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

Imre Fertő and L J Hubbard

Institute of Economics
Hungarian Academy of Sciences
and
School of Agriculture, Food and Rural Development
University of Newcastle upon Tyne, UK

ferto@econ.core.hu
lionel.hubbard@ncl.ac.uk

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Abstract

We investigate horizontal and vertical intra-industry trade (IIT) in agri-food products between Hungary and the EU. Intra-industry trade is separated into its horizontal and vertical components on the basis of differences in unit values. Three different approaches to measuring IIT are employed and these are then tested using standard regression models. Results show that horizontal IIT in agri-food products is low, but that vertical type trade is more prevalent, though still less important than inter-industry trade. The results lend support to the contention that there are different determinants for horizontal and vertical IIT. More importantly, using a measure of IIT that reflects the level of trade produces better regression results than those based on the degree or share of IIT. The model relating to Hungary's vertical IIT in agri-food products yields the most promising results in terms of *a priori* expectations.

Keywords intra-industry trade, product differentiation, Hungary, EU, econometrics

1. Introduction

Intra-industry trade (IIT) is typically defined as two-way trade in similar products. In empirical analysis it is traditionally measured using the Grubel-Lloyd index or a variant, applied at a sufficiently disaggregated level of bilateral trade data such that product groups can be considered as similar. However, similarity of products also has significance from a theoretical point of view, as an important distinction exists in the literature between horizontal and vertical product differentiation. Essentially, the former occurs when varieties of a product exhibit different characteristics but are of a similar quality, and the latter when varieties are of different qualities. The significance of the distinction is that the industry and country characteristics associated with IIT may differ depending on the type of product differentiation (Greenaway, Hine and Milner, 1994 and 1995). Additionally, the distinction has some potential implications for the welfare analysis of economic integration (Blanes and Martin, 2000). Intra-industry trade based on horizontally differentiated products is associated with low adjustment costs - the so-called 'smooth adjustment hypothesis' (see Brülhart, 1999 and 2000). However, these costs can be significantly higher for vertically differentiated products, for two reasons. First, the factor content of exports and imports may be different, akin to *inter*-industry trade (Greenaway and Hine, 1991). Second, if IIT leads to higher quality products displacing lower quality products, then countries that produce the latter are likely to suffer unemployment, which if not compensated by lower prices and access to the higher quality products, will cause negative welfare effects (Shaked and Sutton, 1994; and Motta, 1992).

Theory suggests that separation of ‘similar products’ into horizontal and vertical IIT is “an important distinction to make, yet empirically there have been remarkably few attempts to do so” (Greenaway, Milner and Elliott, 1999, p. 379). The extensive empirical literature on IIT has typically assumed, sometimes implicitly, that product differentiation is horizontal. Yet Greenaway, Hine and Milner (1994 and 1995) and Greenaway, Milner and Elliott (1999) show that vertical IIT is markedly more important than horizontal IIT for the UK, while Fontagné and Freundenberg (1997) find a similar result for the EU. Thus, there is a “need to refine the measures of different types of IIT to facilitate more direct testing of the theories of IIT” (Greenaway, Milner and Elliott, 1999, p. 365).

With specific reference to European food trade, Henry de Frahan and Tharakan (1998 and 1999) separate vertical and horizontal IIT, using the method proposed by Greenaway, Hine and Milner (1994 and 1995), and then test for country and industry specific determinants of these different types of trade. In this paper, we supplement the Greenaway, Hine and Milner approach with two additional approaches after Fontagné and Freundenberg (1997) and Nilsson (1997 and 1999). The three approaches yield different measures of horizontal and vertical IIT, which we then use as dependent variables in standard regressions to test for country-specific determinants. Our empirical analysis relates to Hungary’s IIT in agri-food products with 14 member states of the EU over the period 1992-98.

The next section outlines the separation of horizontally and vertically differentiated products and the three approaches to measuring IIT. In section 3 these approaches are applied to our data set. The theoretical basis for investigation of the country-specific determinants of IIT is outlined in section 4, and the results of the regression analysis are presented in section 5. Section 6 contains a summary and some conclusions.

