MEASUREMENT AND GROWTH OF THE FOOD PRODUCTION AND DISTRIBUTION INDUSTRY IN IRELAND

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INTRODUCTION

In a modern economy each branch of economic activity is inter-linked with other branches of activity. Measuring any one sector of an economy therefore usually involves drawing more or less arbitrary boundaries around that sector. This problem is particularly acute in relation to the food industry. Varying definitions of that industry are in common usage, so that any attempt to measure the size and growth of the industry must first come to grips with the definitional issues involved.

In this paper a comprehensive definition of the food industry is arrived at and an attempt is made to identify the main sectors and resources which would comprise the food industry according to that definition. Furthermore, an attempt is made to measure the size and growth rate of the industry in value-added terms. The measurement of the industry embraces the main sectors in the food chain, namely, food retailing, food whole-saling, food processing, unprocessed exports sector, farming and fishing, and the agricultural input sector. It also includes an approximation of the value-added generated by successive sectors involved in supplying inputs to these sectors. The measurement is attempted for the years 1953 and 1972.

Some of the sectors, such as processing, are reasonably well quantified in published data so that their measurement posed relatively little problem. Others, however, such as the agricultural input sector, are relatively poorly documented and their measurement involved extensive manipulation of the limited data available. As a check on the overall measurement it was possible to compare the results of the calculations with the value of final demand for food. This check, as will be seen, lends more credibility to the results than might be assigned on the basis of the many assumptions that had to be employed in arriving at them*

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CONCEPTS AND DEFINITION OF THE FOOD INDUSTRY

In the Census of Industrial ProductionO) (CIP) there are ten food processing industries, each consisting of a number of establishments which are aggregated as an industry on the basis of usage of similar inputs. Each of these industries transforms farm-produced raw materials into a processed state in which they are ultimately consumed by humans either with or without further processing in the home or elsewhere. These industries are aggregated into the food industry group. This food industry group is often referred to as the food industry. This is a narrow view of what constitutes the food industry. Many resources other than those in the food processing industry are engaged in the provision of what is ultimately consumed by people as food.

On the other hand, there are many in the Physiocratic and Classical mould who regard the food industry as being virtually synonymous with agriculture in the sense of farming. At least they would regard agriculture as far more important to national welfare than other sectors concerned with the provision of food. This fundamentalist belief is widely held by farmers who generally regard other sectors involved in the provision of food as being dependent on agriculture (usually to its detriment), thus leading farming spokesmen to make quite unfounded claims about the "real" size or importance of agriculture in the economy. While one may argue with regard to the direction and degree of dependency as between sectors of the food industry, there can be little doubt that all sectors involved in the provision of food are totally dependent for their existence on the fact that there is a final demand for food.

Food, as used in this paper, is taken to mean food consumed by people excluding alcoholic and non-alcoholic beverages. The value of final demand for food consists of final domestic and export market expenditure on food and food raw materials and the value of increased stocks of food and food raw materials. In an open economy the value of exports such as fertiliser and animal feed, etc. — which would be regarded as intermediate products in a closed economy — must also be included in the value of final demand, since the demand for these products is derived from the final export demand for food and theii export value represents their final value realised within the country.

The value of final demand is totally accounted for in terms of income accruing to factor resources involved in the provision of what is ultimately consumed as food, and therefore provides a logical starting-point for the meaningful definition and measurement of any industry. Some of these factor resources, such as the manufacture of sacks for animal feed, may be very far removed from the final consumer of food; and some may earn only part of their incomes from the contribution they make to the provision of food. Some may reside abroad and any attempt at measuring the Irish food industry must exclude payments to these foreign resources.

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(1)   *Irish Statistical Bulletin,* "Census of Industrial Production Reports".

In input-output analysis the effects of a change in final demand can be traced throughout the economy. These effects are three types - direct, indirect, and induced^). Direct effects refer to the changes in output of all sectors directly required as inputs to satisfy the change in final demand. If, for example, the final demand for fruit- flavoured yogurt increases, then increases in the output of milk and fruit are required directly as inputs to satisfy this increased demand.

Indirect effects refer to the changes in output of all sectors indirectly required as inputs to satisfy the change in final demand. Thus, the increased output of animal feed necessary to produce the extra milk and the increased output of fertiliser which is required to grow the extra fruit would be some of the indirect effects of an increase in the final demand of fruit-flavoured yogurt.

Factor incomes are generated in the provision of both the directly and indirectly required inputs whether these inputs are products — such as fertiliser — or services — such as distribution. Factor incomes are also generated in a third way, namely, through the induced effects of an increase in the demand for food. Induced income effects refer to the factor incomes arising through expenditure of the incomes earned either directly or indirectly in providing food. When these incomes are spent, for example, on electrical products or educational services, they will generate further factor incomes in these areas.

These three income effects suggest a possible definition of the food industry. The industry could be defined as consisting of the aggregate value of direct, indirect, and induced factor incomes which are dependent on the final demand for food.

However, great conceptual and empirical difficulties would arise through attempting to include induced factor income as part of the industry which induces it. In addition, the extent of the induced effect does not vary by industry; whereas the amount and extent of domestic values-added generated through the production of a product are unique to each industry and depend on such things as the degree to which raw materials and capital are imported and on the degree of inter-industry linkage — where an industry is viewed in the CIP sense.

Induced factor incomes are therefore excluded and the food industry is defined as the aggregate value of domestic direct and indirect factor incomes which is dependent on the value of final demand for food. Included under this definition would be the obvious direct and indirect factor incomes generated in the economic activities which culminate in the provision of food at the level of final demand and whose aggregate value is incorporated in the value of that final demand.

Also included, however, would be the less obvious services such as those of university lecturers in agriculture and civil servants dealing with food regulations, since the services of such people are indirectly dependent on the final demand for food. Such resources play a part as inputs in contributing to the provision of food. However, their incomes are not incorporated in the value of final demand for food. This creates the difficulties of identifying all such resources and of measuring their incomes.

(2)   Copeland, J. and Henry, E. 1975, *-Irish Input-Output Income Multipliers,* Dublin: Economic and Social Research Institute, Paper No. 82.

Practical difficulties of measurement do not invalidate the foregoing definition. Because of these difficulties, however, it was not possible in this study to measure the full extent of the food industry according to this definition. Instead the domestic direct and indirect values; of factor incomes which are incorporated in the value of final demand for food were measured. The difference between the two definitions consists of the incomes of factor resources, such as the lecturers and civil servants referred to above, which contribute as inputs to the provision of food but whose returns are not incorporated in the value of final demand for food. The difference is likely to be small in relation to the size of the food industry as estimated here.

Apart from the problem that certain resources are excluded by virtue of this definition, there is also another problem associated with it which arises because of the nature of available data. The domestic market expenditure component of the value of final demand is derived using average retail food prices and therefore excludes the effects of higher food prices obtained in the catering industry by virtue of the services which caterers attach to food. Therefore, both for a definitional and a pragmatic reason, certain values-added are excluded from the measurement of the food industry attempted here.

In absolute terms the overall size of the Irish Food Industry according to the definition used here is given by the value of final demand less the value of imports in that value. Its overall size in relative terms is measured as the value of final demand less imports, expressed as a proportion of GDP. An attempt is made here to measure the value added of the food industry by sector for the two years 1953 and 1972 and to reconcile the total sectoral values-added with the value of final demand adjusted for imports.

Measurement of industries in accordance with this approach would have the advantage that the aggregate value-added of industries so derived would add up to the Gross National Product as conventionally derived. In addition, this approach would emphasise the multi-sectoral nature of industries, a fuller appreciation of which would help to avoid the implementation of policies for one sector which have harmful side-effects on other sectors. This aspect is of considerable importance in view of the many detrimental effects which the operations of the Common Agricultural Policy have had on the Irish food processing sector.

The measurement of value-added was done firstly for six main sectors — food retailing, food wholesaling, unprocessed exports, food processing, farming and fishing, and farm inputs. These estimates were called sectoral values-added. Secondly, an approximate estimate was made of the value-added generated in the provision of inputs to these and successive sectors. In both years, over 90 per cent of the adjusted value of final demand was accounted for by the aggregate sectoral and associated inputs values-added.

MEASUREMENT OF VALUE-ADDED

Sectoral size is measured in terms of value-added which comprises the value of sectoral wages and salaries, profits, and depreciation. In the measurement of the food industry the values-added in the various sectors were expressed, as far as possible, as factor cost rather than at market prices since the factor cost measurement is regarded as a better reflection of the 'true' cost than one at current market prices. Therefore, indirect taxation was excluded to a large extent in the estimation of value-added of those sectors to which it applied. Data were not readily available to remove it entirely. Conversely, the value of subsidisation was included where it applied; for example, the value of agricultural subsidies was included in estimating the value-added in agriculture.

Distributive value-added is generated in four of the main sectors, namely, food retailing, food wholesaling, unprocessed exports, and farm inputs. The general methodology was the same in each case and it is described firstly in general terms before applying it to estimate the value-added of particular sectors. Data and concepts of the census of distribution were used in this task.

Figure 1 shows the relationship between the concepts used in estimating sectoral and associated inputs value-added in distribution. The figure refers to a food distributor.

