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Abstract

We present an analysis of the intra-industry nature of agri-food trade between Hungary and the European Union, following the Association Agreement signed in 1991. A slight growth in intra-industry trade (IIT) is indicated by the Grubel-Lloyd index. However, it is not uniform by product group or EU member state or over time, reflecting different patterns of bilateral integration and an economic restructuring process that is far from complete. Marginal IIT appears to be low, but assumes greater significance when the index is broadened to include vertical as well as horizontal IIT. Accordingly, the structure of the change in agri-food trade between Hungary and the EU during the period is shown to be predominantly either intra–industry of a vertical nature or inter-industry. Both are believed to incur adjustment costs that are higher than with horizontal IIT, but the dominance of vertical IIT suggests that the agri-food industries of Hungary and the EU may be developing in a complementary manner, involving somewhat lower adjustment costs than may have been feared.

Összefoglaló

A dolgozat az EU-val folytatott magyar agrárkereskedelem ágazaton belüli jellegét vizsgálja meg az 1992-1998 közötti időszakban. A Társulási Szerződés az ágazaton belüli kereskedelem szolid növekedéséhez vezetett Magyarország és az EU között. Ez a növekedés azonban különböző mértékű volt országonként és termékekenként. Az ágazaton belüli kereskedelem szerkezetének nagyfokú változékonysága arra utal, hogy a szerkezetváltás még messze nem fejeződött be. Eredményeink rámutatnak az ágazaton belüli kereskedelem szintje és foka közötti különbség fontosságára, és megerősítik azt az általános tapasztalatot, hogy a GL index nem megfelelő mércéje az utóbbinak. A marginális ágazaton belüli kereskedelem szintje Magyarország és az EU között alacsony és inkább a vertikális mint a horizontális ágazaton belüli kereskedelem a meghatározó. Ez arra utal, hogy a mezőgazdasági kereskedelem növekedése Magyarország és az EU között inkább ágazatok közötti, mint ágazaton belüli volt a vizsgált periódusban, ezért részleges kereskedelemliberalizálásból fakadó alkalmazkodási költségek viszonylag magasak voltak.

1. Introduction

Hungary is expected to become a member of the European Union (EU) within the next few years. As a precursor to full accession, an Association Agreement, signed in 1991, has promoted partial liberalisation of bilateral trade over the past ten years. The effects of this step towards closer economic integration depend, *inter alia*, on whether trade is of an *inter*-industry or *intra*-industry nature. Whereas the former is associated with a reallocation of resources between industries, the latter suggests a reallocation within industries. The belief that intra-industry trade (IIT) leads to lower costs of factor market adjustment, particularly for labour, gives rise to the 'smooth-adjustment hypothesis' (*Brülhart,* 1999 and 2000).[1] Thus, as the Hungarian economy becomes more integrated with that of the EU, the extent and nature of the trade impacts are likely to have important implications for economic adjustment costs.

A high level of IIT between two countries suggests an advanced degree of economic integration and tends to be positively correlated with participation in a preferential trading area, as for example has been shown by *Quasmi* and *Fausti* (1999) for agricultural trade within NAFTA. However, this is one of only relatively few studies that focus on the intra-industry nature of agri-food trade, despite its growing importance (*Henderson* et al., 1998). There is an increasing number of studies of IIT between East and West Europe (e.g. *Aturupane* et al. 1999, *Fidrmuc*, et al. 1999 and *Fidrmuc*, 2000), but again these tend to neglect agriculture and food. Accordingly, we focus on the intra-industry nature of agri-food flows between Hungary and the EU during the 1990s, a period when the Association Agreement should have had a positive effect on this type of trade. We apply recent developments in the theoretical literature to identify those measures of IIT that are considered most appropriate in the context of economic adjustment costs.

