

STUDENTS BRIEF

Scottish Index of Production

Throughout the Quarterly Economic Commentary constant reference is made to the Scottish Index of Production (SIOP) reflecting its importance as an indicator of Scotland's industrial performance. The purpose of this Student's Brief will be to outline the construction of this index and to compare Scotland's performance relative to the UK Index of Production (UKIOP).

For reasons of comparability the formulation of the SIOP follows as closely as possible that adopted for the UKIOP. Both are examples of **quantity** or **volume** indices as opposed to a price index, of which the Retail Prices Index is perhaps the most widely used. The SIOP provides a measure of the relative change in industrial output, as measured in quantity terms, for a given year compared with the base year of the index. Currently both the SIOP and the UKIOP have 1975 as their base year (ie 1975 = 100). Thus an index value of 120 for an industrial sector in 1980 means that over the five year period since 1975 output has increased by 20%.

Coverage of both the indices is restricted to Orders II to XXI of the 1968 Standard Industrial Classification, which includes mining and quarrying, manufacturing, construction, gas, electricity and water but excludes the agriculture, forestry and fishing, and service sectors. A wide range of data series are consulted in the compilation of the SIOP. However it is not possible to obtain every data series expressed in the preferred quantity terms. When this occurs it is necessary to adopt either value series, expressed in current prices, from production, sales or delivery records, or in some cases input information based on the throughput of materials used in the production process as well as labour requirements. The most important source are the sales inquiries initiated by the Business Statistics Office. Using this data it has, since 1973, been possible to present the SIOP on a quarterly basis.

Ideally both the SIOP and the UKIOP are attempting to measure physical changes in output. Thus where value series are all that is available there are two important problems. Firstly these series, expressed in current prices, must be deflated by an appropriate price index to the level of prices of the base year for the SIOP. Unfortunately no separate Scottish price indices exist and in practice the UK wholesale price indices are applied. Secondly, whilst it is desirable that the value series should reflect value added over a sector's use of material inputs and labour services they typically are not available in this form. Rather, they tend to measure changes in the total value of output or of sales.

In addition to these problems there are some cases where no detailed Scottish series exists comparable with a UK series. Secondly, in some sectors, such as construction and shipbuilding, there are problems of measuring output since production of individual items in these sectors is spread over a long period, thus an assessment of output based on work in progress is made. (The references quoted at the of this article provide a more detailed description of the various data series used to construct the

SIOP.)

The formal calculation of the index number for each year is obtained from the following equation

$$SIOP_n = \frac{\sum [P_o Q_o (Q_n/Q_o)]}{\sum P_o Q_o}$$

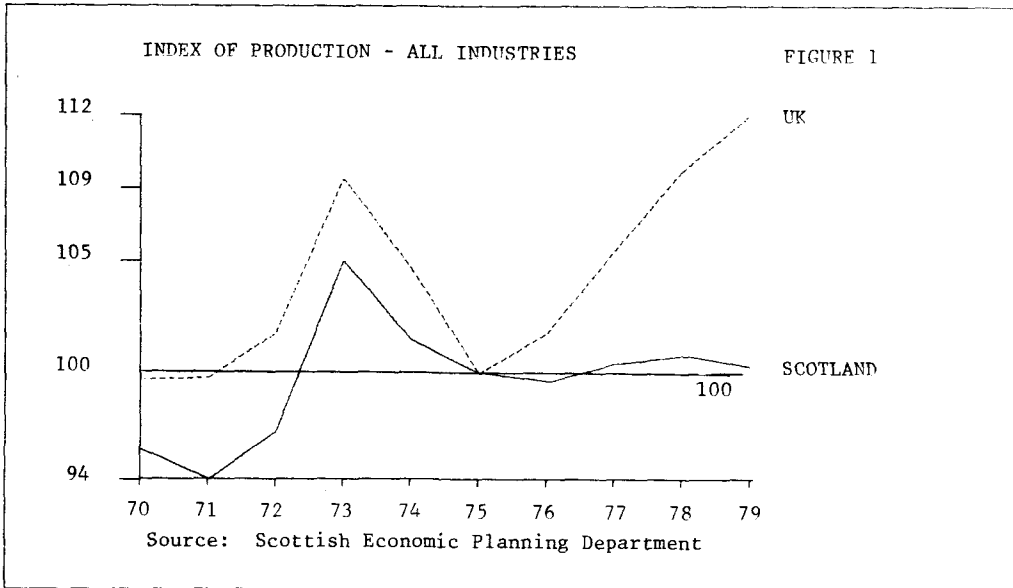
where $SIOP_n$ is the index in year n , $P_o Q_o$ is the net output in the base year and Q_n/Q_o is the ratio of the output indicator in year n relative to the equivalent indicator in the base year. As mentioned above the Q^1 measures are generally only available in the form of gross, rather than net, outputs. The summation (Σ) is made over all of the data series consulted for the index. Indices are compiled for individual sectors as well as for Scotland as a whole.