FIGURE 1: CONCEPTS EMPLOYED IN ESTIMATING SECTORAL AND ASSOCIATED INPUTS VALUE-ADDED IN FOOD DISTRIBUTION.
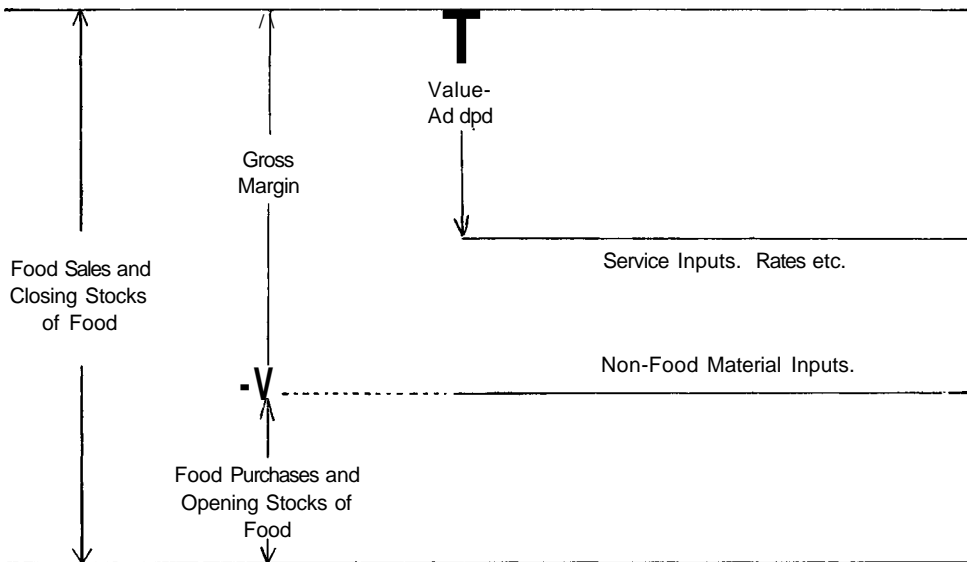
Gross margin is defined as sales and closing stocks less purchases and opening stocks. It consists of value-added plus the value of service inputs, non-food material inputs, and some indirect taxes such as rates and road tax.

Gross margin data are available from censuses of distribution but value-added data are not. Sectoral value-added was estimated by multiplying the gross margin by a ratio representing the proportion of value-added to gross margin. An estimate of this ratio was obtained from an input-output table pertaining to 1964(3) and from the CSO for the year 1969. Unfortunately it was not available for the years 1953 and 1972. In the absence of any indication of a strong trend in the ratios, the average of the two was taken and this was used in obtaining the 1953 and 1972 estimates.

The difference between gross margin and value-added comprises the value of service inputs, non-food material inputs, and some indirect tax items. No separate figures are given for these input values in the census of distribution reports. In the absence of separate data their combined input value was taken as consisting of domestically originating value-added. This is justifiable in the case of service inputs but not in the case of non-food material inputs. Service inputs would include postal and telephone charges, insurance costs, bank charges and interest payments, accountancy and legal fees, advertising, and purchased transport and storage services. Fuel and power and packaging contain a large import content and assuming that their input value consists totally of domestically originating value-added leads to an overestimation of the domestic value-added of associated inputs. Likewise no allowance was made for the indirect tax items such as rates so that the associated inputs value-added is not strictly at factor cost. For the distributive sector, rates may be a fairly large item. For manufacturing sectors the census of industrial production (CIP) reports give separate fuel and power and packaging data and for those sectors it was possible to allow for the import content of these inputs.

Retailing

A problem arose in relation to the measurement of value-added in food retailing because of the fact that food retailers do not engage exclusively in the sale of food. The absolute gross margins of food retailers as published in census reports could not therefore be taken as the gross margins earned on food retailing. The problem was dealt with by firstly estimating the value of food sales of food retailers and multiplying this by a weighted average percentage gross margin of food retailers.

When the attempt to measure the food industry was first undertaken the result of only one commodity analysis of retail sales, namely that of 1966, was available. This enabled a fairly firm estimate of retail food sales to be made for that year. Starting with the 1966 figure, retail food sales were estimated for each year in the period 1953 to 1972 by two methods. The first method involved changing the 1966 value of retail food sales by the rate of change in personal expenditure on food (excluding non-alcoholic beverage) as derived from the National Income and Expenditure Accounts. The second method

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(3) *Input-output tables for 1964,* Dublin; Stationery Office, 1970.

involved applying a weighted trend from ceiisal and inter censal enquiries to the 1966 figure. The weighted trend consisted of an index number derived by weighting the published index numbers of retail sales for the individual categories of retail food outlets by the distribution of food sales among them as obtained from the 1966 commodity analysis and summing the results. The value of retail food sales (excl. indirect taxation on food sales) using the first method was £77 m in 1953 and £197 m in 1972. The corresponding figures derived by using the second method were £80 m and £203 m.

Since that exercise was undertaken the results of the commodity analysis on the 1971 retail census results have been published so that it was possible to obtain a fairly firm estimate of food sales for that year also. The value of retail food sales in 1972 was obtained here by applying a weighted trend to the 1971 figure. The trend consisted of an index number derived by multiplying the published index numbers of retail sales for individual categories of retail food outlets by the relative distribution of food sales among them as obtained from the 1971 commodity analysis and summing the results. The resultant value of retail food sales in 1972 from this exercise was £195 m (excl. indirect tax). The two previous estimates obtained by applying trends to the 1966 figure were £197 m and £203 m. The average of the two estimates i.e. £78.5 m was taken fo^r 1953 while it was felt that the figure of £195 m was the best estimate for 1972.

The absolute gross margins earned on food retailing in 1953 and 1972 were obtained by multiplying estimated retail food sales in those years by weighted average percentage gross margins. The weighted percentage gross margin was derived for 1953 by multiplying the percentage gross margins of individual categories of food retailers in 1953 by the relative distribution of food sales among them in 1966 and summing the results. The 1972 percentage margin was estimated by calculating a series of weighted percentage average margins for the years 1968 to 1971, using the 1971 relative distribution of food sales between retail food outlets as weights and deriving the 1972 figure by extending the trend of this series. The weighted gross margin for 1953 was 13.90 per cent and that for 1972 was 18.83 per cent. The absolute gross margin earned on food retailing in 1953 was obtained as:-

$$13.90/100 \text{ x } £78.5 \text{ m } = £10.91 \text{ m}$$

and that for 1972 as:-

$$18.83/100 \text{ x } £195 \text{ m } = £36.72 \text{ m}$$

Sectoral value-added in food retailing was estimated by multiplying the previously calculated absolute gross margins by a ratio representing the proportion of gross margin accounted for by value-added. Estimates of these ratios were available for only two years, namely 1964 and 1969. In 1964 and 1969 this proportion was 93.0 per cent and 82.0 per cent respectively. The proportion of 93 per cent in 1964 seemed unduly high. It was

obtained by expressing estimated retail value-added in that year as a proportion of the aggregate retail gross margin which was derived from a retail sales value. The retail sales value was obtained by up-dating the 1956 census figure for retail sales by published index numbers obtained in a sample survey each year. However, the sample — in addition to being relatively small (approximately 3% of establishments) — was structured according to the results of the 1956 census of distribution.

The period of the late 1950s and 1960s was one of considerable structural change in the retail sector. Supermarkets were introduced and gained an increasing proportion of retail sales. It is likely, therefore, that by 1964 the result of the annual sample survey was under-estimating the level of retail sales and consequently the level of gross margin derived from that sales level was also under-estimated. The independently estimated figure for value-added would therefore tend to account for an unduly high proportion of a gross margin thus derived.

The problem did not arise to the same extent for the wholesale sector. Neither did it arise for the years subsequent to 1966 for which data were obtained from a sample which was three times as large as the previous one and which was structured according to the results obtained in the 1966 census of distribution.

In view of the above, an arbitrary figure of 85 per cent was taken as the proportion of retail value-added to retail gross margin in 1964. The average of the assumed proportion for 1964 and the actual proportion for 1969 was 83.5 per cent and this was used to divide the retail gross margins on food in both 1953 and 1972 into their sectoral and associated inputs values-added. This sectoral value-added was: —

$$83.5/100 \ \times \ £10.91 \ m \ = \ £9.11 \ m \ in \ 1953 \ and$$
$$83.5/100 \ \times \ £36.72 \ m \ = \ £30.66 \ m \ in \ 1972.$$

Associated input value-added was obtained as the difference between the value of gross margin and sectoral value-added and amounted to £1.80 m in 1953 and £6.06 m in 1972..

Wholesaling

The methodology employed for wholesaling was very similar to that employed for retailing. In the case of the wholesale sector, however, the results of only one commodity analysis — that of 1966 — were available at time of writing. Estimates of wholesale food sales for 1953 and 1972 were made by applying the trend in the sales of food wholesalers to the] 966 figure. This approach was similar to one of the methods used to estimate retail food sales and the encouraging degree of coincidence between the results

of this methodology and the more direct one — using the 1971 census results in the case of retailing — allows a greater degree of confidence in the results for the wholesale sector than would otherwise be the case. Wholesale food sales were estimated as £60 m in 1953 and £119 m in 1972. The gross margin of food wholesalers was 10.2 per cent in 1953 and 14.2 per cent in 1972. The absolute gross margin earned on food wholesaling was therefore:-

$$10.2/100 \text{ x } \text{£60 m} = \text{£6.12 m in 1953 and}$$
$$15.2/100 \text{ x £119 m} = \text{£18.09 m in 1972.}$$

Sectoral value-added in food wholesaling was estimated, as in the case of food retailing, by multiplying the absolute gross margin by a ratio representing the proportion of gross margin accounted for by value-added. For all wholesaling this ratio was 78 per cent in 1964 and 75 per cent in 1969. The average of the two — 76.5 per cent — was used to divide the gross margins earned on food wholesaling in 1953 and 1972 into their sectoral and associated inputs values-added. Thus, sectoral value-added was estimated as:-

$$76.5/100 \text{ x £6.12 m} = \text{£4.68 m in 1953 and as}$$
$$76.5/100 \text{ x £18.09 m} = \text{£13.84 m in 1972.}$$

Associated inputs values-added were obtained as the difference between gross margin and sectoral value-added and amounted to £1.44 m in 1953 and £4.25 m in 1972.


