



CSO The measurement of changes in production

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CENTRAL STATISTICAL OFFICE

The measurement of changes in production

The index of industrial production
and the output-based measure of
gross domestic product

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CENTRAL STATISTICAL OFFICE

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The measurement of changes in production

The index of industrial production
and the output-based measure of
gross domestic product

The Government Statistical Service

As a service to statisticians and other workers in the statistical service, the Government Statistical Service has published this book. It is intended to provide a guide to the methods used in the production of the index of industrial production and the output-based measure of gross domestic product. It is intended to be a reference work for statisticians and other workers in the statistical service.

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Foreword

This publication in the series of Studies in Official Statistics presents a revised edition of No. 17 dealing with the index of industrial production and the measurement of the volume of total output. After a general discussion of the concepts of output measurement in Chapter I, the index of industrial production is dealt with in Chapter II and the remaining industries in Chapter III. The index of industrial production can for national accounts purposes be regarded as a sub-index of the total index of the gross domestic product, but its special characteristics and its place in the series of monthly economic indicators require the special treatment accorded to it here.

Both index numbers are prepared in the Central Statistical Office with the collaboration of the statistics divisions of other government departments. Only with the help of firms and trade associations in industry and commerce is the construction and maintenance of these index numbers made possible and their co-operation in this work is gratefully acknowledged.

Central Statistical Office
Great George Street
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I The measurement of output at constant factor cost

In the national income accounts for the United Kingdom the gross¹ domestic product at constant prices is measured in three ways: from income data, from expenditure data and from output data. This study is concerned with the last of these, that is, the estimation of gross domestic product as the sum of the outputs of all industries.² In this introductory section the general concepts of the measurement of output are discussed. Following sections deal in more detail, first with the treatment of industries covered in the index of industrial production and second with the remainder of the economy. This distinction is made, not because of any basic differences in concept between the two broad categories, but because the data available differ so markedly in type and quality that different approaches are inevitably used. The description of the sources and treatment of the data in these sections includes details of changes made when the estimates were rebased on the year 1970 and subsequent changes; in general it relates to the methods in use at mid-1975.

In the output approach all activities listed in the 1968 Standard Industrial Classification—and these cover the whole spectrum of economic activity—are industries in the sense that they provide goods or services and there is no distinction of treatment in principle between an industry that provides, for example steel and one that provides medical services. However, the term 'industrial' is often taken to refer to those industries covered by the index of industrial production and it will be used in that sense here. These industries are mining and quarrying; manufacturing; construction; and gas, electricity and water, that is, Orders II to XXI of the 1968 Standard Industrial Classification. It is fairly common international practice to confine the index of production to these industries (although some countries exclude the construction industry) but this does not imply that other industries such as agriculture, transport, distribution or public administration are in a class apart from 'industrial' production. The coverage of the index also coincides with that of the former quinquennial censuses of production and broadly, with the exception of construction, with that of the new system of industrial statistics which has been gradually introduced since 1970 to replace the quinquennial censuses.

Industrial production was measured for a considerable time before the production approach was extended to cover the measurement of activity in the whole economy. The index of industrial production, which is produced monthly, has an im-

portance beyond its role as a constituent part of the output-based measure of gross domestic product. The original purpose of the index of industrial production, to provide an aggregate indicator of short-term changes in industrial activity, still remains important.

The extension of the methods used in the industrial index to industries outside this field³ requires no modification of the principles involved but the difficulties encountered, particularly in respect of measures of output to be used and the treatment of quality changes, are so much greater that they may almost be regarded as of a different kind.

The concept of net output at constant prices

An industry's contribution to the domestic product is its net output, that is, the value of its gross (or total) output less any goods or services it has acquired from other industries or has imported. For example, the value of the gross output of the motor vehicle industry includes the value of the steel bought from the steel industry and also includes the value of services provided by insurance, advertising and so on; the value of these goods and services has to be deducted in order to arrive at its net output. Net output in this sense is arrived at before making provision for depreciation but after deducting stock appreciation. It differs from the more limited concept of 'net output' traditionally used in the censuses of production in the calculation of which inputs of services are not deducted.⁴ The net output of each industry consists of the value of the factors of production engaged in that industry and equals the sum of the factor incomes (income from employment and profit incomes) earned in the industry after deducting stock appreciation. The total of the net output of all industries is the gross domestic product of the country measured at factor cost (that is, excluding taxes on expenditure and including subsidies).

Conceptually, net output at constant prices should be estimated

3 This was first done by the Department of Applied Economics of Cambridge University before official estimates were published. See W. B. Reddaway, 'Movements in the real product of the United Kingdom', *Journal of the Royal Statistical Society*, vol. CXIII, 1950; and C. F. Carter, 'Index numbers of the real product of the United Kingdom', *ibid.*, vol. CXV, 1952.

4 Purchases of a range of services were collected in association with the former quinquennial censuses. The annual censuses from 1973 onwards have collected comprehensive information on purchases of services that will enable estimates to be made of value added that are very close to the sense of the term used in this study.

1 The word 'gross' in this context means only that depreciation, i.e. capital consumption, has not been deducted. It must be distinguished from the use of 'gross' in referring to industrial output where it means total output before inputs are deducted to give net output.

2 For a discussion of the other approaches to the estimation of gross domestic product see *National Accounts Statistics: Sources and Methods* (HMSO 1968), particularly Chapter III.

by revaluing at constant prices both the gross output and the inputs of materials, fuel, services and so on, and subtracting the latter from the former. This method, known as 'double deflation', is difficult to apply reliably in practice because it requires a great deal of information. Unless full information on all transactions is available at frequent intervals supplemented by adequate price data, the method can give unreliable results. This applies especially if net output is small in relation to gross output. The double deflation method is in fact currently used in United Kingdom statistics only for estimating the net output of agriculture. It is used for this industry because there is sufficient information available and also because the relationship of net output to inputs and gross output can vary significantly from one year to another owing to weather conditions. Changes in gross output would therefore not give a satisfactory indication of changes in net output. Work is, however, in progress within the Central Statistical Office on the possibility of providing annual estimates of net output in constant prices with the double deflation method for the industrial production industries. This work is made possible by the regular annual construction of input-output tables. In time this work may provide firmer annual estimates which can be used to give definitive past figures. There is no prospect, however, of using the double deflation approach more frequently than annually because of data limitations.

In practice, therefore, net output at constant prices must generally be estimated by the use of other series to indicate the changes in net output. This approach, of finding some proxy indicator to reflect changes in net output, is adopted in the United Kingdom statistics for all industries other than agriculture. This method of estimating changes in net output is simpler than that of double deflation and may be more accurate in practice because net output, measured as the difference between two relatively large aggregates each subject to error, may be subject to substantial error.

The most frequently used proxy indicator is gross output. If the ratio of gross output to net output remains unchanged at constant prices, changes in net output at constant prices can be measured satisfactorily by changes in gross output at constant prices. Changes in the ratio of net output to gross output in individual industries can be caused by many factors, such as changes in production methods, variations in the products made and materials used, and changes in services supplied by other industries, while some inputs—those usually known as overheads such as rent and rates—may be independent, at least in the short term, of the level of production. It is likely that some of the errors introduced by the operation of these factors in individual industries will be somewhat reduced in the aggregate for all industries. For example, if an intermediate process is transferred from one industry to another this does not necessarily alter the combined amount of work done, and if the gross output indicator overstates the change in the net output of one industry for this reason, the error may be offset by an understatement of the change in the net output of the other industry.⁵ Nevertheless, the use of gross output as an indicator is only a substitute for what is ideally required.

Changes in net output may also be estimated by changes in inputs. The input chosen may be materials used or purchased or employment and this is subject to the same sort of limitations

as gross output. Where production processes are improved and economies are made in the use of materials, changes in materials used may underestimate changes in net output. Such indicators apart from employment (mainly outside industrial production) are now very little used in the output measure. Employment, of course, has the disadvantage that it does not take account of any increases in labour productivity and therefore, in general, tends to underestimate increases in net output.

Technological change usually occurs only slowly, so that changes in gross output can be taken as an acceptable approximation to changes in net output so long as the basic estimate of net output is revised sufficiently frequently. This consideration applies also to the use of inputs or of manpower. The periodic revision of the basic estimates of net output when the index is rebased takes account of changes in the relationship of net output to gross output and inputs, and reduces any continuing bias in the results.

In the case of industries whose outputs consist of physical products—as opposed to services—there is usually no great difficulty in determining appropriate measures of changes in gross output at constant prices. These can usually be estimated from the physical quantities of goods produced or from the value of output deflated by an index of price. Greater difficulties arise, however, with the measurement of the output of service industries for which there may be no obvious physical units. For some service industries, such as transport or distribution, measures of output suggest themselves fairly readily: the output of transport can be measured in terms of passenger-miles and ton-miles; the output of the distributive trades may be estimated by the volume of turnover. But the output of financial institutions (banks, building societies, etc.) is difficult to define since the commodity mainly dealt with is money itself. For example, banks, as well as keeping customers' accounts and providing other services, act as intermediaries in channelling funds between lender and borrower. The provision of these financial services requires the employment of people and other organisational arrangements, and it is necessary to allow for changes in their output if the gross domestic product is to be measured. In such cases the change in the services provided may have to be indicated by some series associated with these services, such as the deflated value of bank advances which is used as an indicator of the change in part of the services provided by banks.

Special problems arise in the case of services provided by public authorities for the community as a whole as these services are provided free or with only a nominal charge and there is no unit of output sold in the market which can be used as the indicator. The procedure generally adopted, to use changes in the numbers employed as an indicator of changes in output, is obviously not satisfactory although it seems the best approach with our present knowledge.

The relative importance of the various types of indicators currently used in the annual estimates of output is summarised in the table below, for the 1970-based estimates. For comparison the relative importance of the indicators used on the previous, 1963-based, version is also shown. The differences reflect changes between 1963 and 1970 in the relative growth of industries where the type of indicator is unchanged as well as where the indicator used in the 1963-based estimates has since been replaced by an indicator of another type.

⁵ Whether this compensating effect is present will depend on the types of indicator used in the industries between which the change has taken place.

Type of indicator	Percentage of total weight	
	1970-based output measure	1963-based output measure
Net output at constant prices	3	3
Output indicators:		
Quantity of output of goods	15	19
Quantity indicators for services	21	12
Value of output of goods revalued at constant prices	28	19
Value indicators for services revalued at constant prices	16	27
Input indicators:		
Quantity of material inputs	1	5
Employment	16	15
	100	100

The base year

The measure of the change in gross domestic product at constant prices necessarily depends upon the year chosen as the base. Relative prices change over time and different relative prices can result in a different measure of the change in gross domestic product. For measuring current movements in gross domestic product it is desirable therefore that the current pattern of relative prices is not greatly different from that in the base year. On the other hand there are advantages in being able to measure changes over a number of years in terms of the prices of the same base year. The frequency of rebasing therefore is generally a compromise between these two objectives. The effect on the estimates of changing relative prices was discussed at some length in an article in *Economic Trends*.⁶ This concluded that, on the whole, although some significant differences in the output estimate arose from the change of base year from 1963 to 1970, analysis did not provide any strong evidence to suggest that rebasing of the output measure is necessary more than about once every five years. This tentative conclusion was in line with that of a broadly analogous exercise carried out on the expenditure estimate of gross domestic product.⁷ However, these conclusions could, of course, relate only to the period 1963 to 1970; it should not be assumed that they will necessarily hold for any future rebasing.

In the past the frequency of rebasing of United Kingdom statistics has, in any event, largely been dictated by the availability of data. The quinquennial censuses of production have provided the main information source for rebasing the index of production and the statistics were rebased on, for example, 1963 to make use of the data available from the census for that year. However, the introduction of a new system of industrial statistics with regular annual censuses of production with respect to 1970 onwards and an increasingly complete detailed quarterly breakdown of product sales, give more flexibility. There is now a theoretical possibility of rebasing annually. In fact, the latest base year—1970—was chosen to coincide with international recommendations. As will be seen on page 7, as the quarterly system of product sales statistics was not fully in

operation in 1970, some of the detailed information required for rebasing was extrapolated from the last quinquennial census of production, that for 1968.

In this latest rebasing estimates were fully derived using 1970 weights for 1968 onwards. The way in which they were linked with previous tranches of data is indicated in various *Economic Trends* articles.⁸

Quality changes

The output estimates seek to measure changes in the volume of work done and should as far as possible reflect changes in the quality of goods produced and services rendered as well as changes in their quantities; an improvement in quality represents an increase in output and a deterioration represents a fall. Since, however, quality itself is difficult to define and even more difficult to measure, the treatment of quality changes in output estimation presents formidable problems. It is convenient to examine these problems by looking at each of the two main indicators of changes in output—physical quantities and values adjusted for price changes.

