

THE NEW SCOTTISH INPUT-OUTPUT TABLES : THE IMPORTANCE OF  
UK AND FOREIGN TRADE FOR SCOTLAND \*

A great deal of recent analysis of the Scottish economy has been undertaken, especially since the discovery of oil in the North Sea injected a significant new element. One important piece of information has always been missing, however. Until recently, there existed no reliable data on Scottish trade with the rest of the UK, or with the rest of the world. In 1978, however, such estimates became available for the first time with the publication of a complete set of Input-Output Tables for the Scottish Economy (for 1973). These were the product of some three years' work by IBM, the Scottish Council Research Institute and the Fraser of Allander Institute.

While the results are obviously subject to the range of error usually associated with such exercises, they are striking enough to give us some interesting and novel insights into the nature of the Scottish economy. They have implications too for the ways in which regional policies might best be deployed in trying to overcome some of Scotland's perennial industrial problems, and perhaps also for the current constitutional controversies.

Scotland's Current Trading Behaviour

Total exports £3.9 billion in 1973 and total imports of £4.1 billion summarise Scotland's overall external trading position.

As they stand, the above figures are not very revealing (and may be affected by conditions peculiar to 1973 - for example in the oil industry). But additional information is available on the composition by industry of exports and imports and on the destination of exports. Table 1 provides an approximate breakdown of exports by destination.

TABLE 1

Export Destination 1973

| <u>Destination</u> | <u>% of Total Exports</u> |
|--------------------|---------------------------|
| Rest of UK         | 50                        |
| Other EEC          | 11.5                      |
| EFTA               | 4.5                       |
| North America      | 11.5                      |
| Sterling Area      | 7.5                       |
| Rest of World      | 15                        |

*Source : Scotland's Manufactured Exports 1974-77 SCRI, 1978*

A number of points arise from this Table: first, the massive but expected predominance of England as a market for Scottish exports, reflecting a common culture, common currency, and the general integration of these economies. Secondly, the North American market emerges as an important outlet for Scottish exports, in particular for exports of whisky. Finally, the proportion of exports to the EEC was relatively small in 1973, but might be expected to rise as trade barriers between member nations are removed.

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In terms of individual industries, the main trading sectors are given in Table 2.

TABLE 2

Trade by Individual Scottish Industries 1973

|                           | Main Exporters<br>(% of total<br>Scottish<br>Exports) | Absolute<br>Value of<br>Exports<br><br>(£m) |                           | Main Importers<br>(% of total<br>Scottish<br>Imports) | Absolute<br>Value of<br>Imports<br><br>(£m) |
|---------------------------|---|---|---------------------------|---|---|
| Textiles<br>& Clothing    | 11.2  | 434   | General<br>Engineering    | 11.4  | 470   |
| General<br>Engineering    | 10.2  | 393   | Electrical<br>Engineering | 10.5  | 434   |
| Food<br>Processing        | 10.0  | 388   | Textiles &<br>Clothing    | 10.0  | 410   |
| Electrical<br>Engineering | 10.0  | 387   | Metal<br>Manufacture      | 9.9   | 409   |

Source : Input Output Tables for Scotland 1973 Scottish Academic Press 1978

It is noteworthy that, in terms both of exports and imports, a small number of industries account for a large proportion of total trade. Indeed, at this level of aggregation it is in general the same industries which are large exporters and importers. Given the heterogeneous nature of these industry groups, it is difficult to reach firm conclusions on the reasons for their trade predominance, but evidence from other studies (1) suggests it may in part be a function of the pattern of ownership and control of industries that has developed in Scotland since the war, notably the presence of branch factories of major international companies, which may have a lower propensity to trade locally than indigenous firms; a measure at once of the success and of the failure of traditional regional policy.

The prominence of electrical engineering in the figures also illustrates this trend, it being par excellence the industry that was created 'from the ground up' in the postwar period by attracting plants mainly from England and North America. Similarly, the absence from the top league of the popularly stereotyped mainstays of Scottish exports - whisky and ships - bears further witness to the changes that have been wrought in the economy. In fact, in value terms, drink and tobacco exports together come only sixth, with £342m in 1973.

