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The Quality and Pattern of Intra-Industry Trade Between the Geographically Proximate Regions of Northern-Southern Ireland and Southern Ireland-Great Britain*

S. MANSOOB MURSHED
University of Bradford
and
DAVID NOONAN

Abstract: This paper examines the quality and pattern of the intra-industry trade (IIT) between the geographically proximate regions of Ireland, as well as Southern Ireland and Great Britain in 1978 and 1992. Relative unit values are calculated to ascertain qualitative differences in the exports of the regions. The intensity of IIT is measured using the Grubel-Lloyd index. Changes in the pattern of trade, whether of the inter or intra-industry type, are also calculated. We find major qualitative improvements in the South's exports, and a strengthening of her comparative advantage with regional trading partners.

I INTRODUCTION

International and inter-regional trade is of great importance in a small open economy such as the Republic of Ireland (South) and a region of a national economy such as Northern Ireland (North). Trade brings access to a larger market, allowing for gains from specialisation leading to an improved

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consumption and production mix, as well as potential dynamic gains causing the expansion of production possibilities (see Myint, 1958; Krugman, 1979a and b). Studying the pattern of trade can reveal interesting information about an economy; given its production and consumption mix, it would indicate where the possibilities of trade expansion might be, as well as, what possible gains to the economy would accrue from the expansion of trade in terms of consumer prices and jobs.

This paper will mainly be concerned with the type and quality of North-South trade comparing and contrasting it with trade between the South and Great Britain (GB), another geographically closely located region. The trade between these areas can be viewed as inter-regional trade, because of the traditional economic links between these areas. This is all the more so in the context of increased integration within the European Union. From the viewpoint of the South, the North and GB are traditionally its main export markets, although this importance has diminished over time. In 1978 the North and GB accounted for nearly half of the South's total trade (6.1 and 42.3 per cent respectively). The corresponding figures for 1992 were 4.3 and 32 per cent.

The potential for increased trade between Northern and Southern Ireland has aroused a great deal of interest in many quarters. This is particularly so because of the peace process currently underway in Northern Ireland and the close physical proximity of the regions within one island. The increases in trade could emanate from increases in agglomeration economies and improved infrastructure at a regional level as emphasised in Krugman (1991). The Confederation of Irish Industry (CII, 1990) *Newsletter* of May 1990, spoke optimistically of creating some 75,000 extra jobs in both regions through a 50 per cent increase in manufactured goods trade between the two areas. Scott and O'Reilly (1992) conservatively revise this figure at 7,500 extra jobs.

This paper will be concerned exclusively with intra-industry trade (IIT), which is defined to exist when there is simultaneous export and import within the same product group. This type of trade is a large part of the trade between the regions we are concerned with. We shall be focusing on the *broad* pattern of IIT between these three regions of the British Isles. It should, however, be noted that we will be looking at *bilateral* trade between these regions and not the *total* trade of any country or region. The study of bilateral trade flows does not allow us to draw any *overall* conclusions about the industrial organisation and policy driving the total trade of a country or region. Nevertheless we are able to make some inter-regional (inter-country) comparisons. These include the measurement of the relative quality of exports within the same product group across the regions; as well as gauging

changes in the pattern and intensity of IIT in this bilateral setting.

We will be analysing trade data for 1978 and 1992. We do this for two reasons: 1978 is the last year of the Irish pound's post-independence parity with sterling, and 1992 is the most recent year for which data are available. Also, the gap between these two years is sufficiently long for changes in the policy regime and other factors influencing the industrial landscape of the economies to filter through. For example, 1978 is prior to the major de-industrialising phase in the UK, and before many of the successes in attracting inward investment in the South worked their way through.

Using data for IIT between North-South and South-GB[1] at a three digit level of disaggregation (some 250 products) we first calculate relative unit values for all three digit commodities subject to IIT in 1978 and 1992. This allows us to comment on the relative quality of goods simultaneously produced in these regions. Second, we construct indices to describe the intensity of IIT. This is interesting because a high intensity of IIT reflects similarities in factor endowments and per capita incomes between the economies concerned. Third, we utilise these indices of IIT to determine the pattern of the change in trade. This allows us to say, for broad commodity groups, whether the change in trade between 1978 and 1992 is of the inter-industry or IIT type. If it is mainly the former then it is likely to mean greater adjustment costs to labour and capital within the economy, as these factors of production are required more often to shift to different occupations.

