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ABSTRACT

The export potential of a country depends largely on the demand for its goods in export markets. Consumers' tastes and thus quality of goods play an important role in demand. Making use of the trade data, this paper examines the bilateral intra-industry trade differences between Turkey, OECD and the non-OECD countries. It can be argued that Turkish exports are considered as low-quality goods in OECD countries and high-quality goods in the non-OECD countries.

Decomposing the intra-industry trade (IIT) into its vertical and horizontal components enables us to determine whether trade in commodities occurs as a result of taste-for-variety or as a result of quality differences. Two most widely used methods for determining whether trade in a given commodity is vertical (VIIT) or horizontal (HIIT) are that of Greenaway, Hine and Milner (GHM) and of Fontagné and Freudenberg (FF). In this paper the first one is used to be able to categorise commodity groups as low- and high-quality VIIT as well as horizontal IIT. Once the type of bilateral trade is determined for each commodity group then it will be examined whether there are any differences in terms of quality between country groups.

JEL Code: F14

Keywords: intra-industry trade, quality, vertical and horizontal intra-industry trade

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1. Introduction

It is well-known that intra-industry trade (IIT) constitutes a large part of world trade. In the early 1960s some trade theorists[1] have hypothesized that different countries may specialize in different types of a given commodity instead of being specialize in different products. Because they noticed that most of the world trade actually takes place between developed countries with similar income structure and much of the trade between these countries involves two-way exchange of goods produced with similar factor endowments. In other words, they became aware that certain developed countries exported and imported products in the same product categories[2]. They noticed that countries with similar factor endowments do more trade than countries with different factor endowments. These developments gave rise to abandon the traditional factor endowment theory which assumes that international trade takes place among countries with different factor endowments. Therefore, the new trade theory emphasized the existence of scale economies and imperfect competition.

Intra-industry trade[3] (IIT) is defined as the simultaneous export and import of commodities classified in the same industry, which Falvey (1981) defines as the range of products a certain type of capital equipment can produce.

In this study, it is aimed to examine the bilaretal IIT pattern of Turkey with OECD and non-OECD countries. Specifically, it is asked that whether there are differences in the quality of goods exported from Turkey to the OECD and to the non-OECD countries. In this study

[1] See Verdoorn (1960) and Linder (1961).
[2] This phenomenon occurred in the years following the formation of the European Economic Community (EEC). However, it only started to receive increasing attention after Grubel and Lloyd (1975) had introduced an index to measure IIT (See Faustino and Leitão, 2007).
[3] The "intra-industry trade" term was first used by Balassa (1966).

IIT indices are calculated for the 1990-2009 period by using GL index and by using International Standard Industrial Classification (ISIC) Rev. 3 data at the 4-digit level.

This study is structured as follows: Section II contains theoretical backround of IIT literature. Measures of IIT and its decomposition as vertical and horizontal will be described in Section III. Section IV presents a brief review of the empirical IIT literature of Turkey. Section V describes the data set and outlines the application procedure, followed by the summarized empirical results. Finally, the conclusions will be given in Section VI.

2. Theoretical Backround

Theories of IIT can be divided into two parts such as demand-side theories[4] and supply-side theories[5]. The former is about the diversification of consumer tastes. On the other hand, the latter one gives emphasis on product differentiation[6].

Following the seminal work by Grubel and Lloyd (1975), modelling of IIT for a variety of market structures and types of product differentiation became popular. A great deal of international trade is IIT in differentiated products, as opposed to inter-industry trade[7] in completely different products. IIT is explained by increasing returns theory. The elements of increasing returns theory help explaining IIT like economies of scale and number of varieties produced. Increasing returns theory implies higher trade volumes when there are scale economies, when income levels are similar and when there is product differentiation. This is where new trade theory comes in. The existence of increasing returns to scale or of a demand

[4] See Linder (1961), Lancaster (1980), Helpman (1981).
[5] See Helpman (1981), Krugman (1981) and Helpman and Krugman (1985).
[6] From the earliest work on IIT, product differentiation was seen as an important ingredient in its explanation (see for example Balassa, I966; Grubel and Lloyd, I975). Following the contributions of Dixit and Stiglitz (I977) and Lancaster (I979) product differentiation has become explicitly modelled in formal analyses of IIT (See Greenaway et al., 1995).
[7] Grubel (1967) states that inter-industry trade results when countries produce and export but do not import the output of some industries while they import but do not produce or export the output of some other industries.

for variety may be present under conditions of either inter-industry trade which is the exchanges of the products of distinct industries or IIT which is the exchanges of similar products of a given industry (Williamson and Milner, 1991).

Explanations of international trade have been inspired by the decomposition of total trade in *trade overlap* (representing intra-industry trade) and the *imbalance* (inter-industry trade). The flows related to inter-industry trade remain largely explained by traditional theory, whereas intra-industry trade is explained by the new trade theories (Fontagné and Freudenberg, 1997).

IIT is classified into two types as horizontal and vertical.

Grubel and Lloyd (1975) define HIIT as the exchange of competing or substitute products. According to Greenaway et al. (1994), HIIT is the different varieties of a product[8]. HIIT models that were generated by Lancaster (1980), Krugman (1979; 1981), Helpman (1981), and Dixit and Norman (1980) focus on variation between products of a similar quality in combination with increasing returns to scale. According to these theorists HIIT takes place between countries on the same level of economic development and in monopolistically competitive markets.

HIIT is the simultaneous exports and imports of goods classified in the same industry at the same stage of processing. It is based on product differentiation. Horizontal product differentiation refers to product types which differ in specifications but are of the same "quality" in the sense that they embody the same value of resources (e.g. recordings by different performers, identical houses at different locations, brands of pasta) (Vousden, 1990).

