



INTRA-INDUSTRY TRADE BETWEEN EUROPEAN UNION AND INDIA

Elizabeth Rosen

Associate Professor, Dept. of Economics, G.N.Khalsa College of Arts, Science & Commerce, Matunga, Mumbai.

Abstract

The paper examines the nature and extent of Intra industry trade between EU and India. This is important as EU and India are in the process of finalization of talks regarding an FTA. The results of the study show that IIT is increasing between the two economies, albeit low; as it comprises only one third of the total trade, implying that a major part of the trade is of inter industry type. With regard to disentangling IIT into HIIT and VIIT, the study is in conformity to the standard theory that trade between developed and developing country is more of vertical kind rather than horizontal one. Moreover, the study shows that EU exports high quality goods to India, though the difference between the quality of goods exported and imported vis-a-vis India is declining.

Key words: Intra industry trade, horizontal and vertical intra industry trade, European Union, India.

I. Introduction

The global trade landscape has taken a different hue with greater liberalization of trade and globalization. Traditional trade theory which assumes constant returns, exogenous technology and perfect competition could not offer an explanation to the changing patterns of global trade especially in manufactures. More than factor endowments, scale economies and product differentiation played a key role in explaining a large proportion of trade. A number of trade theorists began to apply methods drawn from the theory of industrial organization to international trade to produce a new genre of trade models. Intra-industry trade (IIT) which involves exchange of almost identical goods became the new byword in trade literature. Convergence of income and factor endowments served as catalysts in bringing about this change, leading to IIT of Horizontal kind. Changes in the technology of information and transportation helped in fragmentation of production and creation of global supply chains, which led to IIT of a vertical kind.

The present study attempts to analyze intra-industry trade between European Union-25 and India. EU, propelled by the initiative 'Global Europe', has been forging FTAs with many countries, giving her the unique distinction of having the largest number of FTAs in the world. India, after a protracted period of low growth is now emerging as an important player in the global scenario. This paper studies the extent and nature of IIT between EU and India. Greater IIT would imply lower adjustment costs domestically, a view put forth by economists like Krugman (1981), Brulhart (2000) and others; thereby strengthening the case for an FTA between EU and India.

The paper is structured as follows: Section II presents the literature review. Section III describes the methodology adopted to study IIT and Horizontal and Vertical Intra-industry trade. Section IV presents the results. Trade is of horizontal type when different varieties of a product of a similar quality, cost, and technology (characteristic of developed countries' trade) are traded while vertical type occurs when trade is in goods of different quality and prices (typical of trade between developed and developing economies). Section V gives the conclusions of the study.

II. Literature Review

Drèze (1961), Verdoorn (1960), and Balassa (1965) found evidence of increasing intra-industry specialization in the decade following customs union formation¹. The positive relationship between tariff liberalization and IIT has also been validated by the studies of Balassa and Bauwens (1987), Hufbauer and Chilas (1974) and Veeramani (1998). However, this view is not shared by Caves (1981) Hamilton and Knesit (1991) who do not find strong evidence to support it. The publication of Grubel-Lloyd (1975), subsequently that of Dixit, Stiglitz (1977) and others like Lancaster (1979), Krugman (1979) and Helpman (1981) helped provide further impetus to the study of IIT wherein scale economies and preference variety mattered more than just the extent of IIT. As pointed by Greenaway (1995), four types predominate in trade in differentiated goods, namely large numbers case of vertical IIT (Falvey, 1981), small numbers case of VIIT (Shaked & Sutton, 1984), large numbers case of horizontal IIT (Helpman, 1981) and small numbers case of HIIT (Eaton and Kierzkowski, 1984). Besides country specific factors, there are also industry specific determinants like scale economies, product differentiation and imperfect competition at work. However, results related to industry specific factor showed inconsistency across the different studies. Greenaway was able to explain the inconsistent results of earlier works by disentangling IIT into HIIT and VIIT.