Where physical quantities are used—the weight of yarn or steel, number of motor cars—little can, in practice, be done to allow for quality changes. The best that can be done is to build the estimates up from series at as fine a level as practicable to ensure that changes in the commodity composition of output is as far as possible properly reflected in the measure of output. For this purpose, for example, separate series are used for two main types of coal and one type is further divided into five grades; and six separate series for man-made fibres are used. This ensures that the component series are reasonably homogeneous—although seldom as fully so as one would like—but changes in the mix are not changes in quality as that term is normally used. No amount of disaggregation of the series used in the construction of the index can take account, for example, of changes in the durability or other characteristics of a particular type of cotton yarn, which should, in concept, affect the measurement of the output of that yarn. The most it can do is to help to isolate the area where the index is not in this way properly constructed.

The problem is more susceptible to treatment where value series are used as indicators. In this case the problem is, of course, transferred to allowing for quality changes in the construction of the price deflators, but here it is generally more manageable. The wholesale price indices, on which the deflators are based, make some allowance for changes in models and specifications when these can be identified in terms of changes in cost or in technical performance, where this can be narrowly defined. Given the method of compilation of the wholesale price indices—which are built up from a sample of quotations of closely defined products—there is more opportunity first of all, at least to identify quality changes that may

⁶ 'The effects of rebasing and some alternative methods of calculation on the output-based measure of gross domestic product', *Economic Trends*, No. 253, November 1974.

⁷ See 'An assessment of the sensitivity of the national accounts constant price estimates to changes in the base year and alternative methods of calculation', *Economic Trends*, No. 244, February 1974.

⁸ See *Economic Trends*, No. 223, May 1972; No. 241, November 1973; and No. 251, September 1974.

have taken place. The problems remain, of course, of defining quality changes and deciding how best to measure them. Discussion of these matters goes beyond the purpose of this study and while practical methods and criteria have been established which enable allowances to be made, they are necessarily often somewhat rough and seldom fully satisfactory. Nevertheless, the fact that allowances can be made for quality changes in the price deflators is one of the major advantages of the use of value series as indicators compared with quantity indicators.

Where quantity or deflated value series are used as indicators for the service trades the problems are of a similar kind to those outlined above but are generally considerably greater in degree.

The problems, first of all, of defining quality are at least as great as they are in the industrial field, and those of measurement are even greater. They stem largely from the fact that however detailed and reliable are the series measuring the quantum of services provided, there is by definition a substantial element of service involved in these provisions which it is difficult both to define and measure. For example, no analysis of the number of passengers or goods carried by the road and rail industries, of the different transactions of the postal services, of the patients treated by the health services, or of the volume of goods sold by retailers, can allow adequately for the changes in the quality with which these services are provided. There is at present no satisfactory treatment of quality changes in the service industries, and little prospect of improvement.

II The index of industrial production

Details of the weights and indicators used in the rebased index are given in the following pages together with comment on the major changes from the former, 1963-based, index. The new index is similar in concept and structure to the old index but differs in that it has greater emphasis on the measure of the total output of industries rather than the production of particular commodities. It is a difference of approach which, while in practice may make little difference to the published aggregates, makes for improved coverage. It is made possible by the use of the new, integrated, system of industrial statistics, particularly the quarterly collection of output statistics on an industry rather than, as in the past, a commodity basis.

The major purpose of rebasing is to incorporate a more up-to-date set of weights. In theory, if all the indicators used in the index were perfect measures of changes in net output, the only effect of rebasing would be to use the relative prices of the latest base year. However, in practice, the use of a new, independent, measure of net output in the new base year provides an opportunity to remove bias in the structure of the index which may have built up, due to the use of inadequate indicators, since the previous rebasing. One particular source of inadequacy which is automatically corrected in a rebasing is any long term relative change between industries in the ratios of net to gross output.

It had been past practice, as well, to confine the introduction of new indicator series, and other methodological changes, largely to the rebasing. However, such changes can be made at any time and in the period up to the latest rebasing more changes to individual indicators were made than had been the practice in the past; this policy has continued. In particular the introduction of new indicators based on the quarterly sales inquiries conducted by the Business Statistics Office has been made progressively as these inquiries became established and produced reliable figures. Nevertheless, rebasing does provide an opportunity to revise indicators that cannot conveniently be changed during the currency of a particular base year and a number of changes were made with the rebasing on 1970.

Objects and definitions

The primary purpose of the index is to show, in one series, the movement in the volume of output in the industrial sector in a

way that the great deal of detailed information on the output of particular commodities cannot. Within this aggregate similar series designed to show movements in the output of manufacturing industry as a whole and its main components are also compiled. A further analysis shows an alternative form of disaggregation in terms of the end-use of the output of industry, for example, consumer goods and investment goods. In concept the index measures movements in the aggregate net output of the industries covered; this is the amount of 'work done', which for each industry is the difference between the gross output of products and the input of materials, products and services provided by other industries, adjusted for changes in stocks and work in progress.

The index is base-weighted in form and the formula is:

$$\frac{\sum P_0 Q_0 (Q'_n / Q'_0)}{\sum P_0 Q_0}$$

where $P_0 Q_0$ is the net output in the base year and Q'_n / Q'_0 is the ratio of some proxy indicator for net output, usually gross output, in period n to that of the base period.

The index aims at comparing the rate of production in different months. Adjustments have to be made to series reported on a calendar monthly basis because months vary in length. Some contain four and others five Saturdays or Sundays when production is likely to be lower than in the other days of the week. The effect of irregularities of the calendar have, so far as possible, to be eliminated so that the index compares the average weekly rate of production in different months. Account is taken in making these adjustments of the number of days per week usually worked by different industries—so far as these are known.

Even when the effects of these calendar irregularities have been removed the index will still exhibit fluctuations not all of which are meaningful in the interpretation of movements in the trend of production. Some of these are fairly regular, both as to timing and magnitude, and result from factors which occur at particular times each year, such as holidays, hot or cold weather, or patterns of demand for particular products. They can be eliminated from the basic series by well-established methods of seasonal adjustment, and series in seasonally adjusted form are also published. It is important to bear in mind that the seasonally adjusted series only eliminate the regularly recurring fluctuations. Other fluctuations remain in the figures. In particular, in the short term, there are fluctuations due to irregular factors such as strikes, shortages, floods and *unseasonably* hot or cold weather. In the longer term there is a fairly well defined pattern of movements, of around five years duration, that follow the economic cycle. Details of the method

used for seasonal adjustment are given in the Annex. Summary measures of variability for the index of industrial production are included in a table published regularly in *Economic Trends*.

Basic series

The objective of the individual series is to measure changes in the value, at constant prices, added by each industry to its inputs of materials and services. To do this, for over 97 per cent of the index, output is measured by the value at constant prices of either production in the period, or, to an increasing extent, sales or deliveries in the period. One of the limitations of the use of sales or delivery series is that no account is taken of changes in the amounts of stocks and work in progress. The index will understate production when stocks of finished goods and work in progress are increasing and overstate it when they are declining. In normal circumstances this is relatively unimportant, but there are occasions—for example, the industrial disputes of the 1973/74 winter—when the distinction could be important for the interpretation of the index.

However, relatively firm data on stocks and work in progress are only available quarterly, with monthly estimates much less reliable—even in aggregate. About half of the current index is represented by sales rather than by production indicators; the proportion is much greater for manufacturing industry. Despite the data limitations, it is hoped to develop a reliable adjustment to the broad published aggregates of the monthly index to take account of the effect of stock movements. Currently such an adjustment is only made in respect of the quarterly estimate of the total all-industries index in deriving the output-based measure of gross domestic product.

Outside manufacturing the index usually employs indicators which measure output at the time of production. For example, in the construction industry the indicator is of the value of work done in the reference period.

Both types of output indicator can in principle be measured at constant prices in two different ways—either by measuring the physical quantities of goods produced or sold, and combining them together by applying base year prices; or by measuring the value of sales or production at current prices and adjusting for price changes ('deflating').

(i) Quantities delivered or produced

This type of indicator is at first sight more attractive in that it does not have to be adjusted for price changes. A typical example of this type is that used for the coal industry where the output indicator is the weight of each of a number of grades of coal produced.

There are, however, limitations to the usefulness of this type of indicator. Most industries produce a large number of products many of which cannot in practice be covered by separate physical output series. To reduce the series to manageable numbers the separate categories have to be fairly heterogeneous. Products which have the same general description, e.g. metal castings, may vary considerably in

quality or technical specification and changes over time in the product mix within a diverse category can distort the measurement of output. Treating each closely defined type of product as a separate commodity with its own series and a net output weight is often not practicable. A major problem is that for many products—e.g. computers, aircraft, and much machinery—there is no sensible physical unit of measurement. Physical quantities can only give a true measure of changes in output if the net output content per unit of product remains constant from period to period.

(ii) Deflated values

These, generally but not exclusively, are related to sales or deliveries. They have the advantage of being able to cover the whole output of an industry, however varied. They also automatically include new products which often might be expected to show greater growth in output than older established products. In addition, a series based on physical quantities will not reflect shifts in the quality of the goods produced, while a deflated value series may more easily make some allowance at least for such changes. All this, however, is dependent on the accuracy of the adjustments made for price changes so that a series of price index numbers, calculated at the appropriate stage in the production process and making as much adjustment for quality changes as possible, is essential in the use of deflated value series. (See page 3.)

For the 3 per cent of the index where output indicators are not available it is necessary to use indicators either of materials or labour input. A particular, unusual, example of using an indicator of material input is the indicator for the spirit blending industry, where the added value derives mainly from years of maturing in store. It is assumed therefore that net output changes proportionately to the level of stocks of spirits held in bonded warehouses. Other more conventional uses of material inputs occur in the use of coal inputs to measure the output of coke from coke ovens, the use of the consumption of newspaper to measure the monthly change of output of newspaper and periodical printing and publishing within quarterly movements shown by sales figures; and the use in the same way of the consumption of rubber in production of rubber goods (other than tyres and tubes). The extent of the use of the different types of series is shown in the following table:

	Percentage of weight carried	
	1970-based index	1963-based index
Output indicators		
Production—quantities	26.7	38.4
—values deflated	17.0	14.0
Sales or deliveries—quantities	6.5	4.9
—values deflated	47.3	29.3
Input indicators		
Materials used	0.8	11.1
Labour	1.7	2.3

A list of the series classified by industry showing the weights attached to each is given in Appendix I. A few of these series relate to Great Britain but most of them cover production in the United Kingdom. These series will, according to the usual practice, be amended as better indicators become available so that, as in the past, the series actually used may progressively depart from those listed. The Appendix represents the position as at mid-1975.

Weighting

The weights given to each industry are based in principle on the values of net output (before deducting depreciation) in 1970. The net output of an industry is defined as the value of the gross output, less any costs incurred in producing this output which are payable to other industries. These costs consist of the value of materials, fuel and electricity used, amounts paid for work given out, and amounts paid for services.

The estimates of net output are based on the results of the Census of Production for 1970 which have been assumed to relate to the calendar year 1970. The main adjustment to the Census figures was to arrive at net output. 'Net output' as defined in the Census of Production for 1970 was reckoned before deducting payments for services purchased from other industries. However, information was available for 1968 about certain expenses, such as payments for repairs to buildings, plant and vehicles, for rates and for hire of plant. This information was used in the construction of the input-output tables for 1968 and indirectly for those of 1970. So far as possible, the estimates used for weighting the index were made consistent with the estimates in the input-output tables for 1970. Estimates had also to be made for mining and quarrying in Northern Ireland and these were based on the percentage of employment in Northern Ireland in that industry to that in the United Kingdom.

As with previous reweighting procedures it was often necessary to apportion the net output for a Census industry over several sub-divisions. The net outputs of sub-divisions of industries were based on figures published in the 1968 Census reports for larger firms only. Where the sub-divisions of industry were not published the net output of the whole industry had to be apportioned among its individual products in proportion to the values of their gross outputs. This was not always a satisfactory alternative and in a number of cases, allowances had to be made for factors which would clearly cause the products to have differing ratios of gross to net output as, for example, alloy and non-alloy steel. These allowances are based on special information received from Departments.

