INTRA-INDUSTRY TRADE OF INDIA WITH SPECIAL REFERENCE TO FEW SELECTED SECTORS

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CERTIFICATE

This is to certify that the thesis entitled, *"Intra-Industry Trade Of India With Special Reference To Few Selected Sectors"* which is being submitted by *Amit Srivastava* for the award of the degree of *Doctor of Philosophy in Management* to the *Jaypee University of Information Technology, Waknaghat,* is a bonafide record of research work done under our guidance and supervision.

The thesis has reached the standard fulfilling the requirements of the regulations relating to the degree. The results obtained in the thesis have not been submitted partially or wholly to any other University of Institutions for the award of any degree or diploma.

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INTRA-INDUSTRY TRADE OF INDIA WITH SPECIAL REFERENCE TO FEW SELECTED SECTORS

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SECTION I. INTRODUCTION

CHAPTER 1

INTRODUCTION TO INTRA-INDUSTRY TRADE

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INTRODUCTION TO INTRA-INDUSTRY TRADE

Intra-Industry Trade (IIT) is defined as "a trade where same or almost the same products are getting exported and imported by a country"; OR – "it is a trade where a country exports and imports the products of same industry". This type of trade pattern is in contrast to *inter-industry trade* where a country exports and imports the products of different industry. This is a comparatively new concept to explain the reason for international trade and the trend has been identified in the late 1960s. As far as the condition of India is concerned little work have been done to explore the nature, pattern and determinants of its intra-industry trade. Therefore, the present study discusses about nature, pattern and determinants of India's intra-industry trade.

The present chapter is divided into 5 sections, the first section deals with the basic concept of intra-industry trade, second section will define the meaning of industry, third section will discuss about different determinants of intra-industry trade, the fourth section will highlight the importance of intra-industry trade and the last fifth section will discuss about the rationale of the study.

1.1 INTRA-INDUSTRY TRADE: BASIC CONCEPT

International Trade has always been a fascinating field for economists and different theories have been proposed to discuss the reason for involvement of a country in international trade. Initially the reason for international trade was explained by the classical and neo-classical theories of trade mainly emphasized that a country will produce and export those goods in which it has absolute/comparative advantage and import that goods in which it is at absolute/comparative disadvantage. The advantages

and disadvantages were decided by the availability of factors of production and hence these theories focus the supply side factor as determining factor for the trade. If a country is having absolute/comparative advantage for producing a product, it is very much possible that the country is having similar advantage of all the products belonging to that industry. Similarly, different countries may have advantages in different industries and if they get engaged in the international trade with other countries, they will export the products in which they are having advantages and import the products in which the other countries are having an advantage. This type of production and exchange of the products of different industries by different countries is called as "inter-industry trade". Therefore, initially it was discussed that international trade is mainly inter-industry and exchange of goods of different industries are taking place. It was never thought of that exchange of goods from the same industry is possible between the two countries.

Later on, with the development of research on trade theories, it was found that countries also exchange products of same industry and this finding surprised the world because earlier it was never thought of. This type of trade was termed as "intra-industry trade (IIT)" and was defined as "simultaneous export and import of very similar goods and services by a country". For example, Germany exports cars to France and simultaneously imports cars from France. This type of trade suggests that countries engage themselves in a narrower form of specialization, they are specializing themselves in a particular product within a given industry and exchanging these products for other products belonging to the same industry. Thereafter it was found that most of the countries of the world, specially developed, are involved in this type of trade and therefore it clearly shows that demand of different varieties of a product, across the world, increased which leads to increase in intra-industry trade.

The phenomenon of intra-industry trade was first noted empirically with the trade behavior of European Common Market and after then it was realized that it is a general characteristics of international trade flow. The distinction between inter-industry trade and intra-industry trade is important mainly for three respects; first, the classical and neo-classical trade theories were unable to explain the reasons for intra-industry trade, second, intra-industry trade do affect the pattern of industrialization of a country, and

third, it reveals the pattern of demand structure of a country. Now all these three points have been discussed here, one by one:

First, the foundation of classical and neo-classical theories were absolute/comparative advantage of a country and according to them a country will produce and export those goods and services in which it is having some advantage therefore theories supports the view that international trade will leads to inter-industry specialization and different country will specialize in different products and their specialization will govern their trade behavior. The theory was based on the supply side factors as determinants of international trade and the corollary of the theory was that the country will not engage themselves in the exchange of similar goods and services. Therefore, a country will either only export goods within the same industry, or only import these goods, but not simultaneously export and import goods within the same industry. But when it was realized that intra-industry trade does exist and in-fact it is an integral part of the international trade, it changed the perspectives of researchers to analyze the behavior of international trade. Since the existing trade theories were unable to explain the behavior of the trade pattern therefore the need of new theory, which could have explained the behavior, was felt and that led the birth of the theory of intra-industry trade. The theory of intra-industry trade stated that a country will engage itself in simultaneous export and import of goods and services with same industry, i.e., similar goods and services. Here the word "similar" means the goods are from the same industry and may be treated as an imperfect substitute, and they are not hundred per cent identical. The nature of similar products can be understood with the example of car trade between Germany and France, as discussed here: Volkswagan, is a product of Germany and is exported to France, while Peugeot is a product of France but is, at the same time, exported to Germany. So both Germany and France simultaneously exports and imports the cars with each other. But here we cannot say that both of these two brands of cars are exactly same, they may be imperfect substitutes but not perfect. Therefore, intra-industry trade focuses on the exchange of the similar products which are imperfect substitutes.

Second, the classical and neo-classical trade theories were based on the development of inter-industry specialization and the welfare effect of the trade was considered in the

respect that countries will be able to consume a greater bundle of the two goods after the international trade than before. While in case of intra-industry trade, almost similar kinds of products will be manufactured by both the countries that mean it will lead to the development of same type of industries in both the countries. Therefore, in case of inter-industry specialization, each country will experience a decline of some industries and the expansion of others; on the other hand, in case of intra-industry specialization, producers decrease the varieties of the products they produce, they decrease the number of varieties produce by them and specialize themselves in producing only a few varieties and the other varieties of the product is imported. Therefore, in this type of industrialization, there is a scope of development of all kinds of industries because the adjustment pressure caused by expansion of trade is lesser than that of inter-industry specialization.

Third, the reason for the existence of intra-industry trade is a demand for different varieties of a product of a country, that is why it is said that the determinants of intra-industry trade is the *demand* rather than *supply* (in the form of factor abundance or comparative advantage). But mere the existence of demand of different varieties of a product does not suffice the cause of intra-industry trade. It can also be questioned that why domestic producers cannot produce different varieties of a product to satisfy the need of consumers of a country. Logically this question can be answered in this way that, if all the producers will start producing a number of varieties of a product then economically it may not be feasible for them to earn sufficient profit to run the business; while on the other hand if they will concentrate on producing fewer varieties only then they may operate at larger scale and economies of scale may allow them to reduce the cost of production and earn market share and hence sufficient profit. The above explanation can also be justified because if initial investment costs is large and variable costs per unit are comparatively smaller, then as the level of operation increases, it will reduce the average cost per unit, that means the company will operate on economies of scale. This means that, a producer will be able to maximize its profit if he concentrates on producing few varieties at large scale rather than a large number of varieties at small scale and the variety which is not produced by a country can be imported from another country to meet the demand.

1.2 INTRA-INDUSTRY TRADE: DEFINING INDUSTRY

As discussed above, intra-industry trade means simultaneous exchange of goods and services of an industry by a country. In this definition, one has to be careful while deciding about an industry, i.e., what constitutes an industry. The literature suggests (Grimwade, 2000) three broad definitions of industry, these are:

Substitution in Production – means that each product is produced with roughly similar proportions of factors or inputs even-if the end-use of the product is different, for example – cars and tractors.

Substitution in Consumption – means that each product has more or less similar end uses, i.e., they are substitutes for the other product although their production requires a different combination of inputs, for example – leather shoes and sports shoes.

Identical Technology Intensity – in this categorization the products are grouped together on the basis of technology employed in their production. Here technology used in production is almost similar, for example – production of petroleum products.

Looking at these three definitions of industry, it can be understood that different definitions will give different sets of products for an industry. Therefore one has to be careful while selecting a criterion for an industry. Normally it depends on the objective of the study, for example – if one wants to analyze the validity of Heckscher-Ohlin theorem then substitution in production will be the most suitable criteria, on the other hand, if the objective is to understand consumer preferences in determining the trade pattern, then substitution in consumption would be the most suitable criteria.

Since different sets of classifications gives different group of products therefore the concept of intra-industry trade suffers from a degree of ambiguity. Hence, to avoid any ambiguity, ITC-HS classification (Indian Trade Classification – Harmonised System) for classifying the products has been used here. In this system of classification, there are about 8000 products, each product is given a 8-digit unique number and grouped into 22 sections and 98 chapters. Details of the categorization (HS-Code at the two-digit) are given in Annexure I. Therefore the degree of accuracy of the present study depends upon

the degree of accuracy of the classification of the products, under the system of ITC-HS classification.

1.3 INTRA-INDUSTRY TRADE: DETERMINANTS

Lots of empirical works have been carried out to find out the factors which may affect intra-industry trade. Broadly these determinants can be categorized into two groups (Grimwade, 2000) – inter-country determinants and inter-industry determinants. These two determinants which affect the level of intra-industry trade have been briefly discussed over here:

1.3.1 INTER-COUNTRY DIFFERENCES:

This is considered to be the most important determinant of intra-industry trade. In general it is assumed that developed economy will show a higher degree of intra-industry trade because their economic condition is good and per-capita income of the people is high which creates more demand for different varieties of a product. In the same way, both developing countries and least-developed countries are supposed to have a lower degree of IIT. But this is not a universal fact and degree of IIT should be checked carefully for a country, before reaching to any conclusion. Different factors which explain the effect of country differences in the level of intra-industry trade are as follows:

The higher the level of a country's per capita income, the higher will be the proportion of intra-industry trade – this is because the people will have more disposable income to spend and they will demand different varieties of a product which ultimately leads to increase in the level of intra-industry trade.

Lesser the difference in the per-capita income of two countries, higher will be the intra-industry trade between them – this is because similar economies will demand similar products which lead to increase in the level of trade and hence intra-industry trade between the two countries may also increase.

The larger the size of a country, as measured by GDP, the higher the level of IIT – this is because normally the demand of a bigger economy will be more that a smaller economy and this increased overall demand will also lead to increased level of intra-industry trade.

The higher the degree of economic integration between the two countries, the higher will be the level of intra-industry trade – this is because normally as the level of economic integration will increase, the level of trade between the two countries will also increase and this may lead to increased level of intra-industry trade.

Intra-industry trade between the neighboring country should be more – this is because if the distance between the two countries are less then transportation costs for shipping or carrying the product to the neighboring country will also be less and therefore there will not be any price escalation and final price of the product in the foreign market will also be lower which leads to increase in the demand of the products in the foreign market and ultimately the level of intra-industry trade will increase.

1.3.2 INTER-INDUSTRY DIFFERENCES:

The kind of industry also affects the degree of intra-industry trade. Substantial differences among product groups in the level of intra-industry trade have been found. Normally, the degree of intra-industry trade is higher in the products of manufacturing industry than that of primary commodities, this is because product differentiation is easily possible in the products of manufacturing industries while it is comparatively difficult with the products of primary commodities. Some of the major inter-industry factors affecting the level of intra-industry trade are considered here:

The higher the degree of product differentiation, the higher the level of intra-industry trade – this is because product differentiation leads to increase in the variety of a product of the same industry and if more variety of a product is traded, it will lead to increase in the level of intra-industry trade.

Economies of scale leads to increase in the level of intra-industry trade – this is because as economies of scale increases, the per unit costs of the product decreases which leads to

increase in intra-industry specialization and therefore the level of intra-industry trade will increase.

Intra-Industry Trade now has acquired a major portion of the world trade and its contribution in the world trade is increasing day by day. As discussed above, it is more with developed economy and with products of manufacturing sectors. Although the degree of intra-industry trade decreases as the product group is disaggregated to a higher level, but it does not become zero and this suggests that intra-industry trade is a pure phenomenon rather than statistical aggregation of the products. The evolution of the theory and the concepts of intra-industry trade have been discussed later in this thesis.

1.4 INTRA-INDUSTRY TRADE: SIGNIFICANCE

Intra-Industry Trade represents a major portion of world trade and is supposed to be more important than inter-industry trade because it stimulates innovations and exploits economies of scale (Ruffin 1999). Some of the points which highlight the importance of intra-industry trade have been discussed here:

a) Comparative advantage is not a necessity – the classical and neo-classical theory emphasizes the importance of comparative advantage of a country to reap the benefits of international trade and did not explain that what will happen to a country not having the advantage in any sector. According to the theory they will lose the ground with their participation in international trade. But the theory of intra-industry trade does not support this argument. Since in this case, countries will trade in more or less similar products (i.e., differentiated products of an industry) therefore even-if two countries are producing the same products, they can enter into international trade with each other and getting benefitted out of it.

b) Equitable Income Distribution – since classical and neo-classical theories emphasizes that "factor abundance" is the reason for international trade therefore the outcome of the trade would be the transfer of income from a "factor scarce" country to "factor abundant" country and this would lead to concentration of

wealth in already rich countries. Intra-Industry does not support this form of international trade and emphasize that trade between the two countries are possible even-if they are endowed with the same level of factors of production because in this case both of the countries would produce and trade similar products. Therefore both the countries will be benefitted from international trade which leads to equitable income distribution in both the countries.

c) Adjustment Costs are lower – since intra-industry trade promotes the trade of products of same industry therefore if a country is getting involved in it, the industrial structures need not to be changed. Countries will focus on producing fewer varieties of the same products rather than shifting its industrial base. Hence adjustment costs will be lower in case of intra-industry trade.

d) Promotes Innovation – in case of intra-industry trade, since firms are producing different varieties of a product therefore to capture more market share a firm would like to make innovations in the product. This is not the case with traditional theories of international trade because there the focus was producing altogether different products of different industry therefore the firms were focusing on producing a different set of products rather than trying to innovate in the same product line.

e) Focus on Economies of Scale – intra-industry trade focusing the gains from trade by exploiting economies of scale and this is possible because firms are producing different varieties of a product using the same infrastructure. As the level of output will increase and firm reaches towards economies of scale, the average cost of the product decreases and this decrease in the cost then passed on to the consumer by charging less price from them.

Therefore looking at all these points it can be said that intra-industry trade represent world trade in a better way apart from this the benefits of intra-industry trade will reach to each partner rather than getting concentrated in few hands.

1.5 RATIONALE OF THE STUDY

Intra-Industry Trade Has become a very important factor now for formulating trade policy because it produces extra gains from international trade by creating a larger market (Krugman and Obstfeld, 1988). The major benefit of a country by getting involved in IIT is that it can simultaneously reduce the number of products produced and increase the variety of products so that the adjustment costs would be less and therefore the income distribution effect would also be small.

The overall objective of the present study is – to analyze nature, pattern and determinants of India's IIT and to find-out its potential in different sectors so as to formulate the trade policy in such a way which increases the international trade, reduces the adjustment costs, minimizes the income distribution effects and produces maximum benefits to India. The present study broadly tries to answer the following questions regarding India's intra-industry trade:

- Does the degree of intra-industry trade increases with the passage of time?
- Does the aggregation level affect the degree of intra-industry trade?
- Does the contribution of intra-industry trade in total trade increases with time?
- Whether export or import is contributing more in intra-industry trade?
- Whether intra-industry trade is vertically dominated or horizontally dominated?
- Does the liberalization process have affected the degree of intra-industry trade?
- How does the intra-industry trade varies with different product groups, i.e., is it higher with more differentiated products and lower with less differentiated products?
- Whether intra-industry trade is more with similar economies or with dissimilar economies?
- How HIIT and VIIT are related to different country groups?
- What are the major determinants of intra-industry trade with different country groups? How per-capita income differences, capital-labor ratio and trade share affect the degree of intra-industry trade with different country groups?

- Does the nature and pattern of intra-industry trade reflect any changes in the economic conditions/development of India?
- Do the nature and pattern of intra-industry trade reflect any changes in the industrial structure of India?

Thereafter few sectors have been selected and the effects of trade policy on the trend and potential of intra-industry trade of the sectors have been discussed.

CHAPTER 2

CONCEPTUAL FRAMEWORK OF INTRA-INDUSTRY TRADE

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International Trade has always been a fascinating field for economists and different theories had been proposed to discuss the reason for involvement of a country in international trade. The first formal attempt was done by Adam Smith in 1776. He proposed the theory of "Absolute Advantage" in which he said that a country should specialize to produce that commodity which it can produce more cheaply than others, using the same amount of resources. He assumed that absolute advantage of a producer of a commodity is a precursor of international trade therefore an exporting country must be able to produce a commodity, using the same given resources, more than its competitors. But this theory was not realistic because there were several countries which did not possess absolute advantage in the production of any commodity but were involved in the international trade.

Later on David Ricardo, in 1817, proposed the theory of "Comparative Advantage" in which he said that a country should specialize the production of that commodity in which it has the greatest comparative advantage or the least comparative disadvantage. Therefore a country should export those commodities in which it has maximum comparative advantage and import those commodities where its comparative advantage is minimum. Both of these theories (Absolute Advantage and Comparative Advantage) belong to "Classical Theory of International Trade", although helped in framing the concept for reasons of international trade, but not devoid of criticisms. The major limitations of these theories were they focused only on one factor of production that is labor. They considered only labor costs for the production of a commodity but practically this were not the truth because the cost of capital also was an integral part of production costs. Moreover these theories were unable to explain the reasons for international trade of Least Developing Countries (LDCs) because they were not having absolute/comparative advantage in producing a good.

Thereafter several theories were proposed to explain the reason of international trade, a few important ones to mention here are – Haberler's theory of Opportunity Cost and Mills theory of Reciprocal Demand. But the most popular and widely accepted theory was proposed by Eli Heckscher and Bertin Ohlin in 1919, the theory of Factor Endowment. This theory was popularly known as H-O theory, the theory says that if a country rich in capital should produce and export capital-intensive commodities and import labor-intensive commodities while a country rich in labor should produce and export labor-intensive commodities and import capital-intensive commodities. The H-O theorem, focuses on the supply side factors, was an improvement over Classical theories and was widely accepted for the basis of international trade. The theorem was able to explain the reason for differences in comparative advantage which the Classical theories were unable to explain. Although the theorem had some limitations but it was accepted for a long period of time.

A different type of trade pattern was observed by Leontief in 1950s. He observed that although US is a capital-rich country but it exports labor-intensive commodities and import capital-intensive commodities. Later on Linder, 1961, also found something contradictory to the existing trade theories that country with similar per-capita income has similar demand pattern and therefore they trade in similar but differentiated commodities. This finding was in contradiction to the existing factor endowment theory which says that differences in factor endowment plays a key role in determining the trade pattern between the two countries, more dissimilar countries will trade more and trade in different products. Later on Hanink (1988) empirically proved that most of the propositions discussed by Linder were valid.