2. Measuring vertical and horizontal intra-industry trade

Over the last decade there has been a number of attempts at separating horizontal and vertical IIT, based on quality differences. Cooper *et al.* (1993) applied an hedonic regression to identify the relative importance of a range of product characteristics in influencing price. An alternative approach is to infer quality differences from measurement of demand elasticities among products from different sources, i.e. domestic versus imports. Following this procedure, Brenton and Winters (1992) interpreted the lower demand elasticities of domestically produced goods as an indicator of their higher quality. Unit value can also be used for assessing product quality in trade data and, despite shortcomings, has become popular in the separation of horizontal and vertical IIT (Abd-el-Rahman, 1991; Greenaway, Hine and Milner, 1994 and 1995). The underlying assumption is that relative prices are likely to reflect relative qualities (Stiglitz, 1987). Typically, trade flows are defined as horizontally differentiated where the spread in the unit value of exports relative to the unit value of imports is less than 15% at the five-digit SITC (Standard Industrial Trade Classification) level. Where relative unit values are outside this range products are considered as vertically differentiated. The presumption is that transport and other freight costs do not cause a difference in export and import unit values by more than this percentage. Furthermore, both Abd-el-Rahman (1991) and Greenaway, Hine and Milner (1994, 1995) demonstrate that increasing the range from 15% to 25% does not radically alter the division of trade into horizontally and vertically differentiated products. Thus, this method produces "an intuitively plausible and fairly robust criterion to disentangle vertical and horizontal IIT…" (Greenaway, Hine and Milner, 1994, p.95).

Formally, bilateral trade of a horizontally differentiated product, j, occurs where the unit values of exports (UV_j^x) and imports (UV_j^m), for a particular dispersion factor, α (e.g. 0.15), satisfies the following condition:

$$1-\alpha \leq \frac{UV_j^x}{UV_j^m} \leq 1+\alpha. \qquad (1)$$

Similarly, bilateral trade of a vertically differentiated product is defined as being where:

$$\frac{UV_j^x}{UV_j^m} < 1-\alpha, \quad \text{or} \quad \frac{UV_j^x}{UV_j^m} > 1+\alpha. \qquad (2)$$

Adopting this approach of a ±15% unit price threshold as a means of separating horizontally and vertically differentiated products, we compute measures of IIT using three different approaches.[1]

The first approach is based on Greenaway, Hine and Milner (1994 and 1995), who calculate overall IIT using an unadjusted Grubel-Lloyd (GL) index and then divide it into horizontal and vertical components on the basis of the unit values of exports and imports, as in (1) and (2). However, Fontagné and Freundenberg (1997) note that the resulting measures are not GL indices. Rather, the outcome of the Greenaway, Hine and Milner approach is to scale the GL index for horizontal (vertical) trade by the share of total horizontal (vertical) trade in total gross trade, such that the two measures sum to the GL index for overall IIT. Thus, the Greenaway, Hine and Milner measure (GHM) expresses horizontal (vertical) matched trade as a share of gross bilateral trade:

$$GHM_k^p = \frac{\sum_j \left[\left(X_{j,k}^p + M_{j,k}^p\right) - \left|X_{j,k}^p - M_{j,k}^p\right|\right]}{\sum_j \left(X_{j,k} + M_{j,k}\right)} \qquad (3)$$

where X and M are values of exports and imports, *p* is either horizontal or vertical trade, *j* is the product category (*j=1,…n*) and *k* is a trading partner. This is the measure used by Henry de Frahan and Tharakan (1998 and 1999) in their analysis of European food trade.

The second approach, after Fontagné and Freundenberg (1997), employs a different definition of intra-industry or two-way trade. “Trade in an item is considered to be ‘two-way’ when the value of the minority flow (for example imports) represents at least 10% of the majority flow (exports)” (Fontagné and Freundenberg, 1997, p.30). Thus, two-way trade in product j requires that the following condition be satisfied:

[1] Fontagné and Freundenberg (1997) criticise use of equation (1) on the grounds that the right-hand side is not consistent with the left-hand side and suggest instead:

$$\frac{1}{1+\alpha} \le \frac{UV_j^x}{UV_j^m} \le 1+\alpha .$$

$$\frac{\mathrm{Min}(\mathrm{X_j},\mathrm{M_j})}{\mathrm{Max}(\mathrm{X_j},\mathrm{M_j})} \geq 10\% \,. \qquad (4)$$

When the minority flow is below this level it is not considered a structural feature of trade, and the gross trade flow is defined as *inter*-industry or one-way.