Since the weights derived from the Census of Production are 'industry' weights it is appropriate to have 'industry' indicators with the same coverage. That is to say, the indicators should measure the total output of the set of industrial establishments classified to a particular industry rather than the total output of products characteristic of that industry. The progressive introduction into the index of indicators based on the new system of quarterly sales inquiries has led the index increasingly to be truly industry based and for the indicators to match the weights. There remain, however, some indicators, both monthly and quarterly, which use product indicators—usually of physical production in quantity units—as an alternative to the conceptually desirable industry based indicators. The distinction may often be relatively unimportant in relation to the overall accuracy of the aggregate index, and in general where product rather than industry based indicators are used no attempt has been made to amend the weights to correspond more closely with the coverage of the indicators; rather the product based

indicators are regarded as proxies for industry based indicators. It has been considered worthwhile, however, to depart from this principle in the treatment of the series for iron castings. Iron castings are the principal product of the iron foundry trade but the production series include a substantial contribution from various branches of the engineering industry. The weight for iron castings is therefore derived from various Orders and the whole of it given to Order VI, metal manufacture:

	<i>Net output £ million</i>	<i>Weight per thousand</i>
Order VI Metal manufacture (MLH 313) ..	160.6	8.55
Order VII Mechanical engineering	6.5	0.35
Order X Shipbuilding and marine engineering ..	0.4	0.02
Order XI Vehicles (MLH 381)	1.9	0.10
Order XII Metal goods (nes) (MLH 390) ..	0.4	0.02
	<hr/> 169.8	<hr/> 9.04

Another practical difficulty in the compilation of the index numbers is the treatment of industries or parts of industries for which weights are available but where no series with which to measure changes in output are currently available. In the very limited areas which correspond with a Minimum List Heading in the Standard Industrial Classification, employment figures can be used as indicators. There is a special difficulty, however, where certain parts or sub-divisions of a heading are covered by production series while others are not. In these cases the usual practice has been to attach the weight for an item to the weight for another item (whether in the same industry or in another industry), whose activity may be expected to be correlated with the output of the uncovered item. One of the large number of instances where this is done is in coal mining where the output of deep-mined coal is used to reflect the output of the very small percentage of miscellaneous minerals and other products of the industry. In some cases the weight has been spread over several other items which collectively might be expected to experience similar activity.

Data sources for indicators

The index draws on a variety of different data sources for the calculation of indicators. Increasingly, as has been mentioned, the index makes use of the system of quarterly sales inquiries carried out by the Business Statistics Office. These were launched by the Business Statistics Office from 1968 onwards; with the majority of inquiries becoming operational during the period 1970 to 1973. The Business Statistics Office also conducts a number of monthly inquiries, either measuring the total turnover of an industry or output of its main characteristic products, which provide information on monthly movements; this is in many cases later replaced by the firmer measures based on quarterly series. Other indicators are compiled from inquiries still run by the departments themselves, for example, some monthly inquiries for the food manufacturing industry are run by the Ministry of Agriculture, Fisheries and Food, and the quarterly indicators of construction output are based on an inquiry conducted by the Department of the Environment. Where employment information is used as an indicator it is based on inquiries run by the Department of Employment. In addition, some indicators are based on information collected by trade associations.

Adjustments to eliminate variation in the length of calendar months

Most of the series used in the compilation of the index are for calendar months or for periods of four and five weeks, but as is shown in the following table, an increasing proportion of the index is ultimately, in its definitive version, covered by quarterly series alone.

Time interval	Percentage of weight carried	
	1970- based index	1963- based index
Weeks or months	54.4	56.1
Quarters (with alternative series for shorter intervals)	19.4	35.8
Quarters	26.2	8.1

Since the purpose of the index is to show changes in the rate of output, the 'months' are made equal in length to permit valid comparison and the series for the different time intervals need adjustment before they can be incorporated in the index.

Calendar months do not all contain the same number of days, and the number of days on which it is the normal practice of firms in different industries to work each week also varies. Adjustments have been made to calendar monthly series to eliminate the effect of such variations in the following ways:

- (a) Industries have been classified according to the length of their standard operating week.
- (b) For each industry, the total number of working days in the base year 1970 was determined, no allowance being made for annual and public holidays. One-twelfth of this total was taken as a 'standard' month for each industry.
- (c) In preparing the current index the monthly production figure for each industry is multiplied by the ratio of the number of working days in the standard month in 1970 to the number in the current month, and then expressed as a percentage of the average monthly production in 1970.

An index for a standard month obtained in the way described is equivalent to one representing the average weekly rate of activity in a month, and can therefore be combined with indices based on weekly averages. These are obtained simply from the figures customarily reported for four or five week periods. The fact that such a period averaged does not coincide exactly with the calendar month it represents is normally of little importance, except when the average period of five weeks might be such as to cause a shift in the effect of, say, the Easter holidays from one 'month' to another. No corrections are made to adjust the estimates for such an occurrence before seasonal adjustment, but they are taken into account in the seasonal adjustment of the figures.

The only figures not requiring adjustment in this way to a standard period are those few relating to numbers employed. This information customarily relates to the number on a payroll at a particular time in each month and is therefore influenced neither by the length of the month nor by the number of days normally worked per week. However in order that the aggregate index, before seasonal adjustment, should as fully as possible reflect movements in actual output, an adjustment is made to

these employment based indicators; in this case the purpose of the adjustment is to amend the indicator to reflect, so far as possible, any estimated variations in production due to holidays.

Quarterly figures require two types of adjustment. First, they are adjusted to eliminate the effects of variations in the number of working days in each quarter (in the same way as has been described for calendar months). Secondly, when there is no independent measure of monthly movement, they are made to yield three separate monthly figures by taking account of public and annual holidays in each of the three months of the quarter but otherwise assuming that the rate of activity is equal throughout the quarter.

Annual indices are calculated by taking a simple average of the indices for the 12 months of the year. This produces a result which would differ from indices based on annual production figures for two main reasons. The first is that years do not all contain the same number of working days; a difference of one working day is equivalent to a difference of nearly half of one per cent. This is not inconsiderable in relation to the changes which are being estimated, but it is felt that the averaging procedure (which essentially standardises the length of year) provides a more useful measure.

The second reason is that a simple average of 12 monthly indices over-weights the shorter working months and the weekly averages of four-week periods as against the longer working months and the weekly averages of five-week periods. In general these latter differences tend to be small in relation to other errors of estimation and it is considered preferable to obtain the annual indices of production by taking the simple average of the 12 monthly indices rather than to introduce more complicated procedures.

The provisional nature of indices for recent months

Not all the series to be used in computing the index as listed in Appendix I are available at the time the index for the latest month is being prepared. This is clearly so for the quarterly series, but also for some of the indicators based on monthly information. Some 26 per cent of the information is received only quarterly. These figures are not brought into the index until three or sometimes six months after the end of the quarter to which they apply. Even where monthly information is available, or indeed quarterly information is first brought into the index, there is the possibility of further revision due to late response to the statistical inquiries providing the basic information.

For two particular sectors of industry—the engineering industry and the construction industry—it is necessary to spell out rather more carefully the precise extent of the provisional nature of the early information published. For engineering, as is explained more fully below, the index published for the latest month does not contain any information directly relating to that month but is a trend estimate based on a weighted average of the information for a sequence of earlier months. For the construction industry, where the basic information is collected

only quarterly, estimates for the latest months are provided by the Department of the Environment based on their knowledge of the activity of the industry. The following table shows, as an illustration of the way in which firm estimates of aggregate production build up, the position in September 1975 when the index for July 1975 was first being calculated.

Information received by beginning of September 1975 for	Percentage of weight covered by data received
1975 January	96
February	96
March	96
April	89
May	89
June	89
July	47

Note: Information for engineering and construction is treated as not available for July.

In computing index numbers for the latest months from incomplete data an estimate is made for each missing series (other than construction), based on recent trends and allowing for the normal seasonal variation and including where possible an allowance for any expected irregularities arising from strikes, holidays, etc.

It should be emphasised that the index of industrial production can only be firm when its component series have all been received in final form. Clearly, provisional figures must eventually be replaced by final figures. Moreover, from time to time, individual series undergo improvement and revision so that figures assumed to be final may be occasionally revised back for several months and in some cases even years. These adjustments and revisions necessarily lead to corresponding revisions in the index, although only the larger ones will have any noticeable effect on the total index.

Publication

The current practice is to publish in a press notice provisional seasonally adjusted index numbers about six weeks after the end of the month to which they relate together with revised figures for the preceding months. The provisional aggregated index numbers are given together with sub-indices⁹ and an analysis by type of market sector. Also tabulated in the press notice are the percentage changes for the latest three months compared with the preceding three months for these same groups based on the seasonally adjusted estimate. This gives a better estimation of the recent movement of production than the comparison of figures for individual months which may be affected by irregularities due to abnormal weather conditions, absenteeism or strikes.

Seasonally adjusted index numbers in greater detail and covering a longer period are published shortly afterwards in *Trade and Industry* and a full analysis is given each month in the *Monthly Digest of Statistics*. A detailed analysis for the period from 1968 onwards is published in supplementary tables to the *Monthly Digest of Statistics* in the September issue.

⁹ All industries; Total manufacturing industries; Food, drink and tobacco; Chemicals, coal and petroleum products; Metal manufacture; Engineering and allied industries; Textiles, leather and clothing; All other manufacturing industries; Mining and quarrying; Construction; Gas, electricity and water.

Comparison between the 1970-based and the 1963-based index numbers

Some idea of the changing relative importance at industrial Order level of the various groups is given by comparing the weights for the 1970- and 1963-based index numbers. These are shown in the table below.

	1970 weights per cent	1963 weights per cent
Mining and quarrying	3.69	5.58
Manufacturing	(74.51)	(74.94)
Food, drink and tobacco	8.43	8.44
Coal and petroleum products	0.74	0.74
Chemicals and allied industries	5.84	6.36
Metal manufacture	5.70	6.01
Mechanical engineering	10.04	9.04
Instrument engineering	1.49	0.97
Electrical engineering	6.67	6.81
Shipbuilding and marine engineering	1.61	1.54
Vehicles	7.24	8.05
Metal goods not elsewhere specified	4.78	4.85
Textiles	4.89	5.64
Leather, leather goods and fur	0.34	0.43
Clothing and footwear	2.38	2.71
Bricks, pottery, glass, cement, etc	2.68	2.90
Timber, furniture, etc	2.18	2.10
Paper, printing and publishing	6.40	5.88
Other manufacturing industries	3.10	2.47
Construction	14.62	12.71
Gas, electricity and water	7.18	6.77
	100.00	100.00

Changes to indicators

The most general change in the indicators used, as compared with the description in *Studies in Official Statistics* No. 17¹⁰ is the increased use of the new range of quarterly sales inquiries to replace the previous more limited commodity-based inquiries, and in some areas to provide a measure of output where previously only input indicators had been available. Even for those industries where other measures of output have been available, there are usually advantages in using the quarterly sales information. It is usually wider in coverage of the industry, the inquiries being addressed to all but the smallest establishments. The data itself is wider in scope, covering in varying levels of product detail the entire output of each industry. Thus the index can be based on the activities of an industry rather than the output of particular commodities and therefore be more appropriate to the weighting system. Moreover, the collection of value figures enables the inquiry to cover the whole range of output of firms (often in greater detail than before) but without imposing on them the burden of identifying every product. In this way the emergence of new products will be reflected in the index, as will the output of a wide range of products not important enough individually to be identified, but making a significant contribution in total to industrial production. The use of sales figures has its own problems, of

¹⁰ *The index of industrial production and other output measures* (HMSO November 1970).

course. Notably, that where production is interrupted, sales can often be maintained by withdrawals from stocks. A good example of this effect is the coal miners' dispute in the winter of 1973/74, which resulted in widespread restrictions on the use of power. It is estimated that the use of sales indicators in the index then led to an overestimate of the level of production by about one per cent. About one-quarter of the index of production is now based upon data from the system of quarterly sales inquiries; eventually it is expected that about two-thirds of the total index will be so derived. For the manufacturing component of the index the proportions are significantly higher.

Apart from the general move toward the adoption of the quarterly sales inquiries to provide information for the final version of the index, there have been a number of other improvements to the indicators used. These include, for example:

Order II—Mining and quarrying

At rebasing an indicator of the drilling activity for oil and natural gas was included in addition to the existing indicator for production of oil and natural gas.

Order III—Food, drink and tobacco

Minimum List Heading 239.1 (part), spirit blending, is an industry where, because of the long duration of the production process, the value of sales does not adequately reflect production in the same period. Because the value added in this industry is related to the maturing of spirits, the indicator now used is the stock of spirits held in bonded warehouses.

Order X—Shipbuilding and marine engineering

The output of this industry will ultimately be derived from quarterly inquiries; but because of the technical problems involved it will be some time before this can be done. In the meantime, the use of employment indicators was improved at rebasing by making allowance for changes in the length of working week and for estimated changes in productivity in the industry.