Unprocessed exports

There is no readily identifiable and separate sector dealing with unprocessed food exports. For present purposes this sector was taken as being synonymous with the live-stock exporting sector. The justification for this is that unprocessed food exports, other than livestock, are relatively small. They consist mainly of fruit and vegetables and are exported largely by producers themselves or by producers' organisations. To the extent that such exports are handled by producers, the value-added in their export is already included in the value-added of the farming sector, since the price received by the farmers for such exports is the full f.o.b. price. The margin earned on livestock exports is estimated by the CSO as 10 per cent of the f.o.b. value of livestock exports. The components of this margin would consist of part or all of the mart commission involved in the final sale of the animal before export, transport to the point of export, handling and lairage charges and of course the profit of the exporter. Therefore a very large proportion of the total margin must consist of value-added. In the absence of information on this point, and in view of the fact that in any case the margin is merely an imputed one, the total margin was taken as being value-added. No division into sectoral and associated inputs value-added was^ attempted in this case. The margin thus calculated amounted to £2.6 m and £7.2 m in 1953 and 1972 respectively.

Processing

Processing or manufacturing value-added is generated in two of the six main identified sectors namely in food processing and in the agricultural input sector. The methodology employed in measuring value-added in processing is described, first in general terms before applying it to any particular sector. Data and concepts of the census *of* industrial production as well as additional information supplied by the CSO were used in the derivation of the value-added of processing sectors. Figure 2 shows the relationships between the concepts.

- FIGURE 2: CONCEPTS EMPLOYED IN ESTIMATING SECTORAL AND ASSOCIATED INPUTS VALUE-ADDED FOR MANUFACTURING SECTORS.
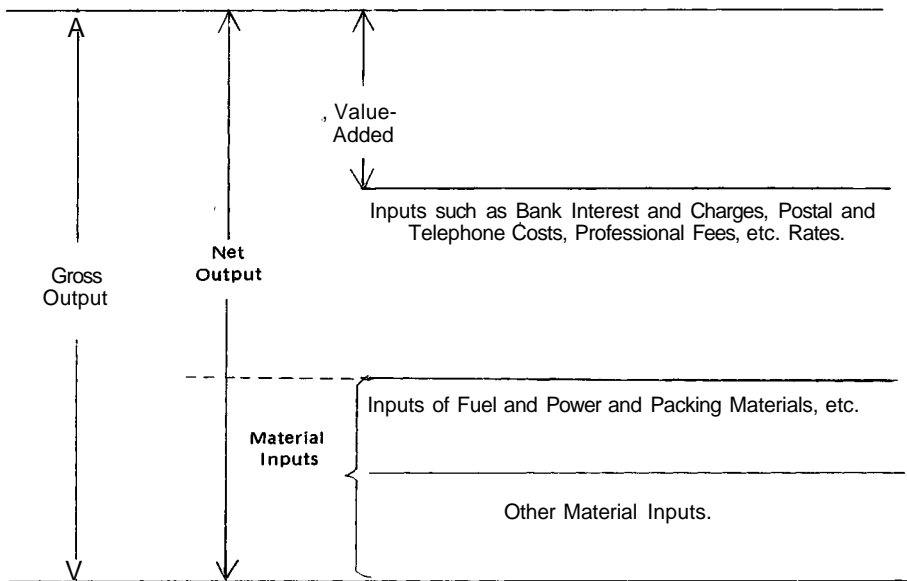
Data on gross output, net output and material inputs are published in the reports of the census of industrial production (CIP) in the *Irish Statistical Bulletin.* Gross output is the total value of sales. Net output comprises gross output less the value of material inputs of which the values of fuel and power, and 'packing materials etc' are given separately in the CJP results. Value-added comprises net output less the value of service type inputs such as those specified above and some indirect taxes such as rates. Data on value-added or the value of service type inputs or indirect taxes are not available in the CIP reports. However estimates of the proportion of net output accounted for by value-added were obtained from an input-output table for 1964 and from the CSO for 1969. These were used to obtain sectoral value-added in manufacturing sectors in 1953 and in 1972.

Associated inputs value-added other than that arising through the provision of fuel and power and 'packing materials etc.' was taken as the difference between sectoral value-added and the value of net output. This difference is comprised of the value of service type inputs and some indirect taxes. Service type inputs must be comprised largely of domestic value-added and equating their input value with their domestic value-added cannot lead to very great error. No allowance is made for the indirect taxes and so this estimate is not strictly at factor cost.

The input value of fuel and power is given separately in the CIP results and was subsequently further broken down by the CSO. The domestic value-added arising from these input values was estimated by multiplying them by appropriate percentage margins derived from CIP results and census of distribution results. Another separate input value is given under the heading 'packing materials etc' This category in fact consists of three components namely packing materials, contract work, and materials for repairs. Packing materials is the most important item, although in the case of food processing, materials for repairs is also fairly substantial. Packing materials and materials for repairs contain high import contents with that of materials for repairs the higher of the two. The value of contract work would contain a relatively low import content and a large domestic value-added component. It was assumed that the average import content of these three components would be close to that of the input packing materials since this is the largest component and the low import content of contract work would tend to cancel out the high import content of materials for repairs. Accordingly since no appropriate CIP or census of distribution classifications exist, an import multiplier for packing materials which incorporated direct and indirect imports was obtained from input-output tables and the domestic value-added in this category was estimated by multiplying its input value by one minus the import multiplier. The estimated domestic value-added arising from the provision of fuel and power, and 'packing materials etc' was added to the difference between sectoral value-added and net output previously obtained to give an approximation of total associated inputs value-added.

For the food processing sector an estimate of the sectoral value-added was derived by first aggregating the net output values of the individual food processing industries as published in the reports of the CIP. These are shown in Appendix Table 1. Sectoral value-added was estimated by multiplying aggregate net output by a ratio representing the proportion of net output accounted for by sectoral value-added. This ratio obtained from an input-output table for 1964 and from the CSO for 1969 was 68 per cent in 1964 and 74 per cent in 1969. The average of the two, namely, 71 per cent was used. Aggregate net output amounted to £24.461 m in 1953 and to £113.947 m in 1972. Thus the 1953 sectoral value-added was estimated as 71.0/100 x £24.461 m = £17.367 m and that of 1972 as 71.0/100 x £113.947 m = £80.902 m.

The difference between the value of net output and sectoral value-added was taken as comprising wholly of domestic value-added. It amounted to £7.094 m in 1953 and £33.045 m in 1972. The values of fuel and power used by the food processing sector are presented in Appendix Table 2 together with the estimation of domestically originating value-added in these values. They are classified under the headings coal, coke, turf, wood, other; petrol, lubricating and fuel oils; electricity; gas. The values of coal, coke, turf, wood and other, were taken as consisting completely of domestically originating value-added. There is no way of checking the validity of this assumption but the values involved are so small that whether or not the assumption is correct makes little material difference to the results.

For the other fuel and power inputs appropriate percentage net outputs and gross margins from census of industrial production and census of distribution reports were used to estimate the absolute margins earned on these inputs. For petrol, lubricating and fuel oils a distributive margin only was calculated. The percentage margin used *in* calculating this margin in 1953 was the 1956 percentage margin of the wholesale category 'Petroleum products'. The percentage margin used in calculating the 1972 absolute distributive margin on petrol, lubricating and fuel oils was the 1971 percentage margin of the wholesale category 'Petroleum products'.

In the case of electricity the 1953 percentage net output of the census of industrial production classification 'Electricity' was 67 per cent. However this was an average figure for all output categories. Different unit prices were charged to users depending on the use to which the electricity was put. Thus electricity for domestic use cost £0.009 per kilowatt hour whereas electricity used for motive power cost £0.006 per kilowatt hour. The average cost for all uses was £0.008 per kilowatt hour. Since electricity in industry is used largely for motive power the 1953 percentage net output earned on electricity used in processing was estimated as 0.006/0.008 x 67 per cent = 50 per cent.

By 1972 different classifications were in use in the electricity output classifications of the census of industrial production. In that year the percentage net output used here was calculated by dividing the unit cost of a kilowatt hour charged to industrial users by the average cost of a kilowatt hour charged to all users and multiplying the average percentage net output for the CIP classification 'Electricity' by this ratio. The cost of a kilowatt hour to industrial users was £0.007 in 1972 and to all users it was £0.011. The average percentage net output was 72 per cent. Thus the average percentage net output for industrial users was calculated as 0.007/0.011 x 72 per cent = 46 per cent.

In the case of the input 'Gas' the percentage net output used was that of the CIP classification 'Gas works undertakings'. This was 39 per cent in 1953 and 61 per cent in 1972.

The absolute margins derived by using these percentage margins were assumed to consist completely of domestically originating value-added even though they could be broken down into successive sectoral and associated inputs value-added components until all the domestic value-added was accounted for. This is a short circuit approach which excludes multiple calculations of ever decreasing domestic values-added. Appendix Table 2 summarises the foregoing calculations.

The value of the input category 'packing materials etc' in the case of food processing was £4.492 m in 1953 and £18.961 m in 1972. The import multiplier for packaging was 0.5988 and domestic value-added was thus estimated as: — .4012 x £4.942 m = £1.983 m in 1953 and as 0.4012 x £18.961 m = £7.607 m in 1972.