The remainder of the paper is organised as follows. Section 2 briefly reviews the literature on IIT in agriculture and food. In section 3 we apply a traditional measure of IIT, the Grubel-Lloyd index, to our data set. We highlight the more recent concept of *marginal* IIT, with associated empirical results, in section 4. The last section summarises and offers some conclusions on the implications for the costs of Hungary's economic integration with the EU.

2. Recent studies on IIT in agri-food trade

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[1] *Lovely* and *Nelson* (2000) question this informal assumption and show that within a general equilibrium context IIT can induce inter-industry adjustment.

McCorriston and Sheldon (1991) investigated IIT in highly processed food products for the US and the EU. They found US trade, except for that with Canada, to be characterised by inter-industry specialisation, but EU trade to be of an intra-industry nature. *Chirstodolou* (1992) examined factors explaining inter-country differences in the level of IIT in the European meat market in the late 1980s, and found that taste overlap, per capita incomes, geographical proximity and imperfect competition to be the most important explanatory variables. *Hirschberg* et al. (1994) analysed IIT in food processing, using panel data for 30 countries over the period 1964-1985, and found it to be positively correlated with a country's GDP per capita and the equality of GDP per capita between countries. They also noted that membership of a customs union or free trade area, and a common border, increased the extent of IIT. Long-run exchange rate variation and the distance between countries were shown to have negative effects. Subsequently, *Hirschberg* and *Dayton* (1996) found that GDP did not have a significant effect on IIT for a majority of disaggregated food processing sectors.

Pieri et al. (1997) examine IIT in EU dairy products for the period 1988-92. As well as showing that measures of equality between two countries are positively related to the level of IIT, industry-specific variables suggest that the presence of large firms with an absolute cost advantage over small firms stimulates IIT, through increased non-price competition. *Quasmi* and *Fausti* (op. cit.) focus on the impact of NAFTA on bilateral trade in agricultural and food products between the US, Canada and Mexico, and their trade links with the rest of the world, over the period 1990 to 1995. The NAFTA agreement has increased IIT, but whereas it is dominant in trade between the US and Canada, US and Canadian trade with Mexico is dominated by inter-industry trade. While Mexican IIT with its NAFTA partners has been enhanced, it is minimal compared to the significant growth in IIT between the US and Canada.

Henry de Frahan and *Tharakan* (1998) are the first to distinguish between horizontal (products differentiated by characteristics) and vertical (products differentiated by quality) IIT in European food trade. In general, their results confirm the country- and industry-specific determinants of IIT proposed by the theory. *Van Berkum* (1999), investigating the pattern of agricultural trade between the EU and ten Central European countries, shows that vertical IIT is dominant, i.e. trade characterised by EU exports of higher quality products and Central European exports of lower quality products. This suggests perhaps a specialisation within agriculture between the two regions, with production becoming increasingly complementary in nature.

In summary, these recent empirical studies have focused on describing trade flows and exploring the possible determinants of IIT. The results support the view that IIT is increasing and determined mainly by distance between partner countries and membership of a free trade area or similar. Market size, market structure, GDP measures and taste overlap may be important, but are not unambiguous as explanatory variables. There would also appear to be a relevant distinction between horizontal and vertical IIT. In the remainder of this paper we present a description of the trade flows in agri-food products between Hungary and the EU, beginning with the traditional Grubel-Lloyd index but then employing the more recent concept of *marginal* IIT, developed in the theoretical literature, to identify those measures of trade considered most appropriate in the context of factor market adjustment.

3. A traditional measure of IIT

We focus on Hungary's agri-food trade with the fifteen member states of the EU over the period 1992–98. The data are supplied by the OECD at the four-digit level of the Standard International Trade Classification (SITC). There are 253 four-digit product categories, to which we add two five-digit product categories (wheat starch and maize starch). The full sample of 255 product categories covers bilateral trade flows between Hungary and the EU member states in each of the seven years.

