955	..	..	84	112	
TOTAL	E	184	138	85	129	139
	L	177	127	81	123	139
	1955	..	..	83	125	

[a]Exports from countries included in Table C1.
[b]See footnote [a] to Table C1.

COMMODITY CLASSIFICATION

The definition of ' manufactures ' used in this book is Sections 5 to 8 inclusive of the United Nations' *Standard International Trade Classification* (S.I.T.C.), excluding ' special category ' exports from the United States. Within this total, the definitions of the commodity groups which have been distinguished are given in Table D.1 in terms of the S.I.T.C. (1953) code.

The primary classification of the commodity groups is according to the nature of the component material. The four broad groupings based on this criterion—metals and engineering, chemicals, textiles and clothing and other manufactures—correspond fairly closely to the usual classifications of both trade and production statistics, especially when the sub-divisions of the metals and engineering group are taken into account.

For comparisons of trade with industrial growth, however, a classification based on component material is inadequate for many purposes. This is particularly so when a distinction is required between imports which are complementary to the industrialization process, such as capital equipment and semi-finished goods (or ' intermediate products '), and imports which are competitive with the output of local industry. Some of the groups distinguished on the component material criterion could reasonably be classified as wholly ' intermediates ' or wholly ' finished ', though there may in fact be marginal items which do not conform in this respect. Thus, the machinery and transport groups have been taken as ' finished ', though parts for assembly or for incorporation in machines are also normally included. Similarly, metals are considered as wholly ' intermediates ', though a proportion will not in fact be further processed, e.g. railway lines. The gain in precision from a detailed re-classification of items in the metals and engineering groups would, however, be unlikely to justify the additional effort.

For the other broad commodity groups—chemicals, textiles and clothing and other manufactures—it was necessary to re-classify S.I.T.C. items or groups to distinguish intermediates from finished goods. The main criterion used was whether or not the commodity item or group was in the main normally subject to further processing (including use as components or parts) in non-food manufacturing industry in the main importing countries. Since mining and construction as well as food, beverages and tobacco are excluded from the definition of ' manufacturing ' industry in this book, goods which are normally used as materials by these industries (such as explosives, bricks, cement and cigarette paper) are here considered as finished goods. Equally, fertilizers—as material for agriculture—are also included with finished goods.

In the textiles group, fabrics present a major classification difficulty, since an unknown and varying proportion is purchased for retail sale. In many

under-developed countries, virtually all the imported fabric is sold direct to consumers, whereas in economically more advanced countries a substantial proportion is made up into apparel in local factories. Fabrics do not, therefore, fit easily into a classification by stage of manufacture, and accordingly they have been shown separately in all the main tables. For some purposes, however, they have been included in finished goods as being in some ways less inappropriate than inclusion in the ' intermediates ' group.

A further difficulty arises in the case of a commodity which is normally a product of one manufacturing industry and a material used by another. Dyestuffs are an important example, since in principle they could be regarded either as finished products of the chemicals industry or as materials for the textiles, and many other, industries. From the point of view of manufacturing industry as a whole, however, dyestuffs are clearly ' intermediates ', and for this reason they were so classified ; they were also left in the chemicals group to maintain comparability with the series for chemical production. This is admittedly a compromise solution, but it seemed preferable to other possible solutions, each of which raised further difficulties of classification and interpretation.

Table D1. *Definition of commodity groups in terms of the Standard International Trade Classification (S.I.T.C.)*

	Stage of manufacture[a]	S.I.T.C. Code
METALS	I	68
METAL GOODS	F	69
MACHINERY[b]	F	71 and 72 *except* 711–04 and –05 and 721–07
TRANSPORT EQUIPMENT		
Passenger road vehicles	F	732–01, –02 and –04; 733–01 and –02
Other transport equipment[b]	F	Rest of 73, *plus* exclusions from machinery in 711 and 721
CHEMICALS		
Intermediates	I	51, 52, 531, 532, 533–01, 551 and 599 *except* 599–02
Finished chemicals	F	Rest of 5
TEXTILES AND CLOTHING		
Yarns	I	651
Fabrics	F	652, 653, 654 and 655
Made-up goods	F	Rest of 65 *plus* 841
OTHER MANUFACTURES		
Intermediates	I	611, 613, 621, 631–01 and –09, 641, 663, 664, 671 and 672
Finished goods	F	Rest of 6 and 8

[a] I = intermediate products; F = finished goods.
[b] These two groups, when taken together, are considered as 'capital goods'.

APPENDIX E

GROSS DOMESTIC PRODUCT AND THE PRODUCTION AND CONSUMPTION OF MANUFACTURES

In various chapters of this book, the long-term movements in international trade in manufactured goods have been related to the corresponding movements in real product per head, or in production or apparent consumption of manufactures per head, in the importing countries. The full set of estimates used for real product, for manufacturing production, and for apparent consumption of manufactures in the different importing countries is given in the following tables.

Gross product

Estimates of gross domestic product at factor cost for the selected years included in the trade network tables are given in Table E.1 for some 40 countries. These estimates are expressed in terms of U.S. dollars at 1955 prices. There were two stages in the calculations. The first was to convert the value of the gross domestic product of each country in 1955, as expressed in national currency, into U.S. dollars at an appropriate exchange rate. The exchange rates used were computed specially for this purpose and are designed to represent an approximation to relative internal purchasing powers; they are given in detail in Appendix F, which also contains a discussion of the rationale of the method used. The second stage was to extrapolate the 1955 estimates so obtained, to earlier years and to 1957, by means of estimates of the movement in the real domestic product of the different countries which were already available in published form. These time series were in some cases the official estimates published by the governments concerned; in others, they were the result of private research. There are, of course, numerous gaps in the data, especially for the earlier part of the period.