The rest of the paper is organised as follows: Section II sets the study of the pattern of trade into context and discusses the importance of intra-industry trade (IIT); Section III presents an overview of the quality of North-South as well as South-GB IIT in 1978 and 1992; Section IV examines changes in the intensity of IIT including marginal IIT; and finally, Section V contains a summary and some conclusions.

II PATTERN OF TRADE AND INTRA-INDUSTRY TRADE

2.1 *Conceptual Basis for Intra-industry Trade*

International trade between nations prior to the Second World War was principally dominated by trade in different products. So, for example, Great Britain exported machinery to Ireland (South) in exchange for agricultural produce. This can be described as inter-industry trade and reflects different factor endowments and even differences in per capita incomes. The direction of post-war trade between industrialised countries, however, has increasingly taken the form of IIT involving the exchange of different varieties of the same product. By the late 1970s this type of trade accounted for around 60 per cent

1. Detailed data for the North's trade with GB are unavailable.

of the value of all world trade (Greenaway and Milner, 1983). In summary, where countries have similar per capita incomes, factor endowments and market structure, we would a priori expect a good deal of IIT, as was suggested originally in Helpman and Krugman (1985). Our priors, thus would be to find a good deal of IIT between the regions we are studying.

There are two important reasons for analysing IIT between regions and neighbouring states. First, one is able to obtain some information about the quality of similar goods exported by the countries or regions in question. Thus, in our case we will be able to say something about the relative quality of the South's exports *vis-à-vis* the North and GB. Second, changes in the intensity of IIT between two periods or marginal changes in IIT can reveal information about the type of adjustment taking place in an economy. By adjustment we refer to the link between the pattern of trade and the factors of production (labour and capital) engaged in their production. If the growth in trade is of the IIT variety it implies less *displacement* of existing factors of production, as the expansion in trade is within the same industry (see Brülhart and McAleese, 1995 and references cited therein). The converse argument applies if the growth in trade is of the inter-industry variety. Thus, growth in intra-industry trade implies less costs to the economy, as fewer factors of production have to be (re)employed in new industries.

2.2 *Measures of Intra-industry Trade*

The most widespread measure of intra-industry trade is the Grubel-Lloyd (1975) index. This relies on total imports and exports within a particular product category using the SITC (Standard International Trade Classification) definitions. As such the Grubel-Lloyd index is a measure of the *intensity* of IIT. IIT, within a product group and between two countries, is defined to exist whenever there is the simultaneous presence of both imports and exports:

$$b_j = 1 - \left[\frac{|X_j - M_j|}{X_j + M_j} \right] \tag{1}$$

where j indicates the SITC product group, often taken at the three digit level;[2] X and M stand for the value of exports and imports in a common currency, $0 \leq b_j \leq 1$. Thus, the higher is b_j, the greater is the level of IIT and vice versa. (We will also employ the term G-L to denote the Grubel-Lloyd or b_j index.) Note that the index is independent of the absolute value of exports and imports. The closer b_j is to 1 the more balanced (exports = imports) trade

2. There are 261 commodities at the three digit level and 3,118 at the five digit level (Revision 3 of SITC).

is within a particular product group. Thus, for example, b_j could be high when the total value of the sum of intra-industry trade is not particularly large. The index employs absolute values of exports and imports (numerator of Equation (1)), this means that it is symmetric in the rise in exports and imports. The Grubel-Lloyd (G-L) coefficient could increase due to rise in exports or imports or both. It is also non-linear in changes, as a small alteration in the coefficient could disguise a big change in trade volumes and vice versa. The index is subject to aggregation problems, as discussed in Greenaway and Milner (1983). This is because the greater the level of data disaggregation from where the G-L is derived, the smaller it becomes. For example, Greenaway and Milner (1983) point out that when working from the five digit level of disaggregation they ran into the danger of eliminating or greatly reducing IIT.

As far as measures of the change in the intensity of IIT (or marginal IIT) are concerned we adopt the method in Brülhart (1994) to measure this:

$$A = 1 - \frac{|\Delta X_j - \Delta M_j|}{|\Delta X_j| + |\Delta M_j|} \tag{2}$$

where Δ = the *change* in the value of trade (exports (X) minus imports (M) between two years) in the numerator of Equation (2). In the denominator the absolute values of export and import changes are summed. The closer the A coefficient is to 1, the greater is the share of IIT in the *change* in trade between the two years. Conversely the closer A is to 0, the higher is the contribution of inter-industry trade in explaining the change in total bilateral trade between the two years. The Brülhart index is in many ways an extension of the G-L index. It deals with the change in trade just as the G-L index deals with the level of trade.[3] It will be subject to the same aggregation biases, non-linearities and symmetricity in import or export rises as the G-L index.

