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Using the Synthetic Biproportional Projector for the Measurement of Structural Change in Ireland*

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Abstract: This paper analyses changes in the industrial structure of Ireland between 1975 and 1985. Confining our analysis to the inter-industry matrix, we use the Synthetic Biproportional Project method, which has significant advantages compared with the more traditional input-output coefficients or the RAS method. The results highlight, *inter alia*, the weak linkages between "strategic industries" such as office machinery and chemicals and the rest of the Irish economy.

I INTRODUCTION

Structural change refers to the way the relationships existing between various industries,[1] as buyers and sellers, evolve during a given period of time. These relationships are fully described in the input-output table of a given country,[2] and more specifically in the inter-industry matrix contained in it. The purpose of studying how much each industry buys from or sells to another is twofold:

(i) it first enables us to understand which industries, as buyers and sellers, exert the greatest influence on the industrial structure of a country as a whole; this leads to the identification of "key industries".

1. An industry is defined in its broad sense. It refers to all productive economic sectors (aggregated as agriculture and extractive industries, manufacturing and services).
2. In the case of Ireland, see CSO (1992 and 1983), Tables A1, pp. 2-5, Dublin.

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(ii) it makes it possible to forecast and it can thus be a useful tool of economic policy.

The objectives of this paper are twofold: first, to understand and explain the change that has occurred in the industrial structure of Ireland within a selected period of time (1975 to 1985); second, to determine which industries and products have changed the most, and are mostly responsible for the change.

In order to do this, we need to compare two inter-industry matrices, referring to two different years (1975 and 1985), of equal row and column totals. Any difference between the two matrices will mirror a change in the structure of transactions denominated in units of currency between industries (input substitution). This change is called "structural" as it is only concerned with the variation of the transaction structure, rather than total, as we assume the stability of row and column totals. We intend to measure industrial relatedness through a non-traditional method, namely the Synthetic Biproportional Projector (SBP). More traditional approaches and their limitations will first be appraised, thereby highlighting the relative merits of the SBP. This will be followed by the explanation of the methodology and the interpretation of results.

II THE LIMITS OF TRADITIONAL APPROACHES

The problem we have to tackle is as follows: if we compare two input-output matrices of identical dimensions and relating to two different years, what methods can be used to explain fully the changes involved? To give an example, referring to the 1975 and 1985 input-output tables for Ireland, we observe that Agriculture/Forestry/Fisheries (industry 01) bought in 1985 some £64.172 millions worth of chemical products (industry 17) at 1975 prices,[3] against £45.373 millions in 1975. This change can be attributed to:

(i) an increase in the output of Agriculture etc., which was only technically possible through a (proportional or non proportional) increase in its inputs, and which could have been explained by an increase in its final demand (demand pull effect).

(ii) an increase in the output of the chemical industry which has managed to sell more to other industries of the economy. This can be caused by various factors such as the introduction and application of an innovation, and its concomitant input quality upgrading effect. Another cause can be the change in the relative price of inputs,

3. The 1985 values have been deflated by the coefficient 3.31074 to arrive at 1975 prices.

which may well originate in another industry. These are the "supply push effects".

(iii) a combined effect, which is the synthesis of (i) and (ii).

Traditional approaches to analysing structural change using input-output matrices rely almost exclusively on the demand pull effect. They are based on input-output coefficients (Leontief's coefficients). Through the computation of such coefficients, the direct connections of an industry with another can be clearly measured. The CSO uses this methodology to compile its A2 tables.[4]

Leontief's technical coefficients, be they direct-indirect or only direct, are based on the assumption that demand is the determining variable. The perspective is that any variation in demand for a product will induce variations in the supply of the same product and in other related products (direct and indirect inputs). For example, in the 1985 inverse matrix (CSO, 1992, Table A3), one can read that each unit of final demand for meat products (industry 31) requires 0.86602 units of output from that industry, 0.04039 units of electricity, 0.05637 units of chemical products.

However, it is legitimate to consider that an increase in the output of industry 31 (meat products) can be caused by supply factors as well; for example, a technical substitution of an input for another, gives an innovative industry, say the chemical industry (industry 17), the opportunity to sell more products to industries in general and to industry 31 in particular.