We use first the traditional measure of IIT, the *Grubel-Lloyd* (1975) index:

$$\text{GL} = 1 - \frac{|X_j - M_j|}{(X_j + M_j)} \qquad (1)$$

where X_j and M_j are the value of exports and imports of product category j. $|X_j - M_j|$ is a measure of 'unmatched' (or inter-industry) trade, while (X_j+M_j) is a measure of total trade in j. The index varies between 0 (complete inter-industry trade) and 1 (complete intra-industry trade). Grubel-Lloyd indices are aggregated at the industry level using trade weights:

$$\frac{(X_j + M_j)}{(X + M)}, \qquad (2)$$

where X and M are total exports and imports.

Some characteristics of Hungary's IIT with the member states of the EU, for agri-food products in aggregate, are shown in *Table 1*. First, there is an upward trend in IIT, but values of the GL indices are relatively low, <0.3. As expected, the GL indices tend to be higher for the EU as a whole than for individual member states. Second, the level of IIT varies significantly by member state and by year. The GL index is relatively high for trade with Austria, the Netherlands, France and Germany, and at its lowest for trade with Italy, Spain, Greece and Ireland, indicating that there are significant differences in the structure of IIT with the member states, and that the EU should not be treated as homogeneous in this respect. It is interesting to note that Hungary's GL indices with richer member states (e.g. Austria, Germany, Netherlands, France) are relatively high, while in the case of the poorer member states they are generally lower. This suggests that GDP per capita is perhaps not a good explanatory factor. Noteworthy also is that Italy has a low GL index (<0.10) although it is one of the most important trading partners for Hungary. In contrast, in some years Finland (1998) and Portugal (1993, 1996–1997) have relatively high GL indices (>0.22), but have no significant role in Hungarian agricultural trade. This highlights that there is no direct relationship between the GL index and the amount or *level* of IIT (see below).

The GL indices in *Table 1* are low compared with those for trade in manufactured goods. Estimates of GL indices for trade in manufactures between Hungary and the EU, from 1990 to 1996, range between 0.47 and 0.57 (*Fidrmuc*, 2000). The pattern is similar for Hungary's trade with selected EU countries (Austria, Germany, Italy, Netherlands and Sweden), with GL indices of between 0.42 and 0.64 (*Fidrmuc* et al. 1999).

Grubel-Lloyd indices are also calculated by commodity groups, based on four-digit level data, which are then aggregated to the two-digit level (*Table 2*). The indices do not exhibit a clear pattern, but vary by year and by product group. However, there are some commodity groups with high values: dairy products; coffee, tea, cocoa; feedstuff for animals; tobacco; hides, skins; textiles fibres; crude animal and vegetable materials; and animal oils and fats. *Table 3* summarises this information in a frequency distribution. It suggests that the more significant changes occurred in the middle range of the GL indices (0.4 to 0.6), where the share of products more than doubled between 1992 and 1998. The shares in the lower and upper ranges of the frequency distribution tended to decline.

However, a different picture emerges if we present the GL indices for the two years in the form of a scatter diagram, with the horizontal axis representing 1992 values and the vertical axis the corresponding 1998 values (*Figure 1*). A point lying on the leading diagonal indicates that no change has occurred in the value of the GL index between 1992 and 1998. A point that lies above (below) the diagonal represents an increase (decrease) in the GL index over the two years. The vertical distance between the diagonal and any point above (below) it represents the absolute increase (decrease) in the GL index over the period. Significant changes occurred in the pattern of IIT between 1992 and 1998; there are only a small number of points close to the diagonal. Although *Table 3* suggests that there is very little change in the lower end of distribution, the scatter diagram displays a different picture. Many products with a GL index of between 0-0.2 in 1992 reveal a much higher index in 1998, and likewise many products with higher indices in 1992 moved into the 0-0.2 range in 1998. These gross movements counter each other, such that there is little change in the frequency distribution. From *Table 3*, there is no change in the share (6.7 per cent) of products in the upper end of the distribution (0.8-1.0), but again *Figure 1* reveals a number of high-to-low and low-to-high movements. This relatively high variance in the pattern of IIT between Hungary and the EU reflects perhaps that economic restructuring is still much in evidence.