Finally, we can attempt to relate the static measure of IIT (G-L index) with the more dynamic (Brülhart) measure of marginal IIT.[4] The former is a measure of the intensity of IIT at a particular point of time; the latter is an index of change in IIT, marginal IIT (MIIT), between two periods. The two measures can be related as follows:

(i) $A \rightarrow 1$. This means that the change in IIT, at the margin, between the periods compared is of the intra-industry type (adjustments are

3. Both the G-L and the Brülhart indices for an SITC section are a weighted average, based on the shares of gross and the changes in gross trade respectively, from some disaggregated level of the data. In this paper we employ weights based on three digit data.

4. We are grateful to an anonymous referee for drawing this feature to our attention.

within the same industries). If the G-L index between the two periods is rising, then this implies that total trade is rising. This is because a rise in the G-L implies more balanced trade, or a rise in both exports and imports. Exactly the converse is true if the G-L is declining. In this case total trade must be falling, as a declining G-L means falling imports and exports.

(ii) $A \rightarrow 0$. This means that in this case MIIT is of the inter-industry type, involving adjustments across industries. Under these circumstances, a rising G-L means that the original surplus country's trade surplus in that particular product has declined over the periods compared, which can be viewed as declining comparative advantage or a worsening trade performance. This is because a rising G-L means that trade has been more balanced over this period, and if the adjustment is of the inter-industry type there cannot have been a substantial rise in (sub-product group) exports and imports simultaneously. The opposite is true when G-L is declining.

2.3 *Vertical and Horizontal Intra-industry Trade*

Having established measures of IIT we turn now to a further distinction into the *type* of IIT. IIT is said to be vertical when products are differentiated by certain perceivable characteristics or attributes (one brand of car is different from another, a Metro and a Mercedes are perceived differently, reflected in their prices). Thus products within the "vertical" category of IIT may be distinguished by quality (reflected in the willingness to pay) as indicated in Falvey and Kierzkowski (1985). The upshot is that in the analysis of bilateral trade between two nations, one country may be exporting higher quality products relative to the other. We shall return to this point presently. Horizontal product differentiation is based upon the consumer's love of *variety* alone. This type of trade has been conceptualised in the works of Dixit and Stiglitz (1977) and Lancaster (1979). An example would be, going back to the car analogy, trade in different colours of a high quality car, such as a Jaguar.

Relative unit values (UVs) are commonly utilised to distinguish the type of intra-industry trade, as well as to judge the relative quality of exports of one country *vis-à-vis* another:

$$\frac{UV_j^X}{UV_j^M} \tag{3}$$

where X and M are exports and imports within product group j. $UV_j^{X(M)}$ is given by:

$$UV_j^{X(M)} = \frac{X_j(M_j)}{Q_j} \tag{4}$$

Q_j = physical units of trade in a common unit, kilograms or tonnes.

The above measure has two potential problems. The first is to do with the choice of the physical unit of measurement. We have to employ the same, or a consistent physical unit to calculate UVs for all commodities. The second problem tends to be the use of unit values in general, and prices in particular, as indicators of value. Stiglitz (1987), however, argues that prices reflect quality even with imperfect information, and it is the best indicator of quality over a large range of products.

We shall, following Greenaway, *et al.* (1994), utilise UVs to (a) distinguish between horizontal and vertical IIT; and (b) comment on the quality of exports. The UVs will be calculated at a SITC three digit level, following the practice in most of the literature, although we shall be commenting on the broad single digit category or section. Horizontal IIT will be defined to occur when UVs, defined in Equation (3) above lie in the range 0.75-1.25, which we describe as the range of *overlapping quality*.[5] All other IIT is vertical. When the ratio of export to import UVs exceeds some critical point above unity (usually 1.25), we will say that the country in question's exports are of a higher quality than its trading partner's (reflected in higher UVs). Conversely, when the ratio of export to import UVs is under some critical point below unity (usually 0.75), we will say that the country in question's exports are of a lower quality than its partner's. Thus for example in North-South trade, taking the ratio of UVs of the South's (North's) exports (imports) to the South's (North's) imports (exports), when UVs in Equation (3) exceed 1.25, in vertical trade, the South exports the higher quality product and when the ratio of UVs is less than 0.75 it is the North which has the qualitative edge.