Through a horizontal reading of the input-output table (Tables A1), it is thus possible to derive another type of coefficients, called the outlet ratios. The paternity of these coefficients has been attributed to Ghosh (1958), Ganczer (1962), Dadajan and Kosov (1962). They are defined as:

$$cd_{ij} = \frac{x_{ij}}{X_i}$$

where x_{ij} refers to the sales of product i to industry j, and $X_i = \sum_j x_{ij}$ denotes the total output of product i.

But, here again, taking into account the outlet ratios only, is equivalent to the assumption that supply is dominant (and that the rows of the input-output table are fairly stable). These two families of coefficients enable only a

4. CSO (1992 and 1983), pp. 6-9. It also provides for an inverse matrix which explicitly shows the direct and indirect connections of an industry with others. Indeed, the matrix of direct input coefficients does not suffice to explain all the complex network of links which are forged by any industry with others. An industry may directly sell to or buy from only a few industries, and yet its customers and suppliers may be connected with many other industries. As a result, the coefficients of the inverse matrix (Table A3) are greater than the coefficients of the matrix of technical coefficients (Table A2).

partial understanding of the input-output matrix; they either rest on the columns of the matrix, and assume that demand is the dominant variable (Leontief's coefficients), or are based on the rows of the matrix, and give supply a determining rôle (outlet ratios).

To overcome the limits of such coefficients involves finding a method which is not only simply proportional, but which takes into account simultaneously demand and supply considerations. This method is, by essence, "biproportional" in that it combines both the vertical and horizontal reading of the input-output matrix. First introduced by Bacharach (1970), this concept lies at the core of other methods, such as the RAS method, and its extension, the Synthetic Biproportional Projector method.[5] (Both Geary (1973) and Henry (1973) studied the relative merits of the RAS method compared with the Least Squares Method in an Irish context.)

In this paper, we will use the SBP method in order to measure the contribution of each industry to the change in the input-output matrix for Ireland, and show this method to be superior to the RAS method.[6]

III THE SYNTHETIC BIPROPORTIONAL PROJECTOR METHOD

Our aim is then to study the change that has occurred in the Irish industrial structure, as revealed by the input-output tables of two different years. Using the biproportional method enables us to determine which industries in particular (respectively, which products) are most responsible for the change, taking into account demand and supply factors in a concomitant way. The only available input-output tables for Ireland which are comparable are those relating to the years 1975 and 1985. This statistical constraint does certainly reduce the breadth of our study, but does not impinge on its validity. The 1985 data have been deflated to 1975 prices, in order to exclude price components. Our analysis will be confined to the inter-industry matrices of these tables. We will thus work on two matrices of equal size (41×41), which correspond to these two years, the elements of which refer to inter-industry transactions denominated in millions of Irish pounds.

Let S be the *source* matrix and T, the *target* matrix. The elements of those matrices are s_{ij} and t_{ij} respectively. For either matrix we consider the sum of all inputs used by each branch j, which we call the *bottom margins* and denote as $s_{\bullet j}$ and $t_{\bullet j}$, respectively. They are calculated as follows:

5. For more on RAS, see for example Stone and Brown (1962). An excellent presentation of the SBP method, as well as the limits of the RAS method are provided for by de Mesnard (1990).

6. According to the RAS method, the "substitution" and "fabrication" effects are proportional. For example, it is assumed that if the sales of a product i are increased, then all industries will buy more, proportionally to this increase. This assumption is dropped in the case of the SBP method.

$$s_{\bullet j} = \sum_i s_{ij},$$

and

$$t_{\bullet j} = \sum_i t_{ij}.$$

Similarly, we call *right margins* $s_{i\bullet}$ and $t_{i\bullet}$, which are the sum of all products sold by industry i:

$$s_{i\bullet} = \sum_j s_{ij},$$

and

$$t_{i\bullet} = \sum_j t_{ij}.$$

If, when comparing two matrices S and T, one element changes, the proportional methods do not satisfactorily allow us to determine the cause of this change. As was seen above indeed, this variation may be imputed to different causes. It may be due:

(i) to a change in the elements of a line (which corresponds to an increase in the output of the chemical industry),
(ii) to a change in the elements of a column (which is the equivalent of an increase in agricultural output),
(iii) to a combined effect.