The Fontagné and Freundenberg approach (FF) uses the same denominator as in (3), i.e. gross bilateral trade, but identifies, on the basis of the 10% minimum trade overlap, an *entire trade flow* as either horizontal or vertical:

$$FF_k^p = \frac{\sum_j \left(X_{j,k}^p + M_{j,k}^p\right)}{\sum_j \left(X_{j,k} + M_{j,k}\right)} \,. \qquad (5)$$

This approach seeks to address a problem that arises in the interpretation of the traditional GL or similar index, namely that the majority trade flow (whichever is the larger of exports or imports) is classed as *both* intra-industry and inter-industry. The FF method avoids this problem; gross bilateral trade for a given product will be *either* intra-industry (two-way) *or* inter-industry (one-way), depending on the degree of trade overlap. Thus, trade is classified as horizontal two-way trade, vertical two-way trade, or one-way trade. In contrast to GL type measures, each of these three trade types may contain a deficit or surplus.

Fontagné and Freundenberg (1997) find that almost one third of all intra-EU trade has an overlap of less than 10%; they classify this trade as one-way with application of their minimum overlap threshold. Generally, the FF measure will yield values for two-way trade which are higher than shown by GL type measures (e.g. GHM), because once the overlap threshold is met the entire trade flow is treated as two-way. Fontagné and Freundenberg point out that their approach is complementary to, rather than a substitute for, traditional measures of IIT; it measures the relative importance of the three trade types in all trade, whereas the GL and similar indices focus on the intensity of matched trade. They also note that the GHM measure in (3) falls between the standard GL index and their own measure in (5).[2]

[2] The exact relationship between these three measures is detailed in Fontagné and Freundenberg (1997).

The GHM and FF approaches both measure trade shares and, as such, are open to the criticism that they reflect the *degree* rather than the *level* of IIT (Rajan, 1996; Nilsson, 1997 and 1999). Consequently, our third approach employs a measure that attempts to indicate more accurately the level of the different types of trade. Nilsson (1997 and 1999) suggests that matched trade [i.e. the same numerator as GHM in (3)] is divided by the number of all products traded, *n*, to yield an average level of IIT per product.[3] Based on this approach we divide matched horizontal (vertical) trade by the number of horizontally (vertically) traded product groups, to yield an average level of horizontal (vertical) IIT per product group:

$$N_k^p = \frac{\sum_j \left[\left(X_{j,k}^p + M_{j,k}^p \right) - \left| X_{j,k}^p - M_{j,k}^p \right| \right]}{n^p}. \qquad (6)$$

Nilsson argues that his measure provides a better indication of the extent and volume of IIT than GL type indices and is more appropriate in cross-country analyses aimed at establishing an empirical relationship between IIT and the explanatory variables emerging from theory.

The three approaches to measuring IIT, shown in equations (3), (5) and (6), are illustrated with a simple numerical example in Table 1.

3. Application to Hungary's agri-food trade with the EU

Using the methods outlined above, we compute measures of IIT in horizontally and vertically differentiated agri-food products between Hungary and 14 member states of the EU, for the period 1992 to 1998, using OECD data. Summary results are presented for each of the three approaches - GHM^p, FF^p and N^p – where p is horizontal (H) or vertical (V) IIT.

From the average measures of GHM and FF over the period, Hungary's IIT in agri-food products with its EU partners was rather low and predominantly of a vertical nature (Table 2). With regards to horizontal IIT, Portugal has the highest GHM^H index (0.16) and highest FF^H share (0.33). Otherwise, horizontal type trade is very low. The highest measures of vertical type trade are for Finland (GHM^V 0.28 and FF^V 0.48). Portugal also displays the highest mean value for total IIT (the sum of the respective horizontal and vertical components) under

[3] Nilsson does not separate IIT into its horizontal and vertical components.

both measurements (GHM 0.40 and FF 0.77). As expected, the FF values are generally higher than their GHM counterparts, as revealed in the overall means. However, these averages should be interpreted with care, because the associated variances are high, especially for the horizontal IIT measures, implying significant variability from year to year. Nevertheless, it would appear that the most prevalent type of agri-food trade between Hungary and its EU partners over the period was one-way, or *inter*-industry, suggesting perhaps complementarity rather than competition in production. However, there is evidence of IIT, mainly of a vertical nature, suggesting the exchange of products of different quality. The dominance of vertical over horizontal type trade accords with the general findings of Greenaway, Hine and Milner (1994 and 1995) and Greenaway, Milner and Elliott (1999) for the UK, and of Fontagné and Freundenberg (1997) for the EU. This also suggests higher economic adjustment costs in the wake of trade liberalisation than would be the case with horizontal IIT.