[8] Here, HIIT is derived from the "love of variety" model pioneered by Krugman and "most preferred variety" type of model pioneered by Lancaster (for details, see Greenaway et al (1994)).

In other words, HIIT occurs when varieties differ in their characteristics, i.e. it may be either "actual" (the colour of wine) or "perceived" (the taste of the wine).

The other type of IIT is VIIT, which is the simultaneous exports and imports of goods classified in the same industry but at the different stages in processing of a final product as oppose to the HIIT. Greenaway et al. (1994) define VIIT as different qualities or levels of service provided by a product. Here, VIIT is derived from the models of Falvey and others that emphasize product differentiation based on quality. The theoretical basis of VIIT was first developed by Falvey (1981)[9]. Falvey explains IIT with quality differences between products by using the constant returns to scale assumption of the traditional H-O-S theorem. Falvey concentrates on trade within a single industry and adopts a partial equilibrium approach. He defines higher quality products by higher K/L ratio used in their production. Thus, the capital-abundant countries have higher quality while labour-abundant countries have lower quality. The demand for different qualities leads to an increase in the volume of VIIT. Therefore, Falvey predicts that the share of VIIT is greater when the difference in the K/L endowment or per capita income of countries is greater.

VIIT involves the exchange of different qualities of the same good, produced using different technologies. In other words, VIIT is defined as the two-way trade of commodities that differ in quality. The determinants of VIIT are more factor and trading partner specific. The share of VIIT increases (decreases) if the trading partner has a larger (smaller) endowment (Cabral et al., 2008).

HIIT is considered to be particularly relevant to explain the presence of IIT among developed countries. HIIT is analyzed under monopolistic competition derived from the

[9] Falvey was followed by Shaked and Sutton (1984) and Falvey and Kierzkowski (1985).

existence of economies of scale in the differentiated product industry.[10] Even though the products are different in many attributes, they are the same in terms of quality, cost and technology used in their production process. On the other hand, VIIT is considered to be particularly relevant to explain the presence of IIT between unequal partners. However, some of the empirical studies show that VIIT is dominant even among the developed countries. For instance, Greenaway et al. (1994) found that VIIT is dominant in the UK's bilateral trade with every developed country. Also, Hu and Ma (1999) observed the dominance of VIIT in the manufacturing industry of China.

The decomposition of IIT into its horizontal and vertical components based on the assumption that price differences reflect quality differences. Greenaway et al. (1999) claims that all studies of quality in international trade start from the low and high price comparison. Falvey (1981) claims that quality is an increasing function of capital intensity. It means that capital abundant countries have comparative advantage in higher-quality varieties while labor-abundant countries have the opposite. In sum, high-income countries export high-price and high-quality products while low-income countries export low-price and low-quality products.

3. Methodology

Grubel and Lloyd (1975) state that there was a debate about the way in which IIT flows should be measured. The appropriate index or statistics to measure this trade was the main discussed issues.

[10] See Krugman (1979).

Balassa (1966) was the first people[11] who proposed the measure of the extent of intra-industry trade. In his measure exports of a given good are ofset by imports of an equivalent good.

$$B_j = \frac{|Xj - Mj|}{Xj + Mj} \quad (1)$$

X_J is the value of the exports of commodity j by a country, and M_J is the value of the "matching" imports. If there is no intra-industry trade (X_J = 0 or M_J = 0), then B_J =1. But if there is perfectly matching intra-industry trade then $X_J = M_J$ and B_J = 0.

Since Balassa index has not found much favour[12], most studies generally use other indexes. There are two well-known measures of IIT both of which try to measure the trade overlap in a given sector. The Grubel-Lloyd (GL) index and Fontagné-Freudenberg (FF) index.

3.1 Grubel-Lloyd (GL) Index

Grubel and Lloyd (1975) proposed a measure of IIT flows that is known as the GL index. In their seminal paper, GL index was calculated for trade between Australia and the rest of the world at different levels of aggregation, both bilaterally and multilaterally.

The *GL* index is a simple modification of the Balassa formula. It calculates the part of balanced trade (overlap between exports and imports) in all trade in a given industry *j*. The Grubel-Lloyd (*GL*) index is written as,

[11] There were alternative measures of intra-industry trade. Verdoorn (1960) measured the strength of inter and intra-industry specialization by computing the ratio of exports to imports of a commodity at the 3-digit level. $U_i = X_i/M_i$. In his study X_i was Dutch exports and M_i was imports from Belgium-Luxembourg. This ratio varies between 0 and +∞. If the ratio for a given industry moved towards unity, intra-industry specialization took place and if the ratio diverged from unity, inter-industry specializatio took place.

[12] The measure of Balassa has two drawbacks. First, it gives equal weight to all industries, irrespective of whether their share in total industry exports plus imports is large or small. Second, there is no correction for the aggregate trade imbalance (Grubel and Lloyd, 1975).

$$GL_j = \frac{(Xj+Mj)-|Xj-Mj|}{(Xj+Mj)} \quad (2)$$

GL index varies between zero and one. If there is no intra-industry trade (X_j=0 or M_j=0), it takes the value of zero and if there is perfectly matching intra-industry trade then *GL*= 1. Therefore, the Balassa index is positively related to the level of inter-industry trade while *GL* index is positively related to the level of intra-industry trade. Criticism on the shortcomings of the GL index[13] have led researchers to develop different ways of measuring IIT. Fontagné and Freudenberg (1997) suggest a different method (*FF* index) which considers trade flows between countries as being either IIT or inter-industry trade in contrast to the *GL* index that involves both IIT and inter-industry trade.