Further evidence on the trading behaviour of individual Scottish industries is given in Table 3, which shows the proportion of total output exported and imported.

(1) Firm J. 'Industrial Policy' in Mackay DI (Ed) Scotland 1980 Q Press 1977

TABLE 3

Proportions of Individual Industry Products Traded

|                              | <u>Exports/total<br/>domestic<br/>industry output</u> |                              | <u>Imports/total<br/>demand for<br/>industry product *</u> |
|------------------------------|---|------------------------------|--|
| Vehicles and<br>Aerospace    | 86.4  | Mining and<br>Quarrying      | 64.1   |
| Electrical<br>Engineering    | 86.8  | Electrical<br>Engineering    | 49.3   |
| Textiles,<br>Clothing        | 79.4  | General<br>Engineering       | 46.2   |
| Miscellaneous<br>Manufacture | 76.8  | Miscellaneous<br>Manufacture | 46.2   |
| Shipbuilding                 | 72.2  | Building<br>Materials        | 45.7   |
| Drink and<br>Tobacco         | 68.2  |                              |  |

Source : *Scottish Input-Output Tables plus imports of industry product*

The export column of Table 3 demonstrates clearly the export dependence of key Scottish industries and the classically 'open' nature of the economy. Such dependence emphasises the heavy reliance of the Scottish economy on external markets (much heavier than UK). Although the relative 'openness' of the Scottish economy has been known for some time, these figures present quantitative information as to the extent of such openness and raise serious questions as to the stability of these industries in changing world conditions, and in particular emphasises the need to examine critically changes in trading relationships with England (and the EEC) which might arise through constitutional changes. Several of the above industries, notably textiles, shipbuilding, and vehicles are already suffering from intense foreign competition in relatively static markets.

Despite data limitations, particularly the availability of trade information for 1973 alone, it appears as shown below that Scotland is unusually dependent on external trade, concentrated in a relatively small number of industries. Some individual industries, by their extreme reliance on non-local markets, are particularly vulnerable to emergent foreign competition and to agreements altering and restricting the volume of world trade.

The impact of constitutional changes such as are currently under debate on the nature of Scotland's trade is difficult to predict. Devolution as at present envisaged might be expected to have little impact, but more fundamental constitutional changes could significantly alter the pattern of Scotland's trade. In particular, an autonomous Scottish Government might negotiate new trade agreements, impose trade restrictions, or establish a separate currency. Freedom of action in all of these would of course be severely constrained by membership of international organisations such as GATT, the EEC and others. Currency alterations would be similarly constrained by existing trading relations with England. The examples of Ireland and England, Denmark and the rest of Scandinavia, and the Netherlands and Germany may apply. It is impossible to specify precisely the nature of such changes, but some idea of Scotland's hypothetical position as an independent trading nation can be derived by comparing Scotland's trade with that of other small developed economies.

## Comparison of Trade in Advanced Economies

A recent study (2) has suggested four characteristics of trade and production which may be shared by the majority of small open economies such as Scotland. These characteristics are:

- (i) A substantial dependence on foreign trade;
- (ii) A highly skewed pattern of industrial production;
- (iii) Dependence on natural resource based industry and trade;
- (iv) Exports predominantly dependent on one or two major markets.

These characteristics appear to provide a useful framework for analysis and therefore in this section each is examined in turn and empirical evidence for a number of countries, including Scotland compared and contrasted. McGilvray provides evidence for nine small economies, which he defines as countries with a population of less than ten million. To keep the comparison manageable, we have selected three of these - Denmark, Finland and Norway - for our comparison. To represent the other extreme, we also selected three large economies, the US, Japan and West Germany, in addition to Scotland and the UK. Finally, because the relationship between Canada and the US is in some respects similar to that between the rest of the UK and Scotland, we have also added Canada. Table 4 provides information on the relative size of the economies as measured in terms of working population. It also provides data on our first characteristic, the dependence of the small economy on foreign trade.