The resulting estimates presented here of the value of the gross domestic product of a wide variety of countries over so long a period—almost 60 years for the industrial countries and 30 years or more for a number of semi-industrial countries—inevitably contain a fair margin of error. The error is likely to be greater in cross-country comparisons than in the movement over time for a single country. Thus, small differences in the figures for different countries should be ignored as of no significance.

The error arises not simply from the statistical difficulty of computing a 'purchasing power parity' rate of exchange from scanty data, but also from the fact that the structure of the economy is so very different in countries at different stages of economic development. Some of the economic activities carried out in an under-developed country, for example, may have no counterpart in a highly

industrialized society; and the reverse is also likely to be true. Comparisons of national product of countries differing widely in economic characteristics are thus, to a considerable extent, of an arbitrary nature, and contain an unavoidable element of error. Nonetheless, the range of per caput real product over the countries here considered is so great—over 30 to 1—that even approximate calculations, such as those presented here, are useful guides to general trends and relationships. The estimates for gross domestic product per head at 1955 prices are given in Table E.2.

Manufacturing production

The relative output of manufactured goods of different countries can validly be compared only on the basis of the value added in the manufacturing process. Comparisons on a gross value basis, including the cost of materials used, are likely to give a distorted picture of the relative amounts of productive work done.

There are, however, two alternative approaches which are practicable for a statistical comparison on the 'net' basis. The first relies on data collected from *establishments* (or factories) at censuses of manufactures; the second is based on the accounts of *business enterprises* and is often used in the compilation of national accounting statistics. With both methods, a considerable amount of statistical estimation may be involved in arriving at a complete coverage of all manufacturing units. Censuses of manufactures normally exclude small firms, or firms not using power, to a greater or lesser extent, while the detailed information available about the operations of companies and other business enterprises would usually exclude data concerning unincorporated businesses[1].

However, apart from problems of coverage, the census approach and the 'companies' approach differ in two important respects. The first reflects the fact that the basic unit of operation is different. Since census data are built up from individual establishments, these can be sorted into a consistent industrial classification; the 'companies' data, however, cannot be used in this way, since individual companies may cover production in several manufacturing industries, and separate operating data for each industry would not be available. Any analysis of changes in industry-patterns must therefore of necessity be based on the census approach.

The other major difference relates to the concept of 'net value' of output. At censuses of production, information is normally collected about the selling value of goods produced, and work done, and about the cost of materials and fuel purchased. The difference between the values of output and of materials

[1]A further problem of coverage arises when the 'companies' approach is used, since some companies which are classified as non-manufacturing may, in fact, do some manufacturing work while, on the other hand, some part of the net value of production of companies classified as manufacturing may represent non-manufacturing activities.

and fuel used is known as the *value added* in production. Another way of expressing this is to define the concept as 'output net of physical inputs'. The value added so defined generally includes, however, two further elements which, strictly speaking, should be excluded from the 'net value' of production. These are the value of services purchased from other firms (such as transport, advertising and research work), and the cost of repair and maintenance work done by outside firms[1]. Both these elements can normally be excluded from the concept of 'net value' of production when working from the accounts of business enterprises since the figure used in this case is simply the sum of wages (and other payments to the firms' own employees) and of trading profit.

There is one further important difference which may arise, according to whether depreciation charges in respect of fixed capital assets are included or not. Some countries (e.g. Australia) collect information about depreciation at their censuses of manufactures so that in these cases it would be possible to define 'value added' as net of depreciation. From the companies side, the amount of depreciation is readily available, so that 'net value' can be expressed either 'gross' or 'net' of depreciation. However, it is usually possible to obtain comparability in this respect by not deducting depreciation charges from either the census figure or from that arrived at by the companies approach.

In the present book, the total value of manufacturing production is defined as the net value, inclusive of depreciation, as derived from the accounts of business enterprises. In national accounts terminology, the concept used is the contribution of manufacturing to gross domestic product at factor cost. The advantage of using this, rather than the alternative census definition is that the figures are, in principle, closer to the 'true' contribution of manufacturing industry to the national product, for the reasons given above. Estimates on this basis are now available for a large number of countries as a result of the work of the Statistical Office of the United Nations[2]. A number of adjustments to the published figures, however, had to be made where, for example, the value stated was at market prices rather than at factor cost, or where non-manufacturing sectors (mining, construction or electricity, gas and water) were included. In addition, there were a number of countries which publish their estimates only on a 'net of depreciation' basis, and for these (the United States being the most important case), an estimate of the depreciation has been added to the published total[3].

[1]When repair and maintenance work is done by the firm's own staff, the cost of repair, etc. materials would be excluded from the census total of value added, but the wages of the maintenance staff would be included. In this respect, the position is the same as in the approach from the 'companies' side.

[2]See *Yearbook of National Accounts Statistics*, New York, United Nations (annual).

[3]Where the adjustment was from market price to factor cost, or from a 'net domestic product' to a 'gross domestic product' basis, it was assumed that the share of manufacturing in the difference was the same as its share in the total. For the exclusion of non-manufacturing sectors, data published by the United Nations were used (*Patterns of Industrial Growth, 1938–1958*, New York, United Nations, 1960, Part II, Country Tables).

The adjusted estimates of the net value of manufacturing production in different countries in 1955 have been converted into United States dollars by use of the 'purchasing power parity' rates shown in Appendix F. The use of these calculated exchange rates is unlikely to produce a greater error in the estimates for manufacturing than in those for the gross domestic product as a whole. The estimated net values for 1955 were then extrapolated to the other selected years by applying national indices of manufacturing production. The resulting set of estimates is given in Table E.3, while Table E.4 gives the corresponding figures on a per caput basis.

All the estimates in Tables E.3 and E.4 relate to the manufacturing sector as a whole, including the processing of food, beverages and tobacco, and the refining of petroleum. The figures of trade in manufactured goods, on the other hand, exclude both the manufactured products of the food, beverages and tobacco industries and refined petroleum (see Appendix A, page 421). When direct comparisons of values of trade and production are being made, it is therefore necessary to make an adjustment to the production series in Tables E.3 and E.4 to bring them to a comparable basis with the trade statistics.