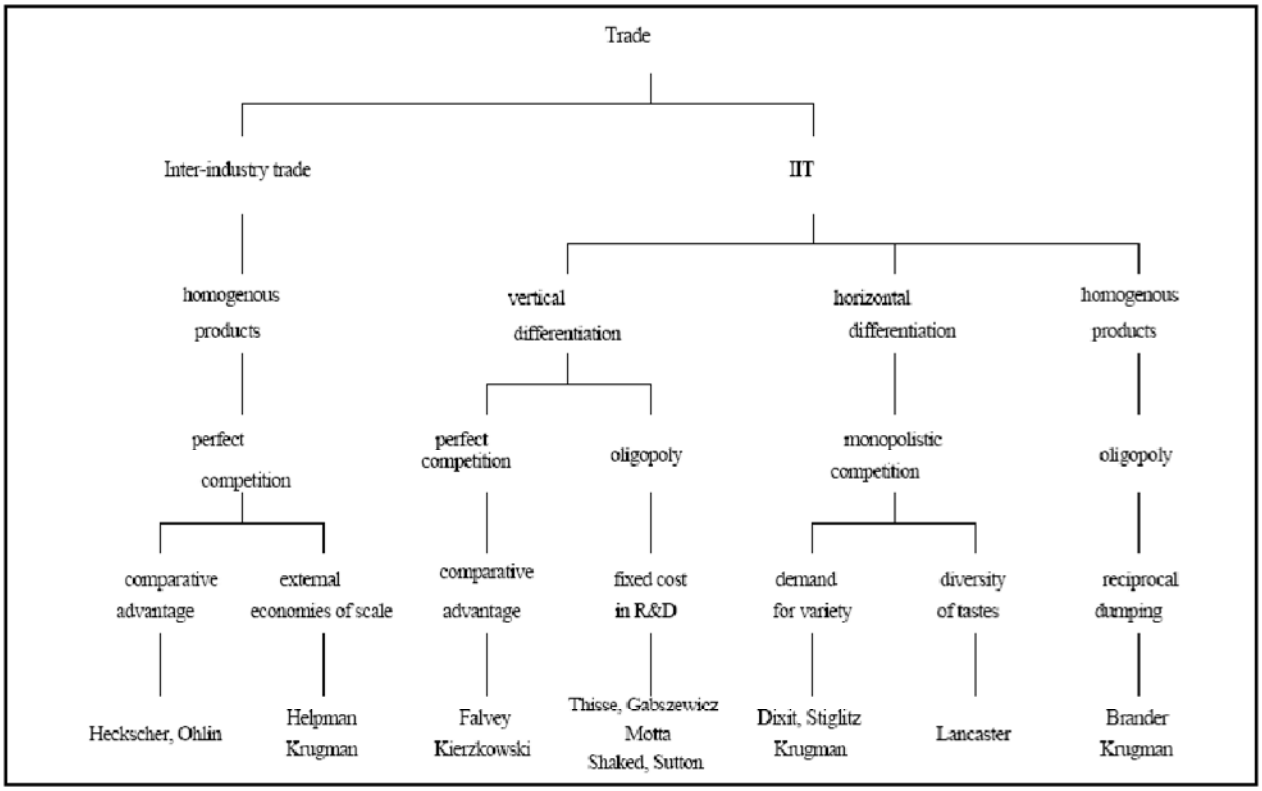
The term “intra-industry trade” was first used by Balassa (1966) and initial empirical work was done by Grubel (1967) where he studied on the relationship between IIT and trade liberalization of EEC (European Economic Community). The research in this direction picked up specially after the work of Grubel and Lloyd (1971) where they developed an index to measure IIT and they also proved that IIT is a “pure phenomenon”. The revelation of intra-industry trade has changed the perspective of defining

international trade, earlier "supply-side factor" was considered as a major determinant but now "demand-side factor" is considered as a major determinant of international trade.

Intra-Industry Trade represents a major portion of world trade today and is supposed to be more important than inter-industry trade. Brulhart (2008) calculated the GL-index for the world and found that it has increased from 20% to 44% between the periods 1962 to 2006, at SITC 3-digit level. Later on, with the further development of the concept, intra-industry trade was disentangled into two parts – horizontal intra-industry trade (HIIT) and vertical intra-industry trade (VIIT). In case of HIIT, products differ in their attributes but do not differ in quality or price as well as production techniques and factors of production used are assumed to be same. On the other hand, in case of VIIT, products can differ in terms of quality and therefore price also, here it is assumed that producers use different production techniques and factors of production. This bifurcation of intra-industry trade into HIIT and VIIT helped in understanding the concept in a better way. The significance of HIIT over inter-industry trade is that while in case of inter-industry trade, reallocation of resources between industries take place, HIIT does not require any redistribution between industries however it may be possible within industries. On the other hand, VIIT seems to be a specialization within industries along the quality spectrum, a phenomenon which is somewhere between the traditional view of intra-industry trade and the one of comparative advantage (classical/neo-classical theory).

Figure 2.1 depicts the relationship between market structure, product differentiation and types of trade – both inter-industry trade and intra-industry trade, as shown on the next page:

Figure 2.1 Relationship between Market Structure, Product Differentiation and Types of Trade



Source: Fontagné and Freudenberg (1997)

Figure 2.1 shows the different types of market structure favoring inter-industry trade, horizontal intra-industry trade and vertical intra-industry trade. It shows that monopolistic competition leads to HIIT while both oligopoly and perfect competition may lead to VIIT. It also shows the way of development of the theory of intra-industry trade.

In the present chapter the development of the theory of intra-industry trade has been discussed in chronological order. The present chapter is divided into two sections, the first section deals with the development of concepts of intra-industry trade and the second section deals with the development of the methodological issues of the intra-industry trade.

2.1 DEVELOPMENT OF CONCEPTS OF INTRA-INDUSTRY TRADE

Till 1950, the most widely accepted theories for international trade were "Ricardian theory of comparative advantage" and "Heckscher-Ohlin (H-O) theory of factor endowment. The theory states that each country should produce and export the commodity which uses its abundant factor extensively and is produced at lowest costs. Although the theory was widely accepted but it was not proved empirically because of unavailability of any technique. Later on, in 1954, after the invention of input-output analysis, H-O theory was tested empirically by Leontief. He analyzed the trade pattern of US, for the year 1947, and he was surprised to find that "although US is a capital abundant country but it exports labor-intensive products and imports capital-intensive products" and this finding was known as "Leontief Paradox". Since the finding was contradictory to the then existing theories of international trade, therefore it was not accepted and criticized by many researchers on the grounds that the selection of the year is not appropriate, 1947 was the year in which trade was not stable. Later on, Leontief again performed his test, called as Leontief second test, and this time he selected the year 1951 for trade data. This time again he got the same result that "US imports is more capital-intensive than exports", in-fact, import was 6 per cent more capital-intensive than export.

Leontief paradox added a new dimension to the analysis of international trade and it changed the way of analyzing the pattern of international trade. Later on, in 1961, Linder also worked on testing the empirical validity of H-O theorem and possible solution to the Leontief Paradox. His findings were also contradictory to the H-O theorem. He proposed an alternative theory of trade that was consistent with Leontief's findings. He hypothesized that "nations with similar demand would develop similar industries and these nations would trade with each other in similar but differentiated products". He used *per capita* income as a proxy for demand structure of a country because the assumption was that similar the income level, similar will be the demand structure. Linder's hypothesis opened a new vista for explaining the reason for international trade. He advocated the *demand* based theory of international trade rather than the existing one *supply* based theory involving factor endowments. This finding changed the perspective

of analyzing international trade and instigated the research in the direction of finding demand structure as determinants of international trade. Later on his work was extended by Hanink (1988) who empirically proved that the fundamental relationships expressed by Linder were valid. Although Linder hypothesized that similar demand structure would lead to the development of similar industries and hence similar but differentiated products, but he did not use the term "intra-industry trade" specifically.

Specifically the term "intra-industry trade" was first used by Balassa (1966) for simultaneous export and import of goods of same industry between the trade partners. Since then, a large number of theoretical and empirical studies have been conducted to explain the phenomenon. The first empirical work on the topic was performed by Grubel (1967) where he studied the nature and pattern of intra-industry trade during the trade liberalization period of EEC (European Economic Community). Although by the end of 1960s the concept was recognized but it did not draw enough attention until its measurement technique was developed by Grubel and Lloyd (1971). Later on with the further development in the concept, intra-industry trade was further divided into two categories – horizontal intra-industry trade (HIIT) and vertical intra-industry trade (VIIT). Horizontal product differentiation means that many varieties of the products are available but these varieties do not differ significantly in terms of quality or price; while in case of vertical product differentiation several varieties of a product are available and these varieties differ in terms of quality and price significantly. All these works have been discussed in detail in the coming section of the present chapter. Here in the section few important theoretical models have been discussed in chronological order, to highlight the development of theory of intra-industry trade.

2.1.1 THE DIXIT-STIGLITZ MODEL

This model proposed in the year 1977 and it was one of the first theoretical models to explain the reason for the existence of intra-industry trade. The model basically focuses on the issue of *quantity* versus *diversity*. The model emphasized that the consumer would prefer to consume different varieties even for same product group, therefore the model is

also known as *"love-of-variety"* model. Thus, a consumer who is indifferent between the quantities (1,0) and (0,1) of the two commodities prefer the mix of (1/2, 1/2) to either extreme. The model was based on monopolistic environment where a producer of an individual variety has a little bit of monopoly power for supplying its own product, therefore the model assumes a strong competition between different producers producing different varieties of a product. Here all the consumers are assumed to be alike. Let c_i be the level of consumption of a particular variety i and let N be the total number of varieties available. The model uses a constant elasticity of substitution (CES) function for the utility U derived from the consumption of the product as a function of consumption c_i of the N varieties:

$$U = \left(\sum_{i=1}^{N} c_i^{\rho} \right)^{1/\rho} ;0 < \rho < 0 \qquad \text{-------} \qquad 2.1.1$$

Here it is assumed that all varieties enter into consumers' utility functions symmetrically. The utility of consumer will increase not only by consuming more of each goods but by increasing the number of goods. Also, even-if the consumer has less of each good, if he has more goods his utility increases.

On the supply side, it is assumed that each good has an identical production function and uses a single factor of production, labor, and are assumed to be produced under increasing returns where a portion of total cost is fixed. Therefore, one producer produces only one product and there are as many producers as products. Therefore the model provides a framework to understand that how demand structure of an economy may lead to intra-industry trade.

2.1.2 THE LANCASTER MODEL

The Lancaster (1980) model applied the analysis of perfect monopolistic competition to the problems of intra-industry trade. The kind of economies considered here was manufacturing based economy characterized by product-differentiated groups. It is

assumed that all products of a product group posses the same characteristics, but in different proportions and this proportion defines its *specifications*. Specifications are assumed to vary smoothly in a continuous manner over some convex set which is referred as *product-spectrum* of that group, in such a way that each group has an infinite number of potential products.

Individuals are assumed to have preferences over characteristics of goods rather than a collection of goods. If all goods in the group, actual or potential, were available in that circumstances individual would prefer his *"most-preferred goods"* or *"ideal products"*. Due to the diversity in consumer preferences, the most prefer goods vary over consumers.

The market structure, here, assumed to perfectly monopolistic competition, i.e., perfectly informed firms facing perfectly informed consumers under conditions of perfect flexibility in choice of specifications, absence of collusion and free and willing entry. He further assumed that the individual firm selling a product within the group has two decision variables, price and specifications, instead of single variable, price, as assumed in traditional theory.

He considered different probable cases of the economic conditions of trading economies like trade of single and multi-group manufacturing sectors between identical economies, the role of preference diversity of consumers, size differences and false comparative advantage, true comparative advantage, and the effects of protection. He showed the possibility of intra-industry trade in all the conditions and interestingly, he also showed that, increase in tariff barrier on a product group may lead to increase in overall intra-industry trade, because of increase in the bilateral trade in other product groups.

Finally he concluded that intra-industry trade not only may occur between similar economies, it is most likely to occur between such economies and the volume may be much higher than trade based on comparative advantage.

2.1.3 THE KRUGMAN MODEL

Krugman worked on monopolistic competitive environment and based his work on the basis of Dixit-Stiglitz model with slight modifications. He (Krugman, 1979) considered the effect of growth of labor, trade and factor mobility on intra-industry trade. He found that economies of scale leads to increase in trade even if there are no international differences in tastes, technology or factor endowments.

In another work (Krugman, 1980, 1981), he considered the trade between economies with similar factor endowments and the role of large domestic markets in promoting exports. He concluded that similar countries will have an incentive to trade, their trade will typically be in products produced with similar factor proportions and this trade will not involve the income distribution effects, a characteristic of conventional trade. He also worked on the effect of home-market on the pattern of trade and found that in the presence of increasing returns, countries will tend to export those goods for which they have relatively large domestic markets.

2.1.4 THE FALVEY MODEL

Falvey's (1981) model was different from all the models of intra-industry trade discussed so far in the respect that it is focused on vertical differentiation of the product rather than horizontal differentiation. He put forward his model with two interesting features – first – intra-industry trade is generated without increasing returns to scale or imperfectly competitive markets, and second – the countries produce vertically differentiated products. Rather than modifying the traditional theory of trade and working on new theory, he tried to minimize the departure from traditional theory by modifying the standard framework in only two essential respects – first – he assumed that one of the two factor inputs used in each industry (capital) is specific to that industry, and second – each industry is no longer assumed to produce a single homogeneous output, but instead can produce a range of products using as inputs labor and its own industry specific capital. Intra-Industry Trade then appears if countries specialize in production within this range.

He assumed a two-country (home and foreign) world, in each of which the industry under consideration has a given capital stock (K and K* respectively) and faces given wage rate (W and W* respectively), and each industry can produce a continuum of products of different qualities. Higher quality products requires more capital-intensive techniques of production and have higher prices. He showed that higher wage home country (W>W*) has comparative cost advantage of those qualities which require more capital-intensive qualities, as also predicted by H-O theory.

He recognized the importance of differences in product quality in international trade, which was not discussed till then. He developed a model for trade within a multi-product industry where the industry's dimensions were defined by a range of outputs obtainable from a particular type of capital. He, therefore, concluded that intra-industry trade would be a natural outcome of this condition without requiring the presence of increasing returns to scale or imperfectly competitive markets. He also showed empirically that volume of intra-industry trade is inversely proportional to the level of trade restrictions.

2.1.5 THE SHAKED AND SUTTON MODEL

The model was proposed by Shaked and Sutton in 1983 and was mainly concerned with the analysis of price competition in vertically differentiated goods. They proved that for vertical differentiation the economic condition is just opposite to that of horizontal differentiation. They proposed that in case of vertically differentiated products, finiteness condition (i.e., only few firms will survive) is necessary and sufficient and it is just opposite to the case of horizontal differentiation where monopolistic market environment is required (i.e., large number of firms). That condition refers to the relationship between consumer's willingness to pay for quality improvements and the change in unit variable costs. They suggested that this condition would likely to behold in those industries where the main burden of quality improvements is on R&D or other fixed costs while unit variables would rise only slowly with increase in quality. Finally they concluded that – it may be possible that product innovation is also accompanied by process innovation and

unit variable costs may fall, and it is the situation where the finiteness property holds along with the relevant interval of quality, which they termed as "natural oligopoly".

2.1.6 THE ABD-EL-RAHMAN MODEL

The model proposed by Kamal Abd-el-Rahman in the year 1991. This was the first model which formally differentiated the horizontal intra-industry trade with the vertical one. He categorized all the types of trade into three categories – first – one way trade – implies export (import) level for which the reversal import (export) flows are either insignificant (less that 10 per cent compared with the other flows) or non-existent; second – Intra-range trade – this is vertical differentiation trade category where export and import unit values difference equal to or greater than 15 per cent; and third – two way trade in similar products – this is horizontal differentiation trade category where difference between export and import unit value is maximum upto 15 per cent. This is further categorized into two parts: bilateral – where export and import partners are same and triangular – if the two partners are different.

Apart from this the model demonstrated that "in the conditions of imperfect competition, firms producing the same types of goods are distinguished by specific competitive advantages and disadvantages against a background of collective comparative advantages and disadvantages related to the industry to which they belong". Therefore, he concluded that in comparative disadvantaged industries, the difference between exporters and non-exporters are particularly large in the case of productivity. In such industries, firms that manage to export despite the collective comparative disadvantage conditions seem, therefore, to be endowed with a specific advantage of their own.

2.1.7 THE DAVIS MODEL

Davis (1991) worked on the effect of economies of scale and intra-industry trade. Till then, most of the models of intra-industry trade were considered that increasing returns to scale is necessary to account for the volume of intra-industry trade among developed

economies, while he concluded that this is not necessary. He discussed an example of perfectly intra-industry goods in which countries with identical endowments and arbitrarily small technical differences, trade substantial amounts of goods of identical factor intensities.

He developed a simple model that can give a unified account of inter-industry trade as well as intra-industry trade. The striking feature of the model was that intra-industry trade attained a maximum at a point where countries had identical factor endowment ratios. He also proved that increasing returns are not a necessary condition for intra-industry trade.

In his other work (Davis, 1995), he emphasised that both H-O and Ricardian models are still relevant for explaining intra-industry trade. He developed a Heckscher-Ohlin-Ricardo model which showed that even the countries of identical factor endowments would still trade due to differences in their technologies, as this would encourage specialization and therefore trade, in the same way as discussed in the Ricardian model. Moreover, the intra-industry trade is possible even at constant return to scale while increasing returns is not at all a necessary condition.

2.2 DEVELOPMENT OF MEASUREMENT ISSUES OF INTRA-INDUSTRY TRADE

The work on analyzing intra-industry trade had been started after the finding of Leontief Paradox in 1954 and Balassa used the term “intra-industry trade” specifically in 1966. Although some empirical work had been done during that period (like Grubel in 1967), but the progress in the development of concept got a real impetus after the development of a tool to measure the degree of intra-industry trade, developed by Grubel and Lloyd in 1971, which is popularly called as GL-index. After the development of GL-index to measure the degree of intra-industry trade, so many indices were proposed by different researchers as well as the research got initiative in the direction of finding the determinants of intra-industry trade. Initial works regarding the measurement issues were done mainly for developed countries and it was believed that intra-industry trade is a characteristic of international trade of developed countries only, but later on different

works had also been done for developing countries which showed that intra-industry trade is also a part of their trade.

So many works have been done so far regarding the measurement issues of intra-industry trade and it is not possible to cover all of them, therefore in this section, few of them which are relevant to the present study, have been discussed here.

2.2.1 THE GRUBEL APPROACH

Grubel (1967) tried to present some empirical measures to explain the nature of international trade among the members of European Economic Community (EEC) and he found that intra-industry trade is dominating specially in trade liberalization period. He used two sets of data – first set consists of trade statistics covering intra-EEC trade of SITC three-digit manufacturing industries for the years 1955, 1958 and 1963; and in the second he used import-export data for the years 1959 and 1963 aggregated on the SITC one-digit level.

He framed his hypothesis from traditional H-O theorem which says that trade liberalization would lead to specialize a country in that area where the country is in relatively advantageous condition, and hence "export-to-import" or "import-to-export" ratio should increase as the trade liberalization takes place – this is because if a country is net exporter (importer) before trade liberalization then its export-to-import (import-to-export) ratio will be high. He hypothesized that after the liberalization process, the country will specialize itself in producing those goods where it is in a relatively advantageous position, which will lead to further increase in export-to-import (import-to-export) ratio. But his findings were quite opposite and he found that both the ratio decreased with the advent of trade liberalization, which clearly shows that increase in trade was more intra-industry trade rather than inter-industry.

In other work, he categorized different products into two categories – one where differentiation was easy (like manufactured) and the other where differentiation was quite difficult (like raw materials). He found that, with the trade liberalization, trade of first

category of products increased very much than that of second category, and this also shows the importance of intra-industry trade.

Finally he made three conclusions from his work – first – trade liberalization, among countries with similar resource endowments, and the level of development will lead to more intra-industry trade because industry would like to shift into new product lines rather than entirely new set-up; second – the basic model of intra-industry specialization implies that the traditional measure of estimating demand by price elasticity will not work well because it will underestimate the increase in multinational trade due to trade liberalization; and third – his model is also capable to explain the simultaneous export and import of capital.

2.2.2 THE GRUBEL AND LLOYD APPROACH

They were among the first economists who developed an index to measure the degree of intra-industry trade (Grubel and Lloyd, 1971). They defined intra-industry trade for an industry *i*, at any given level of aggregation, as the value of exports of an industry which is exactly matched by imports of the same industry. To facilitate comparisons of these measures for different industries and countries, they expressed them as a percentage of each industry's combined exports and imports. The formula for measuring intra-industry trade, proposed by them, was

$$Bi = \frac{[(Xi + Mi) - | Xi - Mi |]}{(Xi + Mi)} \times 100 \quad \ldots\ldots \text{(2.2.2.1)}$$

where Xi and Mi stands for the exports and imports of the product group *i*, respectively. The value of Bi would vary from 0 to 100. If all trade was balanced, it would be equal to 100, means pure intra-industry trade; on the other hand, if all trade was one way, Bi would equal to 0, means pure inter-industry trade.