Order XI—Vehicles

The aerospace industry is now represented by direct annual calculations from value of sales and work done. Monthly indicators, which are revised later, are derived from a regression relationship between production and man-hours worked in the industry.

Order XII—Metal goods not elsewhere specified

The results of a monthly inquiry into turnover, deflated by the appropriate price indices, are now used for the provisional index in place of the quantities of certain metals used in the industry.

Order XXI—Gas, electricity and water

Indicators for gas and electricity supply which distinguish between industrial, commercial and domestic use and allow for differing tariffs were adopted at rebasing. The quantity of water supplied, rather than employment in the industry, is now used as the indicator for the water supply industry.

A change of a rather different nature was introduced in October 1971 for the substantial part of the index relating to Orders VII to IX, mechanical, instrument and electrical engineering. Early results from the monthly inquiry into sales for these industries had proved very unreliable, because of the low response at that stage. A method was adopted of obtaining the first estimates for each month from a weighted average of past indices. This incorporates all the useful information available at the time of the first estimate for any month, but does not use the first direct results from the monthly inquiry for the month itself. This first estimate is, in general, not changed until relatively firm estimates can be made for the whole of the calendar quarter. The initial estimates are then replaced by recalculated trend values based on, and giving the same quarterly average as, the latest inquiry results. The aim of this method is to attempt to predict the movement in the final index more reliably than would be possible by directly basing the initial estimates on the first unreliable results of the inquiry itself, and hence to reduce revisions. While the method has been generally successful over periods of relatively steady growth in engineering output, there is, of course, a risk that it can lead to significant revisions when the trend of engineering output changes rapidly.

A consequence of this method, which is reflected in the aggregate indices, is that there is less month-to-month variability in the results. Sales of items, the production time of which is lengthy and the unit values of which are high (as in the case of a significant part of these industries), are uneven and for periods as short as a month do not accurately reflect production during the period. It seems appropriate, therefore, to use a procedure which smooths out some of the short-term fluctuations in deliveries.

III The output measure of the gross domestic product

When the method used to construct the index of industrial production is extended to cover all industries within the Standard Industrial Classification the aggregate change so derived is a measure of the change in the aggregate net output. As already explained this aggregate is the gross domestic product at constant factor cost measured from output. This section describes the derivation of the base-year weights and the indicators used for the industries outside the industrial production sector.

Statistical sources: weights

The indicators of changes in net output in each industry are combined using weights based on the relative contribution made by each industry to the gross domestic product, as measured by its net output in the base year. In contrast to the index of production industries there is, in general, no census from which the net outputs of these remaining industries can be estimated. The starting point for the calculation of the weights is therefore the analysis of the gross domestic product by industry and type of income which is given in the annual National Income and Expenditure Blue Book (Table 17¹¹ of the 1973 issue of the Blue Book). This gives an analysis of factor incomes, differing from the required concept of net output only by the inclusion of stock appreciation.

The weights for the latest base year, 1970, are consistent with the figures given in the 1973 Blue Book, the latest estimates available at the time when the weights were compiled. For wages and salaries, there are two alternative analyses by broad industry group available. First, an industrial analysis of wages and salaries subject to PAYE for each financial year is made by the Inland Revenue; a similar analysis is made of profits. Second, for Table 17 of the 1973 Blue Book, independent estimates of wages and salaries were made for the main industrial groups; the data are derived from a number of sources, for example, the wage and salary bill of the production industries is based on the results of the detailed census of production.¹² The Inland Revenue analyses are based on a classification of financial units as opposed to a classification by establishments which is used, as far as possible, in the national accounts tables. For the 1963-based index it had been decided,

for consistency with other national accounts data and particularly with the input-output tables, to use the Blue Book analysis of factor incomes for the main industry groups (except within the index of industrial production) as given in Table 17. In the case of profits, the Table 17 figures are based on the Inland Revenue analysis. The use of the Blue Book, rather than the Inland Revenue analysis of wages and salaries, increased the weight for most service industries and reduced the weight for the index of production industries, but the effect on the index numbers of gross domestic product was small. Taking 1958 as 100·0, index numbers for the gross domestic product in 1967 were estimated using the two alternative sets of weights and it was found that they differed by only 0·1. This treatment has also been adopted in the rebasing on 1970.

A number of adjustments were made to the Table 17 figures to produce the 1970 weights. Stock appreciation amounting to £1,137 million in 1970 was deducted, industry by industry, in order to obtain net output weights on the desired concepts.

For the 1963 rebasing the weight for Transport and communication (Road goods transport) had been increased to cover all 'C' licence transport by making appropriate transfers from the weights for other industries employing these vehicles (Manufacturing, Construction and the Distributive trades). This adjustment was made because the indicator used related to road goods vehicles employed in all industries. For the 1970 rebasing, as an indicator which excludes 'own account' road haulage was available, this adjustment was not made.

The analysis of factor incomes provided only the weight for the industrial production industries as a whole. Within these industries the detailed weights were compiled from the results of the detailed censuses of production as explained in Chapter II.

Within the broad industrial groups outside the index of production, use was generally made of the Inland Revenue analyses of wages, salaries and profits to estimate weights for individual Minimum List Headings. In many industries the weights were further apportioned between the various services or groups of services provided by the industries in order to provide appropriate weights for each of the output series used as indicators. Where a breakdown of the weights within Minimum List Headings was required and this was not provided by Inland Revenue data, the further sub-division necessary was generally made on the basis of gross receipts, for example, within railways and postal services and telecommunications. In the case of the distributive trades the weights within Minimum List Headings were estimated from the information on gross margins provided by the latest census of distribution. Gross margins on turnover are not an exact measure of net output since net output is obtained after deduction of payments to

¹¹ This table 'Gross domestic product by industry and type of income' has been renumbered Table 18 in subsequent issues of the Blue Book.

¹² The estimates are described in *National Accounts Statistics: Sources and Methods*, pages 133-140.

other industries for services such as rents, advertising and transport, but they are the best guide available.

One other aspect of the weights which needs to be mentioned concerns Insurance, banking, finance and business services where a large contribution to earnings is made by the excess of interest received over interest paid out. In accordance with national accounting definitions, the net output weights of other industries were estimated before receipts and payments of interest and thus the industry weights contained a certain amount of duplication. The former treatment was to deduct from the weight for each industry the weight for net interest received in Insurance, banking, finance and business services by proportionately reducing the weights for each Order. In the 1970-based index this deduction is made *en bloc* by means of a special item, the Adjustment for financial services, with a negative weight to which are attached the indicators used for those services which are financed in this way. The revised treatment was applied to the years 1963 to 1968 in the 1963-based index before linking on to the new base as described below.

Indicators

A list of the series used from 1968 on the 1970 base in both the annual and the quarterly estimates is set out in Appendix III. Where a series is available both annually and quarterly it is listed once only, under the annual heading. Where an annual series is not available quarterly, the substitute quarterly indicators are shown.

At rebasing the opportunity was taken to replace some of the former indicators by series considered to indicate more satisfactorily movements in output at constant prices in the period covered, but changes may also be made at any time. The main changes between the 1963-based and 1970-based index as it existed at mid-1975 are set out below.

Forestry: a series for timber sold replaces the series of production of hardwood and production of pitwood and softwood.

Transport and communication: the index for road haulage now excludes 'own account' haulage; the indicator for port activity is now represented by volume indices for imports and exports.

Insurance, banking, finance and business services: the indicator for insurance (other than life insurance) is now premiums adjusted for unexpired risk. For Stockbroking additional series are now used for British government securities having a maturity of 'up to five years' and 'over five years' and local authority securities. The indicators for Advertising and market research, Other business services and Central offices not allocable elsewhere are represented by numbers in employment.

Professional and scientific services: An indicator, the number of mortgage advances, is now used to represent conveyancing. In addition, where employment is used as an indicator of output,

an allowance has been made wherever possible in the estimates for periods since 1970 for employment of employees on a part-time basis. It has been assumed that two part-time employees are equivalent to one employee employed full-time.

Full lists of weights and indicators have been published for indices of output at constant factor cost relating to earlier years as follows.

1948-based index: *National Income and Expenditure: Sources and Methods*, Appendix IV (HMSO, 1956)

1954-based index: *Economic Trends*, August 1960¹³ (HMSO)

1958-based index: *National Accounts Statistics: Sources and Methods*, Annex to Chapter V (HMSO, 1968)

1963-based index: *The index of industrial production and other output measures: Studies in Official Statistics No 17*, (HMSO, 1970)

The table below summarises the weights used for the output measures as based on 1970 and 1963.

Orders of the Standard Industrial Classification	Weights per 10,000	
	1970-based index	1963-based index
Agriculture, forestry and fishing	298	344
Industrial production:		
Mining and quarrying	162	244
Manufacturing	3,267	3,285
Construction	641	557
Gas, electricity and water	315	297
Total	4,385	4,383
Transport and communication	846	910
Distributive trades	1,037	1,087
Insurance, banking, finance and business services	825	711
Professional and scientific services	977	811
Miscellaneous services	699	780
Public administration and defence	666	560
Ownership of dwellings	572	414
Adjustment for financial services	-305	—
	10,000	10,000

The following notes relate specifically to the indicators used in the 1970-based index though most of the general remarks also apply to the earlier indices.

Agriculture: The large amount of price and quantity data available for agriculture makes it possible to use the double deflation method for this industry. Some 250 items of output and 400 items of input are separately distinguished each carrying its own base-period price weight. A three-year price average (currently for the farm years 1968/69 to 1971/72) is used for the purposes of revaluation to reduce the effect of fluctuations arising from weather conditions and other factors. The resulting estimates of net output at constant prices for the June–May farm years are allocated to calendar years in the proportion 7:5; for example, the estimate for 1968 is 5/12 of that for the 1967/68 farm year plus 7/12 of that for the 1968/69 farm year. A full description of the method and indicators used was published in an article in *Economic Trends*, December 1969. In addition to covering the net output of commercially significant agricultural and horticultural holdings (an index of which is published annually in the White Paper *Annual Review and Determination of Guarantees*) the index also includes estimates of the output of agricultural contractors in accordance with the Standard Industrial Classification. Also, estimates of depreciation are added back to make the estimates consistent with the definition of gross domestic product.

¹³ Reprinted in *New Contributions to Economic Statistics*, Second Series, 1962.

Mining and quarrying, manufacturing, construction, and gas, electricity and water: These industries are covered by the index of industrial production. (See Chapter II.)

Transport and communication: This is an industry group for which suitable indicators of gross output are readily available. For most of the main forms of transport, figures of passenger-miles and of freight ton-miles constitute the basis of the system of indicators employed.

The indicator for road haulage now excludes 'own account' haulage and is represented only by the ton-miles index for contracting for 'hire and reward' (MLH 703); 'own account' haulage (classified in MLH 704) is now allocated to other manufacturing industries so that the appropriate measure of output is in terms of the output of the parent industry.

For sea transport it is necessary to allow for the work done on cross-voyages as well as on voyages between this country and abroad. The annual inquiry of the General Council of British Shipping provides estimates of gross receipts of British operated tankers and dry cargo vessels which are deflated by indices of freight rates. The indicators for port activity are the volume indices for imports and exports.

The communication sector is quite well covered by volume indicators of various kinds.

Distributive trades: The indicators for this industry are based on the volume of turnover (that is, turnover revalued at constant prices). Where wholesalers mainly supply retailers, as is the case for most consumer goods, wholesale as well as retail distribution of these categories is represented by the indices of the volume of retail trade. Other wholesale dealing in materials is represented where possible by indices of deliveries, and otherwise by indices of production or consumption of the various materials. The activities of export merchants are represented by a number of indices of the volume of groups of United Kingdom exports and re-exports.

Insurance, banking, finance and business services: As far as possible in this industry specific indicators of activity are used. For life assurance business the indicator is derived by deflating the expenses of handling life assurance; this is the same series as is included in consumers' expenditure at constant prices. For other forms of insurance the indicators are the premiums deflated by an appropriate price index.

Banks are regarded as providing financial services to borrowers in addition to the service of keeping customers' accounts, etc. The indicators of output for the latter are the number of cheques cleared and total deposits deflated. For their financial services the indicator is bank advances deflated.

Property management is included in this Order, the indicator used being the stock of commercial and industrial buildings. Employment indicators are used for Advertising and market research, Other business services and Central offices not allocable elsewhere.

Professional and scientific services: The greater part of the weight for this Order is accounted for by public education and health services. The output of these services is represented by employment indicators, with the exception of local authority health services for which the indicators are on an output basis, for example, the number of patients attending clinics. For a large

part of the remaining services in this group there is little information on output and for some of these employment indicators are used.