Apparent consumption of manufactures

It is possible, in principle, to bring together the estimates of the value of production of manufactures (Table E.3 adjusted to exclude the processing of food, beverages and tobacco) and the figures of foreign trade in manufactures (Appendix A), so as to arrive at estimates of apparent consumption, defined as production *plus* imports *minus* exports of manufactured goods other than food.

A major difficulty arises, however, in combining the two sets of figures, since those for production are on a 'net' basis, as explained earlier, whereas the trade figures are valued 'gross', i.e. inclusive of the cost of all materials and services used in their production and transport. The statistical difficulty can be overcome in either of two ways. The trade values can be reduced to their 'net output' content, thus allowing the net value of apparent consumption to be estimated. Alternatively, the estimates of the net value of production can be inflated to their gross equivalents, and the value of apparent consumption can then be estimated on a gross basis.

Conceptually, however, these two methods yield very different results. The movement in net values, when measured at constant prices, reflects changes in the volume of work done in the manufacturing process, whereas the gross value series at constant prices indicate changes in the volume of goods leaving the manufacturing sector and available for consumption domestically or abroad.

The gross value basis—which is the one adopted here—corresponds, in principle, to values in actual transactions and it can therefore be used for making direct comparisons with movements in prices and incomes. For present

purposes, the gross value of production is defined as the selling value, excluding taxes, of the final output of the non-food manufacturing sector; thus, sales or intra-firm transfers between factories must be excluded as being duplicated in the selling value of goods leaving that sector. The extent of such duplication can readily be calculated from a table showing inter-industry purchases and sales. In recent years, such tables have been compiled for a number of countries[1], while for the United States and Britain comparable tables are available for both pre-war and post-war periods. For Britain, the ratio of the gross output, free of duplication, to the net output has remained remarkably stable since 1924[2]:—

	1924	1930	1935	1948	1950	1954
All productive industry	1.52	1.40	1.47	..	1.56	1.59
Non-food manufacturing only	..	..	1.45	1.50	1.59	1.58

Over this period a considerable shift occurred in the relative importance of different industries, and the constancy of the overall gross : net ratio is due partly to offsetting changes (chemicals, metals and metal goods other than engineering all have relatively higher gross : net ratios, whereas building materials, printing and the miscellaneous group have relatively low ones); and partly to the fact that the ratio for engineering—the major expanding group—has been close to the overall average.

In the United States, on the other hand, the gross: net ratio has fallen over the past thirty years or so[3]:—

	1919	1929	1947
Non-food manufacturing			
Market price basis	2.17	2.15	1.86
Factor cost basis	2.08	..	1.72

The fall between pre-war and post-war appears to have occurred in each main industry, to a greater or lesser extent.

For most other countries, inter-industry tables are available only for one or

[1]The technique of inter-industry analysis was first introduced by W. W. Leontief (*The Structure of the American Economy, 1919–1929*, Harvard University Press, 1941). A review of recent literature on the subject can be found in H. B. Chenery and P. G. Clark, *Interindustry Economics*, New York, 1959.

[2]For 1924 and 1930, the ratios are based on the official estimates of the gross output, free of duplication, and the net output, of industries in Gt. Britain covered by the Censuses of Production (see *Final Report on the Fourth Census of Production* (1930), Part V); the 1935 ratios were calculated from T. Barna, 'The Interdependence of the British Economy', *J. Roy. Stat. Soc.*, A, CXV, Part I, 1952; those for 1948, 1950 and 1954 from the table on 'Inter-industry relations' in *National Income and Expenditure*, H.M.S.O., London, 1952, 1953 and 1958.

[3]The 1919 and 1929 ratios were calculated from the inter-industry tables in W. W. Leontief, *op. cit.;* those for 1947 were based on W. D. Evans and M. Hoffenberg, 'The Inter-Industry Relations Study for 1947' (*Review of Economics and Statistics*, Vol. 34, No. 2, May 1952).

two post-war years. A selection of these[1] has been used to compute gross : net ratios at factor cost for non-food manufacturing; the results are given below, together with the latest ratios for Britain and the United States:—

		Gross : net ratio			Gross : net ratio
Belgium	1953	1.84[a]	Australia	1955/6	2.12
France	1951	1.32	New Zealand	1952/3	2.42[c]
Italy	1950	1.90		1954/5	2.32[c]
Netherlands	1950	2.27[b]	Argentina	1950	2.02[b]
Norway	1954	1.93	Colombia	1953	1.79
United Kingdom	1954	1.58	Mexico	1950	1.86
Yugoslavia	1955	1.79	Peru	1955	2.02
Canada	1949	2.40	India	1953/4	
United States	1947	1.72	large factories		1.93
Japan	1951	1.73	small factories		1.76
			Total		1.66

[a]Including food processing and construction.
[b]At market prices.
[c]Including food (other than meat and dairy produce), beverages and tobacco.

The considerable differences which emerge from these computations in the gross : net ratios between countries reflect differences in industrial structure, in the stage of industrial development and in internal price relationships.