Rebasing

From time to time it becomes necessary to rebase the SIOP to take into account changes which are taking place in Scotland's industrial structure as well as to parallel the revisions introduced into the UKIOP. Accordingly the SIOP has been published in the past with a 1958, a 1970 and the current 1975 base. It must be emphasised that these "rebasing" exercises are quite different from the statistical procedure of "changing the base" or chain linking of two or more index series with different base years. (This latter technique is described in most of the basic statistical textbooks.)

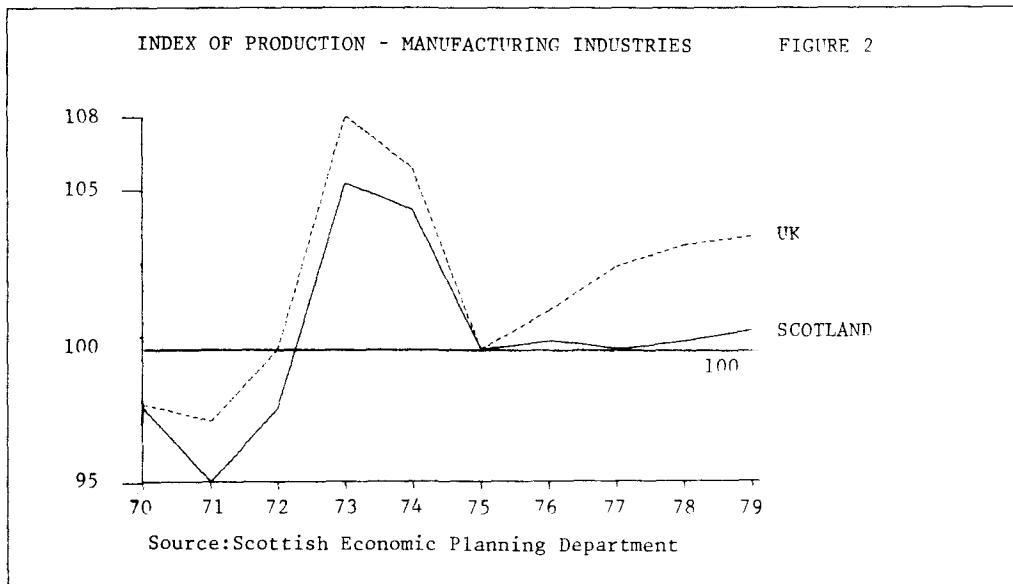
The essential component in the "rebasing" procedure is the revision of the weights used to generate the index numbers for each industrial sector. Typically most industrial sectors consist of firms producing a wide range of products and with each displaying differential rates of growth (or contraction). Under these circumstances a scaling factor (or "weight") is necessary to ensure that, for example, a large increase in the output of a minor product does not distort the index measure. The weights used in the SIOP are chosen to reflect the contribution of each industry to Scottish Gross Domestic Product (GDP) in 1975. The most important source for these detailed estimates is the 1975 Annual Census of Production. Briefly the method is firstly to estimate the share of each broad sector to Scottish GDP and then to use the Census of Production to obtain the detailed weights for each of the industries within each sectoral grouping in terms of gross outputs.

In the following sections the performance of the SIOP and the UKIOP are compared. Figure 1 summarises each index for all industries.