To obtain the average level of intra-industry trade for a country, they proposed calculating a weighted mean, using the relative size of exports and imports of a particular product group as weights. It is shown as:

$$\overline{Bi} = \frac{\sum_{i}^{n} Bi(Xi + Mi)}{\sum_{i}^{n} (Xi + Mi)} \times 100 \qquad \text{…. (2.2.2.2)}$$

the above formula can also be written as:

$$\overline{Bi} = \frac{\sum_{i}^{n} (Xi + Mi) - \sum_{i}^{n} |\, Xi - Mi \,|}{\sum_{i}^{n} (Xi + Mi)} \times 100 \qquad \text{……. (2.2.2.3)}$$

One of the main problems with the above two equations is that it makes no allowance for any imbalance in a country's total trade. When a country has a large trade imbalance (surplus or deficit), it will be biased downward and the true extent of intra-industry trade will, therefore, be underestimated. To avoid the problem, they proposed an alternative formula, which adjusts for any trade imbalance, as:

$$Ci = \frac{\sum_{i}^{n} (Xi + Mi) - \sum_{i}^{n} |\, Xi - Mi \,|}{\sum_{i}^{n} (Xi + Mi) - \left| \sum_{i}^{n} Xi - \sum_{i}^{n} Mi \right|} \times 100 \qquad \text{……. (2.2.2.4)}$$

Equation 2.5 is used whenever country's total trade is unbalanced.

They studied Australian trade data for the year 1968-69 and showed that as the level of aggregation increases, degree of intra-industry trade increases. They found that the degree of Australia's IIT increased from 20 % at SITC 3-digit to 43 % at SITC 1-digit.

They found that Australia's intra-industry trade was maximum with New-Zealand and South Africa, which were the countries with similar kind of resource endowments as that of Australia's.

Apart from this, they studied the nature of Australia's IIT, mainly for two sectors – iron and steel (SITC 67) and petroleum products (SITC 332). In both the cases the degree of intra-industry trade was found to be high. In case of iron and steel, it was high because of scale economies; while in the case of petroleum products, it was high because the northern part of Australia, to avoid huge transportation costs, imports their requirement of petroleum.

They, therefore, explained the main reasons for intra-industry trade, which were – specialization in narrow product ranges, joint production unmatched by complementarities in demand and trade across borders in high transportation cost industries.

Finally they concluded that, intra-industry trade is a real phenomenon and in-fact it is prevalent in almost all industries in the OECD countries including Australia.

2.2.3 THE BALASSA APPROACH

He also proposed a measure for intra-industry trade in the year 1974 and his work was again based on the international trade of European Economic Community. He measured intra-industry trade by taking the sum of the ratios of trade balance (exports minus imports) to total trade (exports plus imports) for each product group and then dividing by the number of product groups, as shown:

$$Ej = \frac{1}{n}\sum \frac{|\, Xi - Mi \,|}{(Xi + Mi)} \qquad \ldots\ldots\ldots \quad (2.2.3.1)$$

here *j* stands for country *j* and *I* for the product group *i* out of *n* industries. The formula shows that *Ej* tends towards zero when all trade is intra-industry trade and towards one when all trade is inter-industry trade.

2.2.4 THE AQUINO APPROACH

He criticized the Grubel and Lloyd approach for failing to fully correct for an imbalance in a country's overall trade. According to him, the GL-index underestimated the true extent of intra-industry trade. His argument was that *Ci* is itself a weighted average of the individual product group ratios, *Bi*. However, these are also downwardly biased whenever a country's total trade is unbalanced. Therefore each *Bi* needs to be adjusted, not just the summary formula. Therefore, he proposed adjusting each *Bi* whenever a country's total trade is unbalanced and then estimating the overall average for the country using the adjusted *Bi* ratios. He proposed estimating hypothetical export and import values for each product group *i* on the assumption that total trade is balanced. The formula for calculating these hypothetical export and import values are:

$$X_i^e = \frac{Xi - \frac{1}{2}\sum(Xi + Mi)}{\sum Xi} \quad \text{AND} \quad M_i^e = \frac{Mi - \frac{1}{2}\sum(Xi + Mi)}{\sum Mi} \qquad . \ (2.2.4.1)$$

these hypothetical values were then inserted into equation 2.2.2.3 of GL-index to obtain a trade-imbalance-adjusted summary measures of intra-industry trade, as shown:

$$Q = \frac{\sum (Xi + Mi) - \sum | X_i^e - M_i^e}{(Xi + Mi)} \times 100 \quad \text{…….. (2.2.4.2)}$$

Aquino method gives a lower estimate of intra-industry trade than GL-index.

2.2.5 THE GREENAWAY AND MILNER APPROACH

They worked on the measurement issues of intra-industry trade (Greenaway and Milner, 1981). They discussed the problems regarding measurement of intra-industry trade at the industry level that whether and how to appropriately adjust the industry indices for the effects of overall trade imbalance. Their work was based on the UK's trade data between 1976 to 1979. They calculated unamended GL-indices for second-digit SITC level with Aquino indices amended, first for the imbalance on the overall visible trade and then for the imbalance on the manufactured goods only. They found the variability in the direction of adjustment in the industry or sub-group indices.

Furthermore, they were not satisfied with the "Equiproportionality in Adjustment", i.e., balancing effect would be equiproportional to each industry or groupings within a particular set, as suggested by Aquino. They said that the assumption would be valid if price and income elasticities of demand, for all imports and exports, were identical and if supply was infinitely inelastic.

They, therefore, concluded that even-if macro-disequilibrium is identifiable, it cannot be generalized at industry level because intra-industry trade is a product of industry characteristics and not of macro-economic adjustment process.

In another work (Greenaway and Milner, 1983), they again discussed the measurement issue and found that the main problem regarding the measurement of intra-industry trade is the unknown influence of "categorical aggregation". They discussed the approaches to assess the influence of categorical aggregation at the level of statistical aggregation, most typically equated with and "industry", i.e., third-digit SITC level.

They said that categorical aggregation occurs when industrial categories are mis-classifieds, i.e., activities with different production functions are erroneously grouped

together. This problem can be overcome by regrouping of categories, but there are two major problems associated with it – first – the absence of any unique criteria for regrouping, and second – it is not clear how one allocates trade in parts and components in any reclassified scheme.

They found a compromise between ignoring the problems and regrouping. They suggested three ways to find out the influence of aggregation bias – measurement at a lower level of aggregation, measurement according to alternative classification system and computation of an adjusted *Bi* index. In the first case – one can expect that as we move towards disaggregated level, intra-industry trade will decrease. If the average level of IIT falls substantially, from one level to another, this could be an indication of the presence of categorical aggregation. In the second case – one can check the sensitivity of *Bi* index with alternative basis of classifications. This enables one to compare *Bi* indices from the two data sets. In the third case – they suggested to use *Ci* in place of *Bi*, i.e., when categorical aggregation inflates *Bi*, *Ci* will be an appropriate measure.

Therefore, they suggested checking categorical aggregation is easy to manage rather than regrouping the data set.

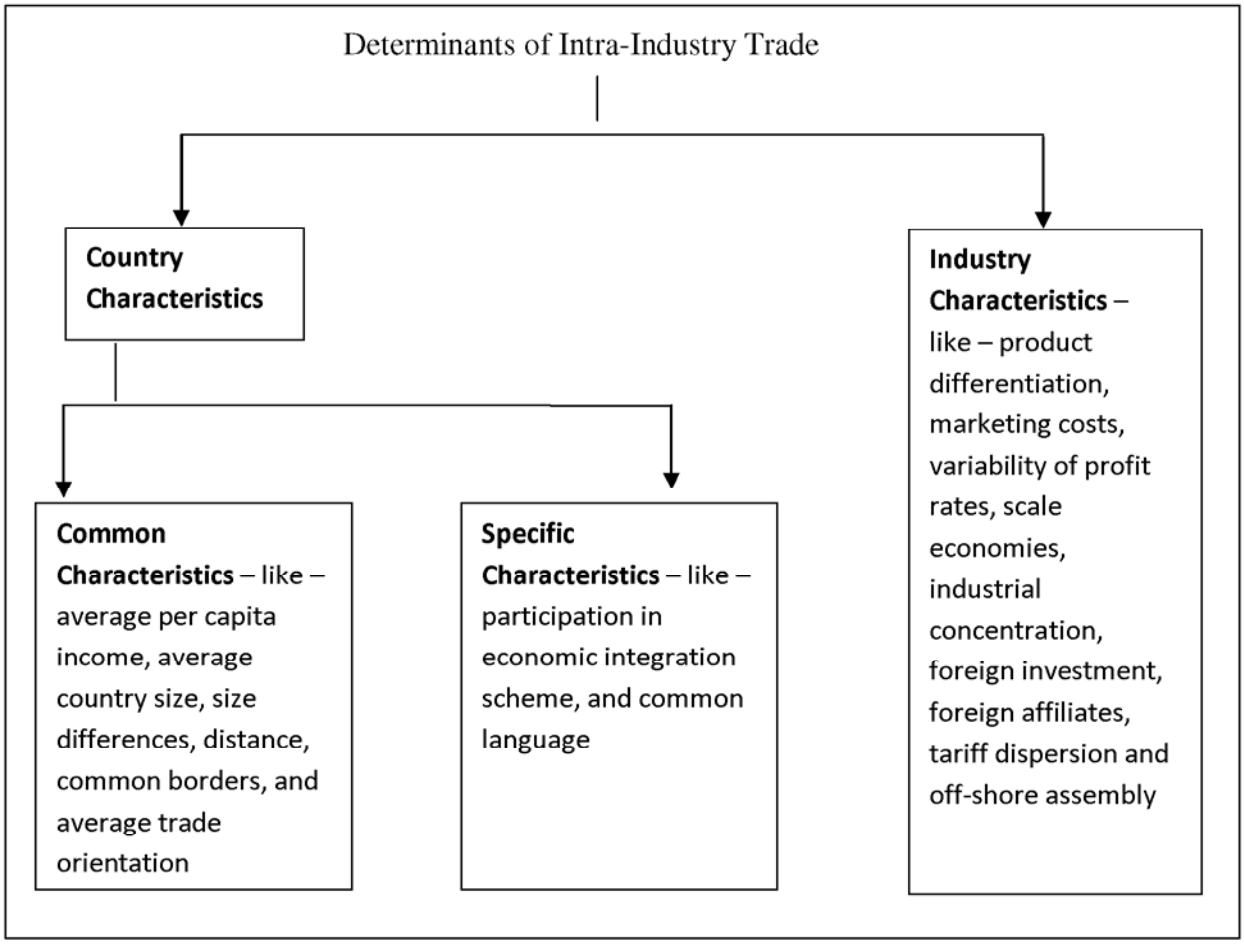
2.2.6 THE BALASSA AND BAUWENS APPROACH

Balassa and Bauwens, 1987 tried to test the hypotheses about the factors influencing the extent of intra-industry trade in a multi-country and multi-industry framework. Their investigation was limited to trade in manufactured goods where product differentiation predominates. Their work was based on 38 countries (mix of developed and developing) and they selected total 152 industry categories. They classified all the countries into four different categories – first – all countries; second – among developed countries; third – among developing countries; and fourth – between developed and developing countries.

They analyzed the determinants of intra-industry trade of every country with every other country and in each industry category. They considered two classes of determinants of

intra-industry trade – country characteristics and industry characteristics. These two categories had further been categorized into different sub categories, as shown below:

Figure 2.2 Determinants of Intra-Industry Trade



Source: Compiled from Balassa and Bauwens, 1987

In most of the cases, they found that the results obtained were matched with the theoretical concepts. Among the Common Characteristics, intra-industry trade was found to be positively correlated with average income level, average country size, trade orientation and the existence of common borders, and was negatively correlated with income inequality, inequality in country size and distance.

Among the Specific Characteristics, intra-industry trade was found to be positively correlated with the cases of trade agreements like ECM (European Common Market), EFTA (European Free Trade Association) and LAFTA (Latin American Free Trade Area).

Among the Industry Characteristics, intra-industry trade was found to be positively correlated with product differentiation, marketing costs, the variability of profit rates and off-shore procurements; while it was negatively correlated with product standardization, industrial concentration and foreign direct investment.

In the last they concluded that the simultaneous introduction of country and industry characteristics offer advantages over a decomposition of estimating equations into equations containing only country or industry characteristics.

2.2.7 THE HANINK APPROACH

Hanink, 1988, presented a model based on geographical product differentiation which directly focuses upon trade as market interactions. The model defines market homogeneity across national boundaries as the basis for international trade. His work was based on the Linder's model of international trade. According to Linder, international trade caused by market homogeneity but limited by distance, is the same thing as intraregional trade. Linder's model, however, did not incorporate the hierarchical flow of goods. Hanink extended the Linder's model and incorporated the hierarchical flow, and therefore the variety across goods, as an additional rationale for existing geographical patterns of international trade. He discussed that in a central place system of intraregional trade there is a hierarchical order of settlements. The highest order settlement, i.e., the one with the largest population, is the focus of trade in the region because it is at that place that the widest variety of goods is available. Variety of goods decreases by hierarchical steps as the population of settlement decreases by hierarchical steps.

Hanink conducted empirical tests for the extended Linder's model and found that, as expected, trade intensity is an increasing function of market homogeneity, a decreasing function of distance and an increasing function of variety across goods. He further discussed that trade theory is developed within the context of trade reality. The theory of comparative advantage was developed at a time when it was able to describe the existing trade patterns. As economic reality changed, the power of comparative advantage theory diminished and alternative trade theories emerged. Product Life Cycle theory, for

example, was developed in the context of post World War II trade which was dominated by the United States. As the international economy continues to change, however, the American dominance has turned to relative decline, and with the coincident increase in transnational corporation activity, product life cycle theory's validity becomes questionable. Then after the market interactions, as discussed by Linder, became a reality. For example, much of the economic growth of the newly industrializing countries results from their successful differentiation of products, specially for export markets rather than for domestic markets.

Finally, he concluded that the fundamental relationships expressed in the extended Linder model seem valid.

2.2.8 THE BERGSTRAND APPROACH

Till 1990, different studies regarding measurement issues of intra-industry trade had been done. These cross-country studies had found systematic empirical relationships between the share of intra-industry trade, between the two countries, and the average levels of and inequalities between their gross domestic products (GDPs), per capita GDPs and tariffs. Although these relationships were robust across econometric studies, a unified theoretical framework for including each one of these particular variables had not yet been established. Bergstrand, 1990, tried to extend the theoretical work of different economists, proposed for understanding the nature of intra-industry trade, by analyzing how each of the six determinants discussed above, as well as the average level of and inequality between their capital-labor endowment ratios, specifically influences their share of intra-industry trade in a given commodity group.

He undertook eight different propositions, for understanding the nature of intra-industry trade, and tested them empirically. These propositions were: the share of IIT between two countries will be lower the greater the inequality between their relative capital-labor endowment ratios; the share of IIT will be lower the greater the inequality between per capita incomes, because of greater divergence in tastes; the share of IIT will be higher or lower the greater the average capital-labor ratios of the two countries, depending upon

their relative factor intensities in production; the share of IIT in luxury (necessity) goods will be higher (lower) the average level of economic development (here he assumed that differentiated goods are luxury while the homogeneous goods are necessity); the share of IIT will be lower the greater the inequality between their economic sizes; the share of IIT will be higher the greater their economic size; the share of IIT will be lower, the greater the inequality between their tariff level; the share of IIT will be lower, the greater their average tariff level, i.e., artificial barriers to trade. He considered the data of OECD countries and the dependent variable was the logit of an average of 3-digit SITC bilateral GL-IIT index.

He found that empirical results on all the propositions had the same sign as expected theoretically, although some of them were not statistically significant as well as the value of R^2 and adjusted R^2 were low. His model also revealed that a greater similarity of two countries' per capita incomes would be associated with more intra-industry trade both for supply (Heckscher-Ohlin-Samuelson) and demand (Chamberlin-Linder) reasons simultaneously.

He "uncoupled", for the first time, the effects of higher average capital-labor ratio and higher average per capita income of two countries on the share of IIT. He empirically proved that, for some manufacturing industries, a higher average capital-labor endowment ratio for the two countries can lower the share of intra-industry trade, even though a higher average per capita income can raise it.

2.2.9 THE HUMMELS AND LEVINSOHN APPROACH

Hummels and Levinsohn, 1993, revisited Helpman's test and reconsidered the evidence. Their objective was not to amend the Helpman's theoretical work but rather they applied a combination of different data and different econometric methods and question whether the data still support the theory's specific predictions.

Helpman worked on OECD countries and found that as countries become more similar in size, the volume of trade as a proportion of GDP increases. They re-estimated the

Helpman's model using both OECD countries and non-OECD (NOECD) countries, and found that regression result strongly supports the Helpman's original findings.

They did panel data regression analysis also for OECD countries and rather than using "per-capita income" as a proxy of factor endowment, they used the real factors like "per labor GDP" and "capita-labor ratio". They finally concluded that, instead of factor differences explaining the share of intra-industry trade, much of the intra-industry trade appears to be specific to country-pairs. Therefore, according to them, the effects of geography are more important in explaining the pattern of intra-industry trade. Since, as they found, much of the intra-industry trade is specific to country-pairs, they were skeptical about the prospects for developing any general theory to explain it.

2.2.10 THE GREENAWAY, HINE AND MILNER APPROACH

Greenaway, Hine and Milner worked for studying the importance of horizontal and vertical intra-industry trade in United Kingdom's total trade. In their work, they explained the importance of country specific factors as well as disentangling horizontal and vertical intra-industry trade in the total trade.

In their first work (Greenaway, Hine and Milner, 1994) they deployed a new methodology based on the work of Abd-el-Rahman (1991), to identify vertical and horizontal intra-industry trade in the UK and estimated a model which was aimed at establishing whether country-specific factors are important in explaining the relative importance of vertical and horizontal IIT in the UK's trade. They used unit value of a product as a proxy for the quality of the product, as used by Rahman. In their study, intra-industry trade in the UK trade, with each of its partner countries, was calculated at the 5-digit SITC level, using unadjusted GL-index. To differentiate between HIIT and VIIT, they used 15% as dispersion factor. They found that almost 70% of the UK's IIT was vertical in nature and just about 30% was horizontal. The incidence of HIIT was highest where EC (European Countries) member states were concerned and lowest in case of geographically distant trading partners. They also found that high-quality vertical intra-

industry trade (HQVIIT) exceeds the low-quality VIIT (LQVIIT) with the majority of trading partners.

They also tried to find out the determinants of UK's intra-industry trade and for that they used OLS (Ordinary Least Square) method for a sample of 62 countries. Here they found that the sign of market size variable (average market size) and integration dummy variables were same as expected theoretically, but the sign of factor endowment proxy (difference in per capita income) did not. They found that country-specific factors were relevant to explain the pattern of IIT. Both market size and membership of a customs union were relevant for VIIT while the relative factor endowments did not support the model. The pattern of HIIT also appeared to be influenced by country-specific factors, though the results were not as strong as the case of VIIT. Finally they concluded that "there are persuasive reasons for believing that it is worthwhile to separate-out HIIT and VIIT, because their determinants are different".

In their second work (Greenaway, Hine and Milner, 1995), they pointed out not only the relative importance of vertical and horizontal intra-industry trade in the UK, but also demonstrated how a failure to separate them out can impact on the interpretation of empirical result. They calculated intra-industry trade in UK trade with all its partner countries, i.e., on a multilateral basis. They used 5-digit SITC trade data of UK. Intra-Industry Trade had been divided into horizontal and vertical components using relative unit values of exports and imports and used 15% as well as 25% dispersion factor, for separating out the horizontal with the vertical IIT. They considered 77 industries for calculating IIT and defined industries as 3rd digit level of aggregation. They performed a regression analysis, separately for horizontal and vertical IIT, to find out the sign/relationships of different determinants on these two forms of IIT. Different determinants they used were – proxy variable for horizontal product differentiation in the industry, proxy variable for scale economies in industry, a measure of market structure competitiveness of industry and measure of importance multinational enterprises in the industry.

The result of regression analysis was encouraging and they found that it is important to separate horizontal IIT with the vertical one, because theory also suggested to do so.

Their findings also suggested that the determinants do differ but not always in the expected fashion. IIT in vertically differentiated products was not well explained by the small numbers model rather they found that it is positively related with the number of firms in the industry, i.e., large numbers model applied. Vertical IIT was also positively linked to the vertical product differentiation. On the other hand, they did not find any evidence of attribute differentiation being positively related to horizontal IIT and this form of IIT appeared to be associated with few firms. Therefore they concluded that it is not the case always that determinants of total IIT support the large numbers model (on the presumption that horizontal IIT is the predominant form).