// Originally output indicators of various kinds were used to measure changes in the volume of output even in those areas where the problems of measurement are greatest as, for example, public education and health services. Such series as number of pupils in schools and number of bed-days in hospital were used, either by themselves or in conjunction with series for the numbers employed. Indicators of this type proved unsatisfactory and have been abandoned, partly because of the difficulty of finding indicators which bear a constant relationship to output and also because of the need to keep the output estimates consistent with the expenditure estimates. It was obviously necessary to revalue expenditure on wages and salaries by public authorities by methods consistent with those used to measure output. Revaluing expenditure on wages and salaries at constant prices by calculating the amount that would have had to be spent if there had been no increases in rates of pay, gave different results from the indicators of output. The present practice, therefore, with a few exceptions, is to measure output in public education and health by reference to the numbers employed. Wherever possible, however, the figures used are not crude totals of staff but are weighted to take account of changes in the numbers in different grades or ranks, or making an allowance for employment of employees on a part-time basis. The assumption is thus made that the 'output' of a senior employee bears the same relation to that of a junior as their respective salaries bear to each other, and that within a particular grade or rank there is no change in output per head from year to year.

Miscellaneous services: Most of the services in this group, which are largely final services provided by the private sector, are covered by gross output indicators. Many of these services are provided wholly to personal consumers, and the indicators for these are taken from the estimates of consumers' expenditure on these services at constant prices.

Public administration and defence: The output of this Order consists of the direct services of the armed forces and women's services, civil servants, etc. and it is estimated from changes in employment. Originally, such output indicators as are available, for example, the number of beneficiaries under social security schemes, were used but they were abandoned for the same reasons as for public education and health services (see above). Separate indicators representing the various grades of staff are used. Because of this treatment productivity is assumed to be unchanged within each grade of employment, any change in output per head being due to a change in the composition by grade of the total number employed.

It should be noted that this Order is defined as in the Standard Industrial Classification 1968 and does not include the activities of persons employed by public authorities but classified to other industries: for example, ordnance factories are included in manufacturing.

Ownership of dwellings: Ownership of dwellings is shown separately and is defined as the contribution to the gross domestic product made by the stock of dwellings. It is measured by consumers' expenditure at constant prices on rent, including imputed rent of owner-occupied houses.

Quarterly indicators

The quarterly indicators are selected so as to reflect the movements of the annual indicators as closely as possible. In many cases the same indicator is used. In some cases, it has been possible to select alternative series covering the same industry. For example, annual indicators for rail passenger transport are based on the number of passenger-miles; these statistics are not available quarterly, but an alternative indicator, the aggregate number of passenger journeys, is available quarterly. This is probably inferior to the annual series but is thought to be the best substitute available. In other cases quarterly indicators for closely related industries are used.

The extent to which each industry group is covered by quarterly information comparable to the annual data varies considerably. For industrial production the quarterly index of production is completely consistent with the annual average. For agriculture, where a large part of output consists of crops grown and harvested once a year, there seems to be no satisfactory way of allocating the annual output to particular quarters within the year. In this case therefore the quarterly figures used are interpolations of the farming year figures (that is, June to May). Transport and communication is fairly well covered by quarterly information, and for the distributive trades all the annual indicators are available quarterly. For Insurance, banking, finance and business services, although several of the annual indicators for banking and finance are available quarterly there are no corresponding quarterly series for types of insurance, which are therefore extrapolated. For Professional and scientific services and Public administration and defence quarterly employment information is available.

Miscellaneous services are well covered by quarterly data, although some of the quarterly estimates of consumers' expenditure which are used as indicators are only interpolations and projections of the annual figures.

Computation and adjustments

The quarterly indicators are used only to estimate changes within the year. For completed years each industry Order has been adjusted to bring the average level of the quarterly indices to that of the annual index. For current quarters a provisional adjustment is made for each Order using the final adjustment to the preceding year's figures as a guide, that is, the quarterly indicators are used as measures of recent movement, but are applied to definitive levels given by the annual figures. Final adjustments are made when the annual indices for each Order are available, and the quarterly estimates are revised to be congruent with the annual figures. In the table below the quarterly series are shown as published in the October 1975 issue of

Economic Trends, and as they would have been at that date if the quarterly rather than annual indicators had been used where the two differ. It will be seen that the difference between the two series, that is, the overall final adjustment, has been small over this period. These adjustments are made at Order level and the overall index for each quarter is produced by combining the results for each Order, using the full weights as in the annual index.

Seasonally adjusted estimates are published for eight industry groups: agriculture, forestry and fishing; mining and quarrying; manufacturing; construction; gas, electricity and water; transport and communication; distributive trades; and other services. The quarterly series for the gross domestic product is a weighted average of these components. The ratio to moving average method of seasonal adjustment is used throughout; as with the index of industrial production, a programme based on the X-11 variant of the US Bureau of the Census Method II is employed.

As the quarterly figures for Agriculture are interpolations of the annual series, seasonal adjustment is not necessary. Quarterly unadjusted index numbers are estimated for Forestry and fishing and these two series are seasonally adjusted separately. For the index of industrial production industries, the quarterly figures are simple averages of the monthly seasonally adjusted index numbers. Transport and communication is seasonally adjusted as a whole, as are the index numbers for the distributive trades. Within the series for Other services only Professional and scientific services and Miscellaneous services exhibit significant seasonal fluctuations and are seasonally adjusted separately. No adjustment is made to the remaining series. The method of seasonal adjustment is described in the Annex (page 16).

Many of the series used in compiling the index of industrial production, in particular for manufacturing industry, measure deliveries rather than production. Deliveries and production in any period may differ because of changes in stock levels. The published index numbers from 1970 of gross domestic product at constant factor cost include an adjustment, based on estimates of stock movements, to allow for these differences.

Index numbers of gross domestic product at constant factor cost

1970 = 100, seasonally adjusted

		After final adjustment and stock adjustment (as published)	Before final adjustment but after stock adjustment
1971	1st quarter	100.3	100.2
	2nd quarter	101.5	101.5
	3rd quarter	102.0	102.0
	4th quarter	102.5	102.5
	Year	101.6	101.5
1972	1st quarter	101.5	101.6
	2nd quarter	104.5	104.6
	3rd quarter	105.2	105.4
	4th quarter	107.0	107.2
	Year	104.6	104.7
1973	1st quarter	110.7	110.8
	2nd quarter	109.8	109.9
	3rd quarter	110.8	110.9
	4th quarter	110.5	110.6
	Year	110.4	110.5
1974	1st quarter	107.7	107.4
	2nd quarter	110.2	110.0
	3rd quarter	111.2	110.9
	4th quarter	109.7	109.5
	Year	109.7	109.5

Reliability

Even if full and complete information were available, the statistical and conceptual problems involved in the calculation of constant price estimates and index numbers would still remain. It must be realised that an estimate of this nature is to some extent arbitrary and its movement should only be interpreted in the light of the conventions and solutions adopted in its compilation; for example, the use of base-year weights and the restricted definition of output for public services. However, if these limitations are realised then the measure of change in output over one period can reasonably be compared with that for another period.

A guide to the reliability of the estimates of output can thus only be given in the context of the principles adopted in its compilation, that is, whether the data available are adequate for this purpose. The reliability of the indices for agriculture, mining, manufacturing industries, gas, electricity and water, and distributive trades over periods of up to say, five years, may be described as good. Those for construction and transport and communication are fair. The reliability of the indices within the other four Orders varies a good deal and depends greatly on the underlying concepts. Accepting the conceptual approach, the indices for the Orders as a whole, allowing for compensation between errors in the estimates for constituent sections, can be regarded as fair. The reliability of the overall index of output, as based on the concepts used in its compilation, can be described as good. However, it must be remembered that many of the estimates for the latest year and some of the estimates for the previous year may subsequently be revised, as the full data gradually become available.

The quarterly index of output is necessarily less reliable than the annual index. Also, the estimates for the latest quarter are less reliable than those for earlier quarters because not all the information is available in time for the first provisional estimates.

The published tables

The estimates of output at constant prices are prepared and published on the basis of the 1968 Standard Industrial Classification. The table of the weights and indicators used for the

estimates of output at constant prices given in Appendix III follows the Orders and Minimum List Headings of this Classification. As well as these 27 Orders, Ownership of dwellings is also distinguished separately from real estate within the Insurance, banking, finance and business services Order, as elsewhere in the national accounts. This is because of its special interest and because much of the income, actual and imputed, is received by individuals, including owner-occupiers.

The National Income and Expenditure Blue Book includes one table (Table 15 of the 1975 issue) on output at constant factor cost which gives annual index numbers of output from 1953 onwards for 17 industrial groups within manufacturing, for total manufacturing, for total industrial production and for all industries and services combined. All of the industrial Orders outside of manufacturing are separately shown and so is the ownership of dwellings and, from 1963 onwards, the adjustment for financial services.

Official quarterly estimates of output at constant prices seasonally adjusted were first published in 1966 (and have been calculated back to 1958). Until the middle of 1972 the first output estimate of gross domestic product was published simultaneously with the income and expenditure estimates. However in July 1972 a preliminary estimate of the output measure was introduced.¹⁴ This preliminary estimate thus provides the first overall measure of gross domestic product available for a particular quarter. It is published in a press notice some six or seven weeks after the end of the quarter to which it relates; this means that it is available some four weeks earlier than the earliest estimates of the income and expenditure based measures of gross domestic product.

Inevitably, to permit this earlier publication, the estimate has to be based on less data and on less firm data than the estimate published coincidentally with the income and expenditure estimates a month later. Various estimating techniques are used to fill the gaps in the data available; these generally relate movements in activity for sectors where no data is available to indicators for industries that might be expected to have behaved in a similar way. The reliability of the method is perhaps better measured by the results achieved than deduced from the techniques employed to produce the estimate. In the period leading up to rebasing, the preliminary estimate of the change between the most recent two quarters obtained in the way described above differed on average (ignoring sign) by 0.3 per cent compared with the corresponding change as it was estimated one month later. It is clear that these preliminary estimates need to be treated with some caution. They have, however, given good indications of the direction, and broad indications of the magnitude of the movements shown by the later estimates.

14 See 'Preliminary estimates of gross domestic product based on output data: A new series', *Economic Trends*, No. 225, July 1972.

ANNEX

Seasonal adjustment

The several calculation stages employed to obtain the unadjusted index numbers from the original output and employment data have been described for all industries in the gross domestic product. These index numbers represent, for the index of production industries, the average weekly output during the period covered by the calendar month and for the remaining industries the total output in the quarter. They still reflect variations in output caused by special circumstances such as strikes and abnormal weather conditions, variations caused by public holidays and those caused by the annually recurring patterns of behaviour of the output series. In addition to these three sources of variation, an economic time series of this type will always contain irregular short-period variations of unknown cause. The purpose of the seasonal adjustment procedure is to remove the regular annual sources of variation in the series, so that the other variations may be more easily observed. The most important of these to the user is the trend of the series, and this is more apparent after seasonal adjustment though the index numbers still show irregular variations, including those due to strikes and abnormal weather conditions.

The adjustment method may be applied to the individual component series, or to groupings of series. In the past the procedure was to group the series for similar industries and obtain composite indices which cover a complete or major part of a Standard Industrial Classification Order and to seasonally adjust those groups. The application of the seasonal adjustment procedure is currently being extended to lower levels of aggregation, and in some cases down to individual industry level. The total index may be adjusted either by weighting together the individual seasonally adjusted components, or by adjusting the original total directly. The choice between the two methods is not too significant since both give similar results. The first method is now used for all aggregates, such as the total index of industrial production, the index for total manufacturing and the index of gross domestic product.

The seasonal adjustment is achieved in two stages although the first of these is applied only to the index of production industries. This removes the effects due to irregular public holidays, and the second stage applies a standard ratio to moving average method to remove the regular annual or seasonal pattern. The irregular public holidays adjustments must be made separately since these are not in a strict sense seasonal adjustments. This is because the incidence of public holidays varies from year to year between calendar months. For example, Easter can occur in either March or April. There are also apparent movements of the public holidays caused by the nature of calendar periods employed in some of the production statistics, for example, the New Year holiday may be reflected

in the December or January figures according to the incidence of the collection period. For many industries summer holidays cause a drop in output which is spread over several months and this can be adjusted by the conventional seasonal adjustment. It is clear that each industry requires a different treatment in respect to these adjustments, so this is an important reason for separate seasonal adjustment by industry group.