III OVERVIEW OF THE QUALITY OF NORTH-SOUTH AND SOUTH-GB TRADE

The data employed in this section pertain to the years 1978 and 1992. (In the text we shall normally insert figures for 1978 in parenthesis immediately after data for 1992). Our disaggregated data, at a three digit level, indicates that IIT (simultaneous exports and imports in the same three digit product groups) dominates total trade between the regions. To facilitate comparison we present our numerical results pertaining to South-North and South-GB trade on the same table.

5. Alternative measures of horizontal IIT range from 0.85 to 1.15.

When we look at the product categories at the three digit level, we identify those product categories where there is simultaneous import and export (implying the existence of IIT) and sum the value of trade in these categories we arrive at a figure which states that 99 per cent of the total bilateral trade between these regions is subject to some IIT. This is true for both South-North and South-GB trade in 1978 and 1992. We justify the use of this methodology because it allows us to identify the share of vertical and horizontal IIT in total IIT, following Greenaway, *et al.* (1994).

Based on 1992 (1978) trade data we found that the share of IIT was 99.9 (99.96) per cent of all trade between the North and South of Ireland in *value* terms using the methodology described above. Thus IIT trade *dominates* the total *value* of North-South trade. Of this 38.7 (59.6) per cent of intra-industry trade was horizontal and 61.3 (40.4) per cent vertical (see Tables 1a and 1b). In the latter category 38.65 (24.6) per cent of Southern exports were of higher quality; while 22.65 (15.8) per cent of Northern exports were of the higher quality. Also, 99.9 (99.3) per cent of the value of all trade between GB and the South was of the intra-industry type using the same methodology. Similar to North-South IIT; 34.2 (50.3) per cent of IIT is of the horizontal variety and 65.8 (49.7) per cent was of the vertical type (see Appendix Tables 1a and 1b). In the latter category the South had a qualitative advantage in 42.2 (29.0) per cent of the total value of IIT; and GB in 23.6 (20.7) per cent. As far as overall GB-South IIT is concerned, 27 three digit groups out of 249 (226) traded accounted for 56 (54) per cent of total IIT between the two regions.

As far as overall trade is concerned, we can see that over time (1978-1992) horizontal trade is declining; and vertical trade is increasing, as is the South's qualitative edge (measured by unit values) within the vertical category, with respect to both the North and GB.

At the level of the broad sector (section), we find that sections 0 and 1 (Food and Live Animals; Beverages and Tobacco) figure prominently in intra-Irish trade. They accounted for 44.9 (49) per cent of trade in 1992 (1978). In 1978 Live Animals alone, accounted for a quarter of North-South trade. This had declined to about 6 per cent in 1992. Processed food (such as meat products) and beverage items grew in importance during this period. A notable growth area in North-South trade has been in alcoholic and non-alcoholic beverages. Sections 5-8 (manufactured goods) are more important in the GB-South direction than in the North-South context. In the former case it was 71.5 (66.3) per cent in 1992 (1978). In the latter instance the figures are 49.1 (44.9) per cent in 1992 (1978). Noteworthy growth areas here in South-GB include products in the chemical industry: such as 542 (medicaments). Another area of dramatic growth in South-GB trade is group 75 (Office machinery and Data Processing), which accounted for nearly 10 per cent of

total IIT between the two in 1992.

The schema below gives the *change* in the share of higher quality (vertical) exports out of total trade in a broad product group (section), between 1978 and 1992. The information in the schema can be gleaned by comparing values in Table 1a with 1b. (See Appendix Tables 1a and 1b). The first set of signs pertain to alterations in the South's higher quality export share, where a positive (negative) sign reflects an increase (decrease) in the share of high quality exports; while the second set of signs reflect changes in the North's or GB's higher quality export share, the signs once again indicating changes in the share of the North's or GB's higher quality exports. It can be readily detected that it is possible for higher quality export shares to rise for both partners in bilateral trade, as long as the share of goods exchanged in the overlapping (horizontal) quality category declines.