The measurement of IIT has two major problems, both well known. The first relates to the grouping of industrial activities or sectors. The second relates to bias arising from the trade imbalance, |X-M|. Several suggestions have been made to counter this problem, but none has general acceptance in the literature. In addition, *Rajan* (1996) highlights the importance of distinguishing between the *degree* of IIT, as measured by the GL index, and the *level* of IIT, which can be defined as total trade (X+M) minus inter-industry trade, or the trade imbalance, |X-M|. Rajan demonstrates that the standard GL index fails to correctly reflect the level of IIT in the presence of trade imbalance, i.e. there may be a high GL index but a low level of IIT. *Nilsson* (1999, p 109) notes that this will make more difficult "… establishing an empirical relationship between the share of intra-industry trade on the one hand, and the explanatory variables emerging from theory on the other, …" To facilitate inter-country comparisons, he proposes a new measure in which the bilateral level of IIT is divided by the total number of products traded, to yield an average level of IIT per product (*Nilsson,* 1997 and 1999).

In *Table 4,* Hungary's IIT with each member state of the EU, for agri-food products in aggregate, is ranked by the level of IIT, Nilsson's measure of IIT per product and the GL index, for 1992 and 1998. The ordering of the top six countries in 1992, and top three in 1998, is the same when the ranking is by level of IIT and IIT per product. However, the rankings by level of IIT and GL index are significantly different. Correlation coefficients of the rankings between the level of IIT and IIT per product are 0.975 and 0.938, in 1992 and 1998 respectively; and between the level of IIT and GL index are 0.833 and 0.556, respectively. This result reinforces that the GL index is a poor indicator of the level of IIT. However, as the next section shows, it is the concept of *marginal* IIT that is now considered more appropriate when examining the relationship between trade liberalisation and the costs of factor market adjustment.

4. Development of marginal IIT

The GL indices in *Tables 1* and *2* indicate a slightly upward trend in IIT. However, the GL index is most appropriate for measurement over a single period of time, i.e. it is regarded as a static indicator of IIT.[2] An assumption, sometimes implicit, in the literature on trade liberalisation has been that the GL index, as a measure of IIT, is negatively correlated with factor market adjustment costs. But adjustment costs are dynamic phenomena, and the static GL index is not a suitable measure in this instance. Consequently, recent theoretical developments stress the importance of *marginal* IIT (MIIT) in the context of the adjustment costs of trade liberalisation (*Hamilton* and *Kniest*, 1991; *Greenaway* et al., 1994; *Brülhart*, 1994, 1999 and 2000; *Azhar* et al., 1998; *Thom* and *McDowell*, 1999).[3] Thus, "… it is the structure of the *change* in flows of goods (MIIT) which affects adjustment rather than the trading pattern in any given time period (IIT)" (*Brülhart*, 1994, p. 609).

Several indices of MIIT have been developed.[4] The most popular measure used in recent empirical studies (e.g. *Fidrmuc* et al., 1999; *Brülhart* and *Hine,* 1999) is that proposed by *Brülhart* (1994), which is a transposition of the GL index to trade changes:

$$A = 1 - \frac{|\Delta X_j - \Delta M_j|}{|\Delta X_j| + |\Delta M_j|} \qquad (3)$$

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[2] Even though the GL index measures trade *flows* and therefore is not static in the strict sense.

[3] *Menon* and *Dixon* (1997) argue a counter case, that when dealing with adjustment costs the focus should be on the measure of inter-industry trade.

[4] Good critical reviews of the various indices of marginal intra-industry trade can be found in *Azhar* et al., 1998 and *Brülhart,* 1999.

where X_j and M_j have the same meaning as in the case of the GL index and Δ is the change in trade flows between two years. Like the GL index, A varies between 0 and 1, where the extreme values correspond to *changes* in trade flows that are attributable to being entirely of an inter-industry (0) or intra-industry (1) nature. The A index is defined in all cases, can be aggregated over a number of product groups using appropriate weights and indeed shares many the familiar statistical properties of the GL index.