Adjustments to allow for loss of output due to holidays are clearly larger in a monthly than in a quarterly series. This is because most of the shifts in holiday patterns occur wholly within a calendar quarter. For example, the movements of summer holidays between July and August do not alter the overall third quarter output figure. Furthermore, the loss of one or two days' production due to a public holiday has a much smaller percentage effect on a quarterly total than on a monthly one. Also in the case of service industries covered by employment indicators (i.e. numbers on the payroll) there is no holiday variation in the series. For these reasons the adjustment process is omitted for all industries outside the index of production.

The method of irregular holiday adjustment is as follows. When a public holiday occurs in a month other than the usual month, i.e. when Easter occurs in March, a factor is used to compensate for loss of output in March and a control factor used in April to allow for a higher than usual production. The magnitudes of the chosen factors depend upon the duration of the holiday, and can be estimated sometimes from direct information on loss of output by the industry, but more usually from previous experience of the effect of corresponding holidays in previous years. A strict application *pro rata* of working days lost is not normally used in the factor, since this is found frequently to overstate the true loss of output.

One industry which provides detailed information on loss of production due to holidays is the deep-mined coal industry, which estimates for each four/five weekly period the loss of production due to recognised holidays. From this figure the percentage of output lost can be easily derived for the period, and this is used as the holiday adjustment factor.

The holiday adjusted monthly series or the original quarterly series is further adjusted for known large irregularities before being seasonally adjusted in a conventional manner. The method used is the X-11 variant of the Census Method II Seasonal Adjustment Program. This program is described in the Technical Paper No. 15 of the US Department of Commerce, Bureau of the Census. It is a development of earlier programs by the Bureau, which were written chiefly by Dr. J. Shiskin.

The program analyses the series into three components in a multiplicative model, namely

$$T = C.S.I.$$

where T is the total unadjusted series, C the cyclical or trend component, S the monthly seasonal factor and I the residual irregular component.

The estimates of the trend and of the monthly or quarterly seasonal factors are made by the application of suitable moving averages to the series since both these components are assumed to have a smooth variation in time, the trend varying smoothly in successive periods, and the seasonal moving over the corresponding periods in successive years. The seasonal factor for each month or quarter is permitted to change slowly to reflect changes in output over a number of years.

In order to separate the trend and seasonal components it is necessary to apply the moving averages by an iterative process. The first step is to approximate to the trend with a simple centred 12-month or four-quarter moving average. This procedure does not give a good estimate of the trend, but when this is divided into the original series, a first estimate is obtained of the seasonal-irregular ratios from which little of the seasonal element has been removed. A moving average over the 12 (or four) sets of ratios—one for each month or quarter—is then applied to obtain a first estimate of the seasonal factors. A variety of moving average options is available to the user of the program, where the choice made for each period in the year depends upon the expected rate of variation over time in the seasonal factor for that period.

This seasonal factor is then removed from the original series by division to obtain a series containing the trend and the irregular component, and to this is applied a more sophisticated trend moving average (13 points for the monthly or five points for the

quarterly series) which is flexible enough to follow the peaks and troughs more closely than the yearly moving average used at the first stage. A better estimate of the seasonal-irregular ratios is obtained by removing this trend from the original series, and the complete set of calculation stages is repeated twice more to improve further the estimates of the trend and seasonal factors. The final adjusted series is then defined as the original series divided by the seasonal factors, so that it contains the trend and irregular components only.

A feature of the program is the method of detecting and eliminating extreme values in the original series. This is done by a progressive replacement of the extreme values in the seasonally adjusted series by the trend value as their departure from the trend value becomes greater. It is important to note that this replacement of extremes applies only at the intermediate calculation stages. Thus the trend and seasonal factors are not influenced by extreme values, but all the original extremes are present in full in the final seasonally adjusted series.

It is possible to run the seasonal adjustment program each time the latest monthly or quarterly member of the series becomes available, so that seasonal factors and trend are continually up-dated. This approach would result in frequent small revisions to the adjusted series and this disadvantage is overcome by running the program less frequently, and using forecast values of the seasonal factors for the most recent periods until the run which includes them is made. A forecast for this purpose is made by the X-11 program of the seasonal factors for 12 months or four quarters beyond the current end of the time series. This facility is used in the adjustment of all of the output series, in such a manner that at any point in time, the seasonal factors employed in the current calendar year are the forecast values.

APPENDIX I

Series and weights used in the index of industrial production

The series used in the index of production together with their corresponding weights have been arranged in accordance with the *Standard Industrial Classification 1968* and are given in the table below. This distinguishes between the provisional estimate (which reflects the best information available at the time the index for the month is first published) and the final position (when for each industry the indicator judged to be the best available is used). Where the 'unit' column of the table shows that the series relate to money values, adjustments have been made for price changes.

Order	Standard Industrial Classification		Provisional figures			Final figures			Weight per 1,000	Remarks
	Minimum List Heading	Industry	Series	Type of indicator	Unit	Period of series †	Type of indicator	Unit		
II		Mining and quarrying								
101	Coal mining	Deep mined coal Bituminous Unscreened Large Graded Treated smalls Untreated smalls Anthracite	Production " " " " "	Tons " " " " "					36.88	Estimated net output in 1970, £693.0 million
102	Stone and slate quarrying and mining	Stone quarrying and mining Granite coated macadam All other granite Limestone coated macadam All other limestone Slate and slate products	Production " " " "	Tonnes " " " "			Sales*	Quantity Value Quantity Value	0.61 0.48 0.36 0.89 0.07 2.41	
103	Chalk, clay, sand and gravel extraction	Sand and gravel extraction China clay	Production Production	Tonnes Tonnes		Q Q	Production Sales*	Quantity Quantity	1.46 1.58 3.04	
104	Petroleum and natural gas	Indigenous crude oil Natural gas production Drilling activity	Production Production	Tonnes Therms		Q	Distance drilled		0.03 0.69 0.16 0.88	
109	Other mining and quarrying	Iron ore Tin ore Salt Gypsum	Production Production Sales	Tonnes Tonnes Tonnes		Q	Sales*	Value	0.28 0.05 0.40 0.12 0.85	
III		Food, drink and tobacco							84.32	Estimated net output in 1970, £1,584.3 million
211	Grain milling	Flour produced Wheat offals Oat milling products Breakfast foods	Production " " "	Tons " " "					2.46 0.47 0.13 1.20 4.26	
212	Bread and flour confectionery	Bread Cakes and flour confectionery	Deliveries	Tons		Q Q	Sales* Sales	Quantity Quantity	6.37 3.69 10.06	National Food Survey
213	Biscuits		Deliveries	Tons					3.19	

III (cont.)	214	Bacon curing, meat and fish products	Production	Tons	Q	Production	Quantity	1-38 0-78	Packing station throughput (England and Wales) National Food Survey National Food Survey
		Bacon and ham							
		Fish products							
		Other meat products							
		Poultry						1-45	
		Quick frozen meat							
		Sausages						0-15	
		Canned meat						1-20	
		Other meat products						1-02	
								1-39	7.37
									National Food Survey
	215	Milk and milk products						3-55	
		Milk, heat-treated	Sales	Gallons					
		Other milk and milk products							
		Butter production	Production	Tons				0-21	
		Butter blending	"	"				0-21	
		Cheese	"	"				0-64	
		Milk, condensed	"	"				0-38	
		Milk for cream	Production	Gallons				0-58	
		Milk powder	Production	Tons				0-39	
		Ice cream	Production	Gallons				0-28	6-24
	216	Sugar	Production	Tons				0-30	
		Sugar, from home-grown beet	"	"				1-21	1-51
		Sugar, total refined							
	217	Cocoa, chocolate and sugar confectionery	Production	Tons				3-39	
		Chocolate couverture etc	"	"				0-37	
		Sugar confectionery	"	"				1-68	5-44
	218	Fruit and vegetable products						0-67	
		Jams and marmalade	Production					0-10	
		Table jellies	"	"				0-78	
		Quick frozen vegetables	"	"				0-15	
		Canned and bottled fruit	"	"				0-62	
		Canned vegetables	"	"				1-35	
		Canned soup	"	"				0-63	
		Pickles and sauces	"	"				0-69	4-99
		Potato crisps	Input: potato usage						
	219	Animal and poultry foods	Production	Tons				3-29	
		Compound feeding stuffs	"	"				0-66	
		Cat and dog food: canned	"	"				0-14	4-09
		other							
	221	Vegetable and animal oils and fats	Production	Tons				0-23	
		Oilcake and meal	"	"				0-18	
		Refined oil: hardened	"	"				0-71	1-12
		unhardened							
	229	Food industries not elsewhere specified	Production	Tons				0-23	
		Margarine	"	"				0-12	
		Cooking fats	"	"				0-32	
		Starch	"	"				0-37	
		Glucose	"	"				1-06	
		Tea blending	"	"				0-05	
		Coffee: liquid essence	"	"				0-75	
		dry extracts	"	"				1-26	4-16
		Cereal convenience foods	"	"					National Food Survey
	231	Brewing and malting	Production	Bulk barrels					15-63
		Beer							
	232	Soft drinks						0-72	
		Soft drinks: concentrated						1-82	2-54
		unconcentrated							
	239	Other drink industries	Production	Gallons				0-99	
		Spirit distilling and compounding	Stocks held	"				5-66	
		Potable spirits	Production	Gallons				0-22	
		Spirits blending	"	"				0-53	7-40
		British wines, cider and perry	Production	Gallons					
		British wines							
		Cider							

†Monthly unless otherwise stated. (Q for quarterly, A for annual.)

*Business Statistics Office quarterly inquiry used.

Standard Industrial Classification

Order	Minimum List Heading	Industry	Series	Provisional figures		Final figures			Weight per 1,000	Remarks
				Type of indicator	Unit	Type of indicator	Period of series †	Unit		
III (cont.)	240	Tobacco	Cigars			Sales*	Q	Quantity	0.27	
			Cigarettes: plain tipped			"	"	"	1.45	
			Other tobacco and snuff			"	"	"	4.13	
								0.47	6.32	
IV		Coal and petroleum products							7.35	Estimated net output in 1970, £138.0 million
	261	Coke ovens and manufactured fuel	Coke from coke ovens Low temperature coke	Production Input	Tons Tons				1.15 0.17	
	262	Mineral oil refining	Fuel briquettes	Input	Tons				0.10	1.42
	263	Lubricating oils and greases	Lubricating oils	Production Input	Tons Tons				5.16	
V		Chemicals and allied industries							0.77	Output from Minimum List Heading 262
	271	General chemicals	Inorganic chemicals Organic chemicals Other chemicals	Sales	Value " "	Sales* " "	Q Q Q	Value " "	6.45 6.69 5.61	18.75
	272	Pharmaceutical chemicals and preparations			Value	Sales*	Q	Value		9.39
	273	Toilet preparations			Value	Sales*	Q	Value		2.34
	274	Paint			Value	Sales*	Q	Value		3.75
	275	Soap and detergents			Value	Sales*	Q	Value		2.42
	276	Synthetic resins and plastics materials and synthetic rubber	Synthetic resins and plastics materials Other than semi-manufactured plastics Semi-manufactured plastics Synthetic rubber	Sales Sales Production	Value Value Tonnes	Sales* Sales* Sales*	Q Q	Value Value	6.93 1.10 0.71	8.74
	277	Dyestuffs and pigments			Value	Sales*	Q	Value		3.17
	278	Fertilizers			Value	Sales*	Q	Value		2.68
	279	Other chemical industries	Polishes Formulated adhesives, gelatine etc			Sales*	Q	Value	0.79	
			Explosives and fireworks Formulated pesticides etc Printing ink Surgical bandages, etc Photographic chemical materials	Production	Quantity	Sales* Sales* Sales* Sales*	Q Q Q Q	Value Value Value Value	1.58 1.02 0.67 1.39	7.12
VI		Metal manufacture							56.95	Estimated net output in 1970 £1,070.0 million
	311	Iron and steel (general)	Wrought iron Steel							
	312	Steel tubes		Production	Tonnes				33.71	
	313	Iron castings, etc	Pig iron Iron castings	Production	Tonnes				0.32 9.04	9.36