¹Greenaway and Milner (1987) p40



In his seminal paper, Greenaway(1995) analyzed a range of industry specific factors for the explanation of VIIT and HIIT in UK's trade with all partner countries at a multilateral level. The study was able to explain the inconsistent results in the earlier studies on IIT and Product differentiation. Using Greenaway's UV approach, Veeramani(1999) analyzed the structure of India's IIT in both the multilateral as well as bilateral (USA) context in Capital goods for the years 1988,1995 and 1996.The study found that value of India's GL index was comparable to that of many developed countries though not for the same years. The study found that increase in IIT was predominantly export led validating the idea of strong positive correlation between growth of exports and growth of GL_i index. The study highlighted a substantial increase in the proportion of industries falling in higher classes of GL_i in 1995 over 1988. The results showed Vertical IIT to be the predominant type confirming the hypothesis of North South IIT to be of the vertical type, with India exporting primarily cheaper varieties of goods to USA and importing expensive ones.

III. Methodology

IIT is studied here using the well-known Grubel Lloyd index.

$$GL_i = \frac{(X_i + M_i) - |X_i - M_i|}{(X_i + M_i)} \times 100 \quad \dots (1)$$

This is usually presented in its more abbreviated form:

$$GL_i = \left[1 - \frac{|X_i - M_i|}{(X_i + M_i)} \right] \times 100 \quad \dots (2)$$

Where GL_i is the index of IIT in an industry i , X_i and M_i are the exports and imports of the industry i . The value of GL_i ranges between zero and 100. With zero indicating no intra-industry trade and 100, complete Intra-industry trade. Grubel Lloyd (1975) pointed out the possible biases that could creep in the index when the overall balance of payments is imbalanced- surplus or deficit. To overcome this, they proposed an adjustment which expressed the trade overlap as proportion of total trade minus the trade imbalance. However, Greenaway and Milner (1981) have shown that such adjustment is more likely to induce rather than reduce distortions in the IIT index. Hence in this study unadjusted measure is used.

The weighted average measure (GL) is used to study IIT across the Sections and Chapters of HS classifications. This is done by aggregating GL_i across the industries taking into account their different weights (proxied by the share of each industry's trade in the total value of trade) which, in other words, is the trade weighted average of the industry indices.

$$GL = \sum_{i=1}^n w_i GL_i = \sum_{i=1}^n \left[\frac{X_i + M_i}{\sum_{i=1}^n (X_i + M_i)} \right] GL_i = 1 - \frac{\sum_{i=1}^n |X_i - M_i|}{\sum_{i=1}^n (X_i + M_i)} \times 100 \quad \dots (3)$$

Where GL = weighted average

Following the methodology of Greenaway *et al* (1994) and Veeramani (1998), the unit value index is calculated for disentangling IIT. Unit values (UV) have been defined for each commodity classification as the value of trade divided by the quantity traded. This measures the average price of a bundle of items from a given product grouping. "The rationale for using UVs is that, assuming perfect information, a variety sold at a higher price must be of higher quality than a variety sold more cheaply. Even with imperfect information, prices will tend to reflect quality. In one way or another, all studies of quality in international trade start from that position that, at least, at a very disaggregated level, relative prices reflect relative qualities."²The relative unit values of exports and imports, UV_i , is calculated in the following manner-

$$UV_i = \frac{UVX_i}{UVM_i} \quad \dots (4)$$

$$UVX_i = \frac{X_i}{Q_i} \quad \text{and} \quad UVM_i = \frac{M_i}{Q_i} \quad \dots (5)$$

UVX_i is the unit value of export in industry i , UVM_i is the unit value of import in industry i and Q_i is the physical units of trade.

² Greenaway *et al*(1995) p1508 .



Following Greenaway, the ratio of unit value of exports to unit value of imports should lie in the range of value 15% or 25% for HIIT.

$$(1 - \alpha) \leq \frac{UV_{ij}^x}{UV_{ij}^m} \leq (1 + \alpha) ; \text{ where } \alpha = 0.15 \text{ or } 0.25 \quad \dots (6)$$

This implies that if UV_i lies between the range of 0.85 and 1.15 or alternatively 0.75-1.25 then trade is in horizontally differentiated goods.