3.2 Fontagné-Freudenberg (*FF*) Index

FF index measures the trade overlap by comparing the minimum of imports and exports to their maximum. 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 in this case) (Fontagné and Freudenberg, 1997). If the value of minority is below this level, it can be said that there is a one-way trade of inter-industry trade.

$$\frac{Min\ (X_{it},M_{it})}{Max\ (X_{it},M_{it})} > 10\% \quad (3)$$

[13] According to Salvatore (1998), there is a serious shortcoming in using the GL index to measure the degree of IIT. This results from the fact that GL index has different values depending upon how broadly the industry or product group are defined. Specifically, the more broadly defined an industry, the greater will be the value of GL because of that a country will export some varieties of the differentiated product and import others. Thus, according to him the GL index must be used with caution. It can, nevertheless, be very useful in measuring differences in IIT in different industries and changes in IIT for the same industry over time. Nilsson (1997) also claims that "the GL index is a measure of the degree of IIT rather than of the absolute amount of IIT. Since the GL index does not correctly reflect the level of IIT, it is necessary to make a distinction between the level and the share of IIT. This failure of the GL index to correctly reflect the level of IIT may partly be explained by the relative size of the trade imbalances. The measure of relative trade imbalances equals one minus the GL index. Hence, the country with the largest relative trade imbalance will always display the lowest degree of IIT according to the GL index, irrespective of the level of IIT. Likewise, the country with the lowest relative trade imbalance will always display the largest share of IIT".

In order to decompose IIT into its vertical and horizontal components, the quality differences in exports and imports of a country are used.[14] Since determining the qualities of commodities are very difficult, in empirical studies the product prices are generally used as indicators of quality. It is assumed that higher quality goods have higher prices (Stiglitz, 1987). Therefore, in order to determine the quality differences of exports and imports, export and import unit values are used.

There are two most widely used methods for decomposing vertical and horizontal IIT: The first one is *GL* index which is adopted by Greenaway, Hine and Milner (*GHM*) (1994) at first and the other way of measurement of VIIT and HIIT is the *FF* index which is adopted firstly by Fontagné and Freudenberg (1997) and by Fontagné, Freudenberg and Peridy (1997). Both methods rely on the same assumption regarding the association of price (actually unit values) with the quality of traded products. In other words, differences in prices (unit values) reflect quality differences. This assumption is only acceptable with the most detailed trade data, where aggregation of different products within one product category is minimized. These studies break down total trade into 3 categories, namely, one-way trade, VIIT and HIIT in order to measure the relative importance of each type of trade in total trade.

The decomposition of *GHM* uses the *GL* index whereas *FF* uses the modified version of *GHM*. In the *GHM* case a product exhibits HIIT when unit values of exports and imports lie between the interval and exhibits VIIT in the opposite case.

$$\left.\begin{array}{ll} 1-\alpha \le UV^{X_{it}}/UV^{M_{it}} \le 1+\alpha & HIIT \\ 1-\alpha > UV^{X_{it}}/UV^{M_{it}} \quad or \quad UV^{X_{it}}/UV^{M_{it}} > 1+\alpha & VIIT \end{array}\right\} \; GHM \tag{4}$$

[14] Fontagné et al. (2006) present the first systematic decomposition of world trade into horizontal and vertical IIT. They show that most IIT is still in bilateral trade between OECD country pairs and most of this is in VIIT.

$$\left.\begin{array}{ll} \dfrac{1}{1+\alpha} \le UV^{X_{it}} / UV^{M_{it}} \le 1+\alpha & HIIT \\ \dfrac{1}{1+\alpha} > UV^{X_{it}} / UV^{M_{it}} \;\; or \;\; UV^{X_{it}} / UV^{M_{it}} > 1+\alpha & VIIT \end{array}\right\} FF \qquad (5)$$

Since $\dfrac{1}{1+\alpha} > 1-\alpha$, in the *GHM* case more products will be classified as VIIT (Azhar and Elliott, 2006). As α[15] gets larger the difference between these two lower bounds will become larger.[16] The vertical component of IIT can be broken down into high quality VIIT (VIIT ^{H}) and low quality VIIT (VIIT ^{L}). In both cases (*GHM* and *FF*) the lower bound of VIIT represents VIIT ^{L} whereas the upper bound represents the VIIT ^{H}.

Traded products are considered to be similar (or horizontally differentiated) if the export and import unit values differ by less than 15%. The transportation and insurance expenditures are estimated to constitute approximately 15% of the product prices. Therefore, in the calculations ±15% are used. If this range is defined broader, the share of horizontal IIT will rise and the share of vertical IIT will fall.

FF rely on a 15% difference in unit value while *GHM* have used 15% (as well as 25%) threshold. The two methodologies differ in the measurement of the trade overlap. In *GHM*, the balanced part of a bilateral trade flow is considered as intra-industry, whereas the trade imbalance is inter-industry. On the other hand, the approach adopted by *FF* no longer relies on the trade overlap. It is based on a simple algorithm: First, test whether reciprocal trade flows are of an intra-industry nature (imports represent at least *x* percent of exports or vice versa). Second, if the answer is positive, test whether unit values of trade flows are similar or not (up to a *y* percent difference in unit values is allowed). (Fontagné et al., 2006). The *GHM* measure is systematically lower than the *FF* one.