2.2.11 SOME OTHER APPROACHES

Gullstrand, 2002, worked on the Chamberlin-Heckscher-Ohlin-Samuelson (CHOS) model to test empirically the theoretical relevance of different methods of measuring intra-industry trade. He specifically worked on refining three measurement issues – adjustment of aggregation biases, the definition of inter- and intra-industry specialization at the product level, and the distinction between horizontal and vertical intra-industry trade. His findings underlined the importance of calculating IIT indices on bilateral trade flows on a low aggregation level in order to disentangle horizontal and vertical IIT. His results confirmed most of the predicted signs of the proxies, and revealed an interesting inverted U-shaped relationship between IIT and economies of scale, however, the interpretation of one key variable, differences in factor endowment, differed between the methods of measuring IIT. Therefore, he finally concluded that it is important to disentangle horizontal and vertical intra-industry trade, and that the specialization pattern across industries is important within rather homogeneous product groups; in other words, the choice of method of measuring intra-industry trade does matter.

Fontagné, Freudenberg and Gaulier, 2005, worked on different theories proposed till then regarding intra-industry trade and disentangling it into horizontal and vertical intra-industry trade. They emphasized that intra-industry trade is not only about trading similar products, on the other hand, two-way-trade in vertically differentiated products has been

the main contribution to the growth of IIT among developed economies. They tried to differentiate intra-industry trade with two-way-trade in vertically differentiated products. According to them, "an exchange of motors for motors (of certain cylinder capacity) represents two-way trade in intermediate goods; likewise and exchange of cars for cars (of a certain cylinder capacity) represents two-way-trade in final goods; but exporting motors and re-importing cars incorporating these motors corresponds to a vertical division of labor, not intra-industry trade". They categorized the world trade into three different types of trade – inter-industry trade, intra-industry in horizontally versus vertically differentiated products. They showed that the increase in intra-industry trade in world level is due to two-way-trade of vertically differentiated products. The second thing what they found was that – specialization according to the classical theories of international trade (inter-industry trade) has recently recovered, due to increasing participation of emerging economies in the world trade. Therefore they predicted that, in future, the magnitude and the nature of internal adjustments induced by trade openness will change, as our economies will progressively go back to the traditional patterns of international specialization.

Cabral, Falvey and Milner, 2008, investigated, both theoretically and empirically, the relationship between differences in factor endowments and intra-industry trade, and its types. They started their study because they found the conflict between theory and empirical results regarding intra-industry trade. While the theory focused on HIIT, empirical studies show that VIIT is a dominant form of intra-industry trade. This phenomenon was explained by earlier researchers as – VIIT, like net trade (NT), will show a positive monotonic relationship with endowment differences between countries. Therefore they developed a general equilibrium framework model which allowed for the simultaneous existence of HIIT, VIIT and NT, by which they tested the relationship between endowment differences and the shares of HIIT, VIIT and NT in total bilateral trade. The assumption they made regarding the behavior of HIIT was quite conventional – larger endowment differences would reduce such type of trade; on the other hand the assumptions regarding VIIT were factor and trading partner specific. VIIT should grow with differences in sector specific factor endowments, as long as these differences remain small. The effects of larger specific factor endowment differences depend on whether the

specific factor is used by the industry or not. If not, then VIIT declines for larger endowment differences; if so, then the share of VIIT increases (decreases) if the trading partner has an ever larger (smaller) endowment.

Their result of European Union (EU) trade with its 51 major trading partners, confirmed that HIIT declines with growing endowment differences. They also confirmed about the sensitivity of VIIT flows to the magnitude of endowment differences. The specific predictions on endowment differences in the specific factor used by the industry (assumed to be capital) were also confirmed. But the non-linearity predicted for specific factors (assumed to be land) did not appear, perhaps due to insufficient variability in the sample. Overall these findings supported the view that both within and between industry specialization and trade can be driven by factor endowment considerations, and undermine the view that VIIT is simply disguised inter-trade associated with industry (dis)aggregation.

CHAPTER 3

INTRA-INDUSTRY TRADE AND INDIA

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INTRA-INDUSTRY TRADE AND INDIA

Although lots of work has been done on intra-industry trade but most of them are for developed countries and only few of them are for developing countries. As far as the case of India is concerned the number of studies is very less, some of have been discussed in the present chapter.

3.1 THE VEERAMANI'S CONTRIBUTION

Veeramani is the one who has analyzed India's intra-industry trade from different perspectives and therefore created a good knowledge base for India centric studies. Few of his works related with India's IIT have been discussed over here.

In his first study (Veeramani, 2001), he worked on India's intra-industry trade under economic liberalization. He focused on two aspects of India's IIT in manufactured commodities under economic liberalization – first he examined the changes in the intensity of multilateral IIT as between 1987-88, 1994-95 and 1998-99 to understand the impact of trade liberalization on IIT; and second – he analyzed the influence of various country specific factors on the intensity and probability of IIT in India's bilateral trade with her major trading partners. Here he assumed that India's bilateral trade is vertical in nature and therefore, he mainly concentrated on vertical IIT. The source of data used was CMIE database and products were grouped under 4-digit level of Indian Trade Classifications. The intensity of intra-industry trade was measured by using the most popular index, the Grubel-Lloyd Index. He divided different industries into two groups – A and B. "Group A" had all the primary commodities with relatively low intensity of IIT, low growth of exports and falling shares in the export basket; on the other hand, "Group B" had mainly manufactured items where the intensity of IIT was relatively high, high growth of exports and a rising share in the export basket.

He found a general increase in GL index after liberalization process, therefore, he confirmed the hypothesis that "trade liberalization biases trade expansion towards intra-industry trade in the Indian context". He also found that GL index was higher in those industries where export was more than that of import and he found a strong correlation and rank correlation coefficient between the growth of export and increase in GL index. He also found that, although generally intra-industry trade is expected to be more with similar type of countries, but in case of India, it is relatively more with high income countries than with the countries of similar level of development.

Therefore, he concluded that, India's trade is vertical in nature because it is more with dissimilar economies rather than similar one, as well as India's intra-industry trade is characterized by a greater extent of complementarity (i.e., within the same industry there are imports from one group of countries and simultaneous exports to another).

In another work, he (Veeramani, 2003) focused on the effect of liberalization on the relationship between industry-specific factors and intra-industry trade. He examined how industries differ in their level of intra-industry trade and how various industry-specific factors influence the level? Here he mainly focused on the multilateral context rather than on bilateral context, because, according to him, India's intra-industry trade was characterized by a greater extent of complementarity. He estimated the level of IIT across industries in India using a "static" as well as a "dynamic" measure and found that, first – in a large number of industries, trade liberalization was biasing trade expansion towards IIT, i.e., within industries, both exports and imports expanded simultaneously. This finding indicated that domestic industries were unlikely to go out of business because of trade liberalization; second – considerable variation observed in the level and growth of IIT across industries.

He performed an econometric analysis also and found that trade liberalization would give rise to greater intra-industry trade in such industries which have narrow product lines. He found that structure of market is also a significant factor and industrial concentration promotes intra-industry trade. While small firms would seek market niches abroad because of collusive behavior by dominant firms in the home market, on the other hand,

multinational firms would have a mitigating effect on IIT because the overseas production (for the local market) of differentiated goods substitute export sales.

Finally, he concluded that the phenomenon of intra-industry trade will gain more importance even in the coming future and India should develop policies in such a way so as to attract vertical foreign investment, and should try to remove the rigidities in the functioning of factor markets – e.g. – labor market.

3.2 THE BURANGE AND CHADDHA'S CONTRIBUTION

Burange and Chaddha (2008) worked on to assess the growth in India's intra-industry trade for a period of 19-years, ranging from 1987-88 to 2005-06. Coupled with the growth in intra-industry trade, they also considered the growth in IIT with respect to various Country Groups. Apart from this, they also discussed the change in the trade flows owing to IIT as reflected by marginal intra-industry trade (MIIT). They considered 4-digit level of HS classification as an industry. They used GL-IIT index for measuring the degree of intra-industry trade. For calculating India's IIT at the multilateral level, they classified all the countries into 7 groups, on the basis of territorial distribution, they were – America, Europe, Africa, Asia, Middle East, Australia & Oceania, and the Unspecified Group. The countries included in each of these groups were as per the classification followed by World Trade Atlas. To calculate growth in IIT at the multilateral level as well as with the various country groups, they used annual compound growth rate (ACGR). They also calculated MIIT, to overcome some of the problems of the result of GL-index.

As far as the growth of India's IIT at multilateral level was considered, they found that the GL-IIT index was increased from 23.48 to 32.09 with the ACGR by 1.86% only. Along with this, they found that 16 out of a total 21 sections of products displayed above average growth rate for the entire period of study. As far as India's IIT with various country groups were concerned, they found that – it was growing with almost all the country groups, for example: the ACGR with Europe, Asia, America, Middle East,

Africa, Australia & Oceania was about 2.01%, 4.17%, 5.83%, 11.00%, 13.59% and 2.97% respectively.

Therefore they found that India's IIT was greater with the region of Asia and Europe when compared to the other regions. Nevertheless, the region of America and Middle East were fast catching up, however, in terms of growth in IIT, Europe had registered least while Australia & Oceania registered maximum growth. They further found that, it was mainly manufacturers, which augmented the component of intra-industry trade with the various regions.

Therefore, they concluded that it is a clear reflection of India's growing capabilities of producing similar goods in certain manufactures, which also reflects lower adjustment costs in these industries, as the economy proceeds on the path of liberalization.

CHAPTER 4

METHODOLOGY OF THE STUDY

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So far the conceptual and measurement issues of intra-industry trade have been discussed, now the present chapter broadly deals with the methodologies used in the study to discuss the nature, pattern and determinants on India's IIT as well as the limitations of the study. The present chapter mainly focused on the system of Indian Trade Classifications (ITC-HS Code), different level of aggregation and their significance, the formula used to calculate Grubel-Lloyd index of calculating the degree of intra-industry trade, disentangling total intra-industry trade into horizontal and vertical intra-industry trade, calculating import-weighted average tariff rate and a brief discussion about panel-data analysis and in the last , the limitations of the study have also been discussed. All these points have been discussed below one-by-one.

4.1 SAMPLING TECHNIQUE (ITC-HS CLASSIFICATIONS)

The data used (secondary data only) in the present study has been taken from ITC (HS) Code. This is called as Indian Trade Classification – Harmonized System of classification, it classifies all the products into different product categories. India uses an eight-digit unique ITC-HS code for different products. Here in this case, all the products are divided into 21 sections and each section is further divided into different chapters. There are total 98 chapters – from HS-01 to HS-98. Each chapter is further divided into four-digit sub-headings and this division continues till the level of eight-digit. This eight-digit code is unique to each product and the trade is done using these codes. For example, at two-digit, chapter HS-85 belongs to "Electrical Machinery and Equipments and Parts thereof"; at four-digit the chapter is divided into 48 sub-categories like 8501, 8502 …. 8548; at six-digit the category 8501 is further sub-divided in 13 sub-categories like 850110, 850120 and so on; while eight-digit specifies a particular type of product; it is shown as – 85 is for – Electrical Machinery and Equipments and Parts thereof; 8501 is

for – "Electric motors and generators (excluding generating sets)"; 850110 is for – "Motors of an output not exceeding 37.5W" and 850120 is for "Universal AC/DC motors of an output exceeding 37.5W"; at eight-digit 85011011, 85011012, 85011013 are DC motors of different types, as micro motor, stepper motor and wiper motor respectively. This is the way by which each product is given an eight-digit unique code and they are traded and recorded according to their product code. The lists of the products of all chapters at two-digit, i.e., all 98 chapters are given in Annexure I.

All the data have been taken from the sample of all 98 chapters and finally four HS chapters have been selected for detailed study.

4.1.1 DIFFERENCE BETWEEN FOUR-DIGIT AND SIX-DIGIT AGGREGATION LEVEL

As far as different studies on international trade are concerned, it depends on the objective of the study that what level of aggregations is required. Some studies may be conducted at the highest level of aggregation, i.e., two-digit level while some may be conducted in the lowest level of aggregation, i.e., eight-digit. Normally, industry has been considered as either at four-digit or at six-digit level of aggregation. Since, theoretically it has been assumed that the level of aggregation affects the degree of intra-industry trade, thus the present study is based on both 4-digit and 6-digit level of aggregation. In the case of defining industry at the four-digit level, the value of all the products at six-digit level, under the same four-digit level, have been considered; while in the case of defining industry at six-digit level, the value of all the products at eight-digit level, under the same six-digit level, have been considered. Therefore, if industry is defined as at the four-digit level then it means that it is carrying the summation of all the values of six-digit level, at six-digit level the summation of all the values of eight-digit level have been considered.

4.2 MEASURING GRUBEL-LLOYD INDEX

In the present study GL-index has been calculated for measuring the degree India's of intra-industry trade. The nature and pattern of IIT has been considered for both four-digit and six-digit level. Although different indices have already been proposed to calculate the level of intra-industry trade, but here GL-index has been used because even today it is the most widely used and most widely accepted index. To obtain the average level of intra-industry trade for a country *j*, they proposed a weighted average measure of IIT_j, which is shown as:

$$IIT_j = \frac{\sum_{i=1}^{n}(X_i + M_i) - \sum_{i=1}^{n}|X_i - M_i|}{\sum_{i=1}^{n}(X_i + M_i)} \times 100 \quad \text{..... (4.2.1)}$$

where IIT_j is the degree of IIT for a country *j*, X_i and M_i is the export and import value of industry *i* of the country, *n* is the number of industries. The equation 4.2.1 can be used for both at 4-digit and 6-digit level of aggregation. The equation ranges from 0 to 100, and in this case closure the value to 100 higher will be the degree of intra-industry trade, while on the other hand, closure the value to 0 more will be inter-industry trade.

But the equation 4.2.1 has one limitation for measuring the level of intra-industry trade, that is – it makes no allowance for any imbalance in the country's total trade and is downward biased for measuring the degree of IIT, in case of trade imbalance. The greater the imbalance, the lower will be the value of IIT. Therefore, to avoid this problem, they proposed an alternative *adjusted formula*, which adjusts for any trade imbalance, which is shown as:

$$IIT_j = \frac{\sum_{i=1}^{n}(X_i + M_i) - \sum_{i=1}^{n}|X_i - M_i|}{\sum_{i=1}^{n}(X_i + M_i) - \left|\sum_{i=1}^{n}X_i - \sum_{i=1}^{n}M_i\right|} \times 100 \quad \text{..... (4.2.2)}$$

The above equation, 4.2.2, is also called as an adjusted equation, and it takes care of trade imbalance, if any, because in case of trade imbalance (surplus or deficit) the unadjusted equation would be biased downwards and true extent of intra-industry trade would be underestimated. The equation has been used to calculate the degree of IIT at both 4-digit and 6-digit level of aggregation.

Both the equations – 4.2.1 and 4.2.2 have been used, for calculating the degree of intra-industry trade. Wherever it was required to calculate unadjusted IIT, equation 4.2.1 has been used; and when it is required to calculate adjusted IIT equation 4.2.2 is used. Both of these two equations have been referred directly in the rest of the study.

4.3 DISENTANGLING TOTAL INTRA-INDUSTRY TRADE INTO HORIZONTAL AND VERTICAL COMPONENTS

Total intra-industry trade can be further divided into horizontal intra-industry trade (HIIT) and vertical intra-industry trade (VIIT), as shown in equation 4.3.1:

$$IIT = HIIT + VIIT \quad \ldots\ldots\ldots (4.3.1)$$

In case of HIIT, products differ in their attributes but do not differ in quality or price. Producers in the industry are assumed to use the same factors of production and same techniques. On the other hand, in VIIT, products can differ in terms of quality which leads to difference in prices also. Here producers use different factors of production and different techniques.

To measure, whether IIT is horizontal or vertical, the following equation, 4.3.2, has been used:

$$1 - \alpha \leq \frac{UV_{exp}}{UV_{imp}} \leq 1 + \alpha \quad \ldots\ldots\ldots\ldots (4.3.2)$$

where UV_{exp} and UV_{imp} are unit-value of export and import respectively. "α" is called as Dispersion Factor and is used to differentiate between horizontal and vertical product

differentiation. There is no fix value for α, but in most of the cases researchers used 0.15 or 0.25 values. The present study has used 0.15 as dispersion factor, which is the most frequently used value. It means if the export and import unit values difference equal to or greater than 15 percent, then the difference between the two unit values is considered as significant to assume quality differences and are regarded as vertical product differentiation, while on the other hand, if the difference is less than 15 percent then the products would be considered of almost same qualities and be regarded as horizontal product differentiation. Therefore, if the ratio of unit value of export to import is lies between 0.85 (i.e., 1-0.15) to 1.15 (i.e., 1+0.15), then the IIT would be called as horizontal intra-industry trade (HIIT); while on the other hand, if the ratio does not lie in the range of 0.85 to 1.15, the IIT would be called as vertical intra-industry trade (VIIT).

Apart from this, vertical intra-industry trade can be further classified into two types – low-quality VIIT (LQVIIT) and high-quality VIIT (HQVIIT). The determining factor for this will again be the value of ratio of unit value of export to import. If the ratio is less than "1-α" (i.e., here it will be less than 0.85 because dispersion factor, α, is taken as 15%), then it will be called as LQVIIT, on the other hand, if the value of the ratio is more than 1+α (i.e., more than 1.15) it will be called as HQVIIT. Low-quality VIIT depicts that a country is importing high-priced product, i.e., high-quality product, and exporting the low-priced product, i.e., low-quality products in such a way that the ratio of unit value of export to the unit value of import is less than or equal to 0.85 (assuming 15% dispersion factor). Similarly in case of high-quality VIIT, a country is exporting high-priced product (i.e., high-quality product) and importing the low-priced product (i.e., low-quality products) in such a way that the ratio of unit value of export to unit value of import is equal to or higher than 1.15 (assuming 15% dispersion factor). In both the cases, the product must belong to the same industry.

As far as calculating unit value of exports and imports are concerned, it is calculated as shown in the equation 4.3.3 –

$$UV_{exp} = \frac{Value_{exp}}{Units_{exp}} \quad \text{and} \quad UV_{imp} = \frac{Value_{imp}}{Units_{imp}} \quad \text{..... (4.3.3)}$$

To calculate unit value of export, as shown in equation 4.3.3, the total value of export is divided by the number of units of the product, similarly to calculate unit value of import, total value of import is divided by the total number of units imported, of the product. In the present study, the currency used is USD, and the unit is tonne, kgs or litre, depending on the nature of the product and the availability of the data. Selecting tonne, kgs or litre does not make any difference in calculating the ratio because same notations have been used for both export and import, for a particular product group.

4.4 IMPORT-WEIGHTED AVERAGE TARIFF (IWAT)

A tariff is a tax levied by a country on its import. It is synonymous with the word import duties or custom duties. The basic objective of levying tariff is twofold – to collect revenue or to protect the domestic industries. The former is called as Revenue Tariffs and the latter is called as Protective Tariffs. The motive of imposing revenue tariff is to earn revenue from import and normally it is lower, because low tariff will not result into price escalation of the imported goods into the domestic market and hence leads to higher demand which finally leads to a collection of high revenue from import. On the other hand, protective tariff is imposed to restrict the import in order to protect the domestic industries and therefore the rate of tariff is generally very high. This high tariff rate will lead to price escalation of the imported goods in the domestic market and will increase its price and reduce the demand which helps the domestic industries because the demand of the product of domestic industries will not decrease and they win the war of price competition. Thus it can be said that in general, imposing tariff leads to increase in the price of imported product in domestic market and hence it restricts the imports and international trade. The wave of globalization leads to reforms in tariff structure and countries are reducing their tariff to promote world trade. Therefore a decrease in tariff rate should increase the international trade which may lead to increase in intra-industry trade. Hence, a decrease in tariff rate may leads to increase in the degree of IIT.

In the present study the effect of tariff rate on intra-industry trade have been considered and this could have been done by either calculating *a simple average* or calculating *a weighted average*. Here *simple average tariff* has not been considered because although it measures the overall degree of protection but it does not adjust for the significance of

different products in the trade profile, so a high tariff on an insignificant product may overstate the degree or protection.