IIT is said to be of vertical type, when the ratio of unit values of export to import satisfies the following condition.

$$\frac{UV_{ij}^x}{UV_{ij}^m} < (1 - \alpha) \quad \text{or} \quad \frac{UV_{ij}^x}{UV_{ij}^m} > (1 + \alpha) \quad \dots (7)$$

VIIT could be further sub divided into low quality and high quality trade. When Un_i value is less than 1- then we have a case of low quality and when greater than 1+ , high quality trade is observed. Different scholars have given different dispersion values to .When is taken to be 0.25, then UV_i values more than say 1.25 could be categorised as trade in in high quality commodities. Conversely when it is less than say 0.75, we can categorise it as low quality VIIT. For disentangling HIIT and VIIT, only those commodities which are intensely traded i.e. with GL_i greater than 40 are taken. The analysis is based on HS 4 digit classification except in certain cases where it is otherwise mentioned.

The measurement of IIT for manufactures based on statistical classification, however disaggregated may be, is subject to both upward and downward bias. Aggregation across improper categories could give us a flawed degree of IIT. The upward bias occurs due to the heterogeneity of commodities included in each statistical group (from the point of view of technological intensity) and downward bias when commodities having identical technology intensity are included in different statistical groups. “Arigorous analysis of the phenomenon of intra-industry trade would then require a thorough reclassification of products to obtain groups homogeneous inside and heterogeneous between them from the point of view of the commodity characteristics which most matter...”³

IIT is analyzed from the perspective of EU’s exports to and imports from India. IIT is studied for the period 1995-2006. The study avoided the years subsequent to 2006 as the data would reflect the effect of financial crisis and thereby distort the analysis. Data has been sourced from UNComtrade through WITS. EU here refers to EU- 25.

IV. Analysis

A. GL-Total Trade

The overall IIT of EU-India bilateral trade for the period 1995-2006 at 4-digit level for all the commodities shows that GL values have been on the rise, save some marginal fall in 2002 and 2003. In 1995 the GL value which was 20.89% rose to 28.72% in 2006.

Table1: GL values(Weighted average of HS-4 digit GL_i indices)

Years	IIT
1995	20.89
1996	23.50
1997	23.88
1998	25.98
1999	25.58
2000	26.28
2001	28.56
2002	27.62
2003	27.09
2004	27.51
2005	27.88
2006	28.72
ACGR	2.32%

(Own calculation)

³ Aquino(1978) p277



The average annual compound growth rate of IIT using semi log model was found to be 2.32%. The GL values ranges from 23-24% in early part of the study period to 27-28% in the later part. This clearly reflects trade between EU and India to be more of inter industry type rather than intra industry, with intra-industry approaching a moderate level only in the later years. IIT is thus observed to be roughly one third of EU- India trade in later years of the study. However, it is encouraging to see that IIT is on the rise, though there are some small dips in 2002 and 2003. But this fall was expected as EU recorded slow growth in the years after 2001, both due to external and internal factors. External factors like dotcom bubble burst and oil crisis and internal factors like stock market contractions, lower productivity pulled the real GDP growth rate from 3.6% in 2000 to 0.8% in 2003.

Following Veeramani (1999), the distribution of GL_i across manufacturing industries is calculated. Analysis of GL_i values is restricted only to the manufacturing since IIT is not very prominent in the category of agricultural goods. The frequency distribution of GL_i indices across the industries will reveal the strength of IIT in the manufacture sector.