[15] "α" is used as a "dispersion factor" by Greenaway, Hine and Milner (1994).
[16] see Erlat and Erlat, 2010

4. Literature on Turkey

Although the number of empirical work on IIT is scarce for Turkey, there are some important studies about the IIT pattern of Turkey. In their study Erlat and Erlat (2003) tried to measure intra-industry and marginal intra-industry trade of Turkey for the period of 1969-1999. They used 3-digit level SITC (Rev. 3) data. In their measurement, they had not differentiated between the trade of goods of similar quality (HIIT) and the trade of goods of different quality (VIIT). Çepni and Köse (2003) used a panel data method in order to examine the intra-industry trade pattern of Turkey for 1989-1999 period. They used 2-digit level SITC (Rev. 3) data. They also asked whether the customs union membership have promoted IIT index of Turkey or not. In order to show the levels of IIT of Turkey with selected 15 countries and two aggregates (the OECD and the EU) they have made 3 classifications. These average levels of IIT indices of Turkey at the 2 digit level for different categories are SITC 0-8, SITC 1-8 and SITC 5-8. They have found that IIT is the highest in those categories which could be classified as manufactures which is defined as SITC 5-8. Emirhan (2005) aimed to analyze the determinants of vertical IIT between Turkey and 9 major trading partners[17] for the period 1989-2002 by using panel data approach. She has concluded that VIIT has a superior importance in Turkey's trade with a share of 83,6 percent in total IIT. This high share of VIIT means that Turkey's IIT mainly covers the two-way trade of commodities that are differentiated by quality. According to results, an increase in the HIIT, which corresponds to a fall of VIIT, will favor Turkey because it will denote a rise in quality of Turkey's exports. In conclusion it is also found that there is a positive relationship between levels of VIIT, GDP and per capita GDP differences among Turkey and selected countries. Also, as the geographical distance between countries increases, the level of VIIT falls. Erlat et al. (2007) tried to investigate the breakdown of IIT for Turkey into its vertical and horizontal

[17] Belgium, France, Germany, Greece, Italy, Netherlands, Spain, United Kingdom and USA.

components for the period of 1987-2001. They also broke down VIIT to its high quality and low quality components. In order to obtain this decomposition they follow Greenaway, Hine and Milner (GHM) approach (1994) by taking the 5-digit SITC Rev. 3 classification. The empirical results were presented in three levels; for the country as a whole, for a five-way classification[18] of the trading sectors and for the sectors at the 3-digit level. They calculated the GL index for each 5-digit sector and aggregated to 3-digit level by calculating their weighted averages based on the share of each sector in components. In another study, Erlat and Erlat (2010) tried to measure product quality in Turkish IIT again for 1987-2001 period by using 5-digit level SITC (Rev. 3) data. The focus of this study was different than Erlat et al. (2007) . They compared the classification procedures of Fontagné-Freudenberg (FF) and Azhar-Elliot (AE). They did not include Greenaway, Hine and Milner (GHM). They calculated the GL and FF indexes at the 5-digit level but did not aggregate them to the 3-digit level. Their objective were not to measure IIT and decompose the corresponding indexes into their vertical and horizontal components but to see how the classification of the products (represented by the 5-digit sectors) are affected by the different criteria described above. Hence, the results are presented in terms of the numbers of 5-digit sectors that one finds in each classification.

5. Application

In this study, the IIT structure of Turkish international trade is tried to examine based on 4-digit ISIC (Rev.3) data[19]. All trade data are measured in $US. The data were obtained from TURKSTAT database. The study covers a period of 20 years from 1990 to 2009. All

[18] SITC 0, 2 (ex.26), 3 (ex.35), 4, 56 as raw material intensive goods (RMIG); SITC 26, 6 (ex.62, 67, 68), 8 (ex. 87, 88) as labour-intensive goods (LIG); SITC 1, 35, 53, 55, 62, 67, 67, 78 as capital-intensive goods (CIG); SITC 51, 52, 54, 58, 59, 75, 76 as easy-to-imitate research-intensive goods (EIRG); SITC 57, 7(ex.75,76,78), 87, 88 as difficult-to-imitate research-intensive goods(DIRG).

[19] The ISIC Rev.3 Classification is given in the Appendix.

calculations are made for the manufacturing sector [20]. There are 23 manufacturing sectors (15-36) and 120 sub-sectors (1511-3699). [21]

Table 1.1: The Share of IIT and Inter-Industry Trade (1990-2009)

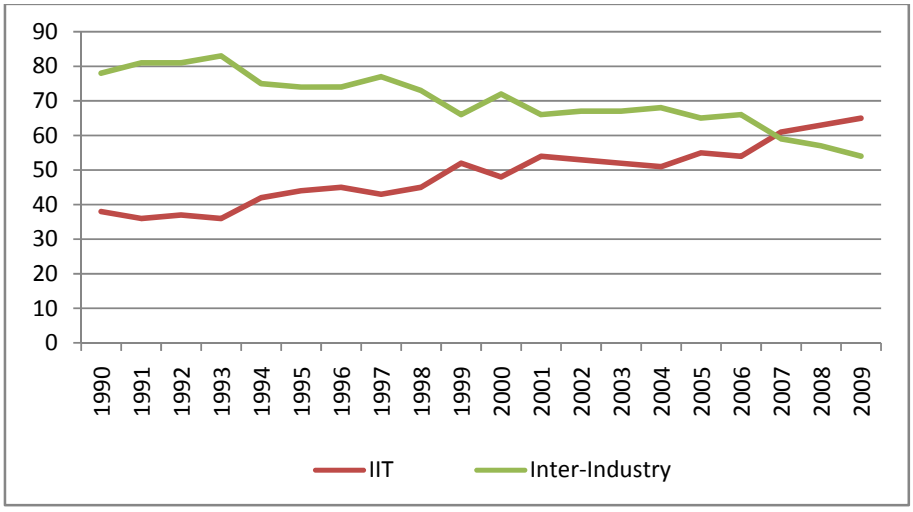


Table 1.1 shows that even if inter-industry trade is dominant in Turkish foreign trade, IIT has shown an increasing pattern. After 2007, the number of sectors that exhibit IIT exceeds the number of sectors that exhibit inter-industry trade. This is also shown in Table 1.2.