Industrial structure affects the overall gross : net ratio simply because some industries require large amounts of materials, or capital assets, per worker compared with other industries. Thus, countries which tend to concentrate on, say, smelting of metals—an industry with high materials and fuel costs relative to wage and other costs—would for this reason have a higher gross : net ratio than would countries specializing in, say, precision industries, such as watch-making or cameras where wage costs and overheads are relatively high in

[1]The sources used were: *Cahiers Économique de Bruxelles*, No. 1, Oct. 1958, Université Libre de Bruxelles; *Tableau Economique de l'Année 1951*, Institut National de la Statistique et des Études Économique, Paris, 1957; *The Structure and Growth of the Italian Economy*, U.S. Mutual Security Agency, Rome, 1953; *Een Verkenning der Economische Toekomstmogelijkheden van Nederland, 1950–1970*, Centraal Planbureau, 's-Gravenhage, 1955; *Input-Output Analysis of Norwegian Industries, 1954*, Central Bureau of Statistics, Oslo, 1960; *The Inter-Industry Flow of Goods and Services*, Canada, 1949, Dominion Bureau of Statistics, Ref. Paper No. 72, 1956; *Inter-industry Analysis for the Japanese Economy*, Ministry of International Trade and Industry, Tokyo, 1957 (summarised in H. B. Chenery and P. G. Clark, *Interindustry Economics*, New York, 1959); *Interindustry relations of the Yugoslav economy in 1955*, Federal Statistical Office, Belgrade, 1957; Burgess Cameron, 'Inter-Sector Accounts, 1955–56', *Economic Record*, Vol. 36, No. 74, April, 1960; *Report on the Inter-Industry Study of the New Zealand Economy, 1952–53* and *1954–55*, Department of Statistics, Wellington, 1957 and 1959; *The Economic Development of Argentina*, United Nations, Santiago, 1958; *The Economic Development of Colombia*, United Nations, Santiago, 1957; *La Estructura Industrial de Mexico en 1950*, Banco de Mexico, 1957; *The Industrial Development of Peru*, United Nations, Santiago, 1959; *Inter-Industry Relations of the Indian Economy, 1953–54*, Indian Statistical Institute, Calcutta, 1958.

relation to the cost of materials. Another important reason for a high gross : net ratio is the existence of assembly plants (e.g. for cars) using little local labour but a relatively high value of imported parts and components. The assembly of imported motor vehicle parts in New Zealand, for example, appears to be a major reason for the extremely high gross : net ratio for that country[1]. The assembly in Canada of motor vehicle parts produced in the United States also appears to be of importance in the high Canadian gross : net ratio.

Another 'structural' factor operating in some countries, such as India, is the existence of a handicraft or very small-scale manufacturing sector, operating at a fraction of the productivity in the factory sector proper, while income per head in the two sectors does not differ very greatly. Consequently, the gross : net ratio will be lower in the small-scale sector than in the factory sector and, since the latter normally supplies the former with semi-processed materials, the overall gross : net ratio for both sectors taken together will be lower still, as is the case in India.

The stage of industrial development affects the gross : net ratio insofar as the more developed countries tend to produce manufactures embodying a greater degree of fabrication per unit of materials used than do the less-developed countries. Another aspect of the same process has been the trend to use a decreasing volume of materials per unit of output, which has been a marked one in the main industrial countries over the past half-century at least.

Finally, the gross : net ratio is affected by differences in the relative costs of the factors of production. Countries with relatively high wage costs in relation to labour productivity will, *ceteris paribus*, tend to have lower gross : net ratios than other countries. France is perhaps the clearest example. From 1951 to 1960 output per worker in manufacturing industry rose more rapidly in France than in almost any other industrial country (Japanese productivity rose faster than French but West German productivity did not); on the other hand, wages per head in France did not rise as fast, in this period, as they did in several industrial countries, including Britain. The implication is that French wages were abnormally high in relation to productivity in 1951, and this depressed the gross : net ratio in that year. It seems likely that in the later 1950's the French ratio was much closer to that of the other industrial countries.

Again, where capital is relatively scarce and depreciation rates are high, the ratio will tend to be lower than elsewhere. Conversely, countries having relatively high materials costs (e.g. where some major materials are imported and freight charges are heavy), will tend to have relatively high gross : net ratios. High freight charges are likely to have a significant effect on the gross : net ratio in Australia, New Zealand and in many of the under-developed countries in Latin America, Asia and Africa.

[1]The other reason is that the figures include many food industries using a high value of materials in relation to wages.

These various considerations need not all work in the same direction. Thus, it is possible for a particular under-developed country to have a gross : net ratio as low as, or lower than, a particular industrialized country. But it seems most likely that the less-developed countries will, generally speaking, have higher ratios than the more developed ones, mainly because they tend to have wage levels which are low in relation to their physical productivity per worker, while materials costs per unit of output are unlikely to be so much lower than in the industrial countries as to offset the effect of the wage differential. The under-developed countries also tend to concentrate less in the high-skill industries, such as engineering and precision work, while they do much less fabrication work per unit of materials used ; both these factors will reinforce the tendency for their gross : net ratios generally to exceed those of the industrial countries.

For these reasons, a comparison of the levels of consumption of manufactures in countries at different stages of economic development would seriously under-estimate consumption in the less-developed countries if the comparison were made on the net value basis. Moreover, because of the trend towards a decreasing consumption of materials per unit of output in the industrial countries, the use of net, rather than gross, values would result in an upward bias over time, in the consumption estimates for these countries.

For the estimates presented here, the net values as shown in Table E.3 were adjusted in two stages. First, a deduction was made for the net value of processing food, beverages and tobacco[1]. The 1955 net value was estimated by applying to the total figure (in Table E.3) the appropriate percentage for the food, beverages and tobacco industries[2]. Estimates for other years at 1955 prices were then derived by applying the relevant national indices of physical output to the 1955 net values. Second, the residual figures, relating to non-food manufacturing, were inflated to gross value equivalents. For countries for which gross : net ratios were available, the appropriate ratios were used. For the others, the ratio 1.75 was used for industrial countries, 2.0 for semi-industrial countries and 2.25 for non-industrial countries (except for Pakistan, where the Indian ratio was applied)[3].

Adjustments are also necessary to the foreign trade statistics before they

[1]Strictly speaking, a deduction should also have been made for petroleum refining and for the processing of solid fuels. However, the magnitudes involved were relatively small for most countries, and the calculation, if made, would not have affected the estimates of apparent consumption significantly.