TABLE 4

### Trade dependence

|              | <u>Working Population<br/>(Employees in<br/>Employment 'ooo)</u> | <u>Exports as<br/>percentage<br/>of GDP</u> | <u>Imports as<br/>percentage<br/>of GDP</u> |
|--------------|--|---|---|
| US           | 85,936   | 8.5   | 8.8   |
| Japan        | 52,010   | 13.8  | 14.5  |
| West Germany | 25,705   | 28.6  | 24.3  |
| UK           | 24,767   | 28.2  | 33.1  |
| Canada       | 9,137  | 26.2  | 26.1  |
| Denmark      | 2,355  | 35.9  | 38.7  |
| Finland      | 2,229  | 30.1  | 34.4  |
| Scotland *   | 2,084  | 60.6  | 64.5  |
| Norway       | 1,659  | 44.2  | 46.0  |

Sources : U N Yearbook of National Accounts 1975  
I L O Yearbook 1975  
Scottish Input Output Tables 1973

\* Including 'exports' to and 'imports' from other parts of the UK

A clear inverse relationship between size and external trade dependence emerges from the Table. The larger economies export and import a smaller proportion of their Gross Domestic Product than the smaller economies. The substantial dependence of small open economies on external trade is established. Scottish dependence on trade appears from the Table to be exceptionally large and may be explained, as mentioned in the introduction, both in terms of the unique interrelationship between England and Scotland - in essence inter-regional trade - and the historical dependence of the UK itself on international

trade. The interrelationship between England and Scotland does, of course, result in the elimination of all hindrances to trade. The lack of customs barriers and tariff and quota protection, and the absence of nearly all kinds of 'non-tariff' limitations, in addition to a common currency and cultural affinity resulting from a common language have all helped to promote specialisation and exchange between the different regions of the UK. The historical dependence of the UK on international trade may be seen in the high trade dependence of the UK for a country of this size. Inter-regional trade with other parts of the UK amounts to approximately half of the Scottish total. If this is omitted, Scotland's dependence on external trade drops to about the level of Finland, although even given an independent Scotland, it is improbable that the present interregional trade would disappear entirely, given that many of the cultural and economic bonds between the two countries would presumably continue to exist over a long period. Certainly, the experience of Eire suggests that Scotland's export dependence on the rest of the UK may decline over time, but it is probable that the UK would remain a (if not the) major trading partner of the independent Scotland.

Evidence on the second characteristic, the highly concentrated pattern of industrial production, is provided in Table 5. McGilvray argues that for 'typical' small economies a few industries account for a high proportion of total industrial production, but the Table indicates that the validity of this hypothesis depends on the way in which concentration is measured. Two alternative measures of industrial concentration are presented.

TABLE 5

Industrial Concentration

Percentage of total Manufacturing Industry accounted for by the four largest manufacturing industries

|              | <u>On Employment Basis</u> | <u>On Gross Output Basis</u> |
|--------------|----------------------------|------------------------------|
| US           | 29.8                       | 45.9                         |
| Japan        | 41.4                       | 40.6                         |
| West Germany | 45.5                       | 41.5                         |
| UK           | 41.4                       | 39.3                         |
| Canada       | 29.8                       | 45.9                         |
| Denmark      | 42.3                       | 51.4                         |
| Finland      | 41.2                       | 58.9                         |
| Scotland     | 47.6 *                     | 47.5 *                       |
| Norway       | 46.8                       | 50.4                         |

Source : U N Yearbook of National Accounts 1975

\* Scottish Input Output Tables 1973

The first measures the percentage of total manufacturing employment accounted for by the four largest manufacturing industries. The second measures this percentage in terms of gross output. On the basis of the employment measure, it is not evident that small countries necessarily have to have this more concentrated pattern of industrial production than large countries, although Scotland and Norway do show slightly higher concentration than any of the other countries. The gross output measure, however, which shows the proportion of a country's total output produced by the four largest manufacturing industries, indicates the existence of an inverse relationship between size and industrial concentration. The relationship is not exact, for the USA, the largest economy, is more concentrated than Japan, West Germany and the UK, but overall the larger economies are less concentrated than the smaller economies, such as Finland and Denmark. One possible reason for the apparent disparity between the two concentration measures arises from the nature of production in individual countries. The four largest manufacturing industries in the USA are