Table 1.2: Disaggregation of IIT and Inter-Industry

Inter-Industry Trade

1990-2009	GL	< 0.5	1403
	GL	0.49-0.40	218
	GL	0.39-0.30	251
	GL	0.29-0.20	285
	GL	0.19-0.10	321
	GL	0.09-0.01	328

Intra-Industry Trade

1990-2009	GL	> 0.5	974
	GL	0.99-0.90	204
	GL	0.89-0.80	169
	GL	0.79-0.70	188
	GL	0.69-0.60	216
	GL	0.59-0.51	197

[20] Çepni and Köse (2003) state that IIT is the highest in manufacturing sector where there is greatest scope for product differentiation. They also claim that when IIT will be greater, the potential for product differentiation will also be greater. Manufacturing sector is capital-intensive and in this sector product differentiation, technology, economies of scale and oligopolistic market structure are the determinants of production.

[21] Except for the sector 2230, every year has 120 sub-sectors. Trade in sector 2230 (reproduction of recorded media) has started in 1996.

If GL index is smaller than 0.5, it is accepted that there is inter-industry trade and if GL index is bigger than 0.5, it is accepted that there is IIT. Here, GL index is divided into intervals of 0.09 to see the detailed picture. As shown in Table 1.2 there are 1403 records that exhibit inter-industry trade. Most of them approach to zero. On the other hand, 974 records exhibit IIT and almost many of them approach to one.

Table 1.3: Number of Sectors in which GL > 0.90

Year	# of sectors		Year	# of sectors
1990	9		2000	11
1991	7		2001	14
1992	8		2002	14
1993	10		2003	10
1994	5		2004	8
1995	7		2005	11
1996	10		2006	12
1997	10		2007	12
1998	8		2008	9
1999	13		2009	14

Table 1.3 shows the number of sectors in which GL index is higher than 0.90 for the 1990-2009 period. It is seen that the highest IIT performance of sectors is occurred in 2001, 2002 and 2009.

Table 1.4: Number of Sectors in which GL = 0

Year	Sector Code	Description	Total Imports ($)	Total Exports ($)	GL index
1990	1553	Manufacture of malt liquors and malt	0	8783756	0
1990	2330	Processing of nuclear fuel	3350138	0	0
1991	2330	Processing of nuclear fuel	3830143	0	0
1992	2330	Processing of nuclear fuel	5645378	0	0
1994	2330	Processing of nuclear fuel	5605275	0	0
1996	2230	Reproduction of recorded media	171133	0	0
1999	2230	Reproduction of recorded media	184121	0	0

As shown in Table 1.4 GL indexes are equal to zero in these three sectors[22]. It means in these sectors there is a one-way trade and one of the value of total import or total export are equal to zero. In another words, an absolute inter-industry trade is seen in these sectors.

[22] Their graphs which are drawn for both OECD and non-OECD countries are given in the Appendix.

Table 1.5: Number of Years in which GL>0.5

Sector Code	# of Years	Sector Name
1512	20	Processing and preserving of fish and fish products
1514	20	Manufacture of vegetable and animal oils and fats
1549	20	Manufacture of other food products n.e.c.
1711	20	Preparation and spinning of textile fibres; weaving of textiles
1729	20	Manufacture of other textiles n.e.c.
2219	20	Other publishing
2424	20	Manufacture of soap and detergents, cleaning and polishing preparations, perfumes and toilet preparations
2710	20	Manufacture of basic iron and steel
2899	20	Manufacture of other fabricated metal products n.e.c.
3610	20	Manufacture of furniture
2519	19	Manufacture of other rubber products
2812	19	Manufacture of tanks, reservoirs and containers of metal
3140	19	Manufacture of accumulators, primary cells and primary batteries
1520	18	Manufacture of dairy products
2021	18	Manufacture of veneer sheets; manufacture of plywood, laminboard, particle board and other panels and boards

Table 1.5 shows the sectors which exhibit IIT in every year between 1990-2009. In other words, these sectors[23] have simultaneous exports and imports in the same sector for a 20 year-period. The other sectors (2519, 2812, 3140, 1520 and 2021), on the other hand, are the following sectors which exhibit IIT for almost 20 years.

6. Conclusion

At the 4-digit level of disaggregation it is founded that Turkish trade is dominated by its inter-industry component but inter-industry trade shows an increasing pattern. IIT pattern has showed an upward trend from 1990 onwards and exceeded inter-industry trade pattern in 2007. After 2007, IIT has dominated the Turkish trade.

When we consider the 4-digit sectors with IIT rates exceeding 50% we find that the highest number of such sectors is in the manufacture of food products and beverages (sector code 15), manufacture of basic metals (especially iron) (sector code 17) and manufacture of textiles (sector code 17).

[23] Their graphs which are drawn for both OECD and non-OECD countries are given in the Appendix. Here, it is seen that in a period of 20 years, GL index is higher than 0.5.

What is interesting to note that is the inavailability of the data in sector 2230 (reproduction of recorded media). In this sector trade has started following the end of 1995. Moreover, this sector has exhibited one-way trade in 1996 and 1996.It means, in these years GL index is zero.

In the following studies it is expected that the decomposition of intra-industry trade into its vertical and horizontal components shows that VIIT dominated HIIT in all cases. Also, it is expected that Turkish exports are considered as low-quality goods in OECD countries and high-quality goods in the non-OECD countries.