Therefore the calculation is based on *weighted average tariff* because it takes into account each product mentioned in the import profile of a country. However, this method is also not devoid of limitations and its major limitation is it understates the level of protection because a very heavily protected product will be imported less and therefore receive a small weight. The formula used in the present study to calculate *import-weighted average tariff* (IWAT) is shown below:

$$\text{IWAT}_j = \frac{\sum_{i=1}^{n} (w_i \times \text{m}_i)}{\sum_{i=1}^{n} m_i} \quad \ldots\ldots\ldots\ldots (4.4.1)$$

where w stands for weighted average tariff, m represents the import value and n represents the total number of products imported. The same equation, 4.4.1, can be used for both 4-digit and 6-digit level of aggregation.

4.5 PANEL-DATA ANALYSIS

Time series and cross section are two most commonly used tools used for the empirical analysis in economics and other areas of research. In time series data we observe the values of one or more variables over a period of time, for example, analyzing GDP or national income of a country for several time periods (years, quarters, months etc.). Therefore time series analysis can also be called as vertical analysis because in this case same data for different time periods, of one parameter, arranged chronologically and the technique is mainly used for trend analysis. In cross-section data, values of one or more variables are collected for several sample units, or entities, at the same point of time, for example, GDP growth for different Asian countries for a given time period. Therefore, cross-section analysis can also be called as horizontal analysis because in this case same

data for different objects but for the same year is given and the technique is mainly used for comparative analysis.

In *panel data* the same cross-sectional unit is surveyed over time. In short, panel data have space as well as time dimensions, for example, data regarding GDP, per-capita income and population of different countries (cross-section data) arranged chronologically for several years (time series). The advantage of using panel data is it gives a holistic view about the nature, pattern and determinants of the data under consideration. This technique is also called as pooled data (pooling of time series and cross-sectional data), combination of time series and cross-section data, micropanel data, longitudinal data (a study over time of a variable or group of subjects), event history analysis (like studying the movement over time of subjects through successive states or conditions), and cohort analysis (like following the career path of 1970 graduates of a business school). Therefore, in short, *panel data analysis* means that movement over time of cross-sectional units.

The advantages of using *panel data* over time series and cross-section data, as mentioned by Gujarati (2006), are:

a) It is more informative because it combines both time series and cross-sectional data. Moreover, because of combining these two series, it gives more variability, less collinearity among variables, more degree of freedom and more efficiency.

b) It relates to individuals, firms, states, countries etc., over time, there is bound to heterogeneity in these units and the technique takes such heterogeneity explicitly into account.

c) By studying the repeated cross-section of observations, *panel data* are better suited to study the dynamics of change.

d) It can better detect and measure the effects that simply cannot be observed in pure cross-section and pure time series data.

e) It enables us to study more complicated behavioral model.

f) By making the data available for several thousand units, *panel data* can minimize the bias that might result if we aggregate individuals of firms into broad aggregates.

Broadly, the model of *panel data analysis* can be classified into two types: the fixed effect approach and the random effect approach. In fixed approach, we assume either intercept or slope or both of the regression equation is constant, depending on the objective of the study. Fixed approach models can be of different types:

a) The intercept and slope coefficient are constant across time and space and the error term, of a regression equation, captures differences over time and individuals. This is the simplest approach and just estimates the usual OLS regressions.

b) The slope coefficients are constant but the intercept varies over individuals. This is also known as Fixed Effects Model (FEM) or Least Square Dummy Variable (LSDV) model. In this model, dummy variables are used for different parameters or time period. Number of dummy variables should be one less than the total number of parameters used, to avoid dummy-variable trap.

c) Slope coefficients are constant but the intercept varies over individuals as well as time.

d) All coefficients vary across individuals.

Fixed effects model or LSDV model has to be used carefully and few things have to be kept in mind like if we use too many dummy variables then the number of degrees of freedom would decrease and in case of using so many variables there is always the possibility of multicollinearity.

The other type of *panel data model* is Random Effect Model (REM) or it is also called as Error Component Model (ECM). This model assumes that if we are not sure about the nature of dummy variables then why should we include it in the equation and sacrifice on the degree of freedom. In that case it is better to use an error component in the equation which represents common mean plus an error term, representing a mean deviation for each individual parameter under consideration.

The question that which model should be used in a particular case, FEM or ECM, it depends on the assumption used in the study. Here fundamental differences between the usages of these two models are given below:

a) If T (the number of time series data) is large and N (the number of cross-sectional units) is small, then practically there will be little difference between the result of FEM and ECM, therefore, the choice is based on the computational convenience. But FEM, in this case, may be preferred.

b) When N is large and T is small, then the results of these two models would differ significantly. In that case if we strongly believe that the individual, or cross-section unit in our sample are not random drawings then FEM should be used otherwise ECM would be appropriate.

c) If individual error component (of REM) and one or more regressors are correlated, then FEM should be used.

d) If N is large and T is small, and if the assumptions underlying ECM hold, ECM estimators would be more appropriate than FEM.

It is difficult to discuss the *panel data analysis* in detail, therefore only the basic concepts of the model has been discussed here. The present study mainly used Fixed Effects Models (FEM) for discussing about the determinants of intra-industry trade of India.

4.6 LIMITATIONS OF THE STUDY

Although the present study deals with different dimensions of India's intra-industry trade but certainly it is not devoid of limitations. The major limitations of the study are:

a) The present study is based on the overall basis therefore to offer a precise policy guideline we need to do a detailed study of country-wise/product-wise. However the present study provides a framework for understanding the nature and pattern of India's intra-industry trade and the result of the study can certainly be used as a base for further study.

b) The accuracy of the calculation depends upon the accuracy of the classifications of the products into different HS-Code. It has already been discussed in earlier chapters that the products can be classified into an industry on a different basis and to avoid any confusion, ITC HS-Classification has been used here. Therefore

the accuracy of the result will depend on the fact that how accurately the products have been classified.

c) For disentangling HIIT and VIIT, the unit values used is average unit-values and not the exact because it has been calculated by dividing total export (import) value with the total number of units. It may be possible that few products of the concerned HS-Code are of high-value and the other may be of low-value but the calculation used here will average-out these values.

d) Grubel-Lloyd index, which is used in the study, is a share measure, i.e., the share of IIT in gross trade and not an absolute or volume measure. It means a high GL-index does not correspond to high trade volume. Therefore while analyzing the value of GL-index one has to be careful about the fact and decisions should be taken accordingly.

SECTION II. DATA ANALYSIS

CHAPTER 5

NATURE AND PATTERN OF INDIA'S INTRA-INDUSTRY TRADE

CHAPTER 5

NATURE AND PATTERN OF INDIA'S INTRA-INDUSTRY TRADE

Intra-Industry Trade (IIT) is now a very well accepted phenomenon of international trade and it has been proved that most of the countries of the world are involved in such type of trade. However the extent and pattern of intra-industry trade of a country depends on several factors like – the level of economic development, per-capita income, similarity in culture, technology used and so on. The importance of intra-industry trade has already been discussed in previous chapters of the thesis. The significance of intra-industry trade has also been discussed by Brulhart (2008) where he showed that with the passage of time the degree of intra-industry trade of world has increased significantly.

The present chapter deals with the nature and pattern of India's intra-industry trade, in general. The time period under consideration is from the year 1992 to 2008, the time period is chosen so because it will reflect the effect of liberalization process on the degree of India's intra-industry trade. Here all the studies are based on at two different level of aggregation, like at the aggregated level (i.e., ITC-HS 4-digit level) and at disaggregated level (i.e., 6-digit level) and the reason for studying the degree of IIT at these two level of aggregations is to check that whether it is a pure phenomenon or it is mere the case of categorical aggregation (Greenaway and Milner 1983).

The chapter is divided into three sections – the first section deals with the hypotheses proposed for the study, data analysis regarding the proposed hypotheses have been discussed in the second section and the last section deals with the result of the study.

5.1 HYPOTHESES PROPOSED:

Based on the discussion regarding the concepts of intra-industry trade so far, different hypotheses, to find out the nature and pattern of India's industry trade with the world, have been proposed here:

Case One:

H_0 = *The degree of intra-industry trade does not change with the passage of time (i.e., with economic development).*

H_1 = *The degree of intra-industry trade increases with the passage of time (i.e., with economic development).*

Case Two:

H_0 = *The degree of intra-industry trade does not change with the increase in the level of disaggregation.*

H_1 = *The degree of intra-industry trade decreases with the increase in the level of disaggregation.*

Case Three:

H_0 = *The contribution of intra-industry trade in total trade does not change with time (i.e., with economic development).*

H_1 = *The contribution of intra-industry trade in total trade increases with time (i.e., with economic development).*

Case Four:

H_0 = *The contribution of export in intra-industry trade, is same as an import.*

H_1 = *The contribution of export, and import in intra-industry trade, is not same*

Case Five:

H_0 = *In case of India, both vertical intra-industry trade (VIIT) and horizontal intra-industry trade (HIIT) will have same contribution.*

H_1 = *In case of India, both vertical intra-industry trade (VIIT) and horizontal intra-industry trade (HIIT) will not have same contribution.*

Case Six:

H_0 = *The liberalization process (since 1991) does not affect the degree of intra-industry trade.*

H_1 = *The liberalization process (since 1991) helped in increasing the degree of intra-industry trade.*

After analyzing these cases, we shall be able to understand and comment on the nature and pattern of India's intra-industry trade with the world.

5.2 DATA ANALYSIS

The present section deals with testing all the hypotheses proposed in the previous section, but before that it shows the way the data have been collected and compiled.

Regarding exports and imports of India with world, the data have been collected from WITS (World Integrated Trade Solution) website, which normally collect the data from UNCOMTRADE. The currency used to represent trade data is US Dollar and its unit is in million of US Dollar. The classification used for collecting trade data is HS-1988/92, i.e., Harmonised System of Classification – the revision of 1988/92. Since the study is based on both the aggregation level – 4-digit and 6-digit, therefore the trade data is collected for both the levels. Both the exports and imports data were arranged in ascending order of their product code, since product code is a unique number and different for a different product, therefore for all the calculations, product code has been used. After then it found

out that what are all those the products in which intra-industry trade is taking place, that means, it was found out that which are the product codes which is both exported and imported. All those products, which show intra-industry trade, were arranged separately.

Now depending on the requirement like – India's IIT with the world or product group-wise IIT or country group-wise IIT , the degree of intra-industry trade was calculated. To calculate the degree of intra-industry trade, the most popular index, Grubel-Llyod Index (popularly called as GL-index) has been used here. Grubel and Lloyd proposed two formula for calculating the degree of intra-industry trade these were "unadjusted measure" and "adjusted measure", as shown in Chapter 4 by equation 4.2.1 and equation 4.2.2 respectively. Although adjusted measure is better than that of unadjusted one because it is not downward-biased in case of unbalanced trade, but here both the measures have been discussed just to get a better picture of the index, however the value of adjusted one is supposed to be more reliable. Apart from this, for testing each hypothesis some more calculations were required and this will be discussed individually while testing the hypothesis. Let's begin with the testing of hypotheses, one-by-one:

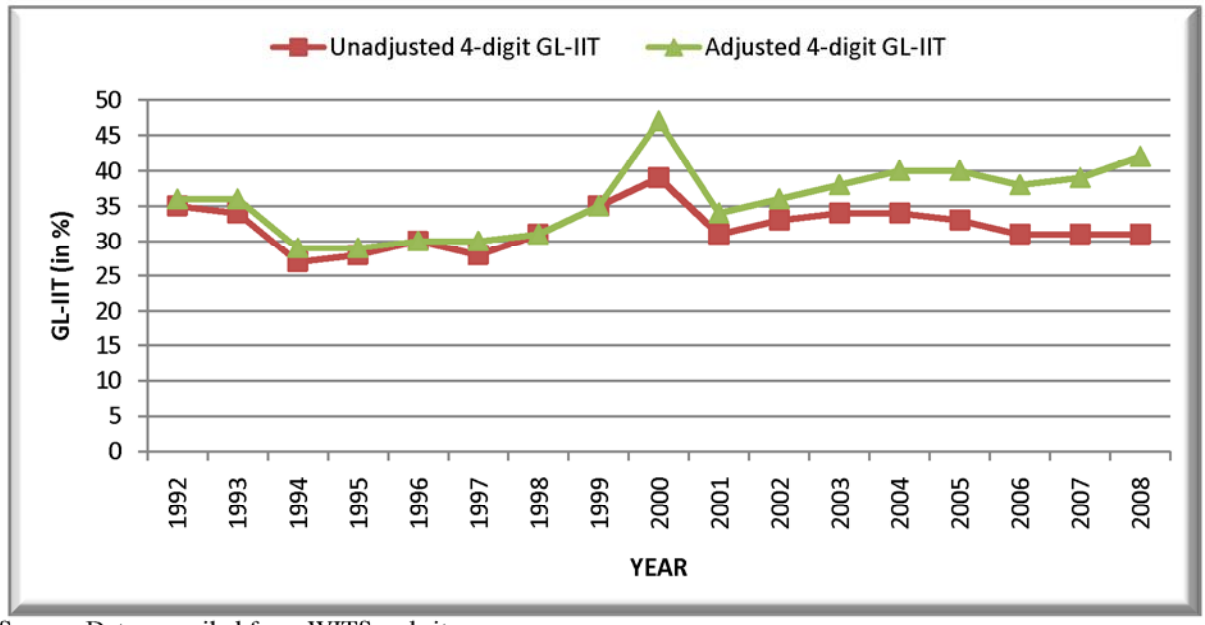
5.2.a) Case One: Changes in degree of intra-industry trade with time

H_0 = *The degree of intra-industry trade does not change with the passage of time (i.e., with economic development).*

H_1 = *The degree of intra-industry trade increases with the passage of time (i.e., with economic development).*

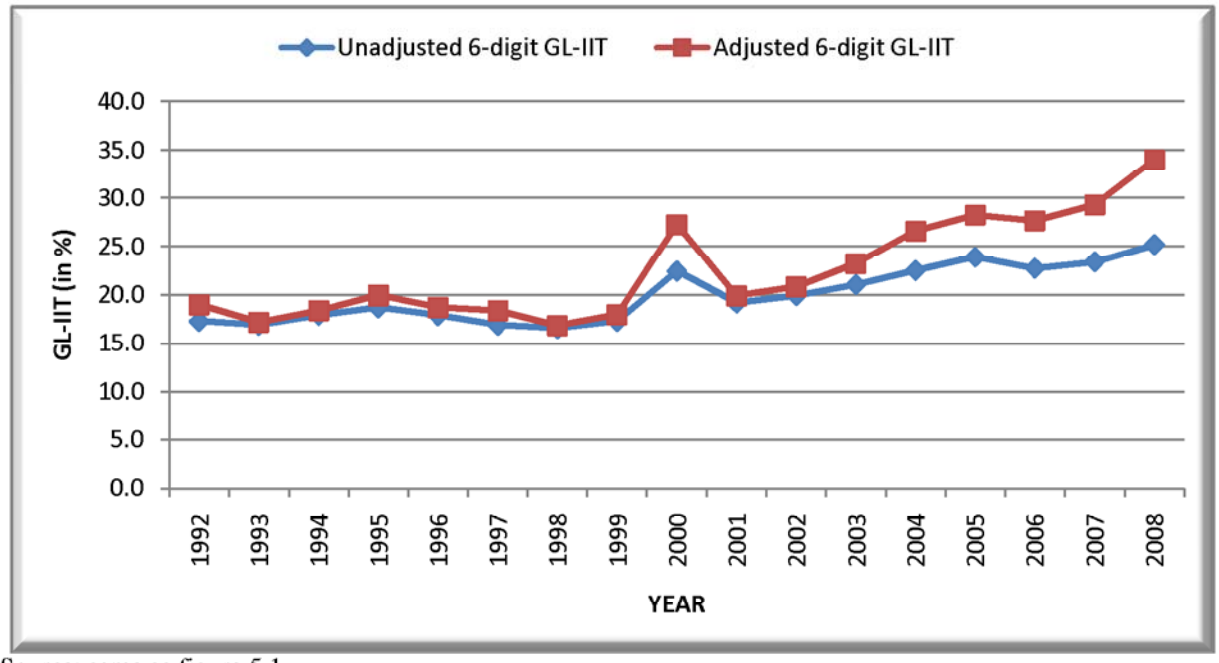
Here the objective is to find out the pattern of degree of India's intra-industry trade and the alternate hypothesis is mainly based on the Brulhart (2008) work in which he showed that the degree of the intra-industry trade of the world is increasing and the reason behind this trend was an increase in economic conditions and integration of world economy. This growth in economic development leads to increase in purchasing power and hence

Figure 5.1: 4-digit GL-IIT of India with the World between 1992 – 2008



Source: Data compiled from WITS website

Figure 5.2: 6-digit GL-IIT of India with the World between 1992 – 2008



Source: same as figure 5.1

demand which ultimately leads to increase in intra-industry trade. Indian economy has also grown significantly after economic reform since 1991, not only the economy has become open but also the purchasing power of people have increased significantly,

therefore it can be assumed that the degree of intra-industry trade of India should also be increased with the passage of time.

Therefore, the alternate hypothesis has been proposed that the degree of intra-industry trade of India with the world is increasing with the passage of time (i.e., with the level of economic development). The time period, for the study, considered over here is from the year 1992 to 2008; and the study has been done for both the level of aggregation – 4-digit and 6-digit. The trends of intra-industry trade separately for 4-digit and 6-digit level have been shown in Figure 5.1 and Figure 5.2 respectively:

Figure 5.1 shows the trend of both unadjusted and adjusted GL-IIT at 4-digit aggregation level. The figure shows that the trend is not smooth. In the year 1992, the degree of intra-industry trade was 35% and 36% for unadjusted and adjusted one respectively and initially it decreased but then after it increased continuously up to 2000 where the value was maximum 39% and 47% respectively. Thereafter in the year 2001 it decreased and its trend was irregular till 2005 and from 2006 it started increasing continuously, although this increasing trend is more visible for the adjusted one and its value, in the year 2008 was, 42%.

Almost similar kind of trend is seen in the case of 6-digit GL-IIT also as shown in the Figure 5.2, but it is not as irregular as the case of 4-digit GL-IIT. Its value in the year 1992 was 17.3% and 19.0% respectively for unadjusted and adjusted IIT. Its peak was there in the year 2000 and then it took a dip in the year 2001and then after it is increasing continuously and its value becomes 25.2% and 34.0% respectively for unadjusted and adjusted one.

In both the cases, we have seen that although its trend was not smooth, but has been increasing since 2006. Specially there is dip in the degree of IIT in the year 2001 and this could be related to the global recession during that period and in-fact in 2001 India's export was less than that of 2000. Therefore, we can reject the null hypothesis and accept the alternate hypothesis that degree of India's intra-industry trade has increased significantly with the passage of time, both for 6-digit and 4-digit level of aggregation.