In summary, the 1953 sectoral value-added of food processing amounted to £17.367 m and estimated associated inputs value-added amounted to £10.501. Corresponding figures for 1972 are £80.902 m and £43.190 m.

Farming and Fishing

The value-added generated in farming was taken as the sum of the published figures for income arising in agriculture and depreciation in agriculture. Since part of the value-added of farming arises from the production of independent non-food products such as turf, malting barley, horses and casualty hides the value-added in farming arising from the production of food raw material was estimated by multiplying farming value-added by the ratio of GAO less the value in GAO of independent non-food products to GAO. This was added to the value-added arising in fishing as obtained from the CSO. The values-added in farming and fishing thus derived amounted to £121.0 m and £1.1 m respectively in 1953 giving a total of £122.10 m and to £318.2 m and £6.9 m respectively in 1972 giving a total of £325.10 m.

Farm Inputs

The estimation of domestic values-added generated in the provision of farm inputs was confined within the boundaries of the headings listed in the Irish Statistical Bulletin as 'Farm materials purchased by farmers' and as 'Expenses of Agriculture' in the calculation of net output and income arising in agriculture respectively. The values of these items at their farm level values are given in Appendix Table 3. For items to which distributive and manufacturing services are attached, domestic value-added was estimated in three steps. First, distributive percentage margins derived from census of distribution data were applied to the values of these inputs as purchased by farmers to give absolute distributive margins. The deduction of these margins from the values of inputs gave the ex-manufacturing value of inputs as sold to Irish farmers. Secondly, the ex-manufacturing value as sold to Irish farmers was adjusted for exports, imports and government sub-sidisation and this adjusted ex-manufacturing value was multiplied by a percentage

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manufacturing margin derived from CIP data to give the absolute net output margin. Thirdly, estimated distributive and manufacturing margins were multiplied by appropriate ratios to derive estimates of sectoral value-added and the value of associated inputs. An estimate of the domestic value-added in the value of associated inputs was subsequently made by allowing for the import content of fuel and power and packaging in the case of manufacturing sectors. For items to which only distributive services apply a distributive value-added only was estimated. The estimates of sectoral values-added and associated inputs values are shown in Appendix Table 4. The values of fuel and power and packing materials etc. used by manufacturers of animal feeds and fertilisers and the estimates of domestic values-added in these inputs are shown in Appendix Tables 5a and 5b.

The remaining items which have not been dealt with and which are deducted in obtaining income arising in agriculture are depreciation, rates, transport and marketing, and others. Since depreciation has already been included as part of the value-added of farming it is excluded here. Rates are treated as an indirect tax in National Income Accounting. Accordingly, since the size of the food industry is being estimated here, as far as possible, at factor cost the value of rates paid by farmers is excluded both from the estimation of value-added and from the value of final demand for food in adjusting it towards factor cost for reconciliation purposes. Transport and marketing are service type inputs and because of this the value of farmer expenditure on them was taken as consisting totally of domestic value-added. There is, of course, some over estimation in this since no allowance is made for the import content of fuels, for example, which are used in the provision of these transport and marketing services. The final category namely 'others' contains the value of payment by farmers for such items as herbicides, pesticides, animal drugs, and veterinary and contractor services. For this input category, value-added was estimated indirectly as follows. First, combined sectoral and associated inputs values-added generated in 1953 and 1972 in the provision of farm inputs exclusive of the categories 'depreciation', 'rates' and 'others' was expressed as a percentage of the combined value of these inputs as bought by farmers (including government sub-sidisation of inputs). This was obtained as (£9.5 m / £37.7 m) x 100 = 25.0 per cent in 1953 and as (£51.8m / £136.57 m) x 100 = 38.0 per cent in 1972. The combined sectoral and associated inputs value-added in the value of the input 'others' was then calculated simply by multiplying its input value in 1953 and 1972 by the 1953 and 1972 percentages respectively.

A final problem in relation to the farm input sector was the division of the value-added generated in providing the inputs of transport and marketing, and others into sectoral and associated inputs components. This too was done indirectly by applying the average division of the other categories to these categories.

Some of the value-added arising through the provision of farm inputs derives from the use of inputs in the production of independent non-food products in farming. These products are horses, casualty hides, malting barley and turf. Since the amount of non-factor resources used in the production of farmers' turf would be extremely small, it is disregarded. The remainder of these items comprised 3.0 per cent and 2.0 per cent of GAO in 1953 and 1972 respectively. It was assumed that they accounted for the same proportion of the value-added of the farm input sector. Thus the value-added in the farm input sector arising from the provision of inputs used to produce food-type farm products was taken as 97 per cent and 98 per cent in 1953 and 1972 respectively of the previously estimated figures. Appendix Table 6 shows the estimated values-added generated in the provision of farm inputs, incorporating the above adjustment.

Table 1 shows the estimated values-added for each sector of the Irish food industry. The estimates in this table, while exclusive of the estimated value-added derived from the production of independently produced non-food products, are still inclusive of the value-added deriving from the production of jointly produced inedible by-products, such as wool in the case of the farming sector and by-products, of the livestock slaughtering and sugar refining industries, etc. in the case of the processing sector. An adjustment is made later for these items.

TABLE 1: VALUES-ADDED BY SECTOR OF THE FOOD INDUSTRY AT APPROXIMATE FACTOR COST, INCLUSIVE OF THE VALUE-ADDED ARISING FROM JOINTLY PRODUCED INEDIBLE BY-PRODUCTS.

		Sectoral value-added	Associated inputs value-added	Combined sectoral and associated inputs value-added
		(£million)		
Food retailing	1953	9.1	1.8	10.9
	1972	30.7	6.0	36.7
Food wholesaling	1953	4.7	1.4	6.2
	1972	13.8	4.3	18.2
Food processing	1953	17.4	10.5	27.9
	1972	80.9	43.2	124.1
Unprocessed exports	1953	2.6	-	2.6
	1972	7.2	-	7.2
Farming and fishing	1953	122.1	-	122.1
	1972	325.1	-	325.1
Farm inputs	1953	7.9	2.5	10.4
	1972	40.4	17.7	58.1
TOTAL	1953	163.8	16.2	180.0
	1972	498.1	71.2	569.3

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RECONCILIATION OF COMBINED SECTORAL AND ASSOCIATED INPUTS VALUE-ADDED WITH THE VALUE OF FINAL DEMAND FOR FOOD

The values-added of the individual sectors of the food industry were estimated in the foregoing pages and the individual and aggregate results were presented in Table 1. The estimations involved complicated precedures involving much manipulation of data and relying on assumptions and indirect methods in many cases. As a check on the over-all exercise it was therefore useful to attempt to reconcile the results with the value of final demand for food and food raw materials before commenting on them. The value of final demand is distributed among the resources engaged in providing for the domestic consumer, food and food raw materials for export, and changes in stock levels of food and food raw materials. Final expenditure on food is measured at current market prices. In the preceding calculations values-added have been measured at factor cost as far as possible. It was necessary therefore to adjust the current market value of final demand to one of final demand at factor cost to the same extent as was done in estimating the sectoral and associated inputs values-added. This exercise is shown in Table 2. The first item in this table is the value of consumer expenditure on food at current market prices. This is the difference between the value of personal expenditure on food and non-alcoholic beverage as published in the National Income and Expenditure Accounts and the value of personal expenditure on non-alcoholic beverage as obtained from the CSO. The second item is institutional expenditure on food and refers to non-personal expenditure on food such as expenditure by prisons, the army, business firms etc. It was obtained from the CSO and it is admitted that this estimate is subject to a fairly large error margin. Exports and re-exports of food and food raw materials were taken from the trade statistics. Exports of animal feed and manufactured fertiliser were also taken from the trade statistics. It was necessary to include these in the value of final demand for food since in the estimation of values-added, the values-added in these industries were estimated not just for the values of these inputs as used by Irish farmers but also for the export value of these items.

The food subsidy shown was paid on flour, wheaten meal, and bread. Consumer and institutional expenditure on food were reduced by the extent of this subsidy but since values-added at factor cost reflect the amount of the subsidy it was necessary to add it to the expenditure on food. Its value was taken from the Appropriation Accounts. The value of stock increases was obtained by applying appropriate valuations to the increases in physical stocks which were taken from the food balance sheets of the CSO.

In 1963 indirect taxation on consumer expenditure on food was introduced in the form of a turnover tax levied on retail food sales. The tax continued in this form until November 1972 when it was replaced by a value-added tax which was levied on the values-added of the various sectors involved in providing food. Since the value-added tax was designed to generate the same amount of revenue as the turnover tax, the figure in Table 2

was estimated by applying to consumer expenditure on food in 1972 the rate of turnover tax operative just prior to November 1972. The value of customs duties on food imports was obtained from the annual reports of the revenue commissioners.

Agricultural subsidies were derived from data in the National Income and Expenditure Accounts. They consist of end product subsidies such as those on dairy produce and pigmeat exports, input subsidies on fertilisers and lime, and subsidies not related to sales such as the subsidy paid under the beef incentive scheme.

The value of final demand for food incorporates the foreign value-added on imports of food, imports of food raw materials and imports of other inputs used in the production and distribution of food within the country. The c.i.f. value of such imports must be subtracted from the value of final demand when comparing it with the estimated value-added of the Irish food industry. Not all such imports were accounted for. Those that were accounted for are presented in Appendix Table 7.