[2]These percentages relate to 1953. They were derived from *Patterns of Industrial Growth, 1938–1958*, United Nations, New York, 1960.

[3]Estimates of the gross and net values of manufacturing production by the G.A.T.T. secretariat for 1958 imply gross : net ratios of 1.16 for North America and Western Europe and 1.36 for the rest of the world outside the Soviet countries (*International Trade, 1959*, Table 4, G.A.T.T., Geneva, 1960). These ratios are considerably lower than those given here because the gross value estimates in the G.A.T.T. report exclude the costs of transport, merchanting and other services used by the manufacturing sector.

can be combined with the estimates of gross value of manufacturing production.

Exports. All the industrial countries of Western Europe, Japan and India value their exports f.o.b., i.e. free on board carrier at a border point of exportation. The United States uses an f.a.s. (free alongside ship) basis for goods exported by vessel, while Canada uses the value at the inland point of consignment for export. To maintain comparability with the production estimates, which generally relate to values *ex factory*, a deduction must be made from the f.o.b. values of exports to allow for transport, merchanting and other costs incurred between factory and port. The percentage deduction will vary considerably from commodity to commodity and from country to country, depending on the relative level of freight, etc. charges, the average length of haul from factory to frontier and the weight or bulk of the commodity in relation to its value.

Some detailed investigations into the appropriate deductions have been made in Britain and the United States. For Britain, an official estimate for 1907 put the deduction for that year at 10-15 per cent of the factory value[1], but this included a large element for the cost of moving coal from pits to ports. A fairly detailed estimate made in the early 1930's—when coal was much less important in British exports—indicated a considerably lower deduction: 6-8 per cent for 1924 and 5-7 per cent for 1930[2]. More direct evidence is available from the 1950 Census of Distribution[3]. In that year, the gross margin of export merchants amounted to 9 per cent of their total receipts. Direct exports by manufacturers would probably carry a smaller charge than this between factory and port; in non-electrical machinery and vehicles, for example, the gross margin of manufacturers' export organizations in 1950 amounted only to 7 per cent of their receipts. Probably, an average for all manufactures exported would lie between 7 and 8 per cent for 1950.

For the United States, an analysis of the expense ratios of exporters and export agents, as recorded at the Census of Distribution for 1929, indicated reduction percentages from export to factory values of 12½ per cent for consumer semi-durables, 3 per cent for consumer durables and ½ per cent for producer durables; for groups for which no calculation was made, a 10 per cent reduction was assumed[4]. More recent information is available from the Census of Business for 1948[5]; in that year, the operating expenses of export merchants, excluding those specialising in farm products, groceries, etc., averaged 8.7 per cent of their sales.

[1] *First Census of Production, 1907*, London, 1912.

[2] G. W. Daniels and H. Campion, *The Relative Importance of British Export Trade* (London and Cambridge Economic Service, Special Memorandum No. 41, Aug. 1935).

[3] *Census of Distribution and Other Services, 1950*, Vol. III, H.M.S.O., London, 1955.

[4] W. H. Shaw, *Value of Commodity Output since 1869*, National Bureau of Economic Research, New York, 1947, p. 271. Though the computation was based on exporters' margins in 1929, the figures quoted were based on exports in 1909.

[5] *U.S. Census of Business, 1948*, Vol. IV, Washington, 1952.

Comparable figures based on censuses of merchanting operations are not available for most other countries. For the industrial countries, generally, it has been assumed that a deduction of 8 per cent is necessary from the f.o.b. value of exports to arrive at a valuation *ex works*. For Britain and the United States, the percentages mentioned earlier were used. For Canada, no deduction is required since, as already mentioned, Canadian exports are valued at inland place of consignment. The corresponding deduction for India is somewhat less. A comparison of the unit value of output and of export, f.o.b., of cotton and jute piece goods in 1957 shows a difference of 5.8 and 4.5 per cent respectively of the f.o.b. unit value. For India, a deduction of 5 per cent has been made from f.o.b. values for all years.

Imports. Since the estimates of manufacturing production are on a gross basis, they will include the value of all materials used, both home-produced and imported. To avoid double-counting, therefore, only imports of *finished* manufactures[1] can be added to the gross value of production to arrive at a total for supplies of manufactures. The figures for finished manufactures, as presented in Appendix A are, as explained previously, generally valued on an f.o.b. basis (apart from the exceptional cases of Canada and the United States mentioned above). For comparison with gross production values, however, it is necessary to value imports c.i.f., i.e. the value at the place of entry in the importing country. The c.i.f. value is, broadly, the f.o.b. value plus the insurance and freight charges incurred in transport from the exporting to the importing country. Where the two countries are contiguous, the f.o.b. and c.i.f. values may be identical.

It is not possible to make a precise calculation of the c.i.f. value of imports from the corresponding f.o.b. values, since the difference depends on the distribution of trade by country of origin and by commodity. The percentage which freight charges form of the f.o.b. value will vary widely according to the route taken, the carrier used[2], the length of haul and the nature of the commodity. A number of countries do, however, make estimates of the freight and insurance element in the c.i.f. value of their total merchandise imports in conjunction with their detailed balance of payments statistics[3], while the United States also provides similar estimates even though her imports are valued f.o.b. or at market price in the exporting country. For the United Kingdom, similar estimates were not published in the official balance of payments statistics until 1961 ; these show freight and insurance payments during the years 1958 to 1960 at 13-14 per cent of the f.o.b. value of imports[4].

[1]See Appendix D for the technical definition of finished manufactures.

[2]An increasing proportion of international freight is carried by air, at considerably higher rates than for surface transport.

[3]See *Balance of Payments Yearbook*, annual, International Monetary Fund, Washington.

[4]*United Kingdom Balance of Payments, 1958 to 1960*, H.M.S.O., London, 1961 (Cmnd. 1329).