5.2. b) Case Two: Changes in degree of IIT with the level of aggregation

H_0 = *The degree of intra-industry trade does not change with the increase in the level of disaggregation.*

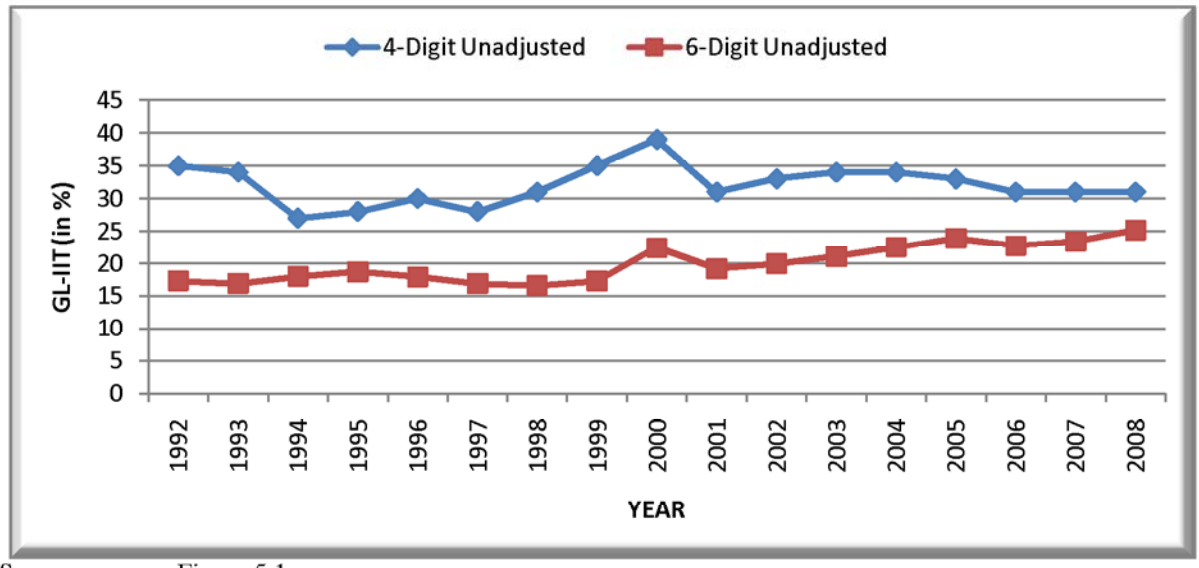
H_1 = *The degree of intra-industry trade decreases with the increase in the level of disaggregation.*

In this case the effect of aggregation level on the degree of intra-industry trade will be analyzed. The alternate hypothesis has been proposed from the theoretical concepts of intra-industry trade, as discussed in earlier chapters. Theoretically it is assumed that as the level of disaggregation will increase the degree of intra-industry trade should decrease because at higher disaggregation level even-if different products are exported and imported the number of products in a category decreases, moreover, as we move to more aggregated level the two different products will come together and the result will be that it will show there is intra-industry trade while practically it may be possible that there is no such trade exists at disaggregated level.

Although it is assumed that as we move towards higher aggregation level the degree of intra-industry trade should increase but while analyzing the trend we should be careful and it should be checked that whether the intra-industry trade is only due to aggregation level or it is happening really. The same problem has been discussed by Greenaway and Milner (1983) which they called as the problem of "categorical aggregation". They suggested the way to check the problem also. According to them, the degree of intra-industry trade at different level of aggregation should be calculated and if there is a steep increase in the level from lower to higher aggregation level then this is the case of categorical aggregation and this is not the case of intra-industry trade.

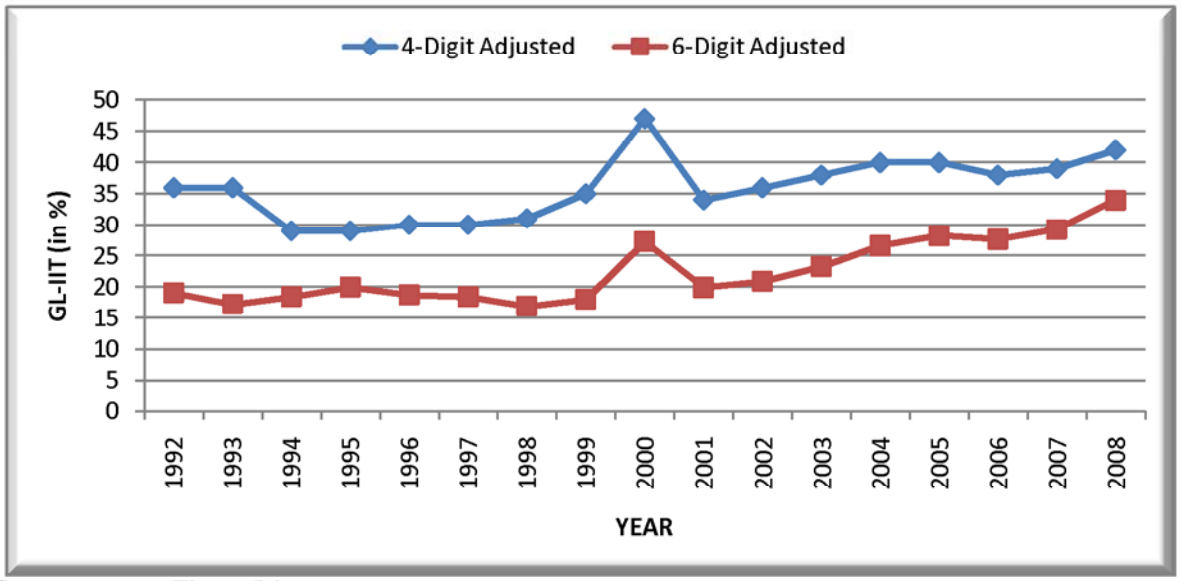
Therefore, to check the case of India that whether intra-industry trade exists really or it is a consequence of categorical aggregation, the alternate hypothesis has been proposed. If intra-industry trade really occurs then the difference between the degrees of intra-industry trade at two different level of aggregation will not be much. Here it has been checked separately for unadjusted and adjusted GL-IIT at both 4-digit and 6-digit level of aggregation. Figures 5.3 and 5.4 discusses the issue:

Figure 5.3: 4-digit and 6-digit Unadjusted GL-IIT from 1992-2008



Source: same as Figure 5.1

Figure 5.4: 4-digit and 6-digit Adjusted GL-IIT from 1992-2008



Source: same as Figure 5.1

Figure 5.3 and 5.4 shows that the movement of both 4-digit and 6-digit GL-IIT for the unadjusted and adjusted case respectively. In both the cases it can be seen that the difference between the degrees of GL-IIT at two different aggregation level decreases with the passage of time. In case of unadjusted GL-IIT, as shown in Figure 5.3, the difference between the degree of IIT for the two 4-digit and 6-digit level of aggregation

was about 17% in the year 1992 but over the period of time this difference decreased to only about 6% in the year 2008. In the year 2008, 4-digit and 6-digit unadjusted IIT was about 31% and 25.2% respectively. This decreased in the difference of IIT at two different level of aggregation clearly shows that intra-industry trade in India is a real phenomenon and in-fact it has increased over the period of time. Since the degree of IIT is higher at 4-digit than that of 6-digit level of aggregation, therefore the hypothesis can be accepted for "unadjusted" case.

Almost the same kind of trend is there in case of adjusted IIT as shown in Figure 5.4, therefore here null hypothesis does not hold and the alternate hypothesis that degree of intra-industry trade decreases with the increase in the level of disaggregation can be accepted.

5.2. c) Case Three: Contribution of IIT in total trade

H_0 = *The contribution of intra-industry trade in total trade does not change with time (i.e., with economic development).*

H_1 = *The contribution of intra-industry trade in total trade increases with time (i.e., with economic development).*

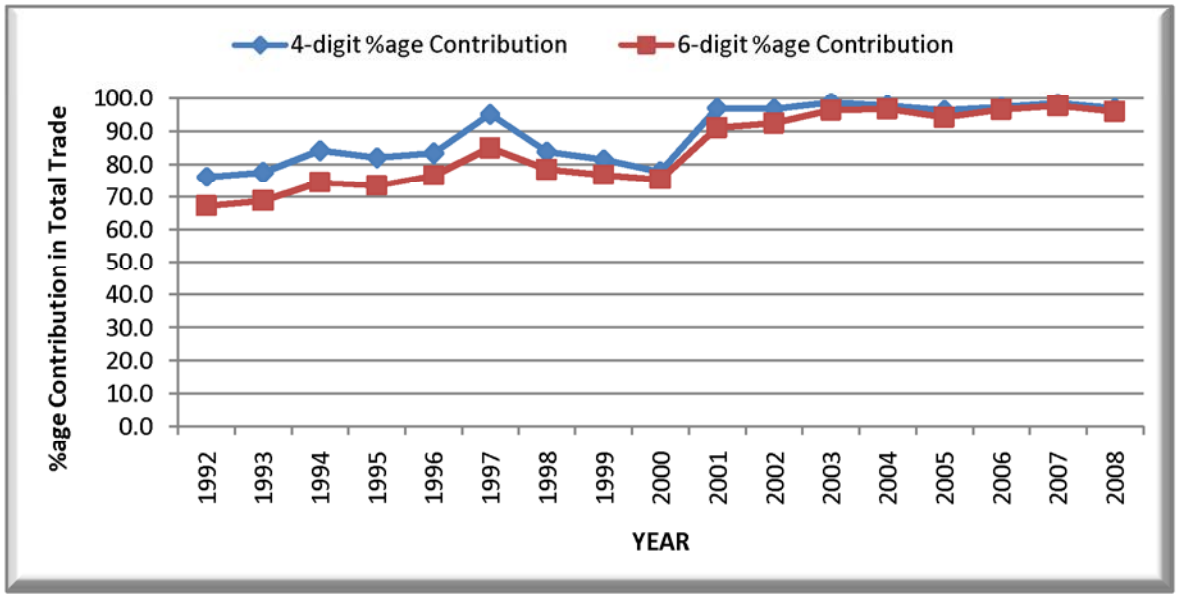
In this case, the pattern of contribution of intra-industry trade in India's total trade has been analyzed. Here the alternate hypothesis is based on the work of Havrylyshyn and Civan (1983) in which they said that as the economy will grow the proportion of intra-industry trade in total trade should increase. This hypothesis should not be confused with the first one in which it was proposed that the degree of intra-industry trade should increase with the passage of time, but here it is proposed that the contribution of intra-industry trade in total trade should increase with the passage of time.

Here both 4-digit and 6-digit level of aggregation have been considered for all those product groups where intra-industry trade takes place and then its share in the total trade is calculated. Figure 5.5 shows the contribution of 4-digit and 6-digit intra-industry trade in total trade and looking at the figure it is clear that the contribution of both the level has

increased with the passage of time, while 4-digit contribution has grown from 76.3% to about 96.9% from 1992 to 2008 respectively, but for the same time period, 6-digit contribution has increased from 67.1% to 96% respectively.

Another interesting finding came while analyzing the figure 5.5 is that with the passage of time the contribution of both the levels has become almost equal. This finding again signifies that the intra-industry trade has become an integral part of India's total trade and it is not mere categorical aggregation.

Figure 5.5: Percentage Contribution of 4-digit and 6-digit Intra-Industry Trade in Total Trade



Source: Same as Figure 5.1

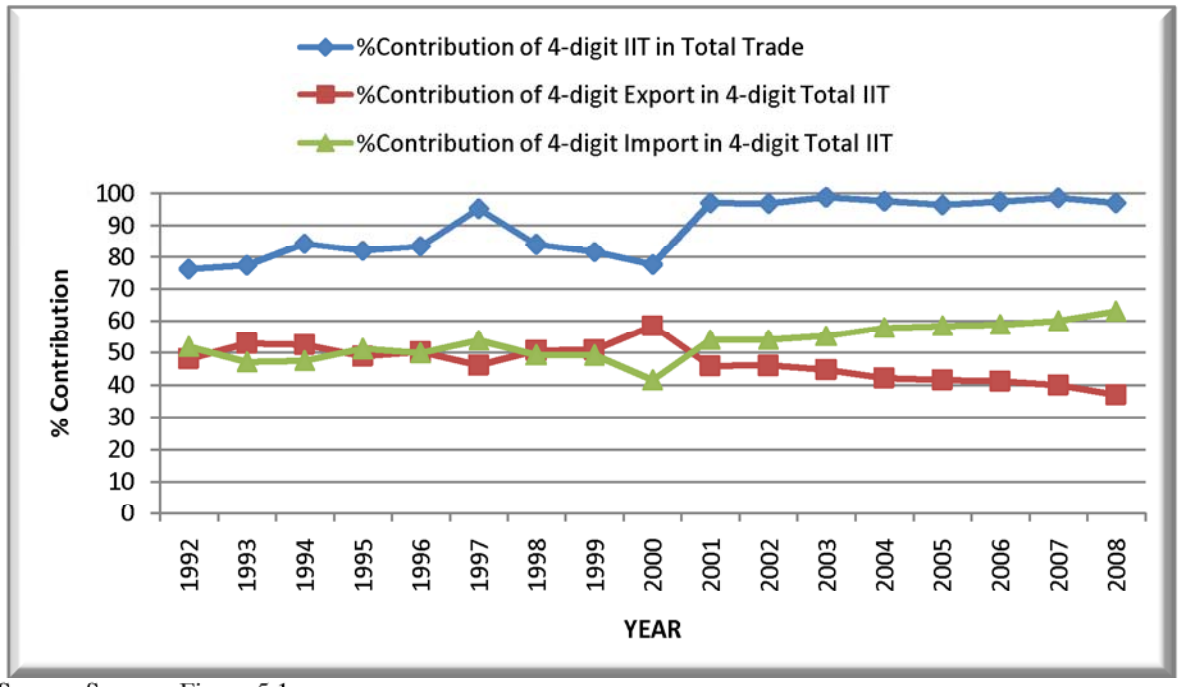
Therefore in this case, the null hypothesis does not hold and the alternate hypothesis that the contribution of intra-industry trade in the total trade of India has increased significantly with the passage of time can be accepted.

5.2. d) Case Four: Contribution of export/import in IIT.

H_0 = *The contribution of export in intra-industry trade, is same as an import.*

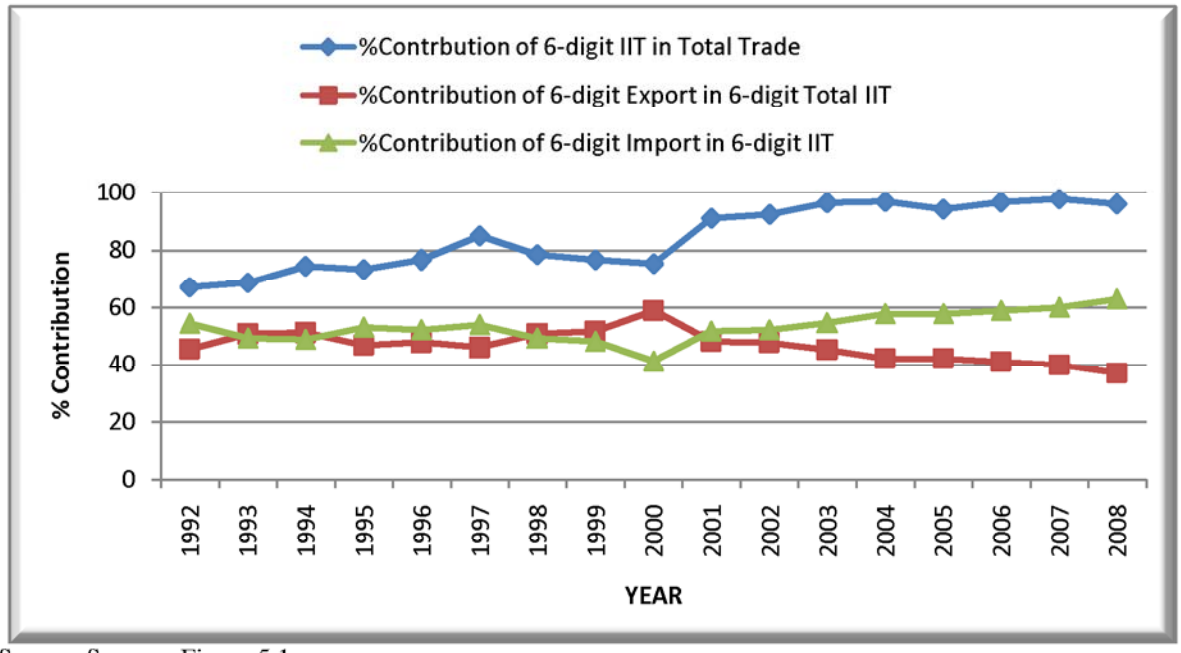
H_1 = *The contribution of export, and import in intra-industry trade, is not same*

Figure 5.6: %age Contribution of 4-digit Export and Import in 4-digit Total IIT



Source: Same as Figure 5.1

Figure 5.7: %age Contribution of 6-digit Export and Import in 6-digit Total IIT



Source: Same as Figure 5.1

Now the next case is to be analyzed is that whether the contribution of export and import in intra-industry trade is same or any one of them dominates over another? This case is

based on the work of Veeramani (2001) and is proposed here mainly to test the case for India that which one –export or import – is more important as far as intra-industry trade is concerned. The hypothesis has been tested for both the level of aggregation – 4-digit as well as 6-digit.

To analyze the case, total export and total import of only those groups of products have been considered where intra-industry trade takes place. Then to get percentage contribution of 4-digit (or 6-digit) total intra-industry trade in total trade the former has been divided by the latter and multiplied by 100. Now to get contribution of 4-digit (or 6-digit) export, where intra-industry trade is taking place, from total 4-digit (or 6-digit) intra-industry trade again the former is divided by later and then multiplied by 100. The same calculation is done for calculating the percentage contribution of import in total intra-industry trade at a given level of aggregation. The next two figures – Figure 5.6 and 5.7 show the conditions for 4-digit and 6-digit respectively.

Figure 5.6 shows that the pattern of contribution of export and import in India's total intra-industry trade at 4-digit aggregation level. It can be seen from the figure that in 1992 the contribution of export in total intra-industry trade was lesser than that of import but slowly it surpassed the import in the year 1993, but later on again its contribution decreased. After 2001, the contribution of import in IIT exceeded than that of export and this trend continued up to 2008. Most of the time, 11 out of 17 years, the contribution of import was more in 4-digit total intra-industry trade than that of export.

Similarly Figure 5.7 shows the %age contribution of 6-digit export and import in 6-digit total intra-industry trade, and we can see that almost similar kind of the pattern is observed. Here the contribution of export is more than that of import only for 5 years (1993, 1994, 1998, 1999 and 200) out of 17 years of the study, otherwise the contribution of import is higher.

Therefore, after analyzing both the figures – 5.6 and 5.7 – the null hypothesis stands rejected and the alternate hypothesis that contribution of export and import is not the same in India's intra-industry trade can be accepted because contribution of import is found to be more than that of export.

5.2. e) Case Five: Contribution of VIIT/HIIT in total IIT

H_0 = *In case of India, both vertical intra-industry trade (VIIT) and horizontal intra-industry trade (HIIT) will have same contribution.*

H_1 = *In case of India, both vertical intra-industry trade (VIIT) and horizontal intra-industry trade (HIIT) will not have same contribution.*

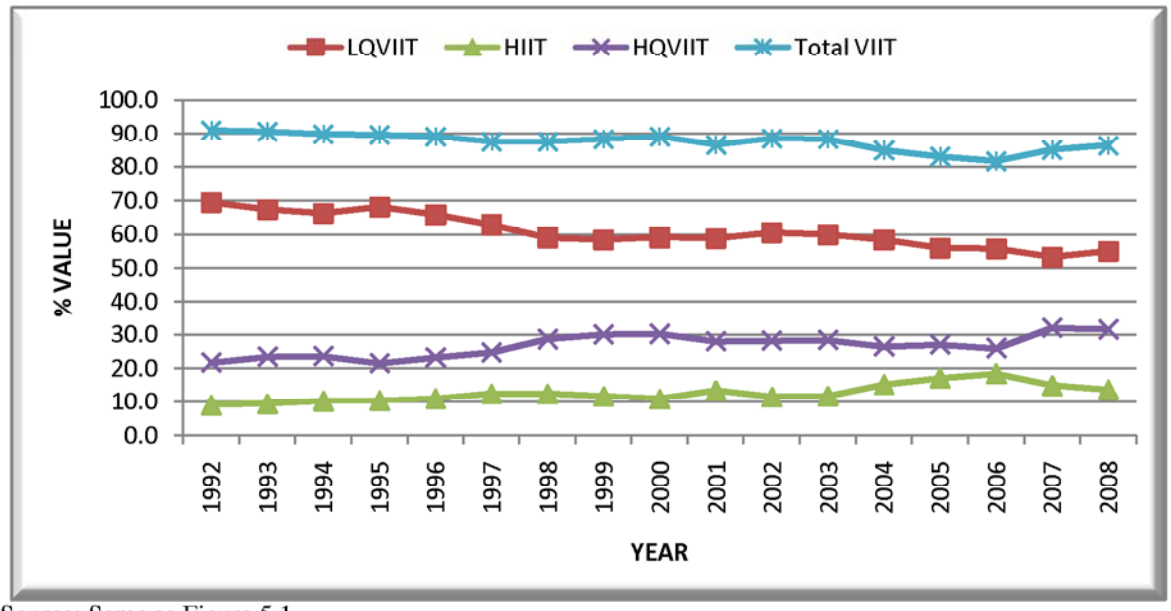
In this case, the contribution of VIIT and HIIT has to be analyzed. Here the alternate hypothesis is proposed from the theoretical concepts discussed in previous chapters and is based on India related works done by Veeramani (2001,2003) and Havrylyshyn and Civan (1983). Now the proposition that for a developing country, like India, vertical intra-industry trade (VIIT) should dominates over horizontal intra-industry trade (HIIT) has come from the fact that in case of developing country, people don't have enough money to purchase different varieties of a product, their money is spent for satisfying their own basic needs rather than consuming different varieties of a product. This leads to decrease in HIIT and increase in VIIT as well as inter-industry trade. India, although is a developing country but is growing very fast thus the level of intra-industry trade is found to be comparatively higher. Therefore, we can assume that, in India's intra-industry trade the contribution of VIIT should be more than that of HIIT.

