Intra-Industry Trade in Agri-Food Products between Hungary and the EU

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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 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 intra-industry trade appears to be low, but assumes greater significance when the index is broadened to include vertical as well as horizontal trade. Thus, growth in agri-food trade between Hungary and the EU over the period 1992-98 is shown to be dominated by vertical intra-industry trade and *inter*-industry trade. Adjustment costs due to partial trade liberalisation are likely therefore to have been relatively high.

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 gives rise to the 'smooth-adjustment hypothesis' (Brülhart, 1999). Therefore, as the Hungarian economy develops and becomes more integrated with that of the EU, the extent and nature of the trade impacts are likely to have important implications for the costs of factor market adjustment and industrial restructuring.

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 a 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.

Hungary's membership of the EU can be expected to lead to an increase in IIT. Prior to full accession, the Association Agreement should have had a positive effect on this type of trade during the 1990s. Accordingly, we focus on the intra-industry nature of agri-food trade between Hungary and the EU over the period 1992-98. The remainder of the paper is organised as follows. Section 2 briefly reviews the literature on IIT in agriculture and food. A traditional measure of IIT with empirical results is presented in section 3. In section 4 we highlight the more recent concept of marginal IIT, with associated empirical results. The last section summarises and offers some conclusions on the implications for the costs of Hungary's economic adjustment.

2. Recent studies on IIT in agri-food trade

McCorriston and Sheldon (1991) investigated IIT in highly processed food products for the US and the EU. They found that US trade was characterised by inter-industry specialisation, except for trade with Canada, but that EU trade was of an intra-industry nature. Chirstodolou (1992) examined factors explaining cross-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 were 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. They found IIT 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 et al. (1996) investigated the pattern of IIT for the processed food industries using disaggregated data. A result which differed from their earlier study was that GDP, in total or per capita, did not have a significant effect on IIT for a majority of sectors.

Pieri et al. (1997) examine IIT in EU dairy products for the period 1988-92. As well as suggesting 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 increasing non-price competition. Concentration in the retail sector was shown to have a negative effect on IIT. 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.

Van Berkum (1999) investigates the pattern of agricultural trade between the EU and ten Central European countries over 1988-97. He shows that trade was characterised by EU

exports of high quality products, while exports from the Central European countries were mainly of lower quality. This suggests a specialisation within agriculture between the two regions, with agricultural production becoming increasingly complementary in nature.

The results of these empirical studies support the view that the level of IIT is 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 are not unambiguous as explanatory variables.

3. IIT in agri-food trade between Hungary and EU

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 (GL) index:

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

where X_j and M_j are the value of exports and imports of product category j. The index varies between 0 (complete inter-industry trade) and 1 (complete intra-industry trade). GL 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 EU for agricultural 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. Second, and as expected, the GL indices tend to be higher for the EU as a whole than for individual member states. Third, 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 development 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 low. 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. The value of GL indices for trade in manufactures between Hungary and the EU from 1990 to 1996 ranged between 0.47 and 0.57 (Fidrmuc, 2000). The pattern was similar for selected EU countries (Austria, Germany, Italy, Netherlands and Sweden) in 1996, with GL indices ranging between 0.42 and 0.64 (Fidrmuc et al. 1999).

GL 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 GL indices do not exhibit a clear pattern, but fluctuate by year and 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 ranges of the GL indices. The share of products with GL indices between 0.4 and 0.6 more than doubled between 1992 and 1998. The share in the lower ranges of the frequency distribution declined slightly, while the upper end of the distribution remained stable.

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 between 1992 and 1998. 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 point 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 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 net 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 suggests that a restructuring process 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, $|X_j-M_j|$. 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 $(X+M)–S|X_j-M_j|$. 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, …" Consequently, he proposes a new measure in which the bilateral level of IIT is divided by the total number of products traded between the two countries, 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 is ranked by the level of IIT, Nilsson's IIT per product and 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 ranking by level of IIT and GL index produces a significantly different result. 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 cost 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 in a single period of time, i.e. it is a static indicator of IIT. An assumption, sometimes implicit, in the literature on trade liberalisation has been that a high GL index is correlated with low 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 in interpreting the adjustment costs of trade liberalisation (Greenaway et al., 1994; Brülhart, 1994 and 1999; Thom and McDowell, 1999)

Several indices of marginal IIT (MIIT) have been developed in recent years[1]. Brülhart (1994) recommends the following:

$$A_i = 1 - \frac{|\Delta X_i - \Delta M_i|}{|\Delta X_i| + |\Delta M_i|} \qquad (3)$$

where the individual variables (X_i and M_i) 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 can be aggregated over a number of product groups using appropriate weights, as with the GL

[1] See excellent critical reviews on various indices of marginal intra-industry trade in Azhar et al. 1998 and Brülhart, 1999.

index, and has become the most popular measure in recent empirical studies of MIIT (e.g. Fidrmuc et al., 1999; Brülhart and Hine, 1999).