This accords well with an earlier estimate by Board of Trade statisticians, which put freight and insurance on all imports as 10-13 per cent of the c.i.f. value[1], which is equivalent to 11-15 per cent of the f.o.b. value.

For 16 countries for which the difference between c.i.f. and f.o.b. valuations can be estimated for a recent year (1955), the difference represented between 9 and 13 per cent of the f.o.b. value for 10 countries.

Freight and insurance on total merchandise imports as percentage of f.o.b. value, 1955

%	
7–8	Nicaragua, Norway
9–10	Belgium-Luxembourg, Canada, Denmark, Netherlands, Portugal, Union of South Africa, United States, West Germany
12–13	Greece, Italy
11–15	Australia[2], United Kingdom
19–21	Japan, Peru

The unweighted mean percentage for all 16 countries is 11 per cent.

For those countries for which percentage additions are available, these were used to estimate the c.i.f. equivalents of the f.o.b. figures of imports of finished manufactures derived from Appendix A. It has been assumed that the 1955 percentages also applied to other years. For countries for which no direct information is available, it has been assumed that the percentage addition from f.o.b. to c.i.f. valuation is 10 per cent for European and African countries, and 15 per cent for countries in Asia, Latin America and Oceania.

The resulting estimates of the gross value of apparent consumption of non-food manufactures are given in Table E.5. In view of the many assumptions made, and the fact that figures for individual years may be unduly influenced by changes in stocks, small differences between countries, or over time, clearly have no significance. The corresponding estimates per head of population are given in Table E.6. All the estimates are in terms of U.S. dollars at 1955 prices. It should be remembered that the exchange rates used for production (Table F.2) differ from those used for trade (Table F.1). In general, this has the effect of increasing the relative importance of home production in relation to foreign trade for countries other than the United States.

Population

The population series used to compute estimates of per caput gross domestic product and per caput value of production and apparent consumption of manufactures, are given in Table E.7. The figures have been taken, in almost

[1]J. Stafford, J. M. Maton and Muriel Venning, (chapter on 'United Kingdom' in *International Trade Statistics*, ed. R. G. D. Allen and J. E. Ely, New York, 1953).

[2]The Australian proportion averaged 14 per cent for the years 1936/37 to 1938/39 and 13½ per cent for the years 1949/50 to 1951/52. For 1957, the proportion was 15 per cent. (*The Australian Balance of Payments, 1928–29 to 1951–52*, and 1957–58, Commonwealth Bureau of Census and Statistics, Canberra, 1953 and 1959, respectively).

every case, from international compilations so as to achieve the maximum amount of comparability possible. For 1899 and 1913, the reliability of the figures is decidedly lower than for the later estimates for many countries, especially where the taking of a population census is difficult for geographic and/or administrative reasons. The figures shown relate, unless otherwise stated, to the total population of each country within the borders existing in the year specified.

EXCHANGE RATES

International trade

The values shown in the trade tables in this book are expressed in terms of United States dollars. The original statistics, in the national currencies of the exporting countries, were converted into dollars by use of the exchange rates shown in Table F1. In general, these exchange rates are the mean official rates of exchange in the years specified.

A major difficulty exists in the case of the German export returns for 1937, in which year German foreign trade was being conducted by the use of a complex system of multiple exchange rates. It was well known that the official rate of 40 U.S. cents per Reichsmark considerably overvalued the German currency, and a wide variety of estimates were published in the late 1930's of the extent of that overvaluation[1]. The evidence points to an overvaluation in the region of 30 per cent, but there is much uncertainty about it. However, it is also apparent that a substantial proportion of German exports in the later 1930's as recorded in the official trade statistics was also overvalued in terms of Reichsmarks, insofar as the official rate was used in the calculations[2]. Thus, the use of the official rate in converting the German export statistics for 1937 into dollars should largely cancel out the overvaluation known to exist in the German export statistics. For this reason, the official rate, as shown in Table F1, was used.

This procedure, while of importance for arriving at the current dollar value of German exports in 1937, does not affect the *volume* calculation, which is ultimately related to the physical quantum of goods traded. However, if we are interested in the movement of German export *prices* in relation to those of other countries, then allowance must be made for the distortion in the German series caused by the arbitrary nature of the official rate[3].

The exchange rates in Table F1 relate to the years selected for the detailed trade network tables, i.e. years ending in 1955. For 1957 and 1959, where shown in the trade tables, the export figures were taken from the *Commodity Trade Statistics*, United Nations, and O.E.E.C. *Foreign Trade Statistical Bulletins*, in both of which they are given in U.S. dollars, for all the principal exporting countries except Switzerland and India. For these two countries, the national export figures were converted into dollars by the mean exchange rate in each year.

Gross domestic product and manufacturing production

When national products are being compared, either in aggregate or for an

[1]C. P. Kindleberger, *op. cit.*, pp. 116–117.

[2]This would certainly have applied to exports paid for in foreign exchange, and to goods exported under clearing agreements; it would probably have applied also to a considerable proportion of other exports.

[3]See, for example, the approximate adjustment made to the German series in Table 8.6.

individual sector, it is inappropriate to use official exchange rates to convert the national currency totals into a common currency unit. This is because, for every country, by far the largest portion of its total product does not enter international trade and is not subject to the same pressures of the world market as are goods which are exported. Consequently, considerable price differences may, and frequently do, emerge between similar goods sold on the home markets of different countries. Such differences must be taken into account if genuine 'volume' comparisons are attempted of the output of different countries, and this can most conveniently be done by the calculation of 'purchasing power parity' rates of exchange. Such rates are, in principle, what the rates of exchange would have to be if the same bundle of commodities produced in different countries were to cost the same in terms of the currency of any one of them.