To test the hypothesis, different equations, as discussed in Chapter 4 (like equations 4.3.1, 4.3.2 and 4.3.3) have been used. As far as the requirement of data is concerned first of all, all the products which show intra-industry trade at both 4-digit and 6-digit level of aggregation, have been taken separately. Then the export value of each of the product is divided by its number of units exported to get unit value of export, and similarly unit value of import was calculated. After then unit value of export divided by the unit value of import to get the ratio. If the ratio was lying between 0.85 to 1.15, intra-industry trade was considered as HIIT otherwise VIIT. In this case, the dispersion factor used is 15% because it is most commonly used dispersion factor.

In the study, VIIT has been further categorized into two parts – low-quality vertical intra-industry trade (LQVIIT) and high-quality intra-industry trade (HQVIIT). If the ratio of unit value of export to the unit value of import was found to be less than 0.85, then the

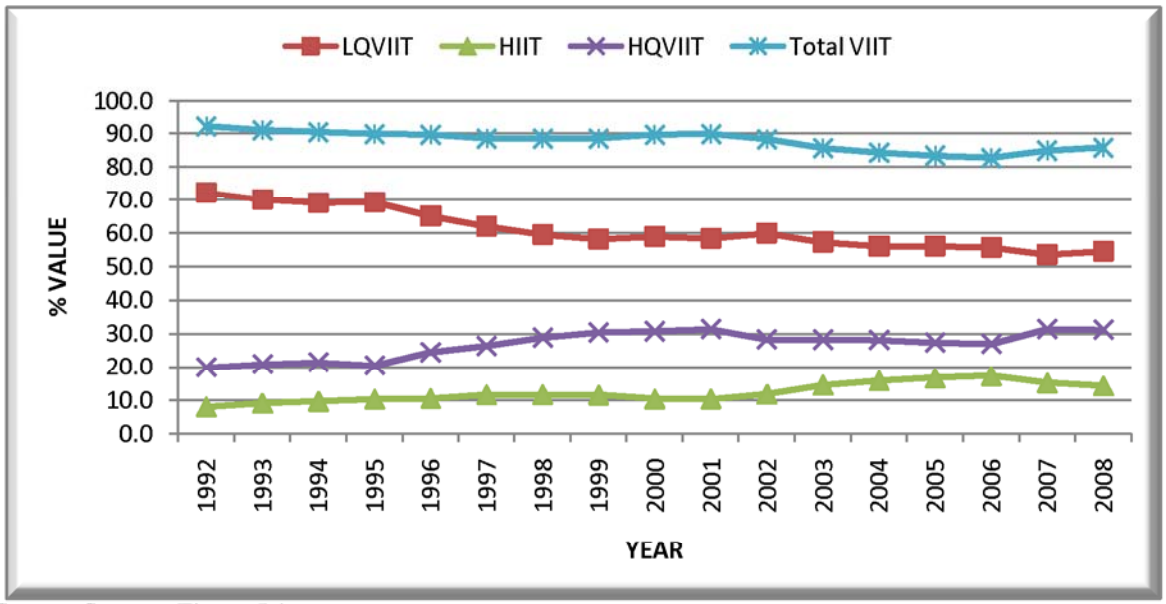
VIIT was called as LQVIIT while if the ratio was more than 1.15 then the VIIT was called as HQVIIT.

Figure 5.8: Contribution of HIIT and VIIT (along with LQVIIT and HQVIIT) in India's IIT, at 4-digit aggregation level



Source: Same as Figure 5.1

Figure 5.9: Contribution of HIIT and VIIT (along with LQVIIT and HQVIIT) in India's IIT, at 6-digit aggregation level



Source: Same as Figure 5.1

The significance of dividing VIIT into LQVIIT and HQVIIT is that if the developing country is performing lower end job then the trade of low-quality products will be more and hence LQVIIT dominates over HQVIIT. Since India is a lower-middle income country (according to the World Bank classification) so we can expect that LQVIIT will dominate over HQVIIT.

The case has been analyzed for both the level of aggregation – 4-digit and 6-digit level – separately and figures 5.8 and 5.9 have been used for analysis purpose. Figure 5.8 and 5.9 shows the level of HIIT and VIIT along with LQVIIT and HQVIIT from the period of 1992 to 2008 at 4-digit and 6-digit level respectively. Figure 5.8 clearly shows that at 4-digit level of aggregation VIIT dominates over HIIT but interestingly over the periods the contribution of HIIT has increased from 9.0 % (out of the total products in which IIT was observed at 4-digit level of aggregation) in 1992 to 13.6% in the year 2008, on the other hand for the same time period VIIT decreased from 91.0% to 86.4% respectively. HIIT was found to be maximum in the year 2006 when its value was 18.4% while in the same year VIIT was minimum and its value was 86.4%.

Moreover, the figure 5.8 also shows that over the years LQVIIT has decreased while HQVIIT has increased. This can be easily seen in the figure that in 1992, out of the total products in which intra-industry trade was observed the contribution of LQVIIT was 69.4% and of HQVIIT it was only 21.6%, remaining was HIIT. But in the year 2008, the percentage of LQVIIT has decreased to 54.9% and HQVIIT has increased to 31.5%.

Almost similar type of pattern is seen at a somewhat higher level of disaggregation, 6-digit level, as shown in Figure 5.9. Here also VIIT dominates over HIIT, as well as the contribution of LQVIIT was more than that of HQVIIT. But over the periods, LQVIIT has decreased and HQVIIT has increased.

Therefore looking at the Figure 5.8 and 5.9, the null hypothesis stands rejected and the alternate hypothesis is accepted because in case of India's intra-industry trade VIIT dominates over HIIT.

5.2. f) Case Six: Effect of the liberalization process on IIT

H_0 = *The liberalization process (since 1991) does not affect the degree of intra-industry trade.*

H_1 = *The liberalization process (since 1991) helped in increasing the degree of intra-industry trade.*

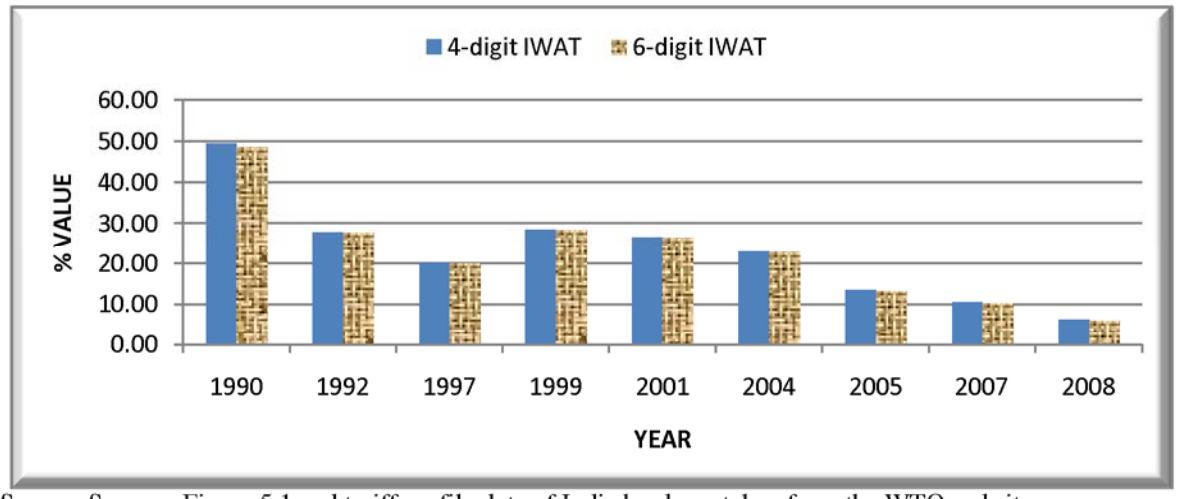
In this case the effect of liberalization process on intra-industry trade has been analyzed. Here the alternate hypothesis basically emerged from the Falvey's (1981) work as well as by the basic nature of intra-industry trade. Normally liberalization in international trade means decreasing the tariff rate on imports and this decrease should lead to an overall increase in the import. And if import (or export) increases then the chances of increase in intra-industry trade also increases. This hypothesis has been tested at both the level of aggregation – 4-digit as well as 6-digit.

The extent of liberalization has been depicted by measuring the tariff rate on imports. Here weighted average tariff rate has been considered rather than simple average tariff rate. The methodology of calculating import-weighted average tariff rate (IWAT) has already been discussed in Section 4.4 of Chapter 4. Since the hypothesis has been tested at both the aggregation level therefore IWAT has also been calculated for both 4-digit as well as 6-digit.

As we know, the liberalization process started in India since 1991 therefore the time period considered over here is from the year 1990 onwards. But because of unavailability of IWAT data for each year, continuously from 1990 to 2008, only those years have been considered in which the data was available.

Here the movement of IWAT data year after year has been discussed and then the trend of both 4-digit and 6-digit GL-IIT (both unadjusted and adjusted) with the movement of IWAT, have been compared. This comparison again has been shown by two ways, first graphically and then to get more clarity in the analysis, the correlation coefficient between the movement of IWAT and the degree of GL-IIT has also been calculated.

Figure 5.10: Changing Patterns of Import-Weighted Average Tariff

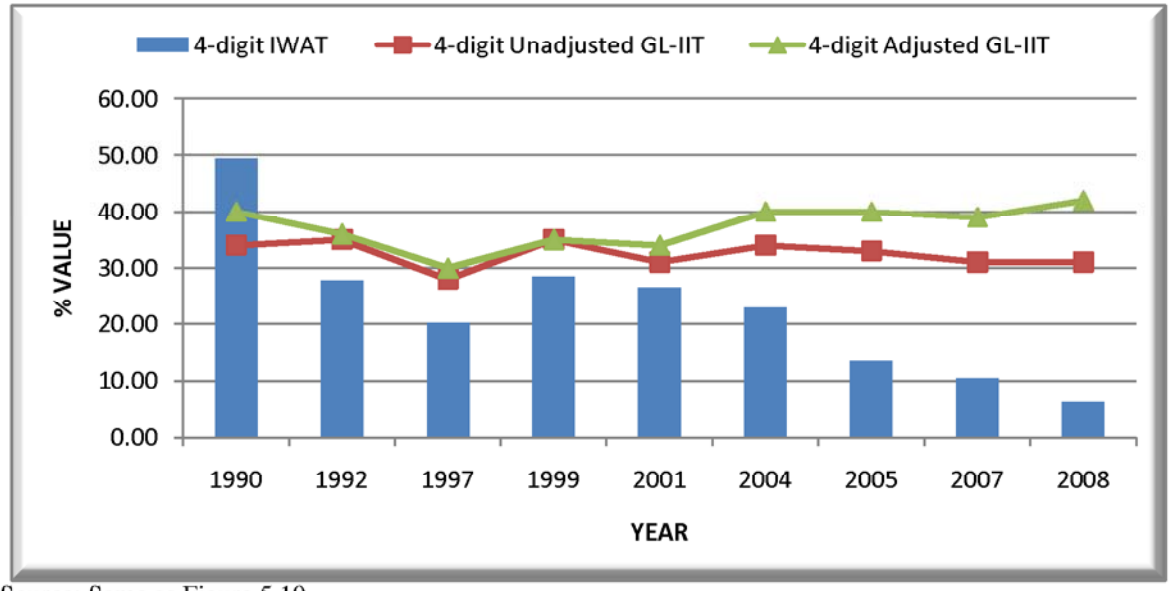


Source: Same as Figure 5.1 and tariff profile data of India has been taken from the WTO website

All these issues have been discussed here one-by-one. Figure 5.10 represent the movement of IWAT from 1990 to 2008. It clearly shows that overall tariff rate has decreased drastically after the start of liberalization process in India. Its value for 4-digit and 6-digit level was 49.48% and 48.59% respectively for the year 1990, while it has decreased drastically and became 6.27% and 6.12% respectively for the 4-digit and 6-digit level, in the year 2008. Its value decreased from 1990 to 1997 and increased in 1999, but after then it is decreasing continuously. Therefore, it can be said that liberalization process has led to decrease in the overall tariff rate.

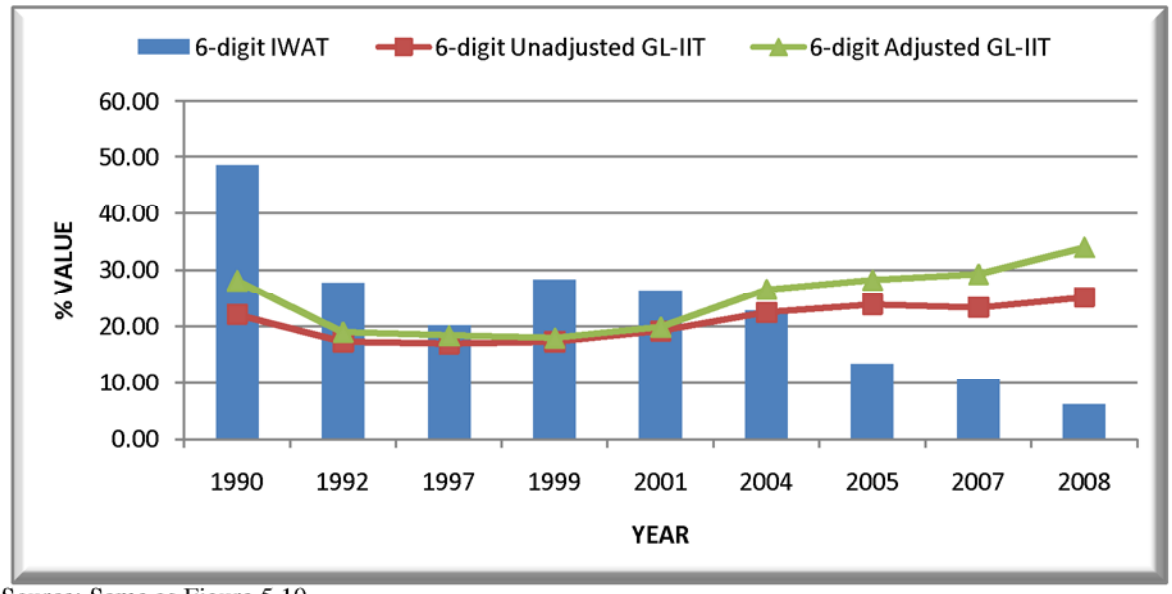
Now the effect of decreasing tariff rate on the degree of GL-IIT, both at 4-digit and 6-digit level of aggregation is considered over here. This will be discussed by two ways – graphically as well as using correlation coefficient values. First the graphical method has been discussed. Figure 5.11 and 5.12 represent the movement of GL-IIT with IWAT at 4-digit and at 6-digit respectively.

Figure 5.11: Changes in 4-digit GL-IIT with 4-digit Import-Weighted Average Tariff



Source: Same as Figure 5.10

Figure 5.12: Changes in 6-digit GL-IIT with 6-digit Import-Weighted Average Tariff



Source: Same as Figure 5.10

Looking at the figure 5.11 and 5.12 we can say that the effect of decreasing IWAT on the degree of GL-IIT is more clear at 6-digit level of aggregation than that of 4-digit. Surprisingly, in both the cases, initially decrease in the IWAT did not help in increasing

the degree of GL-IIT and in-fact the degree of GL-IIT decreased with a decrease in the IWAT, but later on it starts increasing. At 4-digit level, the increase is not very constant but at 6-digit level it has started to increase continuously since 1999.

Now the effect of changing IWAT on the degree of GL-IIT has also been considered using the correlation coefficient. Since decrease in tariff rate should promote intra-industry trade, therefore the correlation coefficient between these two should be negative. To get a better picture, the hypothesis has been tested for both GL-IIT and HIIT & VIIT.

Here it is pertinent to mention that since tariff data was not available for all the seventeen years (1992-2008), therefore the analysis was done on the basis of available data on tariff rate (nine years only) but this data is sufficient to give the information desired here. Since the study is based on both 4-digit and 6-digit level therefore import-weighted average tariff rate on both of these two levels have been calculated, but interestingly, as discussed earlier, the IWAT at both of these two levels are found to be almost same.

Table 5.1: Correlation Coefficient between Import-Weighted Average Tariff Rate and the Degree of GL-IIT, HIIT and VIIT – both at 4- and 6-digit level of aggregation

	4-digit level of aggregation	6-digit level of aggregation
Unadjusted GL-IIT	0.398 (1.148)	-0.415 (-1.201)
Adjusted GL-IIT	-0.148 (-0.395)	-0.377 (-1.074)
HIIT	-0.628 (-2.137)*	-0.724 (-2.774)**
VIIT	0.628 (2.137)*	0.724 (2.774)**

Source: Same as Figure 5.10 (figures in the brackets shows "calculated t-value" of the concerned correlation coefficient) (** = significant at 95% CI and * = significant at 90% CI)

Even then, just to keep things separate for 4-digit and 6-digit level, here the correlation coefficient between tariff rate and IIT has been calculated separately for 4-digit and 6-digit, the result of correlation study is shown in the Table 5.1.

The results are quite interesting. Looking at Table 5.1, we can say that at 4-digit level of aggregation the sign of correlation coefficient is positive, it means that unadjusted GL-

IIT has not increased even after the decrease in the tariff rate while adjusted 4-digit IIT has increased, because the sign of correlation coefficient is negative, but not significant because its correlation coefficient is very low. At the same level of aggregation, it is actually horizontal IIT which increased with the advent of liberalization and not VIIT. The trend is almost similar at 6-digit aggregation level, which shows that, all the three – unadjusted, adjusted and HIIT, have increased with decreasing tariff rate while VIIT has decreased, but for total IIT, correlation coefficient is not very strong.

But on interpreting the result of these correlation coefficients with the help of t-value, it adds another dimension in the analysis. Since "tabular t-value" at significance level of p=0.05 and for 7 degree of freedom (because total number of observation, i.e., years, is 9) is 2.37, therefore on comparing "calculated t-value" with "t-tabular" , it can be found that the only correlation coefficient which is significant is 6-digit HIIT and 6-digit VIIT. Hence we can say, with 95 percent confidence, that on decreasing the tariff rate 6-digit HIIT increases while 6-digit VIIT decreases. On the other hand, t-calculated of 4-digit HIIT and 4-digit VIIT, although not significant, but very close and if we decrease the confidence level from 95 percent to 90 percent (or significance level p=0.1), then it would become significant because at that level value of t-tabular is 1.895.

Therefore the null hypothesis may not be accepted fully and the alternate hypothesis may be accepted partially – for adjusted GL-IIT it may be accepted for both the level of aggregation but for unadjusted GL-IIT it may be accepted only for 6-digit level of aggregation and rejected for 4-digit. On the other hand, the alternate hypothesis is accepted for both HIIT and VIIT, because the sign of correlation coefficient matches with the theoretical concepts, it is negative for HIIT and positive for VIIT.

5.3 RESULTS AND DISCUSSION

Looking at the analysis done so far it can be said that in general the importance of intra-industry trade in India's total trade has increased significantly. In all of the six cases discussed above, the null hypotheses stand rejected and the alternate hypotheses are accepted. This signifies the importance of IIT in India's international trade.