capital intensive, producing more in terms of the proportion of total output than their share of total employment might suggest. Similarly, Finland's largest industries are capital intensive, relative to the rest of her industry. The statistics do not, of course, allow for a comparison of capital intensity between countries. Even if Finland's four largest industries were identical to those of the US there is nothing in the data to suggest that her level of capacity intensity is the same, and indeed it is likely that US industry in general would have a higher capital intensity than Finland. Clearly the case for McGilvray's characteristic cannot be regarded as proven on the basis of the data contained in Table 5, since the alternative measures of concentration give somewhat different results. Further work on this area, covering more countries and alternative concentration measures, would therefore be justified, but beyond the scope of the present paper. McGilvray's characteristic therefore seems broadly true, especially in the Gross Output terms. Additional evidence on the skewed nature of industrial production can be gained from a comparison of Scotland and the UK. Table 6 compares Scottish and UK industry by means of a measure termed the Location Quotient, which indicates whether a region (in this case Scotland) is relatively specialised or deficient in certain industries, compared with the UK as a whole. The Location Quotient (LQ) is the ratio of two proportions; the numbers employed in a particular Scottish industry as a proportion of total Scottish employed, divided by the numbers employed in a particular UK industry as a proportion of total UK employment.

An LQ of unity indicates that the proportion of Scottish workers in a given industry is the same as that in the UK as a whole. An LQ greater than one for an industry means that Scotland is relatively specialised in that industry, while an LQ of less than one implies that Scotland is relatively deficient in that trade. At the aggregate level it appears that Scotland is relatively specialised, as one might expect, in the primary sector, and in construction. The figures for manufacturing and services indicate little difference in these sectors from the position for the UK as a whole. (It must be emphasised that small differences from unity, particularly for a single year, are unlikely to be significant since short term and random fluctuations may occur). At a less aggregate level the Table also provides LQ's for a variety of other industries. The list is not exhaustive, but does include most of the major industries (in terms of employment) in Scotland and the UK. At SIC level, Scotland does not show any extreme degree of industrial specialisation but at the MLH level, a more disaggregated industry classification, considerable variation between Scotland and the rest of the UK is evident. The most extreme is the 7.54 quotient for wines and spirits, reflecting the importance of distilling in the Scottish economy, but several coefficients of two or more reflect diversity between the UK and Scotland. At the other extreme, the very low quotients for footwear, plastics, man-made fibres and business services for Scotland are striking.

Overall, we may conclude that the aggregate analysis hides significant differences in the UK and Scotland's industrial structure. In particular, Scotland, despite all the changes, is still a relative specialist in what have been declining trend industries, notably primary, shipbuilding and major sectors of textiles, and deficient in some of the newer fast-growing industries. Of particular significance, perhaps, is the low rating of business service since this includes R & D activity. (Some caution must be used in drawing conclusions here, however - any increase in disaggregation must by its very nature increase the apparent industry difference between regions).

In addition to the two characteristics discussed above, McGilvray argued that many small economies are characterised by a dependence on natural resource-based industries in both trade and production, and by a high geographic concentration in trading markets. Dealing first with the dependence on natural resource-based industries in production and trade, Table 7 provides data for our countries and their dependence on natural resources. In this Table, these industries are defined as agriculture (including forestry and fishing), mining and quarrying, and food, drink and tobacco. Other definitions are possible,

Table 6

Differences between Scottish and UK Industry Location Quotients

| <u>Industry Breakdown:</u> | <u>Aggregate</u> | <u>LQ</u> | <u>SIC</u>                     | <u>LQ</u> | <u>MLH</u>             | <u>LQ</u> |
|----------------------------|------------------|-----------|--------------------------------|-----------|------------------------|-----------|
| Primary                    |                  | 1.20      | Primary                        | 1.34      | Wines and Spirits      | 7.54      |
| Manufacturing              |                  | 0.94      | Food, Drink and Tobacco        | 1.41      | Shipbuilding           | 2.54      |
| Construction               |                  | 1.40      | Vehicles                       | 0.55      | Computers              | 2.18      |
| Services                   |                  | 0.99      | Other Metal Goods              | 0.60      | Carpets                | 2.18      |
|                            |                  |           | Shipbuilding                   | 2.54      | Paper and Board        | 2.00      |
|                            |                  |           | Miscellaneous Manufacture      | 0.55      | Hotels                 | 1.98      |
|                            |                  |           | Construction                   | 1.40      | Man-made Fibre         | 0.37      |
|                            |                  |           | Insurance, Banking and Finance | 0.71      | Footwear               | 0.18      |
|                            |                  |           |                                |           | Miscellaneous Plastics | 0.32      |
|                            |                  |           |                                |           | Business Services      | 0.51      |