In statistical terms, the problem of cross-country comparison is precisely analogous to that of comparing movements over time within a single country, and the same index number problems are involved. The construction of a volume index number of the gross product of a country over a given time period involves a choice of weights—i.e. the quantities produced in two years being compared can be valued at the prices of either the earlier or the later year, or of some combination of the two. If the structure of relative prices has changed in the interval, the indices obtained may differ substantially according to the weighting system adopted. In the same way, a detailed revaluation of the output of two countries can be made either at the prices ruling in one country, or in that of the other, or—again—at 'synthetic' prices arrived at by some combination of the price structures of the two countries.

In practice, such detailed cross-country revaluations are extremely difficult to make, not only because of the scarcity of suitable statistical data, but also because the pattern of output may be so different in the countries being compared that the results may be of doubtful validity[1]. Even for countries with similar patterns of output, a systematic study on these lines would necessarily entail the accumulation, classification and analysis of a large amount of statistical and other data. In fact, very few cross-country studies of relative national outputs have so far been made[2], though such studies are now becoming

[1]For a fuller discussion of the limitations of such cross-country comparisons see D. Paige and G. Bombach, *A Comparison of National Output and Productivity of the United Kingdom and the United States*, O.E.E.C., Paris, 1959. See also C. Clark, *The Conditions of Economic Progress*, 3rd edn., London, 1957, Ch. II for a valuable discussion of the relative purchasing power of currencies of both advanced and underdeveloped countries.

[2]The pioneer study in this field was the comparison made by the late Dr L. Rostas of British and United States production and productivity in manufacturing industry (*Comparative Productivity in British and American Industry*, Cambridge University Press, 1948). More recent studies have been made by M. Frankel, *British and American Manufacturing Productivity*, University of Illinois, 1957; J. B. Heath, 'British-Canadian Industrial Productivity', *Economic Journal*, Vol. 67, Dec. 1957; A. Maizels, 'Comparative Productivity in Manufacturing Industry: A Case Study of Australia and Canada', *Economic Record*, Vol. 34, No. 67, April 1958 and D. Paige and G. Bombach, *op. cit.*, 1959.

increasingly possible as more countries develop their statistics of production.

Another approach has been to make comparisons of national expenditures rather than of national outputs, the weighting systems being based on the patterns of consumption, investment, etc. in the countries compared. The only detailed studies so far published on this basis are those by Milton Gilbert and his colleagues of the O.E.E.C. Secretariat[1]. Such comparisons yield implicit purchasing power parity rates of exchange for sectors (private consumption, investment, government consumption, etc.) as well as for the economy as a whole. The O.E.E.C. studies, however, cover only eight European countries and the United States, whereas for our present purposes the corresponding rates of exchange were required for a large number of countries at different levels of economic development.

The method adopted here for estimating such rates of exchange is necessarily a crude one. It was assumed that the official mean rate in 1938 correctly reflected the relative purchasing power of the different currencies; the 1955 rate was then estimated by multiplying the 1938 rate by the ratio of the change in United States prices between the two years to the corresponding price change in the country in question. Wherever possible, the (implicit) price change used for estimating the real gross domestic product was taken as the indicator of changes in internal purchasing power. Where such indices were not available, wholesale or retail price indices were used, as seemed most appropriate. The results of such a calculation cannot pretend to provide more than 'orders of magnitude', and they are subject also to the inherent limitations involved in comparisons between countries at different levels of economic development.

Nevertheless, if comparisons *have* to be made over a wide range of countries, it seems preferable to use such estimates of purchasing power parity rates, rather than to use the present official exchange rates, since much less distortion is likely to arise in the final results. A check on the results of the crude method used here can be made for those countries for which estimates are also available on the basis of detailed price comparisons. In Table F2 the estimated rates used in this book are shown, together with the official rates and those estimated in the detailed O.E.E.C. studies; in almost every case, the crude method yields a rate which is within the range of rates calculated by O.E.E.C. on the basis of expenditure studies. The exceptions are Belgium-Luxembourg, for which the 'crude' rate happens to coincide with the higher of the two O.E.E.C. rates; and the United Kingdom, for which the 'crude' rate of $3.80 to the £ exceeds the higher of the two O.E.E.C. rates on the expenditure basis ($3.68), but is within the range of the O.E.E.C. rates on the output basis ($3.60–$4.50).

The only other country for which an independent check is available is Australia. If estimates of the purchasing power parity rates for manufacturing

[1]M. Gilbert and I. Kravis, *An International Comparison of National Products and the Purchasing Power of Currencies*, O.E.E.C., Paris, 1954, and M. Gilbert and Associates, *Comparative National Products and Price Levels*, O.E.E.C., Paris, 1958.

industry in 1950[1] are extrapolated to 1955 by the relative movement of domestic prices in Australia and the United States, the corresponding 1955 rates can be estimated at $2.55–2.70 to the £A, as against $2.75 derived by the 'crude' method. The correspondence is, perhaps, closer than might have been expected in view of the different techniques involved and the fact that the detailed basis of estimation related to the manufacturing sector only.

As this book was being prepared for printing, a valuable new study by the United Nations Statistical Office of the pattern of industrial growth in a large number of countries was published[2]. The statistical analysis in this study is carried out entirely in U.S. dollars, purchasing power parity rates being used. These were calculated for the year 1953 by a 'crude' method very similar to the one used here, the main difference being that, for a number of countries, the movement in internal prices since 1938 was measured by an index of unit values of manufacturing production, based on data collected at censuses of production. The 1953 rates calculated in this way by the United Nations are also shown in Table F2. The differences between these, and the ones used in the present study, are not in general excessive, bearing in mind the somewhat different basis of the calculation, and also that there were some significant changes in relative prices between 1953 and 1955.

The rates shown in the last column of Table F2 were used to arrive at valuations in U.S. dollars of the gross domestic product of the countries listed, as well as of the value added in manufacturing production, where such figures were available in national currencies (see Appendix E).