Table 1a: *Qualitative Changes in the South's Trade with the North and GB Between 1978 and 1992 in Each Section 0 to 9 Inclusive*

	South-North	*South-GB*
Food, Live Animals	+	+
Beverages, Tobacco	–	=
Crude Materials	+	–
Mineral Fuels	+	+
Animal, Vegetable Oils	–	=
Chemicals	+	–
Manufactured Goods	+	+
Machinery, Transport Equipment	+	+
Other Manufactured Goods	–	+
Other Goods and Trans	+	–

Table 1b: *Qualitative Changes in the North's (GB's) Trade with the South Between 1978 and 1992 in Each Section 0 to 9 Inclusive*

	North-South	*GB-South*
Food, Live Animals	+	–
Beverages, Tobacco	–	–
Crude Materials	+	–
Mineral Fuels	–	+
Animal, Vegetable Oils	+	+
Chemicals	+	+
Manufactured Goods	+	–
Machinery, Transport Equipment	–	–
Other Manufactured Goods	+	–
Other Goods and Trans	–	+

In the case of North-South and South-North trade there has been a simultaneous rise in the proportion of high quality (vertical) exports in sections 0, 5 and 6 between 1978 and 1992. This reflects an increased pattern of specialisation; caused by demand factors in the food industry, and supply factors fashioned by industrial policy in manufacturing. In the South-GB case, there has been a decline in GB's share of high quality exports and a rise in the corresponding share of the South in the manufacturing sections 6-8 (except chemicals). This pattern has been caused by changes in the manufacturing sector in the UK and the South of Ireland during the period under study (1978-1992). In the UK there was major de-industrialisation in the early 1980s, followed by major restructuring. In the South, this period was a remarkably successful era in terms of attracting foreign direct investment (FDI). This was mainly in manufacturing, and a considerable part of the production was geared towards export. Qualitative improvements, however, are reflective of the increased industrial maturity of the South and its movement towards a superior product mix, at least as far as exports to a major and geographically proximate trading partner is concerned.

IV CHANGES IN THE IIT INTENSITY AND MARGINAL IIT IN THESE REGIONS

Table 2 presents the calculations of the Grubel-Lloyd indices, defined by Equation (1), for North-South and South-GB IIT in the two years (1978 and 1992). Table 3 shows the change in MIIT based on the A coefficient (Equation (2)). As we shall see below the intensity of IIT is not necessarily related to the value of trade. Thus, for example, there can be a high G-L for low values of trade and vice versa. In the North-South case 130 (102) out of 230 (216) three digit product groups subject to IIT had $b_j > 50$ per cent in 1992 (1978). We define these commodity groups as high intensity IIT product groups. In the South-GB case, a total of 105 (83) out of 249 (226) of these groups exhibited high intensity IIT by our calculations. The number of high intensity IIT commodities within each section is greater in the North-South case than in the South-GB experience, except in section 8, and section 2 in 1992.

We find that for most commodity groups, the coefficient of the Grubel-Lloyd index (b_j) has declined in the case of North-South trade (Table 2). The exceptions being in sections 1, 6 and 9. In section 1 (beverages and tobacco) and 9 (other) the increase was substantial. Turning to the overall average for all commodities, the G-L has declined for both manufactures and all commodity groups in North-South trade. In the South-GB case the picture is mixed, with a rise in the G-L coefficients for sections 0, 1, 3, 5 and 7. The rise was most pronounced in sections 1 (beverages and tobacco) and 7 (machinery

Table 2: *Grubel-Lloyd Indicators of Intra-industry Trade*

	SITC Section	*North-South 1978*	*North-South 1992*	*South-GB 1978*	*South GB 1992*
0.	Food and Live Animals	0.62	0.59	0.27	0.39
1.	Beverages and Tobacco	0.23	0.63	0.25	0.69
2.	Crude Materials	0.64	0.36	0.64	0.29
3.	Mineral Fuels	0.50	0.39	0.06	0.20
4.	Animal and Vegetable Oils	0.70	0.35	0.17	0.15
5.	Chemicals and Related Products	0.49	0.42	0.45	0.46
6.	Manufactures	0.57	0.62	0.61	0.59
7.	Machinery and Transport Equipment	0.70	0.48	0.30	0.55
8.	Miscellaneous Manufactures	0.61	0.53	0.67	0.61
9.	Other	0.53	0.90	0.34	0.31
All (0-9)		0.60	0.56	0.41	0.50
Manufactures (5-8)		0.59	0.54	0.49	0.55

Sources: Calculations based on data supplied by CSO, Dublin.
Notes: The Grubel-Lloyd indices are a *weighted average* based upon trade shares at a three digit level.

and transport equipment). Here, unlike with North-South trade the average G-L coefficient for all commodities increased, including manufacturing.