APPENDIX – A

ISIC Rev.3 Classification for All Economic Activities

A - Agriculture, hunting and forestry
B - Fishing
C - Mining and quarrying
D - Manufacturing
E - Electricity, gas and water supply
F - Construction
G - Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods
H - Hotels and restaurants
I - Transport, storage and communications
J - Financial intermediation
K - Real estate, renting and business activities
L - Public administration and defence; compulsory social security
M - Education
N - Health and social work
O - Other community, social and personal service activities
P - Private households with employed persons
Q - Extra-territorial organizations and bodies

APPENDIX – B

General Structure of Manufacturing Sector
(ISIC Rev.3- Tabulation Category: D)

D - Manufacturing

15 - Manufacture of food products and beverages
16 - Manufacture of tobacco products
17 - Manufacture of textiles
18 - Manufacture of wearing apparel; dressing and dyeing of fur
19 - Tanning and dressing of leather; manufacture of luggage, handbags, saddlery, harness and footwear
20 - Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials
21 - Manufacture of paper and paper products
22 - Publishing, printing and reproduction of recorded media
23 - Manufacture of coke, refined petroleum products and nuclear fuel
24 - Manufacture of chemicals and chemical products
25 - Manufacture of rubber and plastics products
26 - Manufacture of other non-metallic mineral products
27 - Manufacture of basic metals
28 - Manufacture of fabricated metal products, except machinery and equipment
29 - Manufacture of machinery and equipment n.e.c.
30 - Manufacture of office, accounting and computing machinery
31 - Manufacture of electrical machinery and apparatus n.e.c.
32 - Manufacture of radio, television and communication equipment and apparatus
33 - Manufacture of medical, precision and optical instruments, watches and clocks
34 - Manufacture of motor vehicles, trailers and semi-trailers
35 - Manufacture of other transport equipment
36 - Manufacture of furniture; manufacturing n.e.c.
37 – Recycling

APPENDIX – C

Detailed Structure of Manufacturing Sector
(ISIC Rev.3 4-Digit level)

15

1511 - Production, processing and preserving of meat and meat products
1512 - Processing and preserving of fish and fish products
1513 - Processing and preserving of fruit and vegetables
1514 - Manufacture of vegetable and animal oils and fats
1520 - Manufacture of dairy products
1531 - Manufacture of grain mill products
1532 - Manufacture of starches and starch products
1533 - Manufacture of prepared animal feeds
1541 - Manufacture of bakery products
1542 - Manufacture of sugar
1543 - Manufacture of cocoa, chocolate and sugar confectionery
1544 - Manufacture of macaroni, noodles, couscous and similar farinaceous products
1549 - Manufacture of other food products n.e.c.
1551 - Distilling, rectifying and blending of spirits; ethyl alcohol production from fermented materials
1552 - Manufacture of wines
1553 - Manufacture of malt liquors and malt
1554 - Manufacture of soft drinks; production of mineral waters

16

1600 - Manufacture of tobacco products

17

1711 - Preparation and spinning of textile fibres; weaving of textiles
1712-Finishing of textiles
1721 - Manufacture of made-up textile articles, except apparel
1722 - Manufacture of carpets and rugs
1723 - Manufacture of cordage, rope, twine and netting
1729 - Manufacture of other textiles n.e.c.
1730 - Manufacture of knitted and crocheted fabrics and articles

18

1810 - Manufacture of wearing apparel, except fur apparel
1820 - Dressing and dyeing of fur; manufacture of articles of fur

19

1911 - Tanning and dressing of leather
1912 - Manufacture of luggage, handbags and the like, saddlery and harness
1920 - Manufacture of footwear

20

2010 - Sawmilling and planing of wood
2021 - Manufacture of veneer sheets; manufacture of plywood, laminboard, particle board and other panels and boards
2022 - Manufacture of builders' carpentry and joinery
2023 - Manufacture of wooden containers
2029 - Manufacture of other products of wood; manufacture of articles of cork, straw and plaiting materials

21

2101 - Manufacture of pulp, paper and paperboard
2102 - Manufacture of corrugated paper and paperboard and of containers of paper and paperboard
2109 - Manufacture of other articles of paper and paperboard

22

2211 - Publishing of books, brochures, musical books and other publications
2212 - Publishing of newspapers, journals and periodicals
2213 - Publishing of recorded media
2219 - Other publishing
2221 - Printing
2222 - Service activities related to printing
2230 - Reproduction of recorded media

23

2310 - Manufacture of coke oven products
2320 - Manufacture of refined petroleum products
2330 - Processing of nuclear fuel

24

2411 - Manufacture of basic chemicals, except fertilizers and nitrogen compounds
2412 - Manufacture of fertilizers and nitrogen compounds
2413 - Manufacture of plastics in primary forms and of synthetic rubber
2421 - Manufacture of pesticides and other agro-chemical products
2422 - Manufacture of paints, varnishes and similar coatings, printing ink and mastics
2423 - Manufacture of pharmaceuticals, medicinal chemicals and botanical products
2424 - Manufacture of soap and detergents, cleaning and polishing preparations, perfumes and toilet preparations
2429 - Manufacture of other chemical products n.e.c.
2430 - Manufacture of man-made fibres

25

2511 - Manufacture of rubber tyres and tubes; retreading and rebuilding of rubber tyres
2519 - Manufacture of other rubber products
2520 - Manufacture of plastics products

26

2610 - Manufacture of glass and glass products
2691 - Manufacture of non-structural non-refractory ceramic ware
2692 - Manufacture of refractory ceramic products
2693 - Manufacture of structural non-refractory clay and ceramic products
2694 - Manufacture of cement, lime and plaster
2695 - Manufacture of articles of concrete, cement and plaster
2696 - Cutting, shaping and finishing of stone
2699 - Manufacture of other non-metallic mineral products n.e.c.