Using (3), the 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 Austria and Germany recording the highest values of 0.19 and 0.11 (Table 5). These results indicate that growth in agricultural trade between Hungary and the EU during the period was principally of an *inter*-industry nature. Marginal IIT in each of the member states' total agricultural trade over the period is much higher (last column of Table 5), suggesting that whilst the role of IIT in growth of total agricultural trade was important for EU countries, this was not the case in their trade with Hungary.

As with the GL indices, A indices are also calculated by commodity groups, based on four-digit level data which are then aggregated to the two-digit level. The level of MIIT differs sharply by commodity groups between 1992 and 1998 (first column, Table 6). The values of the A indices are below 0.2 for 18 of the 22 product groups. Oilseeds reveal the highest degree of MIIT, with an A index of 0.58.

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.

Intra-industry trade can be classified as either horizontal or vertical. The former occurs when consumers express preferences for product variety, while the latter is usually defined in relation to varieties that offer different levels of quality. Thom and McDowell (1999) argue that whilst Brülhart's index is an appropriate measure of horizontal IIT, it does not distinguish between horizontal and vertical IIT, and therefore may underestimate the importance of total IIT.[2] They offer a method of classifying horizontal and vertical MIIT as follows. A_w, the weighted version of Brülhart's index, is signed horizontal MIIT:

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

where w_i are appropriate weights. A measure of total MIIT, 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 $X_j = \sum_{1}^{N} X_i$ and $M_j = \sum_{1}^{N} M_i$. Vertical MIIT is then defined as $A_j - A_w$.

As can be seen from Table 7, Hungary's total MIIT (A_j) with the member states of the EU is high, especially compared to the GL indices in Table 1. However, there are considerable differences among member countries, with values for A_j 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 the GL indices and the values of A_j. That is, there are countries with a

[2] Thom and McDowell (1999) define vertical IIT as the separation of the processes by which a final good is produced, i.e. the production process is vertically disintegrated. This definition, based on the organisation of

low GL index and a high level of total MIIT, and vice versa. Moreover, the values in Table 7 highlight the difference between total MIIT (A_j) and horizontal MIIT (A_w). If we focus only on the A_w (Brülhart) index, the interpretation is that growth in trade during the period was predominantly of an *inter*-industry nature. However, using the A_j index of Thom and McDowell (1999) reveals the importance of vertical MIIT.

5. 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 can be said to have contributed to a slight growth in IIT as measured by the GL index. However, the increase of IIT 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 this 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 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. These results indicate that growth in agri-food trade between Hungary and the EU during the period was principally intra–industry of a vertical nature, or *inter*-industry. In either case, adjustment costs due to partial trade liberalisation are likely to have been relatively high.

production rather than the characteristics of goods, differs from the conventional definition of 'quality differences'.

References

Aturupane, C., Hoekman, B. and Djankov, S. (1999). Horizontal and Vertical Intra-Industry Trade between Eastern Europe and European Union. *Weltwirtschaftliches Archiv*, Vol. 135, pp. 62-81.

Azhar, A.K.M., Elliott, R.J.R. and Milner, C.R. (1998). Static and Dynamic Measurement of Intra-Industry Trade and Adjustment: A Geometric Reappraisal. *Weltwirtschaftliches Archiv*, Vol. 134, pp. 404-422.

van Berkum, S. (1999). Patterns of Intra-Industry Trade and Foreign Direct Investment in Agro-Food Products: Implications for East-West Integration. *MOCT-MOST*, Vol. 9, 255-271.

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

Brülhart, M. (1999). Marginal Intra-Industry Trade and Trade-Induced Adjustment: A Survey. in. Brülhart, M. and Hine, R.C. (eds.) Intra-Industry Trade and Adjustment. The European Experience. Macmillan Press, London.

Brülhart, M. and Hine, R.C. (eds.) (1999). Intra-Industry Trade and Adjustment. The European Experience. Macmillan Press, London.

Christodolou, M. (1992). Intra-Industry Trade in Agrofood Sectors: The Case of the EEC Market. *Applied Economics*, Vol. 24, pp. 875-884.