Turning to the A coefficients of MIIT (Table 3) we find that the adjustment was mainly of the intra-industry type for section 1 in both North-South and South-GB trade.[6] With food and live animals (section 0) the adjustment was intra-industry in the North-South case but inter-industry in South-GB trade. In sections 2 and 3 the adjustments were inter-industry in the case of both directions of inter-regional trade. In the case of section 4, the adjustment coefficient is of the inter-industry variety in South-GB trade only. In all manufacturing categories the index of MIIT points to inter-industry adjustments except in section 8 in the direction of South-GB trade. As far as the overall averages are concerned the coefficients point to inter-industry adjustments. This is more pronounced for the manufacturing average in the North-South case, whereas in the South-GB experience it is the large inter-industry adjustment in food and live animals which brings down the average for all commodities.

6. We define the cut-off point for intra-industry adjustment as $A > 0.5$.

Table 3: *Intra-industry Trade: Changes at the Margin Between 1978-1992*

SITC Section	*North-South*	*South-GB*
0. Food and Live Animals	0.62 (–)	0.15 (+)
1. Beverages and Tobacco	0.60 (+)	0.70 (+)
2. Crude Materials	0.28 (–)	0.29 (–)
3. Mineral Fuels	0.24 (–)	0.08 (+)
4. Animal and Vegetable Oils	0.54 (–)	0.03 (–)
5. Chemicals and Related Products	0.36 (–)	0.42 (+)
6. Manufactures	0.28 (+)	0.44 (–)
7. Machinery and Transport Equipment	0.34 (–)	0.43 (+)
8. Miscellaneous Manufactures	0.37 (–)	0.51 (–)
9. Other	0.80 (+)	0.29 (–)
All (0-9)	0.50 (–)	0.37 (+)
Manufactures (5-8)	0.32 (–)	0.45 (+)

Sources: Data sources are the same as above.
Notes: Calculations based on the Brülhart A index, weighted from the three digit level, based on changes in gross trade between the two periods. The 1978 trade values are converted to 1992 prices. The 1992 (revision 3) data are adjusted to 1978 (revision 2) conventions. Figures in parentheses reflect the movement in the Grubel-Lloyd index, when 1978 is compared to 1992.

In attempting to link and interpret the G-L (static) and A (dynamic) coefficients the following schema, related to the discussion in Section II (2.2), summarises our findings:

SITC Section	*North-South*	*South-GB*
0. Food and Live Animals	Intra-industry adjustment Total trade rising (non-live animal categories)	Inter-industry adjustment South's trade surplus falling (worsening trade performance)
1. Beverages and Tobacco	Intra-industry adjustment Total trade rising	Intra-industry adjustment Total trade rising
2. Crude Materials	Inter-industry adjustment South's trade surplus rising (improved trade performance)	Inter-industry adjustment South's trade surplus rising (improved trade performance)
3. Mineral Fuels	Inter-industry adjustment South's trade surplus rising (improved trade performance)	Inter-industry adjustment GB's trade surplus declining (worsening trade performance)
4. Animal and Vegetable Oils	Intra-industry adjustment Total trade declining	Inter-industry adjustment South's trade surplus becomes a deficit (worsening trade performance)

SITC Section	*North-South*	*South-GB*
5. Chemicals and Related Products	Inter-industry adjustment ?	Inter-industry adjustment GB's trade surplus declining (worsening trade performance)
6. Manufactures	Inter-industry adjustment North's surplus becomes a deficit (worsening trade performance)	Inter-industry adjustment GB's surplus rising (improved trade performance)
7. Machinery and Transport Equipment	Inter-industry adjustment South's trade surplus rising (improved trade performance)	Inter-Industry adjustment GB's trade surplus declining (worsening trade performance)
8. Miscellaneous Manufactures	Inter-industry adjustment South's trade surplus rising (improved trade performance)	Intra-industry adjustment ?
9. Other	Intra-industry adjustment Total trade rising	Inter-industry adjustment GB's surplus rising (improved trade performance)
All (0-9)	Inter-industry adjustment South's surplus rising (improved trade performance)	Inter-industry adjustment GB's trade surplus declining (worsening trade performance)
Manufactures (5-8)	Inter-industry adjustment South's trade surplus rising (improved trade performance)	Inter-industry adjustment GB's trade surplus declining (worsening trade performance)