27

2710 - Manufacture of basic iron and steel
2720 - Manufacture of basic precious and non-ferrous metals
2731 - Casting of iron and steel
2732 - Casting of non-ferrous metals

28

2811 - Manufacture of structural metal products
2812 - Manufacture of tanks, reservoirs and containers of metal
2813 - Manufacture of steam generators, except central heating hot water boilers
2891 - Forging, pressing, stamping and roll-forming of metal; powder metallurgy
2892 - Treatment and coating of metals; general mechanical engineering on a fee or contract basis
2893 - Manufacture of cutlery, hand tools and general hardware
2899 - Manufacture of other fabricated metal products n.e.c.

29

2911 - Manufacture of engines and turbines, except aircraft, vehicle and cycle engines
2912 - Manufacture of pumps, compressors, taps and valves
2913 - Manufacture of bearings, gears, gearing and driving elements
2914 - Manufacture of ovens, furnaces and furnace burners
2915 - Manufacture of lifting and handling equipment
2919 - Manufacture of other general purpose machinery
2921 - Manufacture of agricultural and forestry machinery
2922 - Manufacture of machine-tools
2923 - Manufacture of machinery for metallurgy
2924 - Manufacture of machinery for mining, quarrying and construction
2925 - Manufacture of machinery for food, beverage and tobacco processing
2926 - Manufacture of machinery for textile, apparel and leather production
2927 - Manufacture of weapons and ammunition
2929 - Manufacture of other special purpose machinery
2930 - Manufacture of domestic appliances n.e.c.

30

3000 - Manufacture of office, accounting and computing machinery

31

3110 - Manufacture of electric motors, generators and transformers
3120 - Manufacture of electricity distribution and control apparatus
3130 - Manufacture of insulated wire and cable
3140 - Manufacture of accumulators, primary cells and primary batteries
3150 - Manufacture of electric lamps and lighting equipment
3190 - Manufacture of other electrical equipment n.e.c.

32

3210 - Manufacture of electronic valves and tubes and other electronic components
3220 - Manufacture of television and radio transmitters and apparatus for line telephony and line telegraphy
3230 - Manufacture of television and radio receivers, sound or video recording or reproducing apparatus, and associated goods

33

3311 - Manufacture of medical and surgical equipment and orthopaedic appliances
3312 - Manufacture of instruments and appliances for measuring, checking, testing, navigating and other purposes, except industrial process control equipment
3313 - Manufacture of industrial process control equipment
3320 - Manufacture of optical instruments and photographic equipment
3330 - Manufacture of watches and clocks

34

3410 - Manufacture of motor vehicles
3420 - Manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semi-trailers
3430 - Manufacture of parts and accessories for motor vehicles and their engines

35

3511 - Building and repairing of ships
3512 - Building and repairing of pleasure and sporting boats
3520 - Manufacture of railway and tramway locomotives and rolling stock
3530 - Manufacture of aircraft and spacecraft
3591 - Manufacture of motorcycles
3592 - Manufacture of bicycles and invalid carriages
3599 - Manufacture of other transport equipment n.e.c.