Table F1. *Exchange rates used to convert national export statistics to U.S. dollars*

	Currency unit	1899 *and* 1913	1929	1937	1950	1955
		U.S. cents per national currency unit				
Belgium-Luxembourg	Franc	19.3	2.78	3.38	2.00	2.00
France	Franc	19.3	3.92	3.98	0.286	0.286
Germany	Mark[a]	23.8	23.8	40.2	23.8	23.8
Italy	Lira	19.0	5.24	5.26	0.16	0.16
Netherlands	Guilder	40.2	40.2	55.0	26.3	26.3
Sweden	Krona	26.8	26.8	25.4	19.3	19.3
Switzerland	Franc	19.3	19.3	22.9	23.3	23.3
United Kingdom	£ stg.	487	487	494	280	280
Canada	$ Can.	100	100	100	94.3	101.3
India	Rupee	32.5	36.2	37.2	21.0	21.0
Japan	Yen	49.5	46.2	28.8	0.278	0.278

Sources: Balances of Payments, 1913–1927, et seq., League of Nations, Geneva; *International Financial Statistics*, International Monetary Fund, Washington; *Yearbook of International Trade Statistics*, United Nations, New York; C. P. Kindleberger, *op. cit.*, Table A-3.

[a]Mark, Reichsmark or Deutschmark.

[1]A. Maizels, *op. cit.*, p. 18. The rates derived relate Australian output to Canadian, rather than to that of the United States. It is assumed that, for present purposes, the Canadian and U.S. dollars are in effect identical.

[2]*Patterns of Industrial Growth, 1938–1958*, United Nations, New York, 1960.

Table F2. *Estimated purchasing power parity rates, 1953 and 1955*

U.S. cents per national currency unit

	Currency unit	*Official exchange rate* (1955)	*Estimated purchasing power parity rate*		
			O.E.E.C. (1955)[a]	*U.N.* (1953)	*Present book* (1955)
NORTH AMERICA					
Canada	$ Can.	101.3[b]	..	101.7	102
United States	$ U.S.	100	100	100	100
WESTERN EUROPE					
Austria	Schilling	3.85	..	4.68	4.86
Belgium-Luxembourg	Franc	2.00	2.23– 2.66	1.76	2.66
Denmark	Krone	14.48	16.80– 21.90	15.67	17.6
Finland	Markka	0.43	..	0.32	0.35
France	Franc	0.29	0.25– 0.35	0.26	0.28
Germany, West	D. Mark	23.81	28.50– 39.40	26.70	32.0
Ireland	£	280.0	..	352.10	363
Italy	Lira	0.16	0.16– 0.30	0.23	0.19
Netherlands	Guilder	26.32	34.10– 46.10	32.42	35.0
Norway	Krone	14.00	15.20– 20.90	19.56	17.6
Portugal	Escudo	3.48	..	3.37	5.7
Sweden	Krona	19.33	..	20.21	23.4
Switzerland	Franc	23.27	..	23.33	22.5
United Kingdom	£ stg.	280.0	314–368[c]	417.70	380
Yugoslavia	Dinar	0.333	..	0.33	0.25[d]
OCEANIA					
Australia	£A.	224.0	..	248.40	275.0
New Zealand	£ N.Z.	280.0	..	369.70	330.0
LATIN AMERICA					
Argentina	Peso	2.77	..	5.14	8.45
Brazil	Cruzeiro	1.50[e]	..	1.80	2.14
Chile	Peso	0.37[f]	..	0.69	0.24
Colombia	Peso	24.0[e]	..	28.30	33.70
Mexico	Peso	8.00	..	12.00	9.10
Peru	Sole	5.26	..	7.56	5.56
Puerto Rico	$ U.S.[g]	100.00	..	..	100.00
Venezuela	Bolivar	29.85	..	27.50	29.50
ASIA					
India	Rupee	21.0	..	21.34	22.8
Pakistan	Rupee	21.0	..	21.34	22.8[h]
Indonesia	Rupiah	8.77[b]	..	4.77	4.8
Israel	£I	55.5–77.0[i]	..	..	70.0
Japan	Yen	0.2778	..	0.28	0.23
Philippines	Peso	50.00	..	23.70	28.9
Turkey	Lira	35.71[b]	..	34.12	30.0
AFRICA					
Belgian Congo	Franc	2.00	..	1.76	2.79
Egypt	£ E.	287.2	..	325.50	335.0
Union of South Africa	£ S.A.	280.0	..	425.40	335.0

For sources and footnotes see next page.

Sources: Statistical Yearbook, United Nations, New York; *Comparative National Products and Price Levels*, Milton Gilbert *et al.*, O.E.E.C., Paris, 1958; D. Paige and G. Bombach, *A Comparison of National Output and Productivity of the United Kingdom and the United States*, O.E.E.C., Paris, 1959; *Patterns of Industrial Growth, 1938–1958*, United Nations, New York, 1960.

[a]The lower end of the ranges shown are exchange rates based on the United States expenditure pattern; the higher figures are based on the expenditure pattern of the country specified.

[b]Currency conversion factor used for trade statistics by United Nations Statistical Office.

[c]The purchasing power rates estimated for 1954 by Miss Paige and Dr Bombach on the basis of a detailed study of relative output and costs in Britain and the United States are 360 cents per £ on U.S. and 450 cents on U.K. weights. These are unlikely to have changed significantly between 1954 and 1955. These rates relate, however, to factor cost excluding taxes and subsidies, and this probably accounts for a third or more of the difference from the rates obtained in the expenditure study, which are at market prices.

[d]Tourist rate plus 5 per cent.

[e]Free rate.

[f]Mean of buying and selling rates for principal imports and exports.

[g]Trade statistics given in terms of U.S. dollars in United Nations publications.

[h]Assumed equal to the rate for India.

[i]Lower figure represents principal rate; higher figure is mean of other rates up to 1st October 1955.

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