In addition, the value of final demand for food does not, include the value-added which arises through the production of jointly produced inedible by-products.(Adjustment has already been made for independently produced non-food products.) Since this value-added is included in estimates of sectoral values-added, as obtained heretofore, a correction must be made to allow reconciliation of the two sets of data. In the case of agriculture and the agricultural input sector, the only jointly produced inedible by-product of relevance is wool. The output value of wool amounted to 1.4 per cent of GAO in 1953 and 0.5 per cent of GAO in 1972. It was assumed that it accounted for the same proportion of value-added in farming and in the farm input sector. Therefore 98.6 per cent and 99.6 per cent of the previously estimated 1953 and 1972 values-added for farming and the farm input sectors were taken as their values-added, exclusive of the value-added generated in the production of jointly produced inedible by-products in farming.

The main sectors in which inedible jointly produced products arise are the processing and the domestic meat sectors. The ex-factory value of inedible by-products and an estimated value of hides and skins arising from slaughtering by butchers serving the home trade are presented in Appendix Table 8. It was assumed that the same percentage margin was earned on by-products as on the total output of the food processing sector, namely, 21 per cent in 1953 and 26 per cent in 1972. The absolute value-added generated in the production of by-products was estimated therefore by multiplying their output values in 1953 and 1972 by 0.21 and 0.26 respectively. Table 2 shows the adjustment of the value of final demand towards a factor cost value. Table 3 shows the reconciliation of adjusted value of final demand and aggregate values-added.

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TABLE 2: ADJUSTMENT OF THE VALUE OF FINAL DEMAND FOR FOOD AND FOOD RAW MATERIALS AT CURRENT MARKET PRICES TOWARDS A FACTOR COST MEASUREMENT

	1953	1972
	(£million)	
Consumer expenditure on food at current market prices	147.2	399.6
Institutional expenditure on food at current prices	7.4	19.5
Exports and re-exports of food and food raw materials	80.5	247.2
Exports of animal feed and manufactured fertiliser	0.1	11.4
Food subsidy	6.2	-
Stock increases	-	8.2
Total at current market prices	241.4	685.9
LESS		
Indirect taxation on consumer expenditure on food and rates paid by farmers	6.0	35.6
Customs duties on food imports	0.4	2.5
	235.0	647.8
PLUS		
Agricultural product subsidies	0.1	49.6
Agricultural input subsidies	1.9	9.8
Agricultural subsidies not related to sales	-	11.7
FINAL demand at approximate factor cost	237.0	718.9

TABLE 3: RECONCILIATION OF ADJUSTED VALUE OF FINAL DEMAND FOR FOOD AND FOOD RAW MATERIALS WITH ADJUSTED SECTORAL AND ASSOCIATED INPUTS VALUES-ADDED.

	1953	1972
	(Emillion)	
Unadjusted value of final demand at approximate factor cost, as estimated in Table 2	237.0	718.9
LESS		
The value of imports accounted for in Appendix Table 7	4 4p7	100.3
Adjusted value of final demand	192.3	618.6
Unadjusted value of combined sectoral and associated inputs value-added as shown in Table 1	180.0	569.3
LESS		
The estimated value-added arising from jointly produced inedible by-products	2.8	6.8
Adjusted value of combined sectoral and associated inputs value-added	177.2	562.5
Adjusted value-added as proportion of adjusted final demand (%)	92.1	90.9

As can be seen in Table 3, 92 per cent of the value of final demand has been accounted for in terms of combined sectoral and associated inputs value-added in 1953 and 91 per cent in 1972. In the circumstances, this is a satisfactory result. In so far as the ratios of value-added to gross margin and net output used in the calculations are accurate, then the sectoral value-added estimates are reasonably accurate. The associated inputs value-added estimates, however, are not accurate to the same extent and still contain some indirect taxation, such as rates and road tax paid by food distributors and processors and some import values, such as the imported value of fuel and power and packing used by distributors. The value of final demand also contains similar tax and import values. The size of the food industry is therefore over-estimated to some extent in absolute terms. However, since similar adjustments were made to both the value-added estimates- and the value of final demand for food, the estimates for the proportion of the industry which has been accounted for here should be reasonably accurate. It should also be remembered that sectoral value-added alone — for which the estimation procedure was

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more accurate than for the associated input value-added — accounted for over 90 per cent of the combined estimate ·in both years.

The difference between accounted for value-added and the value of final demand would be attributable to value-added generated by sectors and resources not accounted for here, such as oil refining and the fishing input sectors, etc. and also to data and estimation errors.

SECTORAL COMPARISONS WITHIN THE FOOD INDUSTRY

The sectoral and associated inputs value-added of the food industry, as estimated in this paper, are presented in Table 4 in both absolute form and expressed as percentages of the relevant totals. The combined sectoral and associated inputs value-added at current prices for the total food industry increased by a factor of 3.2 from 1953 to 1972. The sector which exhibited the largest rate of increase in the combined sectoral and associated input value-added was the agricultural input sector with a factor of 5.7. Farming and fishing had the lowest rate of increase with a factor of 2.7. Between these extremes were the food processing sector with a factor of 4.4; food retailing with 3.3; food wholesaling with 3.0; and unprocessed exports with 2.8.

There was also a difference in growth rate at current prices as between sectoral value-added alone and associated inputs value-added alone. Total sectoral value-added increased by a factor of 3.1, while total associated inputs value-added increased by a factor of 4.4. However, the division of value-added into these two components was achieved using ratios pertaining to 1964 and 1969 and so the basis for their estimation was poor. Also the absolute level of associated inputs value-added was over-estimated in both 1953 and 1972 because not all indirect taxes and imports were accounted for. This problem was more acute in relation to the distributive sectors than for others, because it was not possible to allow for the import value in the input of fuel and power and packaging used by distributors.

In addition, it is probable that the degree of over-estimation was greater in 1972 than in 1953. This could have come about, for example, bacause of the greater use of electricity by distributors in 1972 than in 1953, combined with a greater dependency on oil imports for electricity generation in the latter year. It is interesting to note that for the processing sector, where it was possible to allow for imports of fuel and power and packaging, the sectoral value-added increased by a larger factor than did the value-added of its associated inputs - the factors being 4.6 and 4.1 respectively.

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TABLE 4: VALUES-ADDED WSTHIN THE FOOD INDUSTRY (EXCLUDING VALUES-ADDED ARISING FROM JOINTLY PRODUCED INEDIBLE BY-PRODUCTS) AT APPROXIMATE FACTOR COST 5N ABSOLUTE TERMS; AND AS PROPORTIONS OF THE APPROXIMATE VALUE-ADDED OF THE TOTAL FOOD INDUSTRY

		Sectoral value-added		Associated inputs value-added		Combined sectoral and associated inputs value-added	
		£m	%	£m	%	£m	%
Food retailing	1953	9.0	5.6	1.8	11.4	10.8	6.1
	1972	29.9	6.1	5.8	8.3	35.7	6.3
Food wholesaling	1953	4.7	2.9	1.4	8.9	6.1	3.4
	1972	13.8	2.8	4.3	6.2	18.1	3.2
Food processing	1953	16.9	10.5	10.2	64.6	27.1	15.3
	1972	78.5	15.9	41.9	60.2	120.4	21A
Unprocessed exports	1953	2.6	1.6	-	-	2.6	1.5
	1972	7.2	1.5	-	-	7.2	1.3
Farming and fishing	1953	120.4	74.6	-	-	120.4	68.0
	1972	323.5	65.6	-	-	323.5	57.5
Farm inputs	1953	7.7	4.8	2.4	15.2	10.1	5.7
	1972	40.4	8.2	17.6	25.3	58.0	10.3
TOTAL	1953	161.3	100	15.8	100	177.1	100
	1972	493.3	100	69.6	100	562.9	100

THE FOOD INDUSTRY RELATIVE TO THE ECONOMY AS A WHOLE

Further insights into the performance of these sectors and of the food industry as a whole are gained by comparing them with the growth in Gross Domestic Product (GDP). GDP at factor cost was £430.8 million in 1953 and £1,876 million in 1972.[4] Table 5 shows sectoral and associated inputs values-added as proportions of GDP at factor cost. It can be seen that the food industry in total is a declining one relative to GDP. The only sectors within the food industry to exhibit any growth relative to GDP — viewed either in sectoral terms or combined sectoral and associated inputs terms from 1953 to 1972 — were the agricultural input and food processing sectors. However, the relative growth in the case of food processing was very slight.

TABLE 5: SECTORAL AND ASSOCIATED INPUTS VALUES-ADDED EXCLUDING THE VALUE-ADDED ARISING FROM JOINTLY PRODUCED INEDIBLE BY-PRODUCTS AT APPROXIMATE FACTOR COST AS PROPORTIONS OF GDP AT FACTOR COST.

	Sectoral value-added %		Associated inputs value-added %		Combined sectoral and associated inputs value-added %	
	1953	1972	1953	1972	1953	1972
Food retailing	2.1	1.6	0.4	0.3	2.5	1.9
Food wholesaling	1.1	0.7	0.3	0.2	1.4	0.9
Food processing	3.9	4.2	2.4	2.2	6.3	6.6
Unprocessed exports	0.6	0.4	-	-	0.6	0.4
Farming and fishing	27.9	17.2	-	-	27.9	17.2
Farm inputs	1.8	2.2	0.6	0.9	2.4	3.1
TOTAL	37.4	26.3	3.7	3.6	41.1	30.1

The growth comparisons made so far are comparisons of relative growth in factor cost value-added at current prices. A more conventional approach is to compare actual growth rates measured at constant prices. This is done for food processing, total manufacturing industry, and GDP at constant price factor cost. The food processing sector was chosen because it is the next biggest sector after farming and fishing and it is one which is generally regarded as having potential for growth. In addition, unlike other sectors such as the farm input sector, it is a relatively simple task to measure its growth rate at constant prices.

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(4)   National Income and Expenditure Accounts.