Hungary's IIT in agri-food products as measured by N is also shown in Table 2. The highest average value of horizontal IIT per product group is that for Austria (N^H = 2.668 million US$), whilst the highest average value of vertical IIT per product group is that for Germany (N^V = 2.117 million US$). Some examples of the more important products traded (in terms of the value of IIT) are given in Appendix 1.

As mentioned in section 2, Rajan (1996) and Nilsson (1997 and 1999) argue that the *degree* of IIT, as measured by the GL index, is in general a poor indicator of the *level* of IIT. This is also the case with the indices and shares reported in Table 2. Correlation coefficients show that there is no association between these measures of horizontal and vertical IIT and the corresponding levels of these types of trade (Table 3). However, the measure based on Nilsson provides a much better correlation (see final column of Table 3). It appears that Nilsson's criticism of the traditional GL index is also valid for the measurement of horizontal and vertical IIT.

4. Testing for the determinants of intra-industry trade

We now test for the determinants of horizontal and vertical IIT. We examine whether the hypothesised relationships between various determinants and IIT, arising from the literature, hold for Hungary's trade with the EU in agri-food products. There is no universally accepted procedure to follow. Many empirical studies do not relate directly to a specific model, but rather attempt to regress a measure of IIT on a range of possible explanatory variables. A further feature of these studies is that, in general, they do not distinguish between horizontal and vertical IIT, but focus on total IIT as measured by the GL index.[4]

We follow Greenaway, Hine and Milner (1994 and 1995) and Greenaway, Milner and Elliott (1999) in testing for the determinants of IIT and employ similar explanatory variables. A series of regressions are run using our different measures of horizontal and vertical IIT as the dependent variable. Lack of appropriate data forces us to focus only on the country-specific (as opposed to industry-specific) explanatory variables. Our hypotheses regarding these country characteristics are based both on theoretical models of IIT and on previous empirical studies. They are outlined below.

(i) Tastes and per capita income. The extent of IIT is hypothesised as being positively related to the similarity in per capita income of the trading partners, implying similarity in their demand patterns (Lindner, 1961). We test this using the difference in Gross Domestic Product per capita (DGDPC) between Hungary and each of its partner countries, and expect a negative relationship. However, per capita income is sometimes used as an indicator of relative factor endowments. Regarding horizontal IIT, this does not present a serious problem because the expected relationship is also negative, but it may be problematic for vertical IIT, because the models of Falvey (1981) and Shaked and Sutton (1984) predict a positive relationship between vertical IIT and differences in factor endowments.

(ii) Difference in size of the trading partners. Following Helpman (1981) we test whether the difference in economic size of the trading partners is negatively related to the extent of IIT. This variable is measured by the difference of GDP between Hungary and its partner countries (DGDP).

(iii) Market size. According to Lancaster (1980) and Bergstrand (1990), we expect that the greater the average market size of two partner countries, the larger will be the scope for product differentiation and demand for imports of differentiated products. That is, we expect market size to be positively related to IIT. It is measured by the average GDP of Hungary and its trading partner (AVGDP).

[4] As we previously noted, Henry de Frahan and Tharakan (1998 and 1999) are exceptions in the case of European food trade.

(iv) Transportation costs. Intra-industry trade is generally regarded as being positively influenced by market proximity, largely as a consequence of transportation costs. We measure this variable as the geographical distance between Budapest and the capital city of each of Hungary's trading partners (DIS). Given the possibility of economies of scale in transportation (Hirschberg, Sheldon and Dayton, 1994), DIS^2 is also included in the regressions.

Thus, the general specification of the model is as follows:

$$IIT^p_{ij} = \alpha_0 + \alpha_1 DGDPC_{ij} + \alpha_2 DGDP_{ij} + \alpha_3 AVGDP_{ij} + \alpha_4 DIS_{ij} + \alpha_5 DIS^2_{ij} + \varepsilon_j \quad (7)$$

where,

IIT^p_{ij} is the measure of IIT, with p=horizontal or vertical, i=Hungary and j=EU member state;

$DGDPC_{ij}$ is the difference in per capita GDP between i and j, in US$ '000, calculated from the Euromonitor database;

$DGDP_{ij}$ is the difference in GDP between i and j, in US$ '000 million, computed from the Euromonitor database;

$AVGDP_{ij}$ is the average GDP of i and j, in US$ '000 million, calculated from the Euromonitor database; and,

DIS_{ij} is the distance between Budapest and the capital city of j, in '000 kilometres, calculated from www.indo.com program.