VI (cont.)	321	Aluminium and aluminium alloys	Aluminium (excluding castings): Virgin and secondary unwrought Plate, sheet etc extrusions and foil Aluminium castings	Deliveries " " " "	Tonnes " " " "	0-38 2-73 1-77 4-88
	322	Copper, brass and other copper alloys	Copper, brass etc (excluding castings) Refined copper, copper alloy ingots and billets Copper: rods, bars and sections etc Copper alloy: rods, bars and sections etc Copper, brass etc castings	Deliveries " " " "	Tonnes " " " " " "	1-21 1-99 1-75 0-80 5-75
	323	Other base metals	Unwrought lead, tin slab etc, zinc and alloys Nickel Magnesium, titanium, zinc plates and powder	Deliveries Production Deliveries	Tonnes Tonnes Tonnes	0-90 1-96 0-39 3-25
VII		Mechanical engineering				100-39 Estimated net output in 1970, £1,886.2 million
	331	Agricultural machinery (except tractors)		Sales	Value	1-91
	332	Metal-working machine tools		Sales	Value	7-29
	333	Pumps, valves and compressors		Sales	Value	7-93
	334	Industrial engines		Sales	Value	2-93
	335	Textile machinery and accessories		Sales	Value	4-09
	336	Construction and earth-moving equipment		Sales	Value	5-14
	337	Mechanical handling equipment		Sales	Value	6-31
	338	Office machinery		Sales	Value	3-69
	339	Other machinery	Mining machinery Printing, bookbinding and paper goods machinery Refrigerating machinery (except domestic type refrigerators) and space-heating, ventilating and air-conditioning equipment Scales and weighing machinery and portable power tools Food and drink processing machinery and packaging and bottling machinery Miscellaneous (non-electrical) machinery	Sales Sales Sales Sales Sales Sales Sales Sales	Value Value Value Value Value Value Value Value	1-89 1-86 4-22 1-97 2-78 9-08 21-80
	341	Industrial (including process) plant and steelwork		Sales	Value	20-07
	342	Ordnance and small arms	Weapons and ammunition Armoured fighting vehicles	Sales Sales	Value Value	0-92 0-54 1-46
	349	Other mechanical engineering not elsewhere specified	Ball and roller bearings Precision chains and other mechanical engineering products	Sales Sales	Value Value	5-77 12-00 17-77
VIII		Instrument engineering				14-91 Estimated net output in 1970, £280.2 million
	351	Photographic and document copying equipment		Sales	Value	1-46

1 Monthly unless otherwise stated. (Q for quarterly, A for annual.)
* Business Statistics Office quarterly inquiry used.

XI (cont.)	381 (cont.)	Public service vehicles 8-15 seating capacity Single deck Double deck Parts and accessories	Production " Deliveries	Number " Value	Sales*	Quantity Value	0-14 0-47 0-13 20-63 44-85
	382	Motorcycle, tricycle and pedal cycle manufacturing			Sales*	Quantity Value	0-89 0-44
	383	Aerospace equipment manufacturing and repairing	Change in numbers employed and hours worked	A	Production	Value	19-81
	384-5	Locomotives and railway track equipment, carriages etc		Q	Sales*	Value	3-35
XII		Metal goods not elsewhere specified					47-85 Estimated net output in 1970, £899.1 million
	390	Engineers' small tools and gauges	Sales	Q	Sales*	Value	6-68
	391	Hand tools and implements	Sales	Q	Sales*	Value	1-45
	392	Cutlery, spoons, forks and plated tableware, etc		Q	Sales*	Value	1-41
	393	Bolts, nuts, screws, rivets etc	Sales	Q	Sales*	Value	3-57
	394	Wire and wire manufactures	Sales				3-71
	395	Cans and metal boxes	Sales	Q	Sales*	Value	2-09
	396	Jewellery and precious metals		Q	Sales*	Value	1-84
	399	Metal industries not elsewhere specified	Sales Sales Sales Sales	Q Q	Sales* Sales*	Value Value	1-36 2-60 1-61 21-53 27-10
XIII		Textiles					48-89 Estimated net output in 1970, £918.6 million
	411	Production of man-made fibres	Production " Weight " "				0-62 0-63 3-63 0-55 0-09 1-57 7-09
	412	Spinning and doubling on the cotton system and texturing of man-made continuous filament yarns	Production " Deliveries	Q	Sales*	Quantity	3-09 0-83 1-80 5-72
	413	Weaving of cotton, linen and man-made fibres	Production " "	Q Q	Sales* Sales*	Quantity Quantity	0-24 1-30 1-47 0-57 0-04 3-62

†Monthly unless otherwise stated. (Q for quarterly, A for annual.)
*Business Statistics Office quarterly inquiry used.

Standard Industrial Classification

Order	Minimum List Heading	Industry	Series	Provisional figures			Final figures			Weight per 1,000	Remarks
				Type of indicator	Unit	Period of series †	Type of indicator	Unit	Period of series †		
XIII (cont.)	414	Woolen and worsted	Wool and hair tops Man-made fibre tops Woolen fabrics Blankets Worsted fabrics Woolen yarn Worsted yarn, predominantly of Wool and hair Man-made fibre	Production " Deliveries " Deliveries " Deliveries " " " "	Weight " Area " " " Weight " " " "						
	415	Jute				Q	Sales*	Value		0.55	
	416	Rope, twine and net				Q	Sales*	Value		0.44	
	417	Hosiery and other knitted goods	Hosiery Other knitted goods and weft knitted fabrics Warp knitted fabrics and other warp knitted goods	Sales " " " "	Value " Weight " "	Q	Sales*	Value		2.24 5.75 1.31	9.30
	418	Lace				Q	Sales*	Value		0.39	
	419	Carpets				Q	Sales*	Value		3.90	
	421	Narrow fabrics				Q	Sales*	Value		1.04	
	422	Made-up textiles	Household textiles Canvas goods and sacks etc			Q Q	Sales* Sales*	Value Value		0.89 0.64	1.53
	423	Textile finishing				Q	Sales*	Quantity and Value		4.01	
	429	Other textile industries	Asbestos Other	Sales Employment	Value Numbers	Q	Sales*	Value		2.25 0.47	2.72
XIV		Leather, leather goods and fur								3.41	Estimated net output in 1970, £64.0 million
	431	Leather (tanning and dressing) and fellmongery	Leather tanning and dressing Fellmongery			Q Q	Sales* Sales*	Quantity Quantity		1.75 0.14	1.89
	432	Leather goods				Q	Sales*	Value		1.02	
	433	Fur				Q	Sales*	Value		0.50	
XV		Clothing and footwear								23.77	Estimated net output in 1970, £446.7 million
	441	Weatherproof outerwear		Sales	Value	Q	Sales*	Value		1.07	
	442	Men's and boys' tailored outerwear		Sales	Value	Q	Sales*	Value		4.69	
	443	Women's and girls' tailored outerwear		Sales	Value	Q	Sales*	Value		2.73	
	444	Overalls and men's shirts, underwear, etc		Sales	Value	Q	Sales*	Value		1.99	
	445	Dresses, lingerie, infants' wear, etc		Sales	Value	Q	Sales*	Value		4.57	
	449/1, 3, 4	Dress industries not elsewhere specified	Corsets and miscellaneous dress industries	Sales	Value	Q	Sales*	Value		1.69	
	446	Hats, caps and millinery				Q	Sales*	Value		0.37	
	449/2	Dress industries not elsewhere specified	Gloves			Q	Sales*	Value		0.37	

Standard Industrial Classification			Provisional figures			Final figures			Remarks
Order	Minimum List Heading	Industry	Type of indicator	Unit	Period of series †	Type of indicator	Unit	Weight per 1,000	
XVIII (cont.)	485-6	Printing, publishing of newspapers and periodicals	Consumption of newsprint	Tonnes	Q	Sales*	Value	18.86	
	489	Other printing, publishing, bookbinding, engraving, etc			Q	Sales*	Value	21.78	
XIX		Other manufacturing						31.03	Estimated net output in 1970, £583.1 million
	491	Rubber	Tyres and tubes	Tonnes	Q	Production	Quantity	6.18	
	492	Linoleum, plastics floor-covering, leather cloth, etc	Other rubber goods	"	Q	Sales*	Value	7.13	13.31
	493	Brushes and brooms			Q	Sales*	Value	1.95	
	494	Toys, games, children's carriages and sports equipment			Q	Sales*	Value	0.70	
	495	Miscellaneous stationers' goods			Q	Sales*	Value	2.65	
	496	Plastics products not elsewhere specified	Sales of synthetic resins and plastics materials		Q	Sales*	Value	0.26	2.91
	499	Miscellaneous manufacturing industries			Q	Sales*	Value	1.28	
XX		Construction						1.40	
	500	Construction	Great Britain: new work repairs and maintenance Northern Ireland		Q	Work done	Value	105.32	
					Q	Work done	Value	37.00	
					Q	Work done	Value	3.83	146.15
XXI		Gas, electricity and water						71.85	Estimated net output in 1970, £1,350.0 million
	601	Gas	Coke produced at gasworks Gas sent out Construction by the gas industry's own employees	Tons Therms	Q	Production Supply	Value	0.64 13.75 0.62	15.01
	602	Electricity	Electricity sent out Construction by the electricity industry's own employees	KWH	Q	Supply	Value	46.64 2.45	49.09
	603	Water supply	Average daily supply of water Construction by the water supply industry's own employees		Q	Supply	Volume	7.18	
					Q	Work done	Value	0.57	7.75

†Monthly unless otherwise stated. (Q for quarterly, A for annual.)

*Business Statistics Office quarterly inquiry used.

APPENDIX II

Series and weights used in analysing the index of industrial production by market sector

Series and weights used in analysing the index of industrial production by market sector

APPENDIX II

Intermediate goods industries (cont.)

Formulated pesticides, etc.	1-02
Printing ink	0-67
Iron and steel	33-71
Iron castings, etc.	9-36
Aluminium and aluminium alloys	4-88
Copper, brass and other copper alloys	5-75
Other base metals	3-25
Ordinance and small arms, excluding vehicles	0-92
Hand tools and implements	1-45
Cutlery, spoons, forks and plated tableware, etc.	1-41
Bolts, nuts, screws, rivets, etc.	3-57
Wire and wire manufactures	3-71
Cans and metal boxes	2-09
Drop forgings, etc.	2-60
Miscellaneous metal goods n.e.s.	21-53
Production of man-made fibres	7-09
Spinning and doubling on the cotton and flax systems	5-72
Weaving of cotton, linen and man-made fibres	3-62
Woolen and worsted	8-58
Jute	0-55
Rope, twine and net	0-44
Lace	0-39
Narrow fabrics (not more than 30 cm. wide)	1-04
Textile finishing	4-01
Asbestos	2-25
Leather (tanning and dressing) and fellmongery	1-89
Bricks, fireclay and refractory goods	4-50
Glass	7-05
Cement	1-82
Abrasives and building materials, etc. n.e.s.	10-01
Timber	8-04
Shop and office fitting	2-97
Wooden containers and baskets	1-27
Miscellaneous wood and cork manufactures	1-45
Paper and board	8-19
Packaging products of paper, board and associated materials	7-89
Manufactured stationery	3-80
Rubber	13-31
Water supply (excluding construction work)	7-18
Total intermediate goods industries	362-38
All industries other than construction	850-21
<i>Construction (including gas, electricity and water construction)</i>	<i>149-79</i>

Consumer goods industries (cont.)