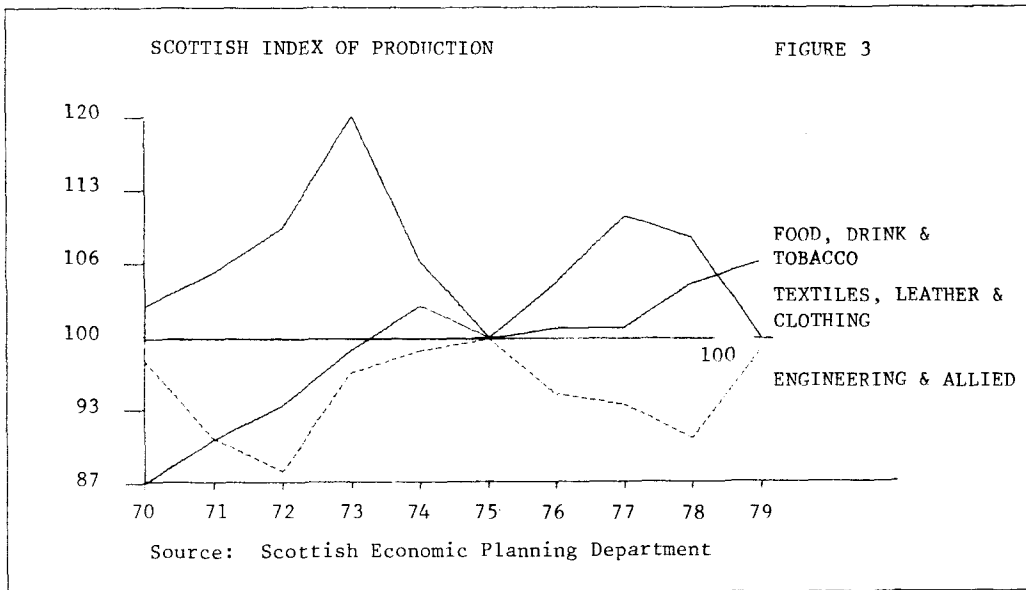
The graphs in Figure 1 show that both regions had been experiencing a fairly steady growth in output up to 1973, but this trend was reversed after the oil price rises of that year. Whilst the UK has been able to reverse this trend, such that by 1979 output for all industries was 12.6% higher than 1975 levels, Scotland has been less fortunate with 1979 output only 0.3% higher than 1975 levels. As far as the SIOP is concerned the discovery and exploitation of North Sea oil has introduced a number of problems in the compilation of the index. In particular it was recognised that the output of the oil sector, if attributed to Scotland would swamp the index, especially for the index values relating to the mining and quarrying sector. The Scottish Office has resolved this dilemma by using employment in oil activities offshore as a surrogate measure of output in this sector. Offshore production is in fact assigned to UK rather than Scotland. Consequently the UK index value for mining and quarrying in 1979 is 295 whilst the Scottish equivalent is only 95.

The main component of the figures reported in Figure 1 are the manufacturing sectors which is shown in Figure 2.



The manufacturing sectors exhibit similar trends to the indices of All industries, however the revival in the UK manufacturing output is considerably more modest with 1979 output only 4.1% above the 1975 level.

The indices for individual sectors within manufacturing in Scotland are shown in Figure 3 below for three of the main manufacturing sectors. The Food, Drink and Tobacco sector, although affected by the downturn in the economy during the mid-1970's has been relatively successful in returning to a growth path, with 1978 output 5% above the base year levels. This experience contrasts markedly with Scottish Engineering and allied sectors which, although exhibiting a more modest expansion up to 1975 has experienced a serious decline in output to the end of the decade. In 1978 output was 9% below 1975 levels in Scotland but in 1979 recovered to the 1975 levels. This trend, if it continues would have serious consequences for the Scottish economy bearing in mind the dependence on heavy engineering



is predominantly of a lighter variety, is equally important and has been more successful in maintaining production levels despite the recession. Output in 1978 in the UK engineering sectors was only 1% below 1975 levels. Finally in this section Textiles, Leather and Clothing which prior to 1975 had been a fast growing sector, with, for example, 1973 output 20% above 1975 levels. The sector has managed to increase output 9% above 1975 levels in 1978, which is a much better performance than the UK industry, however in 1979 these output gains were lost and the sector returned to the 1975 levels.

REFERENCES

Each issue of the Scottish Economic Bulletin updates the Index of Production. In addition various issues have articles outlining developments in the compilation and rebasing of the index. These include:

1. Scottish Economic Bulletin, No 10, Summer 1976. Index of Industrial Production.
2. Scottish Economic Bulletin, No 12, Summer 1977. A Revised Index of Industrial Production for Scotland, 1958-1970.
3. Scottish Economic Bulletin, No 19, Autumn 1979. Index of Industrial Production for Scotland - Rebasing 1975.

The Scottish Abstract of Statistics 1980 has a brief description of the SIOP with a wide range of detailed tables, generally with the equivalent UK figures.