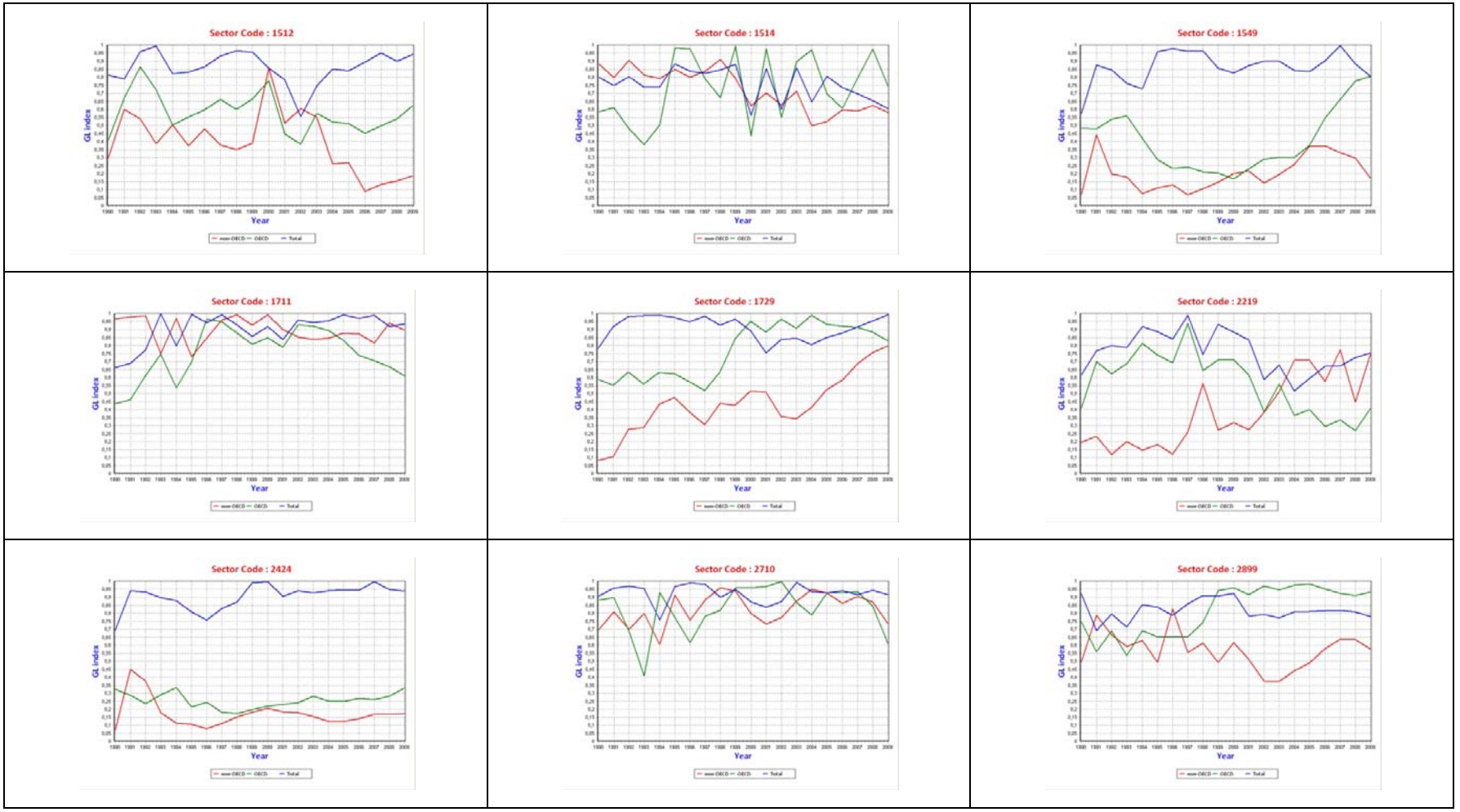
36

3610 - Manufacture of furniture
3691 - Manufacture of jewellery and related articles
3692 - Manufacture of musical instruments
3693 - Manufacture of sports goods
3694 - Manufacture of games and toys
3699 - Other manufacturing n.e.c.

37

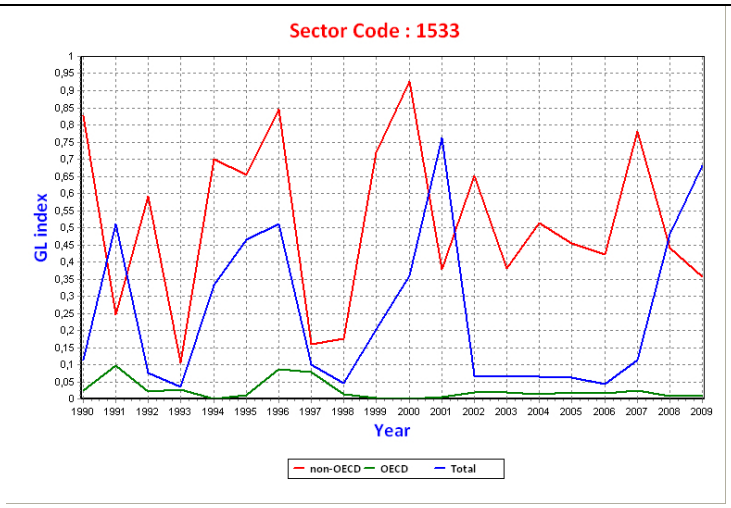
3710 - Recycling of metal waste and scrap
3720 - Recycling of non-metal waste and scrap

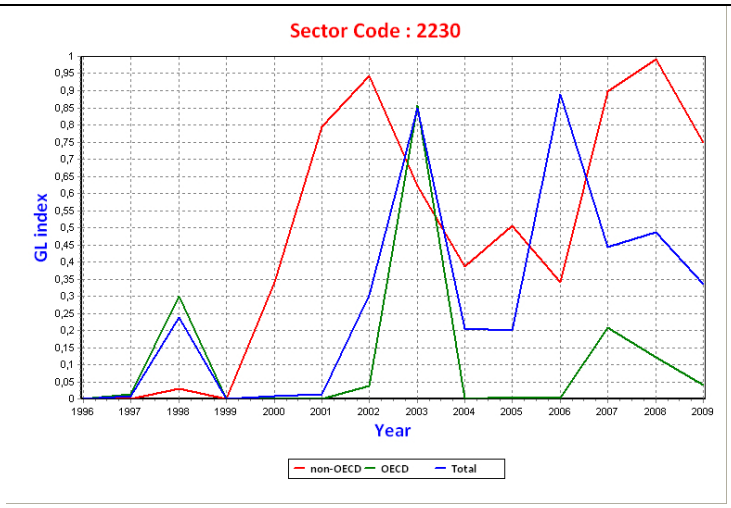
APPENDIX – D: Sectors and Number of Years in which GL>0.5

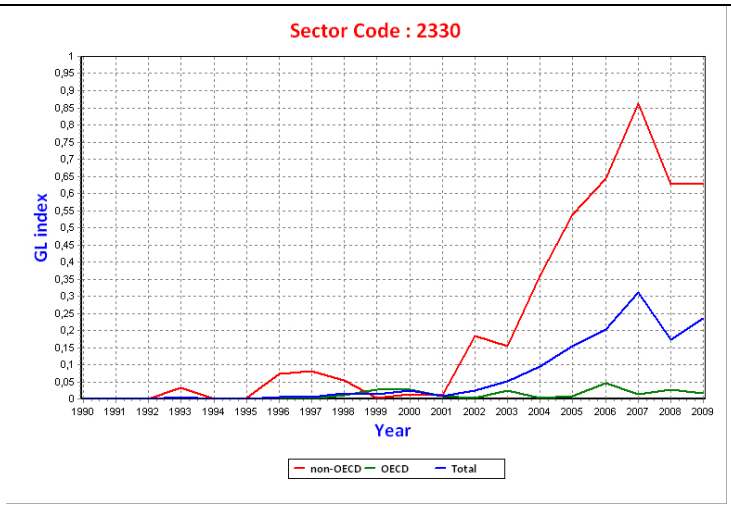


- Blue line: Total GL index; Green line: OECD GL index; Red line: non-OECD GL index

APPENDIX – E: Number of Sectors in which GL = 0







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