Using (3), MIIT in agricultural and food products between Hungary and each of the member states of the EU, between 1992 and 1998, is very low, <0.2, with neighbouring Austria recording the highest value of 0.19 (*Table 5*, middle column). These estimates suggest that the *change* in agri-food trade between Hungary and the EU during the period was almost entirely of an *inter*-industry nature. Marginal IIT in each of the member states' total agri-food trade over the period is much higher (*Table 5*, last column), suggesting that whilst the role of IIT in the change in total agri-food trade was important for EU countries, this was not the case in their trade with Hungary.

As with the GL indices, the A indices are also calculated by product groups, based on four-digit level data and then aggregated to the two-digit level. The degree of MIIT differs considerably between 1992 and 1998 (Table 6, second column), but the indices are below 0.2 for 18 of the 22 product groups, again suggesting that inter-industry trade was dominant.

Brülhart's A index overcomes various problems associated with earlier attempts to measure MIIT (e.g. *Hamilton* and *Kniest,* 1991; *Greenaway* et al., 1994), but has been subject to criticism. *Oliveras* and *Terra* (1997) investigate statistical properties of the index and point out that there is no general relationship between the A index of a certain period and the corresponding indices of any sub-periods. They also find that there is no general relationship between the A index of a given industry and the corresponding indices of any sub-industries. Consequently, results based on the A index are very sensitive to choice of period and industry aggregation. The first of these problems is illustrated by splitting our period into two sub-periods, 1992–94 and 1995–98 (*Table 6*). Correlation coefficients between the whole period and these two sub-periods are 0.30 and 0.06, respectively. However, as *Oliveras* and *Terra* note, this inconsistency may provide additional information about the adjustment process.

A final but important consideration relates to the classification of MIIT as either horizontal or vertical. Conventionally, horizontal differentiation is based on actual or perceived differences in product characteristics which do not cause a systematic variation in price, whereas vertical differentiation is defined in relation to varieties that offer different levels of quality and therefore command different prices. Adopting a rather different dichotomy, based on the organisation of production rather than the characteristics of goods, *Thom* and *McDowell* (1999) argue that whilst Brülhart's A index is an appropriate measure of horizontal MIIT, it does not distinguish between horizontal and vertical MIIT, and therefore may underestimate the importance of total MIIT. This offers a further insight into the link between MIIT and adjustment costs, because vertical IIT is associated with factor endowments and specialisation and therefore closer to inter-industry trade. *Thom* and *McDowell* (1999) define vertical IIT as involving the separation of the processes by which a final good is produced, that is, the production process is vertically disintegrated, e.g. the production of feed wheat and beef cattle in agriculture; horizontal IIT is defined, more conventionally, as occurring when consumers express preferences for product variety. Effectively, this distinction requires MIIT to be measured at the industry and sub-industry levels. Their method of classifying horizontal and vertical MIIT is as follows. A_w, the weighted version of Brülhart's index is calculated over the N sub-industries that comprise industry j,

$$A_w=\sum_{i=1}^{N} A_i w_i \qquad (4)$$

where w_i are appropriate trade weights. This measures horizontal MIIT. A measure of total (horizontal and vertical) MIIT at the industry level, A_j , is given as:

$$Aj=1-\frac{|\Delta X_j-\Delta M_j|}{\sum_{i=1}^{N}|\Delta X_i|+\sum_{i=1}^{N}|\Delta M_i|} \qquad (5)$$

where $X_j=\sum_{i=1}^{N} X_i$ and $M_j=\sum_{i=1}^{N} M_i$. Vertical MIIT can then be defined as A_j-A_w, and inter-industry trade as 1-A_j. Thus, the overlap in a country's exports of feed wheat and imports of beef cattle, for example, will now be classified as vertical MIIT rather than as inter-industry trade, as would be the case under the Brülhart index.