The expected signs are $\alpha_1 < 0$ for horizontal IIT, $\alpha_1 > 0$ for vertical IIT, $\alpha_2, \alpha_4 < 0$ and $\alpha_3, \alpha_5 > 0$.

The data set includes 14 EU countries and seven years (1992-98), giving 98 observations. Previous empirical studies have used various estimation methods, including ordinary least squares (OLS) with linear and non-linear functions, and logit and tobit models. We applied a number of these methods, including OLS as in Greenaway, Hine and Milner (1994), but report only the lin-log specifications which produced better results in all cases. All of the regressions and diagnostic tests were estimated using the software package Easyreg.

5. Regression results

Horizontal intra-industry trade

We estimate three equations, using as the dependent variable the three measures computed in section 3: GHM^H, FF^H and N^H. For the models with GHM^H and FF^H, the explanatory power is low (Table 4). The distance variables in these equations have the expected signs and are significant, but the other variables have unexpected signs and are insignificant. The N^H model's explanatory power is much better at 0.60. Again, the two distance variables have the expected signs, and are highly significant. However, the other three variables have unexpected signs, with DGDPC significant.

Vertical intra-industry trade

Initially, regression equations for vertical IIT were estimated with the same five independent variables as for horizontal type trade, but better results were obtained after omitting DGDP and these are reported in Table 5. The explanatory power is very low for the GHM^V and FF^V models, but in both cases the DGDPC variable has the expected sign and is significant. The distance variables are insignificant and AGDP does not have the expected sign. The explanatory power of the N^V model is again much better at 0.56. Moreover, all variables have the expected signs and are significant.

6. Summary and conclusions

In this paper we have sought to investigate horizontal and vertical IIT in agri-food products between Hungary and its EU trading partners. Intra-industry trade has been separated into its horizontal and vertical components on the basis of differences in the unit value of exports and imports, a practice popular in the literature. We have used three different approaches to measuring IIT and have then used regression models employing an array of explanatory variables, again popular in the literature, to test for the determinants of the resulting trade flows. Our results show that for Hungary, horizontal IIT in agri-food products is low, but that vertical type trade is more prevalent, though still less important than *inter*-industry trade. Using the measure after Fontagné and Freundenberg, the average share of IIT in total agri-food trade is 40% (8% horizontal and 32% vertical). The greater prevalence of vertical IIT suggests that any economic adjustment costs to the Hungarian economy are likely to be higher than in the case where trade is predominantly of a horizontal nature.

Part of the reason for separating IIT into its horizontal and vertical components is to better explain the determinants of trade and to clarify some of the contradictory findings in the empirical literature, as for example with the equality in income per capita variable, the sign of which is crucially dependent on the type of trade being modelled. Our results lend support to the contention that there are different determinants for horizontal and vertical IIT. More importantly, using a measure of IIT that reflects the *level* of trade, after Nilsson, produces much better regression results than those based on the degree or share of IIT which are more usually employed in the empirical literature. This applies particularly to the model relating to Hungary's vertical IIT in agri-food products, which yields the most promising regression results in terms of *a priori* expectations. Consequently, use of a Nilsson-type measure in empirical analysis may be recommended not only for traditional GL-based investigations, but also for testing the determinants of horizontal and vertical IIT.

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Table 1 Numerical example of three different IIT measures

Product j	X	M	Total trade (X+M)	Unmatched trade |X-M|	Unit price difference 15%	Matched trade (X+M)-|X-M|		Minimum 10% trade flow	Trade types (X+M)		
						H	V		HTWT	VTWT	OWT
1	9	10	19	1	<	18		Yes	19		
2	1	20	21	19	<	2		No			21
3	10	18	28	8	>		20	Yes		28	
4	30	2	32	28	>		4	No			32
Total	50	50	100	56		20	24		19	28	53
Measure:											
Greenaway, Hine and Milner (GHM)						0.20	0.24				
Fontagné and Frudenberg (FF)									0.19	0.28	
Nilsson (N)						10	12				

X is value of exports, M is value of imports, H is horizontal, V is vertical, HTWT is horizontal two-way trade, VTWT is vertical two-way trade, and OWT is one-way trade.