We clearly see that what happens in this case is a change in the margins (i.e. T will have different margins from S). De Mesnard (1990) calls this "the effect of the margins". If however, we compare two matrices S and T of equal margins (bottom and right), then it is possible to ascertain that a change in one element of the T matrix will be caused by a change in the structure of transactions between the various industries. This is termed the "structural effect".[7]

The Synthetic Biproportional Projector is aimed at explaining this "structural effect". To that purpose, we need to compare two matrices of same size and of identical margins. The SBP method produces the *projected* matrix P:

$$p_{ij} = a_i \cdot b_j \cdot s_{ij},$$

where A and B are two vectors. This expression is biproportional in the sense of Bacharach (1970). The margins of the projected matrix are equal to the

7. The "effect of the margins" and the "structural effect" are not mutually exclusive. It is possible to conceive of a case where the change is attributable to a variation in the margins, which itself causes a change in the structure of the transactions between the various industries.

margins of the target matrix. In order to find P, it is necessary to obtain the vectors A and B. These vectors will not be found analytically. Therefore, an iterative method shall be used.

The method is as follows. The initial elements of the vector A are equal to one:

$$a_i^0 = 1, \text{ for all } i=1,\ldots,41.$$

Then the values of A and B are calculated using the following formulae:

$$b_j^{n+1} = \frac{t_{\bullet j}}{\sum_{i=1}^{41} s_{ij} \cdot a_i^n}, \tag{1}$$

$$a_i^{n+1} = \frac{t_{i\bullet}}{\sum_{j=1}^{41} s_{ij} \cdot b_j^{n+1}}. \tag{2}$$

The process stops when the margins of P approximate the margins of T.[8] For formulae (1) and (2) to be workable, each column sum and row sum must be non-zero.

For any vector X or matrix Z we use the Euclidean norm:

$$\|X\| = \sqrt{\sum_{i=1}^{41} x_i^2},$$

$$\|Z\| = \sqrt{\sum_{i=1}^{41} \sum_{j=1}^{41} z_{ij}^2}.$$

Consequently, the distance between any two vectors or matrices was estimated as the norm of their difference. In the above calculations, the process stopped when both distances of the relative margins of the projected and target matrices were less than 10^{-6}. Since P and T have the same margins, the distance between these two matrices corresponds to the structural effect (or to the change in the industrial structure of Ireland between 1975 and 1985). It will then be possible to appreciate the intensity of the change between these two periods of time. The method will not yield the result when some of the elements of the matrices are zeros. In the inter-industry matrices for Ireland, there are two blank rows and columns; they correspond to

8. The time required to reach the convergence depends upon the size of the gap existing between the margins of S and the margins of T.

industries 03 (Products of Coking) and 06 (Radioactive Materials and Ores). So, an initial distortion was added to the elements of the target and source matrices, which was less than one penny.

The projection of S on the margins of T is called a "prospective projection", because in our case, the resulting P matrix is an hypothetical 1975 matrix endowed with the margins of the 1985 matrix. Finally, it is possible to do the reverse projection (i.e. projection of T on the margins of S). The result will be a projected matrix P, that we can compare to S, the source matrix. This corresponds to a "retrospective projection".

Since the results obtained with the prospective projection will be different from those obtained through the retrospective projection, it will be necessary to analyse both projection paths.

IV RESULTS AND INTERPRETATION

To analyse the contribution of each industry to overall change between 1975 and 1985, we can compute the normalised squared absolute (column or line) difference following the formula and the method proposed above. The results of such computations appear in Table 1 below.

Table 1: *Classification of the Top Ten Industries Contributing to the Overall Change (per cent)*

Prospective Path			*Retrospective Path*		
01.	Agriculture/Forestry/Fishing	28.89	01.	Agric/Forestry	27.06
27.	Building/Construction	14.59	27.	Building	17.96
05.	Electricity/Gas/Water	11.66	39.	General Public Services	17.42
16.	Meat/Meat Products*	10.78	16.	Meat/Meat Products*	9.36
17.	Milk/Dairy Products*	9.52	18.	Other Food Products	6.92
39.	General Public Services	4.11	05.	Electricity/Gas/Water	5.40
29.	Wholesale/Retail Trade	4.08	29.	Wholesale/Retail Trade	4.23
18.	Other Food Products	3.26	36.	Business Services	1.95
36.	Business Services	2.68	09.	Chemicals	0.98

*No definite conclusion can be reached for industries 16 and 17 since in the 1975 inter industry matrix, one can surprisingly read that $x_{16,16} = x_{17,17} = 0$.