Fidrmuc, J. (2000). Restructuring European Union Trade with Central and Eastern European Countries. *Atlantic Economic Journal*, Vol. 28, pp. 83-92.

Fidrmuc, J., Grozea-Helmenstein, D., and Wörgötter, A. (1999). East-West Intra-Industry Trade Dynamics. *Weltwirtschaftliches Archiv*, Vol. 135, pp. 332-346.

Greenaway, D., Hine, R.C., Milner, C.R. and Elliott, R.J.R. (1994). Adjustment and the Measurement of Marginal Intra-Industry Trade. *Weltwirtschaftliches Archiv*, Vol. 130, pp. 418-427.

Greenaway, D. and Torstensson, J. (1997). Back to Future: Taking Stock on Intra-Industry Trade. *Weltwirtschaftliches Archiv*, Vol. 133, pp. 249-269.

Grubel, H.G. and Lloyd, P.J. (1975). *Intra Industry Trade*. Macmillan: London.

Hamilton, C. and Kniest, P. (1991). Trade Liberalisation, Structural Adjustment and Intra-Industry Trade: A Note. *Weltwirtschaftliches Archiv*, Vol. 127, pp. 365-367.

Henderson, D.R., Sheldon, I.M. and Pick, D.H. (1998). International commerce in processed foods: patterns and curiosities. in: Pick, D.H., Henderson, D.R., Kinsey, J.D. and Sheldon, I.M (eds.) Global markets for processed foods: theoretical and practical issues. Westview Press, Boulder Colorado.

Henry de Frahan, B. and Tharakan, J. (1998). Horizontal and Vertical Intra-Industry Trade in the Processed Food Sector. American Agricultural Economics Association Annual Meeting, Salt Lake City, USA, August 2-5 1998.

Henry de Frahan, B. and Tharakan, J. (1999). Testing the Determinants of the European Food Trade Flows. European Association of Agricultural Economists IXth Congress, Warsaw, Poland, August 24-28, 1999.

Hirschberg, J., Sheldon, I. and Dayton, J. (1994). An Analysis of Bilateral Intra-Industry Trade in the Food Processing Sector. *Applied Economics*, Vol. 26, pp. 159-167.

Hirschberg, J. and Dayton, J. (1996). Detailed Patterns of Intra-Industry Trade in Processed Food. in. I.M. Sheldon and Abbott, P.C. (eds.) *Industrial Organization and Trade in the Food Industries*. Boulder, Westview Press.

Oliveras, J. and Terra, I. (1997). Marginal Intra-Industry Trade Index: The Period and Aggregation Choice. *Weltwirtschaftliches Archiv*, Vol. 133, pp. 170-178.

McCorriston, S. and Sheldon, I.M. (1991). Intra-Industry Trade Specialization in Processed Food Products: The Case of US and the EC. *Review of Agricultural Economics* Vol. 13, 173-184.

Menon, J. and Dixon, P.B. (1997). Intra-Industry versus Inter-Industry Trade: Relevance for Adjusment Costs. *Weltwirtschaftliches Archiv*, Vol. 133, pp. 164-169.

Nilsson, L. (1997). The Measurement of Intra-Industry Trade between Unequal Partners. *Weltwirtschaftliches Archiv*, Vol. 133, 554-565.

Pieri, R., Rama, D., and Venturini, L. (1997). Intra-Industry Trade in the European Food Industry. *European Review of Agricultural Economics*. Vol. 24, 411-425.

Qasmi, B.A. and Fausti, S.W. (1999). NAFTA Intra-Industry Trade in Agricultural Food Products. Western American Agricultural Economics Association Annual Meeting, Fargo, July 11-14.

Rajan, R.S. (1996). Measured of Intra-Industry Trade with Reference to Singapore's Bilateral Trade with Japan and the United States. *Weltwirtschaftliches Archiv*, Vol. 132, 378-389.

Thom, R. and McDowell, M. (1999). Measuring Marginal Intra-Industry Trade. *Weltwirtschaftliches Archiv*, Vol. 135, 48-61.

Table 1 Grubel-Lloyd indices for 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 code 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 code data at four-digit level, aggregated using trade share weights.

Table 3 Frequency distribution of Grubel-Lloyd indices for 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 code data at the four-digit level.

Table 4 Ranking of countries by level of IIT, IIT/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 code data at the four-digit level.

Table 5 Marginal Intra-Industry Trade in Agri-food Products, 1998/92

Country	Hungary	Total
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 code 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 code 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 code 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)