Table 2 Horizontal and vertical intra-industry trade in agri-food products between Hungary and EU member states (means, 1992-98)

Country	GHM^H	GHM^V	FF^H	FF^V	N^H	N^V
Austria	0.09	0.18	0.12	0.33	2.668	1.259
Belgium	0.03	0.21	0.04	0.41	0.480	0.823
Denmark	0.03	0.19	0.06	0.34	0.344	0.636
Finland	0.09	0.28	0.17	0.48	0.152	0.272
France	0.01	0.16	0.01	0.27	0.864	1.392
Germany	0.01	0.17	0.03	0.35	2.226	2.117
Greece	0.02	0.10	0.02	0.16	0.042	0.125
Ireland	0.03	0.12	0.18	0.28	0.011	0.119
Italy	0.02	0.12	0.03	0.19	0.791	0.782
Netherlands	0.02	0.24	0.01	0.44	0.821	1.632
Portugal	0.16	0.24	0.33	0.44	0.048	0.124
Spain	0.04	0.14	0.10	0.25	0.146	0.412
Sweden	0.01	0.21	0.00	0.32	0.072	0.417
UK	0.01	0.13	0.01	0.23	0.122	0.529
Overall mean	0.04	0.18	0.08	0.32	0.628	0.760

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

Note: For definitions of GHM^p, FF^p and N^p, where p is horizontal (H) or vertical (V) intra-industry trade, see equations (3), (5) and (6) in text. N^p is measured in million US$.

Table 3 Correlation coefficients between measures and levels of intra-industry trade

	GHM^H	FF^H	N^H
Level of horizontal IIT	-0.02	-0.04	0.69
	GHM^V	FF^V	N^V
Level of vertical IIT	0.08	0.12	0.54

Source: Authors' calculations based on SITC code data.

Table 4 Regression results for Hungary's horizontal intra-industry trade

Independent variable	Dependent variable		
	GHM^H	FF^H	N^H
DGDPC	0.000440	0.000980	0.0212***
	(0.500)	*(0.645)*	*(2.638)*
DGDP	0.000805	0.00258	0.00170
	(0.730)	*(1.117)*	*(0.213)*
AVGDP	-0.00165	-0.00523	-0.00267
	(-0.747)	*(-1.128)*	*(-0.168)*
DIS	-0.177**	-0.214*	-3.764***
	(-2.148)	*(-1.860)*	*(-6.960)*
DIS^2	0.0734*	0.101*	1.06***
	(1.803)	*(1.861)*	*(6.487)*
Constant	0.197*	0.371*	2.960***
	(1.710)	*(1.808)*	*(3.755)*
Statistics:			
N	98	98	98
Adj. R^2	0.11	0.11	0.60
$F_{5,92}$	3.45	3.34	30.49

Figures in parentheses are t statisitcs; significance levels are ***=1%, **=5%, *=10%.

Table 5 Regression results for Hungary's vertical intra-industry trade

Independent variable	Dependent variable		
	GHM^V	FF^V	N^V
DGDPC	0.00494**	0.00790*	0.0295***
	(2.489)	*(1.926)*	*(4.743)*
DGDP	-	-	-
	-	-	-
AVGDP	-0.0000536**	-0.0000729	0.00103***
	(-2.025)	*(-1.253)*	*(6.779)*
DIS	-0.0141	0.0145	-0.931***
	(-0.141)	*(0.099)*	*(-2.968)*
DIS^2	0.0182	0.00471	0.230**
	(0.380)	*(0.071)*	*(2.391)*
Constant	0.095*	0.174*	0.722***
	(1.760)	*(1.697)*	*(2.689)*
Statistics:			
N	98	98	98
Adj. R^2	0.01	0.01	0.56
$F_{4,93}$	1.16	0.83	31.83

Figures in parentheses are t statistics; significance levels are ***=1%, **=5%, *=10%.

Appendix 1 Examples of Hungary's horizontal and vertical IIT in agri-food products, 1998

Trading partner	Horizontal IIT	US$ million	Vertical IIT	US$ million
Germany	Non-coniferous wood	2.310	Meat of swine	14.814
	Vegetables, prepared	1.498	Food wastes	10.338
	Pepper of the genus "piper"	0.530	Materials of animal origin	9.700
			Seeds, fruits & spores	5.470
			Food preparations containing cocoa	4.986
Austria	Sunflower seeds	16.744	Materials of animal origin	4.102
	Food wastes	13.636	Wood of coniferous species	3.666
	Milk and cream	1.014	Bakers' ware	2.464
			Non-coniferous wood	2.218
			Meat & edible offal of poultry	1.866
Netherlands	Birds' eggs	1.244	Bovine animals	5.158
			Food wastes	3.750
			Seeds, fruits & spores	3.564
			Meat of swine	3.182
			Materials of animal origin	2.326