Because of lack of data on value-added, however, the estimation was done here on' the basis of the published indices of net output at constant prices for both food processing and total manufacturing. The estimation was done by fitting data for the twenty years 1953 to 1972 on these index number series and on GDP at constant factor cost to an exponential equation. On this basis the rate of growth of the food processing sector was 3.9 per cent per annum, compared to 5.5 per cent per annum growth in total manufacturing and a 3.1 per cent per annum growth in GDP at constant price factor cost.

A large sector of the food industry — and one from which a high growth rate could reasonably be expected — has had a growth rate in the period 1953 to 1972 which was not very substantially greater than the rate of growth in the economy as a whole, but which was significantly lower than the growth rate of total manufacturing industry.

SUMMARY AND CONCLUSIONS

An attempt has been made in this paper to define the Irish food industry in a more comprehensive way than has been done heretofore and to measure its size and growth between 1953 and 1972. The food industry was defined as the aggregate value of domestic direct and indirect factor incomes which is dependent on the final demand for food. Practical difficulties precluded its measurement exactly according to this definition. Instead, a measurement was attempted on the basis of a slightly less comprehensive definition, namely, that the food industry consists of the domestic direct and indirect factor incomes which are incorporated in the value of final demand for food. The difference between these two definitions would consist of the incomes of people, such as lecturers in agricultural science, who play a role in the production sense in the provision of food through providing an input of knowledge but whose incomes are not incorporated in the value of final demand for food.

On the basis of the latter definition sectoral and associated input values-added were estimated. Sectoral value-added refers to the value-added generated by the main conventionally recognised sectors — food retailing, food wholesaling, food processing, unprocessed exports sector, farming and fishing, and the farm input sector. Associated inputs value-added refers to the value-added generated in successive sectors by virtue of providing products or services which contribute to the provision of what is ultimately consumed as food. Estimated combined sectoral and associated inputs value-added, accounting for 41.1 per cent and 30.1 per cent of GDP at factor cost in 1953 and 1972 respectively, were calculated. In the reconciliation of the value of final demand with aggregate values-added, these aggregate values-added in 1953 and 1972 amounted to 92.1 per cent and 90.9 per cent of the approximate value of final demand for food. Therefore, the food industry amounted to 44.6 per cent(^) and 33.1 per cent[6] of GDP in 1953 and 1972 respectively when measured as the aggregate of domestic values-added which are incorporated in the value of final demand for food.

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(5) Calculated as 41.1 x 100/92.1
(6) Calculated as 30.1 x 100/90.9

Because of the fact that not all indirect taxes and import values were accounted for, this estimate is somewhat too high. On the other hand, this definition excludes some resources whose incomes are dependent in a production sense on the existence of a demand for food, although they are not incorporated in an accounting sense in the value of that demand. Because of the nature of the available data the measurement of the food industry, according to this definition, also excludes the values-added of resources engaged in the provision of food in the hotel and catering sector. Incorporation of the values-added of such resources would further increase the estimated size of the food industry.

The food industry thus comprises a large segment of the Irish economy. As measured here it is also a relatively declining segment. Even the sector from which growth is generally expected, namely, food processing, had a growth rate in the period 1953 to 1972 which was not very substantially greater than the growth rate in the economy as a whole, and which was significantly less than the growth rate in total manufacturing.

This paper has confined itself to the period 1953 to 1972. This is the period covered by the thesis from which the paper was taken. It is also the twenty-year period prior to Ireland's EEC entry. It would be of interest to up-date the study. However, because of the time lag in the publication of official statistics, it could as of now be up-dated only as far as 1974. It is possible, nevertheless, to conclude that it is unlikely that the trends of the period 1953 to 1974 have changed very much in recent years.

In the period 1971/72/73 to 1974/75/76 the volume of gross agricultural output has grown by an annual rate of only 1.9 per cent. This compares with 2.3 per cent per annum over the period of the study. The rate of growth in the volume of gross agricultural output is a prime determinant of growth in the food processing sector of the food industry. The other main determinant of growth is the rate of growth in the degree of processing intensity. Apart from an increase in the de-boning of meat in beef processing, which began in 1974 consequent on EEC intervention arrangements, there is no evidence of any significant increase in the intensity of processing.

The low growth rate of the food industry could be excused prior to our EEC entry on the grounds that market outlets were very limited. That is no longer the case. Yet we have not to date capitalised on the improved market access which our EEC entry has afforded us.

APPENDIX TABLE 1: NET OUTPUT AND ESTIMATED SECTORAL VALUE-ADDED IN FOOD PROCESSING.

	1953	1972
	£'000	
Flour milling	1,733	4,600
Bread, biscuit and flour confectionery	5,897	20,496
Sugar refining, cocoa, chocolate etc.	5,317	17,308
Margarine, compound cooking fats and butter blending	478	2,117
Miscellaneous food preparations	225	3,860
Bacon factories	2,885	11,440
Beef factories	1,106	11,963
Creamery butter, cheese, etc.	4,673	34,518
Canning of fruit and vegetables	1,577	7,104
Flour production by feed mills	570	541
Total net output	24,461	113,947
Sectoral value-added at 71 per cent of net output	17,367	80,902
Value-added of associated inputs other than fuel and power and packing materials etc.*	7,094	33,045

*   Assumed to be value-added. See text p. 239.

**APPENDIX TABLE 2: DERIVATION OF VALUE-ADDED IN THE FUEL
AND POWER INPUTS USED BY THE FOOD PROCESSING SECTOR.**

		Coal, coke turf, wood, other	Petrol lubricating and fuel oils	Electricity	Gas
Value (£)	1953	1,007,861	1,038,552	442,303	**61,168**
	1972	453,340	4,197,465	2,637,137	**121,983**
Percentage distributive gross margin	1953	-	16.5	-	-
	1972	-	19.0	-	-
Absolute distributive gross margin (£)	1953	-	171,361	-	-
	1972	-	797,518	-	-
Percentage manufacturing net output	1953	-	-	50	39
	1972	-	-	46	61
Absolute manufacturing net output(£)	1953	-	-	221,152	23,856
	1972	-	-	1,213,083	74,410
Total margin (£)	1953	-	171,361	221,152	23,856
	1972	-	797,518	1,213,083	74,410
Value added (£)	1953	1,007,861	171,361	221,152	23,856
	1972	453,340	797,518	1,213,083	74,410

APPENDIX TABLE 3: THE VALUE OF ITEMS DEDUCTED IN DERIVING INCOME ARISING IN AGRICULTURE.

	1953	1972
	£m	
Feed	20.0	65.4
Seed	2.8	5.9
Fertiliser	6.6	30.8
Repairs to machinery	1.5	6.8
Petrol and oil	4.0 ~	10.8
Rates	6.0	15.0
Depreciation	5.2	24.3
Transport and marketing	2.8	7.0
Other	4.7	19.7
TOTAL	53.6	185.7

Source: *Irish Statistical Bulletin,* June 1962, June 1973. Dublin: Stationery Office.

APPENDIX TABLE 4: SECTORAL VALUES-ADDED AND ASSOCIATED INPUTS VALUES.

		Feed	Seed	Fertiliser	Repairs to machinery	Petrol and oil
		£m				
Input value	1953	20.0	2.8	6.6	1.5	4.0
	1972	65.4	5.9	30.8	6.8	10.8
Distributive percentage margin	1953	6.9		6.9	13.5	16.5
	1972	13.1	13.3	13.1	18.1	19.0
Absolute distributive margin	1953	1.4	0.2	0.5	0.2	0.7
	1972	8.6	0.8	4.0	1.2	2.1
Distributive value-added to margin ratio	1953	0.78	0.78	0.78	0.78	0.78
	1972	0.59	0.59	0.59	0.59	0.59
Sectoral distributive value-added	1953	1.1	0.16	0.4	0.16	0.55
	1972	5.1	0.47	2.4	0.71	1.2
Associated inputs*	1953	0.3	0.04	0.1	0.04	0.15
	1972	3.5	0.33	1.6	0.49	0.9
Unadjusted value ex-manufacture	1953	18.6	-	6.1	-	-
	1972	56.8	-	26.8	-	-
Manufactured imports	1953	2.6	-	3.2	-	-
	1972	8.7	-	0.0	-	-
Subsidy	1953	-	-	1.9	-	-
	1972	–	-	7.9	-	-
Exports	1953	0.1	0.0	0.0	-	-
	1972	9.6	0.0	1.8	-	-
Adjusted value ex-manufacture	1953	16.1	-	4.8	-	-
	1972	57.7	-	36.5	-	-
Manufacturing percentage net output	1953	12.6	-	27.4	-	-
	1972	20.2	-	39.6	-	-
Absolute Manufacturing margin	1953	2.0	-	1.3	-	-
	1972	11.7	-	14.5	-	-
Sectoral manufacturing value-added	1953	1.5	-	1.1	-	-
	1972	8.9	-	12.1	-	-
Associated inputs other than fuel and power, and packing materials etc.	1953	0.5	-	0.2	-	-
	1972	2.8	-	2.4	-	-
Fuel and power	1953	0.19	-	0.04	-	-
	1972	0.96	-	0.82	-	-
Packing materials etc.	1953	0.36	-	0.26	-	-
	1972	1.6	-	1.6	-	-

*   Assumed to be wholly domestic value-added.

APPENDIX TABLE 5a: DERIVATION OF THE VALUE-ADDED IN THE INPUTS OF FUEL AND POWER AND PACKING MATERIALS ETC. USED BY ANIMAL FEED MANUFACTURERS.