First of all, it should be noted that the two projection paths give similar results. The Spearman Rank Coefficient, RS, which is a measure of the closeness of association between two ordinal variables, is equal to 0.7191159. The RS is defined as follows:

$$RS = 1 - \frac{6 \sum_{i=1}^{n} (d_{i1} - d_{i2})^2}{n(n^2 - 1)}$$

This suggests that there is a strong correlation between the two paths. The test we conducted reinforces this result.

Agriculture, Building/Construction, Electricity/Gas/Water, Meat Products, General Public Services, Wholesale/Retail Trade and Other Food Products are consistently the major contributors to change. The reliance of the Irish economy on agriculture and on the food industry is confirmed here again: these industries are responsible for more than 50 per cent of total structural change.

A first conclusion is that the change of the inter-industry matrices is attributable to a few industries only (namely Agriculture and Food, Building/Construction, Electricity, General Public Services and Wholesale/Retail Trade). However, these industries are also the biggest contributors in terms of total output. Hence, a marginal change in Building/Construction would have a very important impact on the change of the inter-industry coefficients, because of the size of this particular industry. Conversely, a very substantial change in Motor Vehicles, an industry with a smaller weight, will bear only a minor impact on the total structural change.

In order to exclude the "size effect", our analysis will rely on an indicator measuring the *relative intensity of the change*. Structural change will be appraised through an indicator relating the distance between two matrices to the size of each pole. The indicator of the relative intensity is:

$$RI_j = \frac{\|t_j - p_j\|}{\|t_j\| + \|p_j\|},$$

$$\text{or} \quad RI_j = \frac{\sqrt{\sum_{i=1}^{41}(t_{ij} - p_{ij})^2}}{\sqrt{\sum_{i=1}^{41} t_{ij}^2} + \sqrt{\sum_{i=1}^{41} p_{ij}^2}}$$

where t_j and p_j are j-th columns of the target and projected matrices.

Because of the closeness of association existing between the prospective and retrospective paths, we have synthesised the results achieved with the help of the SBP method in Tables 2 and 3 below. Table 2 describes the change in the structure of the purchases of industries. What appears clearly from this table is first that the industries which we identified as contributing mostly to structural change (Table 1) have in fact a low relative intensity. We find Building/Construction, Agriculture, Wholesale/Retail Trade, Other Food Products, Meat Products, Milk/Dairy in the third and fourth quartiles of the distribution only. The ranks are respectively 25, 29, 30, 31, 36 and 38. These

industries were fairly stable, i.e. they did not modify the structure of their purchases as intensively as most other industries of the Irish economy. Clearly, when the size effect is taken into account, the distribution of the most "dynamic industries" changes to a great extent.

When compared together, Tables 1 and 2 show a certain stability for Electricity/Gas/Water (rank 3), and to a lesser extent for Business Services (rank 13) and chemicals (rank 15). According to the results displayed in Table 2, the industries which underwent an intensive restructuring during the period of time considered, belong mostly to a few dominant groups. After the highly aggregated industry "Other Manufacturing Products", we find industries belonging to the primary sector (Petrol Products/Natural Gas, Electricity, Coal/Lignite), to the first transformation manufacturing sector (Rubber/Plastic Products, Metal Products), to the services sector (Repair/Recovery Services, Non Market Health Services, Business Services), and to the equipment goods group (Transport and Motor Vehicles).

In addition, structural change means either an increase (+) or a decrease (–) of the purchases of an industry. Almost all the industries ranked in Table 2 have increased their purchases of products over the ten years considered. The increase of purchases by the services sector corresponds for instance to the phenomenon of tertiarisation[9] of the Irish economy. The high value of the relative intensity coefficients found for the primary sector substantiates the high level of restructuring experienced by these industries. The most dynamic industries have been Petrol Products/Natural Gas, and Electricity/Gas/Water.

The relative change of energy prices since 1973 is responsible for the structural change occurring in industry 04 (Petrol Products/Natural Gas) and in industry 02 (Coal/Lignite). The price changes promoted a substitution of coal for oil since 1978 (Henry, 1983), as well as a drastic plan to reduce Ireland's dependence on imported energy through the increased Kinsale Gas production. The structural change in industry 04 explains the change in the structure of purchases of industry 05 (Electricity/Gas/Water).

Some exceptions to this general trend ought to be mentioned. The industries which have decreased their purchases are:

— not surprisingly, Textile/Clothing, Leather/Footwear, Paper/Printing, which are classified among the declining industries
– other Food Products
– Auxiliary Transport, Other Transport Equipment, and especially Motor Vehicles, all industries which receded in the same period of time.