Table 2: Frequency Distribution of GL_i in the Manufacturing Sector

Classes of GL_i indices (n= GL_i value)		Percentage of industries (%)				
		1995	1998	2001	2004	2006
A	n = 0	14.51	12.35	12.78	8.43	6.07
B	0 < n < 20	46.55	43.77	41.40	41.57	41.92
C	20 < n < 40	14.01	15.81	15.44	17.06	14.99
D	40 < n < 60	10.21	9.39	11.60	11.67	14.30
E	60 < n < 80	8.31	9.58	8.85	11.76	10.97
F	80 < n < 100	6.41	9.09	9.93	9.51	11.75

(Own calculation)

A large percentage of industries fall in the category of low GL_i values i.e. in the range of 0-20, although number of industries in the class is showing a declining trend. This could be attributed to the fact that these manufactures may involve relatively simple transformations of the raw materials and such transformations may not be amenable to further slicing up of production process. Another notable feature is the marked decline in the number of industries with inter industry or one way trade i.e. where n=0. It is also clearly evident that the number of industries in the classes of high GL_i values (40 and above) is showing a consistent rising trend over the years. In 1995, only 249 industries in a total of 999 (24.9%) of industries had GL_i values greater than 40. In 2001, the number shot to 309 out of 1017 industries (30%) and by 2006 it notched up to 378 out of 1021 (37%) industries. This clearly brings out that as trade is being progressively liberalized, there is a greater number of industries showing high intra-industry trade.

To study the GL index in the category of manufactured goods in terms of intermediate, consumer and capital goods, a 6 digit HS classification based on WTO's classification is used. GL value is found to be highest for capital goods and not for intermediate goods. This is contrary to what was expected as IIT is supposed to be higher in intermediate goods. However, it should be borne in mind that in the category of capital goods, there are goods that undergo further processing.

Table 3: GL values for the categories of manufactured goods

(6 digit level)

	1995	1998	2001	2004	2006
Intermediate goods	14.00	17.19	19.49	21.31	22.89
Consumer goods	6.28	8.28	11.20	11.87	13.72
Capital goods	14.73	23.07	27.42	29.13	28.46

(Own calculation)

Analysis of the distribution of industries in the categories of intermediate goods, consumer goods and capital goods reveals a picture that is consistent with globalization and consequent fragmentation that follows from it. There is highest concentration of intermediate goods in high GL_i ranges. The table 4 brings out this fact very well.



Table 4: Distribution of GL_i across categories of manufactures

Classes of GL_i indices		Intermediate goods		consumer goods		capital goods	
		1995	2006	1995	2006	1995	2006
A	$n = 0$	724	343	406	150	250	113
B	$0 < n \leq 20$	469	636	449	579	366	389
C	$20 < n \leq 40$	158	246	135	178	105	134
D	$40 < n \leq 60$	132	178	105	120	50	97
E	$60 < n \leq 80$	109	166	72	123	46	48
F	$80 < n \leq 100$	71	134	75	119	32	81

(Own calculation)

Out of the total 3754 goods (manufactures) traded in 1995, 44% constituted intermediate goods, 33% consumer goods and 22% capital goods. In 2006 too, out of 3834 industries, the intermediates goods sector has maintained its lead with the shares of the respective categories remaining the same. While the share of industries having high GL_i (above 40) values was highest for the intermediate goods category in both the years (8% in 1995 and 12% in 2006), followed by consumer goods (6.7% and 9% respectively) and lastly by capital goods sector (3.4% and 5.8% respectively). It must be kept in mind that there could be capital goods and consumer goods that could be used as intermediates, as pointed out by Feenstra (1998). Capital goods are not only used as investments but also as intermediates, for instance, electrical parts and components, parts of capacitors are classified under capital goods though they undergo further processing. In the case of consumer goods as pointed out by Krugman (1996), they still undergo value addition through advertising, market development in the foreign markets.

B. Decomposition of IIT- HIIT and VIIT

The quality of goods traded between the two economies is brought out by disentangling IIT. Goods having GL_i values of 40% or more (indicating reasonably strong IIT) are considered. There were 249 industries in 1995 and 378 in 2006 which registered high GL_i values. A problem was encountered in the calculation of UV_i values as some of the commodities had discordant units between exports and imports while some had no information on quantities. Such commodities have therefore been excluded from the study.⁴ As mentioned earlier, calculation of UV_i values helps to disentangle IIT into HIIT and VIIT. This will throw light on the nature of IIT as to whether the trade is in superior or inferior kind of goods.