		Coal, coke, turf, wood, other	Petrol, lubricating and fuel oils	E.ecUicity	Gas
Value (£)	1953	57,734	69,970	56,240	3,973
	1972	10,744	513,875	420,570	11,728
Percentage distributive	1953	-	16.5	-	-
gross margin	1972	-	19.0	-	-
Absolute distributive	1953	-	11,545	-	-
gross margin (£)	1972	-	97,636	-	-
Percentage manufacturing	1953	-	-	50	39
net output	1972	-	-	46	61
Absolute manufacturing	1953	-	-	28,120	1,549
net output (£)	1972	-	-	193,462	7,154
Total margin earned which is taken to approximate value-added (£)	1953	57,734	11,545	28,120	1,549
	1972	10,744	97,636	193,462	7,154
Packing materials etc.	1953	360,106			
	1972	1,611,297			
Domestic value-added	1953	360,106 x 0.4012 = 144,475			
	1972	1,611,297 x 0.4012 = 646,452			

APPENDIX TABLE 5b: DERIVATION OF VALUE-ADDED IN THE INPUTS OF FUEL AND POWER AND PACKING MATERIALS ETC. USED BY FERTILISER MANUFACTURERS.

	Coal, coke, turf, wood, other		Petrol, lubricating and fuel oils		Electricity		Gas	
	1953	1972	1953	1972	1953	1972	1953	1972
Value (£)	9,981	2,094	13,986	213,813	19,771	606,985	405	0
Percentage distrib-utive gross margin	-	-	16.5	19.0	-	-	-	-
Absolute distribut-gross margin (£)	-	-	2,308	40,624	-	-	-	-
Percentage manu-facturing net output	-	-	-	-	50	46	39	61
Absolute manu-facturing net output (£)	-	-	-	-	9,886	279,213	158	0
Total margin (£)	-	-	2,308	40,624	9,886	279,213	158	0
Value-added (£)	9,981	2,094	2,308	40,624	9,886	279,213	158	0

Packing materials etc.	1953	256,976
	1972	1,642,559

Domestic Value-added	1953	256,976 x 0.4012 = 103,099
	3 972	1,642,559x0.4012 = 658,995

APPENDIX TABLE 6: VALUE-ADDED IN FARM INPUTS.

	Sectoral		Associated inputs		Combined sectoral and associated inputs	
	1953	1972	1953	1972	1953	1972
			£m			
Feed	2.7	14.0	1.0	7.2	3.7	21.2
Seed	0.16	0.5	0.04	0.3	0.2	0.8
Fertiliser	1.5	14.5	0.4	5.0	1.9	19.5
Repairs to machinery	0.2	0.9	0.0	0.3	0.2	1.2
Petrol and oil	0.5	1.2	0.2	0.9	0.7	2.1
Transport and marketing	2.1	4.9	0.7	2.1	2.8	7.0
Other	0.9	5.2	0.3	2.3	1.2	7.5
Total	8.1	41.2	2.6	18.1	10.7	59.3
Adjusted for independently produced non-food items in GAO	7.9	40.4	2.5	17.7	10.4	58.1

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APPENDIX TABLE 7: IMPORT VALUES SUBTRACTED FROM THE VALUE OF FINAL DEMAND FOR FOOD.

	1953	1972
	£'000	
Food and food raw materials	31,113	63,566
Manufactured animal feed	2,567	8,693
Manufactured fertilisers	3,160	0
Petrol and oil used by manufacturers of feed and fertiliser	70	586
Electricity used by manufacturers of feed and fertiliser	37	548
Gas used by manufacturers of feed and fertiliser	3	5
Packaging used by manufacturers of feed and fertiliser	370	1,948
Petrol and oil used by farmers	3,300	8,700
Petrol and oil used by food processors	867	3,400
Electricity used by food processors	221	1,424
Gas used by food processors	37	48
Packaging used by food processors	2,959	11,354
Imports accounted for	44,704	100,272

Source: Trade Staiistics, Dublin: Central Statistics Office.

Note: Fuel and power import values obtained as the difference between input values of these items and the estimated distributive and manufacturing margins earned thereon. Packaging import value obtained as the difference between the input value of 'packing materials etc' and the estimated domestic value-added arising therein.

APPENDIX TABLE 8: VALUE OF INED9BLE BY-PRODUCTS.

	1953	1972
	£'000	
Ex-factory		
Cattle hides	357	⎤
		⎬ 5,661
Sheep skins	57	⎦
Beef: inedible fats and offals	18	456
Sheep: inedible fats and offals	3	134
Pigs: inedible fats	81	87
inedible offals	27	67
Wheat: bran	598	⎤
pollard	1,708	⎬ 2,635
other	77	⎦
Milk: products not going for human consumption	0	2,537
Sugar beet: inedible by-products	1,034	3,500
Ex-butcher's shop		
Hides and skins	832	3,667

Sources: Census of industrial production reports, Central Statistics Office, and Bord Bainne.

Katherine Meenan: Mr. Chairman, ladies, gentlemen, I am happy to be associated with the vote of thanks to Dr. O'Connell for his paper. It is of enormous value to anyone engaged in the food sector, academically or industrially, that such a paper has been written. The fact that it has been produced so clearly, so comprehensively and with such authority makes it all the more valuable.

The questions inherent in the paper are valuable too. In this case as in many others I think that it is more important to ask the right questions than to give the right answers. The question here is why is the rate of growth in the food industry so low? Probably everyone in this room has a different answer to the question, this makes the posing of the question all the more valuable, particularly when the absolute proof of its relevance is shown in the paper.

A very important way of answering this question would be to investigate the environment in which the food industry is currently developing, in other words the CAP. Let us take the different aspects of the CAP and see what way they have helped or hindered us.

1.   Community Preference

The control of third country imports must be of benefit to producers and processors alike. The EEC is a high cost producer and the application of the principle of Community preference has helped preserve a high priced market. Of course, Community preference has not always been a perfect instrument. The level of beef imports. from third countries in 1974 proves this, but all we need do is compare cattle prices here and Australia since 1974 and we can see what might have been.

2.   Monetary Compensatory Amounts

Monetary Compensatory Amounts have certainly reduced the price available to the Irish exporter of primary products. But if we are talking about value-added, and products with a high level of value-added, monetary compensatory amounts have not been so important, not until October of last year at any rate. I mean that processed products were free of monetary compensatory amounts which meant that they could be freely traded and prices could be quoted in advance, something

not possible in primary products. Only since the British refund reached its current abused level, has it meant that Irish exporters to the UK have been disadvantaged. Now most of the products affected by the level of the UK refund have been incorporated into the monetary compensatory amounts system, which of course effectively rules out continental exports. Therefore the existence or absence of monetary compensatory amounts does not help to explain the absence of growth in the food processing sector.

3.   Guaranteed price

The use of a system which guarantees a product price, rather than one which guarantees an income to the producer, is probably the aspect of the CAP which is the most difficult to evaluate. But most of the objections to intervention which are put up, however valid, are not relevant here. The only one which is relevant and is crucial is that the existence of intervention reduces the level of marketing skill and effort among the processors.

But if we consider that the application of the principles of CAP are not the main stumbling block to increased processing, then what is? I may say that I do not consider the three aspects I have mentioned above as the major bar to development of the food processing industry, what is a major disadvantage is the fact that all decisions on the market system are political, not economic. It is the general atmosphere of uncertainty, not the actual decisions which cripple any attempt at forward planning.

What then is the real stumbling block. I think we could do worse than use John's approach, that in order to define this food industry we should work backwards from the demand, rather than forwards from the production. There are many things we can produce, the only problem is no one wants to eat them. I remember being very struck when someone said to me 'who eats intervention beef?'. Approximately a quarter million tons of intervention beef have been traded in the last three years, but no one I know had ever asked that question.

We have in Ireland sufficient production and technical expertise to enable us to produce any kind of food product that is necessary. What we do not have is knowledge of products that are required. After all, even our life style and our eating habits are quite different from those of our potential customers. One example is the demand for sterilised milk in the North of England - because most housewives work and begin

work at 6.00 or 7.00 a.m., therefore there is no one to take in the milk when it is delivered and it must stay on the doorstep for five or six hours. No housewife in Ireland would thank you for sterilised milk and very few families would have that kind of requirement. Another example might be the consumption of milk fed veal in the Rome area. After all this white veal is an appallingly extravagent way of consuming protein in a fairly poor area, but there is a belief that white veal is essential for children.

I am not suggesting that anyone go into the production of sterilised milk or white veal, but I put these examples forward to stress my point that distance from the market place creates much more difficulties than just transport difficulties. I would suspect that the lack of growth in the food processing sector is because we have looked at it in terms of what we could supply rather than in terms of what the market wanted.

It would be very wrong to underestimate the difficulty of finding and establishing the kind of product which our overseas' clients would require. After all Sweden is the most developed market for frozen food and 80 per cent of all food buying is done by three companies. The frozen food industry in the UK was recently the subject of a monopolies commission enquiry. 65 per cent of the German market is controlled by two companies.

Fergus O'Neill: It gives me great pleasure to move the vote of thanks to the speaker. Dr. O'Connell is to be congratulated on this paper and especially on the amount of work involved in its production.

I had some difficulties with the terminology in the earlier pages, and I feel that the definitions referred to as A or B do not bring out the distinction intended by Dr. O'Connell.

On the difficult subject of where to set the limits to the study, my preference would have been to include alcoholic and non-alcoholic beverages in the food industry.

A more important issue is the procedure of moving from the gross margin in retailing and the net margin in processing to the corresponding added value in each case. It is possible that there have been significant changes in added value over the twenty years.