<i>Non-durable: Other</i>	77-22	279/4
Pharmaceutical chemicals and preparations	9-39	279/5
Toilet preparations	2-34	311-312
Soap and detergents	2-42	313
Polishes	0-79	321
Surgical bandages, etc.	1-39	322
Photographic chemical materials	1-67	323
Soft furnishings	0-73	342 (part)
Manufacturers of paper and board n.e.s.	3-48	391
Printing, publishing of newspapers and periodicals	18-86	392
Other printing, publishing, bookbinding, engraving, etc.	21-78	393
Brushes and brooms	0-70	394
Toys, games, children's carriages and sports equipment	2-91	395
Miscellaneous stationers' goods	1-28	399/5
Plastics products n.e.s.	9-48	399 (part)
		411
		412
		413
		414
		415
		416
		418
		421
		423
		429/1
		431
		461
		463
		464
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		471
		474
		475
		479
		481
		482
		483
		491
		603 (part)
Total consumer goods industries	249-61	
Investment goods industries	56-66	
<i>Electrical</i>		
Photographic and document copying equipment	1-46	
Scientific and industrial instruments and systems	10-35	
Electrical machinery	13-19	
Insulated wires and cables	5-29	
Telegraph and telephone apparatus and equipment	5-97	
Radio and electronic components	9-97	
Electronic computers	2-60	
Radio, radar, and electronic capital goods	7-83	
<i>Transport</i>		
Military vehicles	0-54	
Shipbuilding and marine engineering	16-12	
Wheeled tractor manufacturing	3-11	
Commercial vehicles	9-42	
Components and accessories for motor vehicles	20-63	
Aerospace equipment manufacturing and repairing	19-81	
Locomotives and railway track equipment, etc.	3-35	

APPENDIX III

Series and weights used in estimating the gross domestic product at constant factor cost

Standard Industrial Classification

Order	Minimum List Heading	Industry	Weight per 1,000	Annual series	Quarterly series (if different from annual series)
I		Agriculture, forestry, fishing	29.8		
	001	Agriculture and horticulture	27.2	Net output (before deducting depreciation) of agricultural and horticultural holdings, and of agricultural contractors, at constant prices	Interpolation and projection of the annual figures
	002	Forestry	1.2	0.6 Forest area 0.3 Area planted 0.3 Timber sold	Interpolation and projection of the annual figures
	003	Fishing	1.4	Landings of British taking : Weighted total of different types of fish	Landings of British taking : Unweighted total
II		Mining and quarrying	438.5	Index of industrial production ¹	
III-XIX		Manufacturing			
XX		Construction			
XXI		Gas, electricity and water			
XXII		Transport and communication			
	701	Railways	11.4	British Railways : Number of passenger-miles : 2.5 Full fare 1.3 Reduced fare 0.9 Season tickets Number of freight net ton-miles : 2.0 Coal and coke 0.8 Iron and steel 1.5 Other traffic 0.8 Parcels receipts, deflated 0.5 Mail : Number of letters posted and parcels carried 1.1 London Transport railways : Number of passenger-miles	Number of passenger journeys Parcels and mail, receipts deflated Number of passenger journeys
	702	Road passenger transport	10.2	1.1 London Transport road services : Number of passenger-miles 2.6 National Bus Company : Number of passenger journeys 0.5 Scottish Bus Group : Number of passenger journeys 1.3 Municipal operators : Number of passenger journeys 0.9 Passenger transport executives : Number of passenger journeys 1.3 Other operators : Number of passenger journeys 2.5 Taxis and private hire cars : Consumers' expenditure at constant prices	All operators : Total number of passenger journeys
	703/704	Road haulage	13.6	Number of ton-miles : hire and reward	Index of ton-miles for all road goods transport
	705	Sea transport	8.1	4.4 Tankers : Ton-miles of UK seaborne trade carried by UK registered vessels Dry cargo : Freight receipts of vessels in foreign trade deflated by indices of freight rates : 2.7 Liners 0.4 Tramps Passenger movement by Commonwealth ships (assumed that proportion of passengers carried by British ships is constant) : 0.1 Between UK and Continent 0.5 Between UK and other countries	Interpolation and projection of the annual figures
	706	Port and inland water transport	5.2	4.8 Volume indices for imports and exports 0.4 Inland waterways : net ton-miles	

¹ See Appendix I

Standard Industrial Classification

Order	Minimum List Heading	Industry	Weight per 1,000	Annual series	Quarterly series (if different from annual series)
XXII (cont.)	707	Air transport	5.5	All scheduled services : Number of passenger-kilometres : 1.9 International 0.5 Domestic Number of tonne-kilometres : 0.3 Mail 0.5 Freight Charter operations : Capacity tonne-kilometres flown Passengers arriving and departing from UK airports Freight uplifted and discharged at UK airports Aircraft movements at UK airports	
	708	Postal services and telecommunications	24.3	Post Office : 6.0 Number of letters and parcels posted 0.2 Number of postal orders cashed 0.5 Number of pensions and allowances paid ² 0.5 Number of savings bank and Giro transactions ² 0.1 Number of broadcast receiving licences issued ² 0.9 Number of overseas telegrams Number of telephone exchange connections : 2.5 Business 2.5 Residence Number of telephone calls : 5.2 Trunk 2.2 Local 1.1 International 0.2 Number of telex calls Number of private wire rentals : 0.5 Telephone 0.1 Telegraph 1.8 Number of telegrams handled by cable companies	Number of machine-counted letters and number of parcels
	709	Miscellaneous transport services and storage	6.3	Number in employment	
XXIII		Distributive trades	103.7		
	810	Wholesale distribution of food and drink	9.6	4.5 Volume of sales of independent food shops 1.0 Volume of sales of co-operative food shops 0.8 Volume of sales of restaurants, cafes, etc. 0.2 Volume of sales of canteens 1.9 Volume of sales of public houses 0.7 Volume of sales of licensed hotels 0.5 Volume of exports of food and drink	
	811	Wholesale distribution of petroleum products	5.8	5.5 Deliveries of petroleum products for inland consumption 0.3 Volume of exports of petroleum	
	812	Other wholesale distribution	10.8	1.9 Volume of sales of independent and co-operative clothing and footwear shops 1.6 Volume of sales of independent and co-operative durable goods shops 4.9 Volume of sales of independent and co-operative miscellaneous non-food shops 1.8 Volume of exports of manufactured and miscellaneous manufactured goods 0.3 Home deliveries of other paper and board 0.1 Home consumption of newsprint 0.2 Deflated sales of wholesale textile houses	
	820	Retail distribution of food and drink	20.5	9.4 Volume of sales of independent food shops 8.4 Volume of sales of multiple food shops 2.7 Volume of sales of co-operative food shops	
	821	Other retail distribution	42.2	4.6 Volume of sales of independent and co-operative clothing and footwear shops 4.2 Volume of sales of independent and co-operative durable goods shops 8.0 Volume of sales of independent and co-operative miscellaneous non-food shops 5.9 Volume of sales of multiple clothing and footwear shops 5.1 Volume of sales of multiple durable goods shops 6.3 Volume of sales of multiple miscellaneous non-food shops 3.4 Volume of sales of department stores 3.6 Volume of sales of mail order businesses 1.1 Deflated cost of National Health Service prescriptions	
	831	Dealing in coal, oil, builders' materials, grain and agricultural supplies	7.0	1.7 Separate indicators for domestic merchants' disposals of house coal and anthracite, boiler fuel and oil, for overseas shipments of coal, for coast-wise bunkers, and for some industrial consumption of coal	

² Representing agency services

Standard Industrial Classification

Order	Minimum List Heading	Industry	Weight per 1,000	Annual series	Quarterly series (if different from annual series)			
XXIII (cont.)	831 (cont.)			3.2	Index of industrial production for construction (Order XX)			
				2.0			Separate indicators for deflated value of farmers' purchases of fertilisers and feedingstuffs, for wheat and oats milled, and for total arable acreage under seed	
				0.1			Livestock (cattle two years old and over and sheep) on agricultural holdings	
	832	Dealing in other industrial materials and machinery		7.8	2.0	Index of industrial production for mechanical engineering		
					1.3			Index of industrial production for metal manufacture
					0.7			Index of industrial production for chemicals
					1.3			Index of industrial production for timber
					0.5			Separate indices of industrial production for textiles and leather
					1.2			Separate indicators for iron and steel scrap consumption at steel works and foundries, for home industrial consumption of scrap copper, zinc and lead, and for waste paper consumed by paper and board mills
					0.8			Volume of exports of industrial and electrical machinery
XXIV	Insurance, banking, finance and business services		82.5					
860	Insurance		13.0	6.2	Consumers' expenditure on life assurance at constant prices	} Interpolation and projection of the annual figures		
				6.8			Other insurances, total premiums deflated	
861	Banking and bill discounting		16.2	0.4	Number of cheques cleared			
				8.4			Total bank deposits deflated by total retail prices index	
				0.7			Amount remaining invested in national savings deflated by total retail prices index	
				6.7			Bank advances deflated by total retail prices index	
862	Other financial institutions		23.8	Building societies:				
				0.8	Number of mortgage advances			
				0.8	Value of mortgages outstanding deflated by price index of new houses			
				0.8	Total liabilities deflated by price index of new houses			
				Stockbroking:				
				British government securities:				
				Number of transactions:				
				6.5	Up to 5 years to maturity			
				7.2	Over 5 years and undated			
				Local authority securities:				
				Number of transactions				
				5.0	Stamp duty on share transfers deflated by index of share prices			
				Hire purchase:				
2.0	Balance of debt outstanding deflated by the durable goods retail prices index							
863	Property owning and managing, etc.		19.8	1.8	Transfer costs of land and buildings at constant prices, representing estate agents, etc.	} Interpolation and projection of the annual figures		
				18.0			Stock of commercial and industrial buildings at constant replacement cost, representing real estate industry	
864	Advertising and market research		0.1	Number in employment				
865	Other business services		5.9	Number in employment				
866	Central offices not allocable elsewhere		3.7	Number in employment				
XXV	Professional and scientific services		97.7					
871	Accountancy services		4.6	Number of Schedule D tax assessments:		} Number in employment in Order XXV (one indicator for the Order)		
				2.0	Individuals			
				0.6	Partnerships			
872	Educational services		41.7	Number of tax assessments on companies				
				2.0				
				21.8	Weighted index of teachers in maintained schools			
				8.1	Number of other local authority employees in education departments			
873	Legal services		5.9	4.0	Number of full-time teaching staff at universities			
				7.8	Others employed in education			
				Conveyancing:				
2.5	Number of mortgage advances							
Cases tried in Courts of Justice:								
1.0	Magistrates Courts							
0.9	Total all courts of first instance							
1.5	Number of grants of probate applied for by solicitors							

Standard Industrial Classification

Order	Minimum List Heading	Industry	Weight per 1,000	Annual series	Quarterly series (if different from annual series)				
XXV (cont.)	874	Medical and dental services	30.0	17.5	National Health Service hospitals index of current expenditure on goods and services at constant prices	Number in employment in Order XXV (one indicator for the Order)			
				0.5	Ante-natal, post-natal and child welfare clinics : Number of patients				
				0.5	Home-nursing : Number of patients				
				0.3	Health visits : Number of patients				
				0.3	Midwives : Number of home confinements and early discharges				
				0.7	Ambulance service : Patients carried				
				0.5	Mental health services : Number of cases				
				0.5	School medical service : Number of children inspected				
				3.4	Number of doctors on the Executive Council services list, representing general practice				
				1.6	Weighted average of number of dental treatments				
				4.2	Number employed in other medical services				
				875	Religious organisations		1.4	Number in employment	
				876	Research and development services		3.4	Number in employment	
				879	Other professional and scientific services		10.7	Number in employment	
XXVI	Miscellaneous services		69.9						
	881	Cinemas, theatres, radio, etc.	3.5	1.2	Number of admissions to cinemas				
				2.3	Number of television licences current				
	882	Sport and other recreations	5.5	Consumers' expenditure on other entertainment and sport at constant prices					
	883	Betting and gambling	2.1	Consumers' expenditure at constant prices					
	884	Hotels and other residential establishments	6.3	Deflated index of value of turnover					
	885	Restaurants, cafes, snack bars	9.3	Deflated index of value of turnover					
	888	Catering contractors							
	886	Public houses	3.4	Deflated index of value of turnover					
	887	Clubs	2.2	Deflated index of value of turnover interpolated and projected from periodic figures					
	889	Hairdressing and manicure	2.7	Consumers' expenditure at constant prices					
	891	Private domestic services	3.4	Number in employment	Interpolation and projection of the annual figures				
	892	Laundries	2.8	Consumers' expenditure at constant prices					
	893	Dry cleaning, etc.							
	894	Motor repairers, distributors, garages and filling stations	14.0	4.5	Deflated index of new motor vehicle sales				
				2.1	Deflated index of used motor vehicle sales				
				7.4	Deflated index of other sales				
895	Repair of boots and shoes	0.5	Consumers' expenditure at constant prices						
899	Other services	14.2	Number in employment						
XXVII	Public administration and defence		66.6						
	901	National government service	41.4	18.6	Armed services and women's services : Weighted index of strength	Number in employment			
				17.5	Non-industrial civil servants : Weighted index of staff				
				5.3	Industrial civil servants : Number in employment				
906	Local government service	25.2	6.6	Police : Weighted index of strength	Number in employment				
			1.5	Fire service : Weighted index of strength					
			17.1	Other local government service : Number in employment					
Ownership of dwellings		57.2		Consumers' expenditure on rent at constant prices, representing house ownership and occupation					

Standard Industrial Classification

Order	Minimum List Heading	Industry	Weight per 1,000	Annual series	Quarterly series (if different from annual series)
		Adjustment for financial services	-30.5		
861		Banking and bill discounting	-16.3	-8.3 Total bank deposits deflated by total retail prices index -1.4 Amount remaining invested in national savings deflated by total retail prices index -6.6 Bank advances deflated by total retail prices index	
862		Other financial institutions	-14.2	Building societies : -0.8 Number of mortgage advances -0.8 Value of mortgages outstanding deflated by price index of new houses -0.8 Total liabilities deflated by price index of new houses Stockbroking : British government securities : Number of transactions : -3.4 Up to 5 years to maturity -3.7 Over 5 years and undated -0.4 Local authority securities : Number of transactions -2.6 Stamp duty on share transfers deflated by index of share prices -1.7 Hire purchase : Balance of debt outstanding deflated by the durable goods retail prices index	

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