Location Quotient based on employment in 1974.

$$\frac{\text{Employment in the Scottish Industry} / \text{Total Scottish Employment}}{\text{Employment in the UK Industry} / \text{Total UK Employment}}$$

Source: *British Labour Statistics*. HMSO 1976

with hotels and leisure, leather and fur, textiles and shipbuilding all being possible candidates. The dependence on natural-resource-based industries is measured once more in terms of employment \*. The US, for example, has 7% of its labour force employed in agriculture, mining and food industries in contrast to Finland's 46.8% of the labour force in the same industries.

TABLE 7

Natural Resource Dependence

|              | <u>Percentage of the workforce employed in natural resource based industries</u> | <u>Percentage of the exports accounted for by natural resource based products</u> |
|--------------|--|---|
| US           | 7.0  | 31.9  |
| Japan        | 14.4   | 4.1   |
| West Germany | 11.3   | 10.3  |
| UK           | 7.4  | 14.6  |
| Canada       | 6.4  | 50.2  |
| Denmark      | 12.8   | 42.9  |
| Finland      | 46.8   | 23.8  |
| Scotland     | 8.7  | 22.4  |
| Norway       | 14.0   | 26.5  |

Sources : *UN Yearbook of Labour Statistics 1976*  
*OECD Labour Force Statistics 1963-74*  
*OECD Foreign Trade Statistics, Ser. A 1975*  
*Scottish Input Output Tables 1973*

Leaving aside Finland as an extreme case, there is little evidence to support the hypothesis that small countries are characterised by a high dependence on their natural resources in production. Japan has a higher dependence than either Denmark or Norway. Indeed, cursory examination of some other developed and successful small economies (for example Singapore, the Netherlands), reveals no such heavy resource-dependence, unless strategic location were to be so defined. As regards trade, the evidence is slightly more favourable. The Table shows the percentage of exports accounted for in 1974 by natural resource based products to the exports of both Canada and the US. In general though, the contribution of natural resource based exports is higher for the small countries than for the larger industrialised countries such as Japan and West Germany.

Scotland's dependence on natural resource based industries as compared to the UK as a whole is explored in more detail in Table 8 below. More industries are included in the definition 'natural resource-based', although it may be seen in almost any definition that Scotland is more dependent on such industries than the UK as a whole. Over time this dependence has been decreasing as the relative importance of such traditional industries has diminished, but it is likely to increase in the future in consequence of oil and gas.

\* This may be misleading if a country produces high value natural resource products with relatively little labour.



TABLE 8

Dependence on Natural Resource Based Industries

|                                    | Percentage of Scottish<br>Workforce employed in |             | Percentage of UK<br>Workforce in 1974 |
|------------------------------------|---|-------------|---------------------------------------|
|                                    | <u>1969</u>                                     | <u>1974</u> |                                       |
| Agriculture, Forestry<br>& Fishing | 2.9   | 2.4         | 1.8                                   |
| Mining and Quarrying               | 2.0   | 1.6         | 1.5                                   |
| Food, Drink and Tobacco            | 5.2   | 4.7         | 3.3                                   |
| Shipbuilding                       | 2.2   | 2.1         | 0.8                                   |
| Textiles                           | 4.4   | 3.3         | 2.6                                   |
| Leather and Fur                    | 0.2   | 0.1         | 0.2                                   |
| Hotels etc.                        | 1.8   | 2.2         | 1.1                                   |
|                                    | <u>18.7</u>                                     | <u>16.4</u> | <u>11.2</u>                           |

Source : *British Labour Statistics 1974*

By 1974 oil-related industry accounted for 1.2% of all Scottish employees (3) distributed over a number of activities.