9. Tertiarisation implies an increased importance of the services sector in the economy.

Table 2: *Ranking of Industries According to their Relative Intensity. (Column Comparison)*

	Industry	*Rank*	*Expansion (+) Contraction (–)*
26.	Other Manufacturing Products	1	(+)
14.	Motor Vehicles	2	(–)
04.	Petrol Products/Natural Gas	3	(+)
05.	Electricity/Gas/Water	4	(+)
15.	Other Transport Equipment	4	(–)
28.	Repair/Recovery Services	6	(+)
02.	Coal/Lignite/Briquettes	6	(+)
11.	Agric./Industrial Machinery	8	(+)
33.	Auxiliary Transport	8	(+)
40.	Non Market Health Services	10	(+)
25.	Rubber/Plastic Products	11	(+)
10.	Metal Products	11	(+)
20.	Tobacco Products	13	(+)
36.	Business Services	14	(+)
39.	General Public Services	14	(+)
41.	Other Non Market Services	16	(+)
09.	Chemical Products	16	(+)
32.	Maritime/Air Transport	16	(+)
12.	Office Machinery	19	(+)
23.	Wooden Products/Furniture	20	(+)
19.	Beverages	20	(+)
07.	Metals & Ores	22	(+)
13.	Electrical Goods	23	(+)
38.	Other Market Services	23	(+)
27.	Building & Construction	25	(+)
31.	Inland Transport	26	(+)
30.	Lodging/Catering Services	26	(+)
34.	Communication Services	28	(+)
01.	Agriculture/Forestry/Fishing	29	(+)
29.	Wholesale/Retail Trade	30	(+)
18.	Other Food Products	31	(–)
21.	Textiles/Clothing	31	(–)
37.	Renting of Immovable Goods	33	(+)
08.	Non Metallic Mineral Products	34	(–)
24.	Paper/Printing Products	35	(–)
16.	Meat/Meat Products	36	(+)
22.	Leather/Footwear	37	(–)
17.	Milk & Dairy Products	38	(+)
35.	Credit & Insurance	39	(+)

Note: The two industries which have not been considered here correspond to the zero columns in the input-output tables (i.e. industries 03 and 06).

Motor Vehicles is the one industry which par excellence underwent a total restructuring. Traditionally integrated into the British Motor Car industry, as suppliers of car parts to the UK industry, Irish producers have been hit by the globalisation of Japanese car manufacturers into the UK market.

It should be noted that Chemicals and Office Machinery, which are critical industries for the Irish Manufacturing sector in terms of output and employment, have only a median position in this table, i.e. these industries did not contribute substantially to overall structural change. In spite of their crucial rôle in the Irish economy, they did not buy importantly from other industries in Ireland. This confirms the existence of poor linkages between these two industries and the rest of the industrial structure of Ireland.

The agglomeration of some types of services at the top of Table 3 appears clearly. Table 3 shows the change in the structure of sales of products over the decade considered. The utilisation of some types of services by other Irish industries has increased substantially: these are Non Market Health Services, Other Non Market Services, General Public Services, Lodging & Catering Services. The increase in the relative intensity of primary products in the domestic transactions is less marked in this table: the ranking of Rubber/Plastic Products (rank 5) and of Metals/Ores (rank 12) can be explained by the introduction of new products and by the variation of the relative price of ores.

By comparing Tables 2 and 3, we find that the ranking of products according to their relative intensity is only weakly correlated to the ranking of the corresponding industries. The Spearman Rank Coefficient is equal to 0.2466. For example, Coal/Lignite and Chemicals are now classified in the last quartile. Also, there seems to be an apparent contradiction between the positive structural change enjoyed by the industry Agriculture & Industrial Machinery (rank 8 in Table 2) and the considerable decline in Agricultural & Industrial Machinery as a product bought by other industries of the Irish economy. This apparent contradiction is easily resolved if we take into account the high degree of specialisation of firms within this industry, their inherent inability to meet all the different types of domestic demand, and consequently the importance of trade, which has been omitted from our analysis. As a consequence, the decrease of sales of Agricultural & Industrial Machinery does not imply a decrease in the capitalistic intensity of the Irish industry. It only means that this industry is less and less integrated into the Irish industrial structure, and that the domestic industry as a whole, and the food industry in particular, rely increasingly on imported machinery and parts.