All changes in trade surpluses (deficits) are reckoned in real terms. It should be noted that in some cases the coefficient of adjustment (A) is near the critical value of 0.5, making it difficult to decide whether the adjustment process is intra- or inter-industry trade. Also, the movements in the G-L indices can be quite small in several instances. Be that as it may, we can readily ascertain that the South strengthened its trade performance or comparative advantage *vis-à-vis* the North and GB in the manufacturing sections taken as a whole. This was because its trade surplus grew with the North and its trade deficit declined with GB in the manufacturing sections, in the context of inter-industry adjustment. It is also reflective of the South's more active industrial policies. In the North-South sphere, there was an increase in total trade in the food, tobacco and beverage categories, which experienced intra-industry adjustments. This was also true of South-GB trade in beverages and tobacco. The South's historical role as an exporter of food and live animals to GB had greatly diminished, in the period between 1978 and 1992.

The overall average for all products does suggest inter-industry adjust-

ment in the pattern of IIT between 1978 and 1992, for both North-South and South-GB trade. Although the study of bilateral trade flows does not allow us to conclude that this meant adjustment costs in terms of displacement of factors of production, the South's bilateral trade with the North and GB must have contributed towards inter-industry adjustments in the two Irish economies. This is because GB's total trade with the South is a smaller proportion of its overall trade, compared with South-GB trade.

V CONCLUSIONS

As far as the overall quality of exports is concerned, horizontal trade appeared to decline between 1978 and 1992 in both the North-South and South-GB cases. The share of vertical trade increased, as did the share of high quality vertical exports, for all regions. This finding can be possibly explained by a number of factors. First, lower per capita income nations, such as the South, often tend to export their superior products to higher income countries or regions. Second, the quality of the South's exports are a reflection of its success in attracting export oriented inward investment, notwithstanding the associated problems of profit repatriation and transfer pricing. Third, changes in consumption patterns such as an increased demand for higher quality goods would partially explain the rise in vertical IIT. Fourth, the post-1979 industrial re-structuring in the UK leading to higher productivity is likely to promote some higher quality exports. A final concern remains about the role of transfer pricing by multinationals in the value added (unit values) in many industries in the South.

To summarise our findings regarding the pattern of IIT changes between 1978 and 1992 we find that the change has been of an inter-industry type in the manufacturing sections, with the South increasing its comparative advantage (reflected in rising surpluses or falling deficits). This was true for both North-South and South-GB trade and, perhaps, reflects the South's more vigorous industrial policies. The South's traditional role as a supplier of food and live animals to GB declined during this period. The adjustment pattern, however, was of an intra-industry variety in beverages and tobacco. The overall pattern of adjustment is one of inter-industry type change in both directions of regional trade. This suggests that bilateral trade between these regions contributed to trade related factor displacement.

REFERENCES

BRÜLHART, M., 1994. "Marginal Intra-Industry Trade: Measurement and Relevance for the Pattern of Industrial Adjustment", *Weltwirtschaftliches Archiv*, Vol. 130, pp. 600-613.

BRÜLHART, M., and D. McALEESE, 1995. "Intra-Industry Trade and Industrial Adjustment in Ireland", *The Economic and Social Review*, Vol. 26, No. 2, pp. 107-209.

CII, 1990. Confederation of Irish Industry, *Newsletter*, May.

DIXIT, A.K., and J.E. STIGLITZ, 1977. "Monopolistic Competition and Optimum Product Diversity", *American Economic Review*, Vol. 67, pp. 297-308.

FALVEY, R., and H. KIERZKOWSKI, 1985. "Product Quality, Intra-Industry Trade and (Im)Perfect Competition", in H. Kierzkowski (ed.), *Protection and Competition in International Trade*, Oxford: Blackwell.

GREENAWAY, D., and C. MILNER, 1983. "On the Measurement of Intra-Industry Trade", *Economic Journal*, Vol. 93, pp. 900-908.

GREENAWAY, D., R.C. HINE, and C. MILNER, 1994. "Country-Specific Factors and the Pattern of Horizontal and Vertical Intra-Industry Trade in the UK", *Weltwirtschaftliches Archiv*, Vol. 130, pp. 77-100.

GRUBEL, H.G., and P.J. LLOYD, 1975. *Intra-Industry Trade*, London: Macmillan.

HELPMAN, E., and P. KRUGMAN, 1985. *Market Structure and Foreign Trade*, Brighton: Harvester Wheatsheaf.