In the case of retailing, the period saw the introduction and spread of super-markets and the application of the self-service concept by even quite small independents. This form of retailing is associated with reduced service, tighter margins and in the case of the chains — very much greater throughput. Labour is a large part of retailing costs and its reduction should affect margins and added value. Advertising of food by both chains

and voluntary groups has increased.

What is true of retailing may be true to a lesser degree of processing, but it is certainly true of the dairying industry. In the late sixties and early seventies a structural reorganisation took place that was as fundamental in its way as the replacement of the family grocer by the supermarket. This reorganisation was accompanied by corresponding changes in marketing, especially advertising, and in the product mix. All these have implications for the value-added. In other parts of the food industry change may have been less fundamental. But the growth in the meat factories over the twenty year period may have been large enough to raise the question: how great must a quantitative change be before it becomes a qualitative change?

I have already commended Dr. O'Connell for the efforts — at times ingenious — which he brought to this intractable material. I should also congratulate him for — as it were — casting himself in the role of Martha. By this I mean he has done all the spade-work and left us the more congenial task of considering the implications for the industry.

Turning to the results, I should like to comment on Table 4. The fact that the added value for retailing (as a proportion of added value of the whole industry) increased surprised me for the reasons I have already outlined. I would welcome Dr. O'Connell's views on this, particularly as I turned up somewhat similar results in the case of bacon some years ago and was unable to explain what looked like a deviant result.

In the same Table, the other sectors behave as we might expect them to from what we know about the period.

Table 5 also shows results of the sort we would expect of a "normal" economy. Food production and processing inevitably become less important as the services sector and other manufacturing develop. But the "normality" of this Table should not blind us to the problem of the food industry. It is primarily an export oriented industry and should not be bound by the limits of the domestic market. In some areas it is deficient in the depth of processing. Therefore it is desirable that this figure for processing in Table 5 should be abnormal, in the sense of being much greater than it now appears.

It is widely recognised that our food industry needs to increase the value-added to primary agricultural products. The arguments for this increase are framed in terms of increased profits for firms, but they are also frequently framed in terms of employment and the prosperity of the country. At this level they are precisely the same as the arguments being expressed, more recently, about our mineral resources.

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If I appeared to have been questioning Dr. O'ConnelTs results, it is in the knowledge that he achieved a reasonable reconciliation between added value and final demand.

I will conclude by thanking him again.

Michael Lucey: I would also like to express my thanks to Dr. O'Connell for a most interesting paper. The study presented in the paper is really on Input-Output type exercise where the Final Demand for food is ultimately expressed in terms of the Value-Added arising in the sectors engaged in meeting this demand. The exercise could, I feel, be done much more precisely using an Input-Output model but, unfortunately, we have no table for the two years examined. However, perhaps Dr. O'Connell would consider using the latest Input-Output model available to verify and substantiate his results. Indeed it should be possible, using a detailed Input-Output model, to examine the performance of individual sectors of the Agricultural and Food Processing groups. It could well be that substantial changes in these sectors are cancelling each other out when aggregated.

Regarding the content of the paper I wish only to comment on the treatment of the Food Wholesaling sector. In particular, I would refer you to the proportions used to derive Value-Added from Gross Margin. As stated these proportions refer to all Wholesaling and the decrease from 78 per cent in 1964 to 59 per cent in 1969 is, perhaps,misleading. Gross Margin is defined as Sales-purchases plus Stock Changes and will, therefore, include any taxes levied on sales. Since Wholesale Tax was introduced in 1966 the 1969 Gross Margin will include it and the 1964 Margin will not. If one excludes Wholesale Tax from the 1969 Gross Margin the proportion of Value-Added in the revised margin is very close to the 1964 figure. I should mention that, even though food was exempted from Wholesale Tax, applying the above proportions to the Food Wholesaling sector will not affect the combined sectoral and associated input Value-Added estimated for the sector. Incidentally if one excludes Turnover Tax from the Gross Margin of all Retailers the proportion of the revised margin accounted for by Value-Added falls between 1964 and 1969.

Reply by John J. O'Connell: I am grateful for the many helpful comments on my paper. I have taken Fergus O'Neill's point in relation to the terminology used in my definition of the food industry and the published paper is amended in the light of his remarks.

Labour is a component of both value-added and gross margin and therefore the[1] **development** of supermarkets, which operate on relatively low labour costs, may not have had a very large effect in changing the ratio of value-added to gross margin. It would have been more desirable to have these ratios for 1953 and 1972, but since that was not possible there was little one could do except use the ratios that were available, namely, those for 1964 and 1969. Because of this more reliance can be placed on the combined sectoral and associated inputs estimates of value-added than in either of the components.

I do not find it very surprising that the value-added of food retailing increased as a proportion of the value-added of the whole food industry. Retail food sales increased in value by a factor of 2.5 in the period 1953 to 1972. In addition, despite the development of supermarkets, the estimated average gross margin of all food retailers — derived by weighting the gross margin changes of individual food retailer categories by the distribution of food sales among them in 1966 — increased from approximately 14 per cent of sales in 1953 to approximately 19 per cent in 1972. This combination of increasing sales value and increasing percentage gross margin was obviously sufficient for the value-added at current prices, estimated from them, to show a slight increase relative to the industry as a whole.

Katherine Meenan raises the question — "Why is the rate of growth in the food industry so low?". She mentions the environment in which this industry operates and specifically the effects of CAP. Ireland has been a member of the EEC for over four years now and there is no doubt that in that period the operations of CAP, which was designed mainly for the benefit of farming, have had many adverse effects on the food processing sector. The outputs of both the Dairy and Beef processing sectors have tended to concentrate on the intervention products. Since in both cases no more than two products are eligible for intervention, no inducement is provided by CAP to diversify the output of these sectors. The beef processing sector continues to dispose of very large quantities of prime beef into intervention; there has been a corresponding failure to explore new markets and develop marketing expertise. In the case of both dairy and beef processing, there has been a failure to diversify production with consequent loss in marketing flexibility. In addition, the dairy and beef intervention products, with the exception of de-boned beef, are relatively low value-added products and also require relatively little labour in their production. That we should use our raw materials in this way is profligate, given the growth and employment needs of our economy.

Greater appreciation of the fact that the food industry consists of many sectors - as has been high-lighted in this paper - which are all dependent on the final demand for food, might help to avoid the implementation of policies designed for only

one sector without due regard to the spin-off effects which these policies may have in other sectors. These adverse effects of CAP on the food processing sector have not been mitigated by increases in the volume of gross agricultural output, which — as was shown — have been lower on average in the post-EEC entry period than in the twenty years prior to EEC entry.

The reasons for the low growth rate of food processing are probably many and varied. Katherine has examined some — the environment and in particular the effect of CAP; uncertainty arising from political influence on the market system; a non-market and production oriented approach to business, which is re-inforced by the intervention system. I have done the easy task of measuring the performance; analysing the reasons for this disappointing performance is more difficult; and prescribing the cure is much more difficult still.

I agree with the comments of Michael Lucey and Professor O'Connor that this study could be done more precisely and elegantly as an input-output study. This paper was taken from the introductory chapters of a thesis on the food industry. To do this exercise in the form of an input-output study would have constituted material for a substantial thesis in itself and I think would have required access to more data than are currently available with reasonable facility to a researcher in my position.

I am grateful to Michael Lucey for his comments on the ratios of value-added to gross margins which I used for the wholesaling and retailing sectors. The error arising in these because of indirect taxation has been corrected with his assistance in the published paper.

Mr. linehan has raised the question of setting the boundary to an industry and why the farm machinery sector was not included in this study. First, I see no conceptual difficulty in setting the boundary. I would include the incomes of all domestic factor resources which arise from the direct and indirect contributions which these resources make to the provision of food at the level of final demand. This is much more difficult in practice than in concept but it has already been done in input-output studies to a fair degree of detail for economies and for sectors within economies.

The incomes of manufacturers and distributors of farm machinery and equipment have not been included here as part of the food industry. Neither have the incomes of the manufacturers and distributors of machinery and capital equipment used in sectors other than in farming. Since little farm or other capital equipment is manufactured in Ireland, the main omission is in the area of distributive value-added. However, the

values involved were omitted from both the value-added side and from the final demand side so that, while the size of the industry may be under-estimated because of this omission, the proportion of final demand accounted for by aggregate values-added is unlikely to have been very much affected.

Finally, it seems to me that including the domestic values-added in the manufacture and distribution of capital equipment in the present exercise would give rise to a unique kind of double counting, because depreciation — the annual cost of capital consumption — is already included as part of the value-added of the various sectors in which it arises. A contrasting situation arises in the case of other inputs, for example, fertiliser. The incomes of domestic fertiliser manufacturers are included as part of the food industry, but the annual cost of fertiliser consumption — unlike the annual cost of capital consumption — is not included as part of the value-added of farming.

It seems that the position with regard to capital arises because capital is conventionally recognised as a factor of production. With the benefit of hindsight I think a better approach — especially in the Irish situation since most of our capital is imported - would have been to estimate sectoral and associated inputs values-added exclusive of depreciation; but to include as part of the food industry the values-added of domestic manufacturers and distributors of capital equipment used in the food industry. For reconciliation purposes the value of final demand in that case would have to be adjusted by subtracting the cost of depreciation and adding the domestic value-added arising from capital formation in the food industry. This approach would provide a more meaningful measure of the food industry than one which incorporates the value of depreciation. Growth rates of this measure would more accurately reflect domestic economic advancement than growth rates as currently calculated which reflect growth in capital stock, most of which is imported. I would welcome further comments on this point.

In conclusion, I acknowledge and am very appreciative of the assistance given to me in the preparation of my thesis and in the preparation of this paper by the ever courteous staff of the Central Statistics Office.