As can be seen from *Table 7*, Hungary's total MIIT (A_j) with the member states of the EU is high. However, there are considerable differences among member states, with values ranging from 0.93 for trade with Portugal to 0.39 for trade with Sweden. It is interesting to note that there is little similarity between the values of A_j and the GL indices of *Table 1*, i.e. there are trading partners with a high level of total MIIT and a low GL index, and vice versa. Moreover, the values in *Table 7* highlight the difference between total MIIT (A_j) and horizontal MIIT (A_w). The A_j index of *Thom* and *McDowell* (op. cit.) reveals the importance of vertical MIIT, the highest value of which is for Hungary's trade with Portugal (0.84). Indeed, the largest share of the change in IIT over the period is attributable to vertical MIIT in eight of the member states. Similarly, for the EU as a whole, vertical MIIT (0.51) is shown to dominate marginal inter-industry trade (0.36) and horizontal MIIT (0.13).

5. Summary and conclusions

This paper has presented an analysis of the intra-industry nature of agri-food trade between Hungary and the EU for the period 1992 to 1998. The Association Agreement, in promoting partial trade liberalisation, can be said to have contributed to a slight growth in IIT as measured by the GL index. However, this increase is not uniform by country or product group, and probably reflects different patterns of bilateral integration and progress in economic restructuring. Also, the relatively high variance in the temporal pattern of IIT suggests that restructuring is far from complete. Our results reinforce the importance of distinguishing between the degree and the level of IIT, and accord with the general finding that the GL index is a poor indicator of the latter.

Marginal IIT, which is now regarded as a more appropriate measure in the context of economic adjustment costs, would appear to be low for agri-food trade between Hungary and the EU, but assumes greater significance when the index is broadened to include vertical as well as horizontal IIT. The structure of the change in agri-food trade between Hungary and the EU during the period therefore was predominantly intra–industry of a vertical nature or *inter*-industry. Both are believed to incur adjustment costs that are higher than with horizontal IIT, but the dominance of vertical IIT suggests that the agri-food industries of Hungary and the EU may be developing in a complementary manner, involving somewhat lower adjustment costs than might have been feared.

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Table 1

Grubel-Lloyd indices of Hungarian Agri-food Trade with EU partners, 1992–98

Year	1992	1993	1994	1995	1996	1997	1998
Austria	0.20	0.18	0.25	0.27	0.21	0.24	0.25
Belgium	0.11	0.15	0.17	0.08	0.09	0.08	0.15
Denmark	0.13	0.16	0.07	0.05	0.06	0.13	0.06
Finland	0.05	0.02	0.08	0.01	0.02	0.06	0.23
France	0.09	0.12	0.14	0.10	0.14	0.16	0.21
Germany	0.12	0.13	0.15	0.13	0.13	0.14	0.15
Greece	0.01	0.00	0.01	0.01	0.02	0.01	0.01
Ireland	0.00	0.01	0.00	0.04	0.00	0.02	0.03
Italy	0.04	0.04	0.05	0.04	0.05	0.07	0.09
Netherlands	0.14	0.16	0.16	0.16	0.17	0.23	0.20
Portugal	0.01	0.23	0.00	0.11	0.28	0.22	0.14
Spain	0.03	0.02	0.03	0.02	0.01	0.03	0.04
Sweden	0.02	0.04	0.06	0.06	0.09	0.13	0.08
UK	0.07	0.04	0.07	0.05	0.07	0.14	0.09
EU15	0.17	0.18	0.27	0.22	0.21	0.23	0.25

Source: Authors' calculations based on SITC data at the four-digit level, aggregated using trade share weights.