The same remark could apply to Chemicals, to Office Machinery, and also to Motor Vehicles and Transport Equipment. This last consideration leads us

Table 3: *Ranking of Products According to their Relative Intensity. (Row Comparison)*

	Product	*Rank*	*Contraction (–) Expansion (+)*
11.	Agricultural & Industrial Machinery	1	(–)
26.	Other Manufacturing Products	1	(+)
40.	Non Market Health Services	3	na
41.	Other Non Market Services	4	(+)
39.	General Public Services	5	na
25.	Rubber/Plastic Products	5	(+)
04.	Petrol Products/Natural Gas	7	(–)
16.	Meat/Meat Products	8	(+)
32.	Maritime/Air Transport	9	(–)
30.	Lodging/Catering Services	9	(+)
17.	Milk/Dairy Products	11	(+)
07.	Metal & Ores	12	(+)
22.	Leather/Footwear	12	(–)
05.	Electricity/Gas/Water	14	(+)
27.	Building/Construction	15	(–)
10.	Metal Products	16	(+)
19.	Beverages	17	(+)
38.	Other Market Services	17	(+)
15.	Other Transport Equipment	17	(+)
13.	Electrical Goods	20	(+)
14.	Motor Vehicles	21	(–)
37.	Renting of Immovable Goods	22	na
29.	Wholesale/Retail Trade	23	(+)
33.	Auxiliary Transport	23	(–)
24.	Paper/Printing Products	23	(–)
28.	Repair/Recovery Services	26	(+)
31.	Inland Transport	27	(–)
36.	Business Services	28	(+)
34.	Communication Services	29	(+)
23.	Wooden Products/Furniture	29	(–)
12.	Office Machines	31	(+)
08.	Non Metallic Mineral Products	31	(+)
01.	Agric./Forestry/Fishing	33	(+)
18.	Other Food Products	34	(–)
21.	Textiles/Clothing	34	(–)
09.	Chemical Products	36	(+)
35.	Credit & Insurance	37	(+)
02.	Coal/Lignite/Briquettes	38	(+)

Note: The zero lines correspond to the following products: Products of Coking, Radioactive Materials and Ores, and Tobacco Products.

to conclude that the small size of the Irish economy, its high degree of openness, and the high level of specialisation of firms in the manufacturing sector, all explain the low value found for the Spearman Rank coefficient.

Finally, two other categories of services did not experience the same fortunes as those ranked in Table 3. These are Business Services (rank 28) and more importantly Credit & Insurance. The latter, according to both tables, was totally isolated from structural change over the decade under review.

V CONCLUSION

Changes in the input-output structure of Ireland between 1975 and 1985 have been analysed with the help of the Synthetic Biproportional Projector method which presents advantages compared with more traditional input-output coefficients or the RAS method.

The industries mostly affected by a positive structural change, in the sense of an intensive increase or their purchases or/and of the sales of their products, were to be found in the primary sector — with the exception of agriculture — in the services sector (Health and Business Services), and only marginally in the manufacturing sector (Other Manufacturing Products and Agricultural & Industrial Machinery).

Changes in the Petrol Products/Natural Gas and Electricity/Gas/Water industries have been a response to the oil shocks of the 1970s. For Ireland, they implied a higher reliance on domestic supplies (a better exploitation of comparative advantages), and a substitution of other fuels for oil products. Two industries, namely Motor Vehicles and Other Transport Equipment, experienced a negative structural change: they contracted very sharply during the period of time under review. Structural change was not as intensive, but was negative also for the Textiles/Clothing, Footwear and Paper industries.

The tertiarisation of the Irish economy, or the increase of the services sector, is seen both in an intensive positive restructuring of health services, and to a lesser extent, business services (Table 2), and in an increased use of almost all types of services by other industries (Table 3). However, Credit & Insurance Services have remained quite static over this period of time.

Finally, a low Spearman Rank Coefficient between rankings given in Tables 2 and 3 suggests that in spite of an intensive restructuring, some industries of the Irish economy are less and less integrated into the whole domestic industrial structure, or that industrial inter-relatedness decreases constantly. This is the case for Agricultural & Industrial Machinery (in spite of the importance of the agricultural sector), Motor Vehicles, Other Transport

Equipment, and also for two expansionary industries, Chemicals and Office Machinery. This suggests that an extension of our analysis to encompass international trade, final demand etc., would be very revealing.

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