Table 5: Category of IIT

UV_i	Percent of industries	
	1995	2006
0.85-1.15	7.23	11.6
0.75-1.25	13.65	17.7
0.65-1.35	19.67	23
greater than 1.25	59.84	50.5
less than 0.75	24.09	20

(own calculation)

As expected HIIT is small, 7.23% in 1995 and this increased to 11.6% in 2006. Even if we define HIIT by a wider range taking 0.75-1.25 it is still a small proportion. When the widest definition is adopted i.e. 0.65-1.35, HIIT is in the range of 20% in 1995 and 23% in 2006; implying that close to 80% of the goods which were intensely traded displayed trade pattern of vertical type. This is in consonance with the theory that IIT between a developed and developing country is more of a vertical kind rather than horizontal one. HIIT is more typical of trade between developed countries. However, one can see increase in the percentage of industries in the horizontal type of trade though its share is small. In the category of VIIT, UV_i values above 1.25 are indicative of exports in superior quality goods, while UV_i values below 0.75 reflect trade in inferior

⁴ Under the four digit category one could find parts and finished good expressed in different units like kilograms, litres and some in items. Where units of measurement are different, UV_i values have been calculated separately



quality goods. The above table clearly brings out the fact that EU is exporting high quality of goods to India as the proportion of goods with UV_i values greater than 1.25 was close to 60% in 1995 which has subsequently fallen to 50.5% in 2006. This implies that 60% of the industries in 1995 and 50.5% of industries in 2006 had a qualitative advantage vis a vis India. This indicates inherent competencies of EU in the production of superior commodities in the earlier period of analysis, though the difference between the quality of goods exported and imported vis- a- vis India is declining in the later period. One may attribute this to: i. Non-EU countries increasing their competitiveness in their exports to India. ii. India improving on her productive and technological capacities. This is brought out in the European commission's Communique that the productivity gap of EU is widening vis a vis its economic partners for want of sufficient investment in R &D, innovation, sufficient use of information and communication and such factors. "Countries such as China or India are investing heavily in research and technology in order to move their industries up the value chain and "leapfrog" into the global economy"⁵

V. Conclusion

The overall IIT using weighted GL index reveals that the about one third of the trade between EU and India is of intra industry type; which means that it is inter industry trade rather than intra-industry trade that dominates EU India trade. However, the share of intra-industry trade is gradually increasing with the exception of two years of 2002 and 2003 when there had been a marginal fall in the values. Analysis of the percentage of industries across different classes of GL_i values revealed a large percentage of industries (42%) lay at the lower end, in the range of 0-20. However, there was also an increase in the number of industries in the upper end with GL values greater than 40. GL value was found to be highest for capital goods. However, there is a large concentration of industries with high GL_i values in the intermediate goods category which is an expected result. With regard to disentangling IIT into HIIT and VIIT, the study is in conformity to the standard theory that trade between developed and developing country is more of vertical type. Moreover, the study also shows that EU exports high quality of goods to India. However, the difference between the quality of goods exported and imported vis-a- vis India is declining in the later period of study.

Rising trend of intra-industry trade presages lower adjustment costs and could promote greater fragmentation of production, strengthening production linkages in the event of an FTA between the two economies. However, it needs to be emphasized that concentration of IIT in certain products may cause product specific shocks to be transmitted rapidly. The flip side of this is that trade becomes less sensitive to short term price or exchange rate changes.⁶ Since IIT between EU and India is predominantly of the vertical kind, one can say that their trade relationship is more complementary than competitive. From India's perspective, the study underscores the necessity of strategizing and pushing exports of those goods in which her comparative advantage is strongest.

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⁵ Europe 2020 (2010) p6

⁶ OECD (2002) p169



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