Table 2

Grubel-Lloyd indices of Hungarian Agri-food Trade with the EU by product group, 1992–98

SITC product group – two digit level	1992	1993	1994	1995	1996	1997	1998
00: Live animals other than animals of division 03	0.06	0.06	0.08	0.06	0.08	0.09	0.17
01: Meat and meat preparations	0.04	0.15	0.24	0.16	0.07	0.12	0.16
02: Dairy products and birds' eggs	0.25	0.21	0.31	0.43	0.44	0.24	0.54
03: Fish, crustaceans, molluscs and preparations thereof	0.05	0.05	0.15	0.14	0.08	0.09	0.09
04: Cereals and cereal preparations	0.21	0.35	0.39	0.18	0.29	0.25	0.19
05: Vegetables and fruits	0.12	0.16	0.22	0.18	0.17	0.22	0.18
06: Sugar, sugar preparations and honey	0.28	0.18	0.17	0.15	0.19	0.26	0.38
07: Coffee, tea, cocoa, spices, and manufactures thereof	0.55	0.45	0.46	0.58	0.45	0.41	0.38
08: Feedstuff for animals (excluding unmilled cereals)	0.52	0.38	0.36	0.37	0.54	0.45	0.44
09: Miscellaneous edible products and preparations	0.18	0.21	0.17	0.29	0.29	0.19	0.14
11: Beverages	0.21	0.19	0.15	0.10	0.17	0.16	0.17
12: Tobacco and tobacco manufactures	0.42	0.33	0.54	0.12	0.37	0.23	0.24
21: Hides, skins and furskins, raw	0.62	0.77	0.80	0.56	0.56	0.69	0.78
22: Oil seeds and oleaginous fruits	0.07	0.04	0.12	0.21	0.05	0.09	0.36
23: Crude rubber (including synthetic and reclaimed)	0.10	0.05	0.12	0.21	0.11	0.45	0.49
24: Cork and wood	0.14	0.12	0.10	0.09	0.11	0.13	0.13
26: Textiles fibres and their wastes	0.24	0.25	0.25	0.29	0.32	0.61	0.61
29: Crude animal and vegetable materials, n.e.s.	0.46	0.41	0.39	0.42	0.50	0.55	0.48
41: Animal oils and fats	0.16	0.39	0.48	0.60	0.37	0.57	0.35
42: Fixed vegetable oils and fats, crude, refined or fractionated	0.04	0.02	0.03	0.10	0.07	0.19	0.35
43: Processed Animal and vegetable oils and fats	0.14	0.13	0.11	0.06	0.05	0.07	0.06
59211/12 Starch	0.43	0.49	0.92	0.41	0.00	0.22	0.04

Source: Authors' calculation based on SITC data at four-digit level, aggregated to two-digit level using trade share weights.

Table 3

Frequency distribution of Grubel-Lloyd indices of Hungarian Agri-Food Trade with the EU, 1992–98 (percent)

GL index	1992	1993	1994	1995	1996	1997	1998
0.0 – 0.2	71.0	68.3	67.0	71.3	67.9	69.4	67.4
0.2 – 0.4	8.6	11.8	11.8	9.1	11.4	12.2	8.2
0.4 – 0.6	5.1	8.6	8.7	7.8	7.1	8.2	11.4
0.6 - 0.8	8.6	7.0	5.5	5.8	9.8	5.1	6.2
0.8 – 1.0	6.7	4.3	7.0	5.9	4.0	5.1	6.7
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Authors' calculations based on SITC data at the four-digit level.

Table 4

Ranking of EU member states by level of IIT, IIT per product and GL index

	1992			1998		
	level of IIT	IIT/product	GL	level of IIT	IIT/product	GL
Germany	1	1	4	1	1	6
Austria	2	2	1	2	2	1
Netherlands	3	3	2	3	3	4
Italy	4	4	9	4	5	8
France	5	5	6	5	4	3
Belgium	6	6	5	6	6	5
UK	7	9	7	7	10	9
Denmark	8	8	3	10	11	11
Spain	9	7	10	8	8	12
Sweden	10	12	11	9	9	10
Finland	11	11	8	11	7	2
Greece	12	12	12	13	13	14
Ireland	13	13	14	12	12	13
Portugal	14	14	13	14	14	7

Source: Authors' calculation based on SITC data at the four-digit level.