Dependence on natural resources brings with it both benefits and problems. In particular, the impact of World commodity price fluctuations and the prospects of exhaustion of supplies with concomitant increasing marginal extraction costs are potential problems.

The final characteristic of small economies suggested above was a highly biased direction of trade whereby one or two countries provide the major outlets for the small countries' exports. Evidence on the percentage of exports absorbed by the two largest markets presented in Table 9 provides evidence on this hypothesis.

TABLE 9

Trade Concentration

|              | Percentage of Exports<br>Absorbed by two<br><u>largest markets</u> | Measure of<br><u>Specialisation</u> + |
|--------------|--|---------------------------------------|
| US           | 31.1   | 48.5                                  |
| Japan        | 28.1   | 64.6                                  |
| West Germany | 22.0   | 43.5                                  |
| UK           | 16.6   | 43.1                                  |
| Canada       | 73.4   | 45.9                                  |
| Denmark      | 33.3   | 41.7                                  |
| Finland      | 34.9   | 56.4                                  |
| Scotland     | 60.0   | 44.6 *                                |
| Norway       | 34.1   | 46.5                                  |

+ Measure of Specialisation defined as exports of four largest commodity groups (SITC 2) as a percentage of all exports in 1974.

\* Four largest Input-Output exports as percentage of total (excluding services).

Source : UN Yearbook of Trade Statistics, 1974

There is a slight indication that small countries are more concentrated in their export markets, but care in interpretation is indicated, in view of the small difference between the US and Japan on the one hand and Denmark, Finland and Norway on the other. More interesting are the results for Scotland and Canada arising from the proximity to relatively large and culturally similar markets, the rest of the UK and the US respectively. It is perhaps surprising this is the only characteristic shared by these economies in view of their superficially similar trading position. Scotland appears to be more dependent on specific markets than other small countries and its trade may consequently be more at risk since localised recessions in its main markets could severely affect the Scottish economy.

An additional hypothesis that small countries concentrate on fewer commodities for export, an idea closely tied to the earlier discussion on the existence of a concentrated pattern of industrial production, is also considered in the Table. An export specialisation measure calculated as the proportion that exports of the four largest commodity groups represent of all the commodity exports indicates that there is little support for the hypothesis. The export specialisation of the larger economies is similar to that of the smaller economies although it is possible that significant differences have been hidden by the level of aggregation used (2 digit SITC).

Out of all this, a number of clear pointers emerge in respect of Scotland. First, it can reasonably be viewed as having, in high degree, a number of the characteristics of a 'typical' small economy. Prime among these are the very 'open' nature of the economy, as measured by the high contribution of trade (including or excluding inter-regional 'trade' within the UK) and the concomitant high dependence on exports for incomes and employment. When this is allied to the special feature (shared in our analysis only by Canada) of extreme dependence on the adjoining larger market (in our case, England) we see some possible implications for a Scottish controlled economic policy. A thorough discussion of these implications is beyond the scope of the present paper, but one or two points emerge quite clearly. Firstly, the openness of the Scottish economy in terms of external trade would make it very difficult to operate an effective internal policy of demand management, since domestic economic conditions would be heavily influenced by world market factors. It would, for example, be even more difficult for Scotland to boost domestic levels of activity in the fact of worldwide recession than it has proven for the UK as a whole. Maintenance of international competitiveness, and consideration of foreign exchange and balance of payments factors would be important aspects of the economic policy of such a small, open, nation state. Secondly, if, as suggested previously, the UK remained Scotland's major trading partner, then it could prove difficult for Scotland to improve its economic performance above that of the UK. This is of course a specific (but important) aspect of the type of constraint imposed on internal economic management discussed above.

Finally, the findings of the paper have implications for the operation of regional policy within the existing UK framework; i.e. policies which attempt to operate primarily through increasing regional aggregate demand may have limited effect on the Scottish economy since many of the expansionary benefits envisaged may in fact 'leak out' of the domestic economy because of its high propensity to import. On the other hand, policies aimed directly at improving Scottish firms' international competitiveness could be much more effective in the long run given the area's dependence on external markets.