KRUGMAN, P., 1979a. "Increasing Returns, Monopolistic Competition and International Trade", *Journal of International Economics*, Vol. 9, pp. 469-479.

KRUGMAN, P., 1979b. "A Model of Innovation, Technology Transfer, and the World Distribution of Income", *Journal of Political Economy*, Vol. 87, pp. 253-266.

KRUGMAN, P., 1991. *Geography and Trade*, Cambridge, Mass.: MIT Press.

LANCASTER, K., 1979. *Variety, Equity and Efficiency*, Oxford: Blackwell.

MYINT, H., 1958. "The 'Classical' Theory of International Trade and the Underdeveloped Countries", *Economic Journal*, Vol. 68, pp. 317-337.

SCOTT, R., and M. O'REILLY, 1992. *Exports of Northern Ireland Manufacturing Companies 1990*, Belfast: Northern Ireland Economic Research Centre.

STIGLITZ, J.E., 1987. "The Causes and Consequences of the Dependence of Quality on Price", *Journal of Economic Perspectives*, Vol. 25, pp. 1-48.

APPENDIX

Appendix Table 1a: *Vertical and Horizontal Trade in Each Section as a Percentage of Total Trade in Each Section (1992)*

	SOUTH-NORTH			*SOUTH-GB*		
	Same Quality	*Higher South Quality*	*Higher North Quality*	*Same Quality*	*Higher South Quality*	*Higher GB Quality*
Food, Live Animals	42.0	42.8	15.2	36.8	36.6	26.6
Beverages, Tobacco	23.3	0.7	76.0	23.6	—	76.4
Crude Materials	39.4	33.7	26.9	23.5	3.2	73.3
Mineral Fuels	55.5	44.5	—	7.6	5.3	87.1
Animal Vegetable Oils	95.7	—	4.3	—	—	100.0
Chemicals, etc.	26.5	28.5	45.0	3.5	69.6	26.9
Manufactured Goods	35.0	35.8	29.2	51.7	33.1	15.2
Machinery, Transport Equipment	13.6	85.9	0.5	35.3	60.8	3.9
Other Manufactured Goods	66.3	17.7	16.0	43.8	32.8	23.4
Other Goods and Transport	—	45.7	54.3	52.8	—	47.2
Total	38.7	38.65	22.65	34.2	42.2	23.6
IIT:	(£499.9m)	(£499.4m)	(£292.5m)	(£3261m)	(£4028.97m)	(£2249.64m)

Notes:
Same Quality = Horizontal IIT.
Higher South Quality = Vertical IIT with the South producing the higher quality products over the North and GB, i.e., Ver>1.25.
Higher North/GB Quality = Vertical IIT with the North or GB producing the higher quality products over the South, i.e., Ver<0.75.

Appendix Table 1b: *Vertical and Horizontal Trade in Each Section as a Percentage of Total Trade in Each Section (1978)*

	SOUTH-NORTH			*SOUTH-GB*		
	Same Quality	*Higher South Quality*	*Higher North Quality*	*Same Quality*	*Higher South Quality*	*Higher GB Quality*
Food, Live Animals	78.5	13.4	8.1	52.0	17.1	30.9
Beverages, Tobacco	—	17.7	82.3	4.5	—	95.5
Crude Materials	50.6	28.0	21.4	11.1	6.3	82.6
Mineral Fuels	48.2	19.8	32.0	95.2	4.4	0.4
Animal Vegetable Oils	92.7	7.3	—	28.4	—	71.6
Chemicals, etc.	79.6	12.3	8.1	8.8	84.1	7.1
Manufactured Goods	40.9	32.3	26.8	55.4	29.3	15.3
Machinery, Transport Equipment	0.8	64.8	4.4	64.1	29.4	6.5
Other Manufactured Goods	49.3	36.1	14.6	35.1	28.7	36.1
Other Goods and Transport	—	—	100.0	53.8	0.1	46.1
Total	59.6	24.6	15.8	50.3	29.0	20.7
IIT:	(£677.44m)	(£279.90m)	(£179.90m)	(£3913m)	(£2257.25m)	(£1614.41m)

Notes:
1978 values based on 1992 prices.
Same Quality = Horizontal IIT.
Higher South Quality = Vertical IIT with the South producing the higher quality products over the North and GB, i.e., Ver>1.25.
Higher North/GB Quality = Vertical IIT with the North or GB producing the higher quality products over the South, i.e., Ver<0.75.