Table 5

Marginal Intra-Industry Trade in Agri-food Products, 1998/92

Country	Hungary	All
Austria	0.19	0.46
Belgium	0.09	0.55
Denmark	0.04	0.24
Finland	0.09	0.28
France	0.10	0.29
Germany	0.11	0.28
Greece	0.00	0.15
Ireland	0.06	0.20
Italy	0.03	0.17
Netherlands	0.08	0.34
Portugal	0.09	0.24
Spain	0.03	0.32
Sweden	0.01	0.34
UK	0.09	0.33
EU15	0.13	0.63

Source: Authors' calculations based on SITC data at four-digit level, aggregated using trade share weights.

Table 6

Marginal Intra-Industry Trade between Hungary and the EU, by product group

SITC product group – two digit level	1998/92	1994/92	1998/95
00: Live animals other than animals of division 03	0.00	0.29	0.03
01: Meat and meat preparations	0.06	0.28	0.70
02: Dairy products and birds' eggs	0.14	0.97	0.94
03: Fish, crustaceans, molluscs and preparations thereof	0.05	0.69	0.37
04: Cereals and cereal preparations	0.07	0.68	0.67
05: Vegetables and fruits	0.09	0.44	0.91
06: Sugar, sugar preparations and honey	0.12	0.54	0.59
07: Coffee, tea, cocoa, spices, and manufactures thereof	0.40	0.45	0.68
08: Feedstuff for animals (excluding unmilled cereals)	0.18	0.00	0.39
09: Miscellaneous edible products and preparations	0.08	0.21	0.78
11: Beverages	0.15	0.19	0.18
12: Tobacco and tobacco manufactures	0.41	0.52	0.50
21: Hides, skins and furskins, raw	0.05	0.45	0.20
22: Oil seeds and oleaginous fruits	0.58	0.50	0.46
23: Crude rubber (including synthetic and reclaimed)	0.11	0.11	0.63
24: Cork and wood	0.10	0.18	0.78
26: Textiles fibres and their wastes	0.32	0.88	0.95
29: Crude animal and vegetable materials, n.e.s.	0.16	0.84	0.72
41: Animal oils and fats	0.11	0.10	0.86
42: Fixed vegetable oils and fats, crude, refined or fractionated	0.01	0.01	0.55
43: Processed Animal and vegetable oils and fats	0.01	0.23	0.43
59211/12 Starch	0.02	0.00	0.89

Source: Authors’ calculations based on SITC data at four-digit level, aggregated using trade share weights.

Table 7

Decomposition of the Change in Hungarian Agri-food Trade Flows with the EU, 1998/92

Member state	TMIIT	HMIIT	VMIIT	MiIT
	(Aj)	(Aw)	(Aj-Aw)	(1-Aj)
Austria	0.92	0.19	0.72	0.08
Belgium	0.68	0.09	0.59	0.32
Denmark	0.44	0.04	0.40	0.56
Finland	0.70	0.09	0.62	0.30
France	0.53	0.10	0.43	0.47
Germany	0.86	0.11	0.51	0.37
Greece	0.47	0.00	0.47	0.53
Ireland	0.65	0.06	0.59	0.35
Italy	0.45	0.03	0.42	0.55
Netherlands	0.54	0.08	0.46	0.46
Portugal	0.93	0.09	0.84	0.07
Spain	0.71	0.03	0.68	0.29
Sweden	0.39	0.01	0.38	0.61
UK	0.80	0.09	0.72	0.20
EU15	0.64	0.13	0.51	0.36

Source: Authors' calculations based on SITC data at four-digit level, aggregated using trade share weights.

Note: TMIIT is total marginal intra-industry trade, HMIIT is horizontal marginal intra-industry trade, VMIIT is vertical marginal intra-industry trade, and MiIT is marginal inter-industry trade.

Figure 1

Scatter Diagram for GL indices (1992, 1998)