The importance of intra-industry trade in the total trade can also be expected because India is a growing economy and its growth rate is one of the highest growth rates in the world. India has become an outsourcing hub for most of the developed countries, may it be manufacturing activities, financial activities or even services. This is also one of the reasons that why vertical intra-industry trade is dominating over horizontal one because of its being an outsourcing hub. Apart from this, since even in the outsourcing industry, mostly India is performing lower or lower-middle tier job that is why low-quality VIIT dominates over high-quality VIIT. Interestingly, it has been found that over the years, the contribution of low-quality VIIT has decreased while HQVIIT has increased this signifies that India is moving forward in the value-chain and it represents the potential of India to become an economic power. Moreover, since VIIT dominates over HIIT it signifies that most of the trade of India is with dissimilar countries, here in this case it is with developed countries.

One very important point to be mentioned over here is that we cannot expect the nature and pattern of India's intra-industry trade as have been discussed in theory because most of the models of the intra-industry trade have been developed after studying the condition of developed countries and not the developing countries, like Grubel (1967) used the data of EEC, Grubel and Lloyd (1971) used Australian trade data, Greenaway and Milner (1981, 1983) used United Kingdom's trade data, Bergstrand (1990) used OECD trade data and Abd-el-Rahman (1991) used French trade data. Since the level of economic development has a significant impact on the degree and pattern of intra-industry trade therefore, obviously, the nature and pattern of India's intra-industry trade would be different than that of developed countries.

As Linder stated that (Hanink 1988) "although the trade between countries with similar income level is no different than intra-regional trade but the high level of trade between similar but poor countries are unlikely. Poor countries have domestic economies that are not sufficient to generate any significant number of potential exports, nor are poor domestic economies large enough to appeal many foreign producers". Looking at the points discussed here and considering the India as a developing country, we can confidently rely on the findings that although the degree and percentage contribution of

intra-industry trade in India's total trade is increasing with the passage of time, but it is not as much as the case of developed countries. Therefore, the nature and pattern of India's intra-industry trade are matching with the expectations for the developing countries.

CHAPTER 6

PRODUCT GROUP-WISE INTRA-INDUSTRY TRADE OF INDIA

CHAPTER 6

PRODUCT GROUP-WISE INTRA-INDUSTRY TRADE OF INDIA

The nature of the product is one of the most important factors which determines the degree and extent of intra-industry trade of a country. Here the nature of product means what type of the product it is i.e., what level of differentiation is possible in the product. Normally, if we are talking about primary products, like raw materials, where degree of differentiation is very less, then the chances of intra-industry trade in such cases would also be very low because the other country is also having exactly similar product, i.e., perfect substitute of the product. While on the other hand, if a country is dealing in manufacturing products, where very high degree of differentiation is possible, then the chances of intra-industry trade would also be very high because even-if the other country is having the same product but it will not be of the same variety, i.e., imperfect substitute of the product. Therefore, we can say that the basic reason of existence of intra-industry trade is the availability of imperfect substitutes of a product and not a perfect substitute, if more substitutes are available then possibility of intra-industry trade would also be more.

The present chapter deals with the effect of different product categories on the nature of India's intra-industry trade, horizontal IIT and vertical IIT. The time period considered over here is again ranging from 1992 to 2008.

The chapter is divided into three sections – the first section deals with the hypotheses proposed for the study, data analysis regarding the proposed hypotheses have been discussed in the second section and the last section deals with the result of the study.

6.1 HYPOTHESES PROPOSED

Based on the discussion regarding the concepts of intra-industry trade so far, different hypotheses have been proposed to find out the effects of intra-industry trade on different

categories of products. Here categories of products have been decided depending on the possibility of product differentiation. Mainly two conditions regarding India's intra-industry trade have been tested over here, although these two conditions looks similar but to signify the importance of different categories of the products two different conditions have been considered, these are:

Case Seven:

H_0 = *The degree of product differentiation does not have any effect on the level of intra-industry trade.*

H_1 = *The higher the degree of product differentiation possible, the higher should be the level of intra-industry trade.*

H_2 = *The lesser the degree of product differentiation possible, the lower should be the level of intra-industry trade.*

These alternate hypotheses proposed over here are based on the work of Balassa and Bauwens (1987), and Hanink (1988). Although these two alternate hypotheses look similar but they have been considered separately to highlight the importance of intra-industry trade for different categories of products because it is not necessary that if intra-industry trade is higher for highly differentiated products then it has to be lower in less differentiated products.

6.2 DATA ANALYSIS

In this case the products have been categorized depending on the possibility of product differentiation. ITC-HS Code used over here to categorize the products. This code classifies all the products into 21 Sections or 98 Chapters, depending on the nature of products. Each Chapter, two digits, is then divided into sub chapters, four digits, and this division go up to eight digit. So each product will have a unique eight-digit code and this code is used to identify the products during trade. The detail of products is shown in Annexure I and moreover it has already been discussed in detail in Section 4.1 in Chapter

4 of the thesis. Depending on the nature of the products, all the products have been categorized into three different groups, these are:

- Group A: consists of those products where product differentiation is very less, it is basically from Section 1 to Section 5 or Chapter 1 to 27.
- Group B: consists of those products where product differentiation is moderate, it is from Section 6 to 15 or Chapter 28 to 83.
- Group C: consists of those products where high product differentiation is possible, it is from Section 16 to 21 or Chapter 84 to 98.

The relationship between the product differentiation and degree of intra-industry trade has been tested here and to do that all the three types of IIT like overall adjusted GL-IIT, HIIT and VIIT have been used. The hypotheses proposed have been mentioned below:

6.2. a) Case Seven: Degree of product differentiation and the level of intra-industry trade.

H_0 = *The degree of product differentiation does not have any effect on the level of intra-industry trade.*

H_1 = *The higher the degree of product differentiation possible, the higher should be the level of intra-industry trade.*

H_2 = *The lesser the degree of product differentiation possible, the lower should be the level of intra-industry trade.*

Although both of these two alternate hypotheses look similar but actually they are not. First alternate hypothesis assumes that if product differentiation is high then the degree of intra-industry trade will also be high and the second alternate hypothesis assume just opposite to the H_1 that if product differentiation is less then the degree of intra-industry trade should also be less. Actually both of these two are not correlated, it is not necessary that if IIT is higher in case of high product differentiation then it has to be lower in case of low product differentiation, however, theoretically it should be. Therefore two

different alternate hypotheses have been proposed for testing these two cases separately. Since data requirement is almost similar thus these hypotheses have been discussed together.

As far as compilation of the data is concerned, first of all only those products, at both 4-digit and 6-digit level of aggregation, in which intra-industry trade takes place have been taken out; and the time period considered is from 1992 to 2008, i.e., 17 years. Then all the products have been separated into different categories, as mentioned above, and thereafter adjusted GL-IIT, HIIT and VIIT of all the products of each group has been calculated separately. Therefore the degree of GL-IIT, HIIT and VIIT of each group represent a composite figure of all the products of that group.

As far as clubbing different sections into a group is concerned, this is somewhat subjective decision and it has decided by looking at the nature of the product as well as depending on the classifications made by the Government of India. Therefore Section 1 to 5 is clubbed in Group A, it is because all the products in this section are mainly primary products and degree of product differentiation is comparatively lower; while on the other hand in case of Group C where products of Section 16 to 21 are clubbed, are mainly manufacturing products where the chances of product differentiation are very high (because by varying the input combinations, different varieties can be produced). The rationality of clubbing all the products in this way can also be justified because it is based on the ITC-HS Code.

Now the data and the analysis of the hypotheses proposed have been discussed here. Table 6.1 shows the degree of GL-IIT, for different product groups, for both the level of aggregation:

Table 6.1 shows the 4-digit and 6-digit adjusted GL-IIT of different product groups. On looking at the hypothesis proposed and analyzing the result it can be said that both the seventh and eighth hypothesis have been found to be valid for 4-digit level of aggregation. At 4-digit aggregation level, degree of GL-IIT increases as we move from Group A to Group C. GL-IIT is minimum for Group A and maximum for Group C that means the result is same as expected.

However the condition is different for 6-digit level of aggregation. Here we can see that hypothesis seven is accepted because the degree of intra-industry trade is maximum for Group C products, but hypothesis eighth cannot be accepted fully because surprisingly GL-IIT is not minimum for Group A product. In some of the cases, 6 out of 17 years, GL-IIT of Group B products are lower than that of Group A products.

Table 6.1: Adjusted GL-IIT for Different Product Groups, from 1992 to 2008

	Adjusted GL IIT index					
	4-digit level			6-digit level		
Year	Group A	Group B	Group C	Group A	Group B	Group C
1992	23.7	42.6	64.1	28.2	11.7	55.5
1993	22.8	47.1	61.2	26.1	13.8	51.6
1994	20.2	36.2	60.2	20.1	18.2	51.6
1995	18.0	35.7	65.8	22.2	17.8	56.1
1996	16.4	40.7	66.8	16.1	16.6	55.9
1997	14.5	36.9	72.1	13.5	17.9	61.5
1998	10.5	45.8	73.4	10.7	18.9	60.5
1999	12.7	52.1	74.5	11.9	19.3	62.7
2000	31.8	58.4	74.2	33.5	22.9	63.8
2001	19.5	43.1	76.1	18.6	22.9	65.4
2002	24.5	51.5	74.8	23.2	26.0	62.8
2003	23.6	49.4	68.8	22.2	24.3	58.5
2004	27.1	46.4	71.7	25.8	24.1	61.5
2005	28.0	44.9	72.0	26.1	28.5	62.9
2006	24.1	42.2	75.5	23.3	25.0	66.6
2007	25.0	39.7	81.0	24.2	23.7	70.2
2008	26.7	41.2	78.6	25.9	28.4	70.3

Source: Author's Calculation (Data compiled from WITS website)

Therefore as far as overall adjusted GL-IIT is concerned, we can reject the null hypothesis and can accept the first alternate hypothesis because it has been seen that if the product differentation is high then the level of IIT is also high. But it is not very much visible that if the product differentiation is low the the degree of IIT will also be low.

Now the present case has been tested for horizontal intra-industry trade (HIIT) as well as vertical intra-industry trade (VIIT) with the help of data shown in the table 6.2.

Table 6.2: HIIT and VIIT for Different Product Groups from 1992 to 2008

	Horizontal IIT (percentage)						Vertical IIT (percentage)					
	4-digit level			6-digit level			4-digit level			6-digit level		
Year	Gr A	Gr B	Gr C	Gr A	Gr B	Gr C	Gr A	Gr B	Gr C	Gr A	Gr B	Gr C
1992	8.7	11.2	3.4	7.0	10.2	3.9	91.3	88.8	96.6	93.0	89.8	96.1
1993	11.1	9.6	7.6	8.8	11.6	3.9	88.9	90.4	92.4	91.2	88.4	96.1
1994	9.1	12.6	4.7	8.9	12.5	4.0	90.9	87.4	95.3	91.1	87.5	96.0
1995	10.2	12.4	5.1	10.2	12.7	5.3	89.8	87.6	94.9	89.8	87.3	94.7
1996	10.6	13.0	5.6	9.3	12.8	6.0	89.4	87.0	94.4	90.7	87.2	94.0
1997	11.5	15.0	6.0	13.5	13.6	6.6	88.5	85.0	94.0	86.5	86.4	93.4
1998	13.3	14.3	6.3	11.5	14.2	6.0	86.7	85.7	93.7	88.5	85.8	94.0
1999	10.4	13.3	7.9	9.3	14.2	6.4	89.6	86.7	92.1	90.7	85.8	93.6
2000	8.1	12.2	5.3	7.5	12.7	6.3	91.9	87.8	94.7	92.5	87.3	93.7
2001	17.6	12.5	11.1	12.3	11.5	6.5	82.4	87.5	88.9	87.7	88.5	93.5
2002	12.1	12.4	6.0	11.8	14.0	6.9	87.9	87.6	94.0	88.2	86.0	93.1
2003	10.5	13.1	7.2	11.3	18.6	7.1	89.5	86.9	92.8	88.7	81.4	92.9
2004	13.3	16.3	12.9	10.2	17.2	15.2	86.7	83.7	87.1	89.8	82.8	84.8
2005	12.4	19.9	12.2	11.7	18.1	15.4	87.6	80.1	87.8	88.3	81.9	84.6
2006	17.2	20.5	10.6	14.3	21.7	9.0	82.8	79.5	89.4	85.7	78.3	91.0
2007	14.1	16.3	9.9	12.3	19.3	7.4	85.9	83.7	90.1	87.7	80.7	92.6
2008	9.1	17.0	6.5	12.3	17.8	7.4	90.9	83.0	93.5	87.7	82.2	92.6

Source: Same as Table 6.1

Table 6.2 gives the information of percentage of HIIT and VIIT for different product groups. The result is quite interesting. As it has already been discussed in Chapter 5 that

India's intra-industry trade is basically vertical in nature, the same result can also be seen here. It is clearly shown in the table that vertical intra-industry trade is dominating over the horizontal one.

As far as horizontal intra-industry trade (HIIT) is concerned, the result obtained is just opposite to the theory. Here we can see that, for both 4-digit and 6-digit level of aggregation, the percentage of HIIT is maximum with Group B products, which is quite surprising. On the other hand, if we look at the condition of vertical intra-industry trade (VIIT), it has been observed that for both the level of aggregation VIIT is maximum for Group C products but it is not minimum for Group A products, in-fact it is minimum for Group B products.

Therefore, looking at the above analysis, we can say that the null hypothesis does not hold in this case. The first alternate hypothesis can be accepted fully but the second alternate hypothesis cannot be. This means, as far as India is concerned, if product differentiation is high then the degree of intra-industry trade is found to be higher, but on the other hand, if product differentiation is low then it is not necessary that degree of intra-industry trade is also lower.

6.3 RESULTS AND DISCUSSION

Intra-Industry Trade is found to be highest for manufacturing products which is quite natural because high product differentiation is possible in these types of products, moreover, VIIT is found to be more than that of HIIT, and this is because of the nature of economic condition of India. The result is quite similar to the findings of Chapter 5, this also supports findings of the present analysis.

Another interesting finding is that in several cases it has been seen that the degree of intra-industry trade is higher for Group A product than that of Group B products. Actually Group A consists of agricultural and mineral products while Group B products consists of chemicals, plastics, wooden items, textiles, footwear, pearls and base metals. Looking at the nature of the products, it can be said that the possibility of intra-industry

trade should be more with the Group B products than that of Group A but in reality the condition of India is quite opposite, this is quite surprising and to get a clear picture some more research is required in this direction. It also shows that somehow we are not able to exploit our potential fully, therefore, trade policy should be framed in such a way so it can exploit the potential of India fully. Moreover, to get detailed information, we need to analyze the products individually, chapter-wise, because whatever effects we are seeing here, it is due to a group of products and not the individual product analysis.

CHAPTER 7

COUNTRY GROUP-WISE INTRA-INDUSTRY TRADE OF INDIA: A PANEL DATA ANALYSIS

CHAPTER 7

COUNTRY GROUP-WISE INTRA-INDUSTRY TRADE OF INDIA: A PANEL DATA ANALYSIS

Economic conditions of the country, involved in international trade, are one of the most important factors for determining the degree of intra-industry trade between them. The theory of intra-industry trade says that similar economy will trade more and therefore the chances of intra-industry trade will be more in such cases. So many economists and researchers have already worked on the issue and found affirmative result. But we should not forget the fact that most of the work in this direction has been done with respect to developed countries and very little work is based on the condition of developing country. Moreover, only a few studies regarding India's intra-industry trade have been done so far. Therefore it is difficult to make an opinion regarding the conditions of India's intra-industry trade without analyzing it because we cannot project the result obtained from the study of developed countries, directly on India.

The present chapter tries to find out the nature of India's intra-industry trade with different categories of countries. Here countries have been categorized into different categories, according to the World Bank classification. Different parameters, which are supposed to be relevant for affecting intra-industry trade, have been considered here and a panel data analysis for the last ten years data (2000 to 2009) has been performed to find out the determinants of intra-industry trade of India.

The chapter is divided into three sections – the first section deals with the hypotheses proposed for the study, data analysis regarding the proposed hypotheses have been discussed in the second section and the last section deals with the result of the study.

7.1 HYPOTHESES PROPOSED

The present chapter is trying to explore the nature and pattern of India's IIT with different country groups, as classified by the World Bank. Different hypotheses proposed to discuss the issue are:

Case Eight:

H_0 = *Intra-industry trade should be same with all economies.*

H_1 = *Intra-industry trade should be more with similar economies.*

Case Nine:

H_0 = *HIIT and VIIT should be same with all economies.*

H_1 = *HIIT should be more with similar economies while VIIT should be higher with dissimilar economies.*

Case Ten:

H_0 = *Vertical intra-industry trade should be at the same level with the horizontal intra-industry trade.*

H_1 = *Vertical intra-industry trade should dominate the horizontal intra-industry trade.*

Case Eleven:

H_0 = C*ontribution of low-quality VIIT (LQVIIT) and high-quality VIIT (HQVIIT) should be same.*

H_1 = C*ontribution of low-quality VIIT (LQVIIT) should be more than that of high-quality VIIT (HQVIIT).*

All these alternate hypotheses are based on the theoretical understanding of intra-industry trade as well as based on the work of Balassa and Bauwens (1987), and Hanink (1988). Apart from these analyses, a panel-data analysis has also been performed to find out the determinants of India's intra-industry trade. The hypotheses proposed for panel-data analysis are:

Case Twelve:

H_0 = *Differences in per-capita income between countries does not have any effect on IIT, HIIT or VIIT.*

H_1 = *The greater the difference in per-capita income between countries lower will be the degree of intra-industry trade and horizontal intra-industry trade while higher will be the degree of vertical intra-industry trade.*

Case Thirteen:

H_0 = *Differences in capital-labor ratio between countries does not have any effect on IIT, HIIT or VIIT.*

H_1 = *The greater the difference in capital-labor ratio between countries lower will be the degree of intra-industry trade and horizontal intra-industry trade while higher will be the degree of vertical intra-industry trade.*

Case Fourteen:

H_0 = *Trade share does not have any effect on IIT, HIIT or VIIT.*

H_1 = *The greater the trade share between countries higher/lower will be the degree of IIT, HIIT or VIIT.*

These alternate hypotheses are based on the work of Balassa and Bauwens (1987), and Bergstrand (1990). Here both per-capita income and capital-labor ratio is used as a proxy for factor endowments. After testing these hypotheses, we would have a somewhat better understanding of different dimensions of India's intra-industry trade.

7.2 DATA ANALYSIS

The present section deals with analyzing the proposed hypotheses one-by-one, but before that the way the data have been collected and compiled, has been discussed.

The time period considered in the chapter is 10 years ranging from the year 2000 to 2009, and the level of aggregation is 6-digit ITC-HS classification. The rationale for taking ten year period of time is that since India's intra-industry trade has a continuous increasing trend only since 2000, before that it was not following any trend and very much fluctuating. This un-even trend would have affected the result that is why to avoid any fluctuation in the data those periods have not been considered here and hence the period of only ten years have been taken into account.

Trade data (export and import) has been taken from WITS web site (World Integrated Trade Solution) and data regarding economic conditions like, GDP, per capita GDP etc. has been taken from UNCTAD Handbook of Statistics – 2009 from its web site. Different groups of countries, discussed in the chapter, have been directly taken from World Bank's website. World Bank categorized all the countries into different groups based on their 2009 per-capita GNI (Gross National Income) and different categories are as follows: low income countries (LIC) are having per-capita GNI $995 or less, lower-middle income countries (LMIC) are in the range of $996 to $3945, upper-middle income countries (UMIC) are in the range of $3946 to $12195 and high income countries (HIC) are having $12196 or more. High income countries can be further categorized into two categories – all high-income countries (AHIC), i.e., OECD plus non-OECD, and high income OECD countries (HI-OECD). Total number of countries in LIC, LMIC, UMIC, AHIC and HI-OECD is 43, 55, 46, 66 and 27 respectively. (Different groups of countries are mentioned in the Annexure II).

It is pertinent to mention here that World Bank has classified India as LMIC because in 2009, per capita GNI of India was $1040. The rationale for dividing the country according to their economic conditions is that the degree of intra-industry trade between the two countries depends on the level of their economic development. Since earlier

studies on India's IIT have not taken this factor into account, therefore the present analysis is important in this respect.

Now each hypothesis has been discussed below, one-by-one.

7.2. a) Case Eight: IIT with different economies.

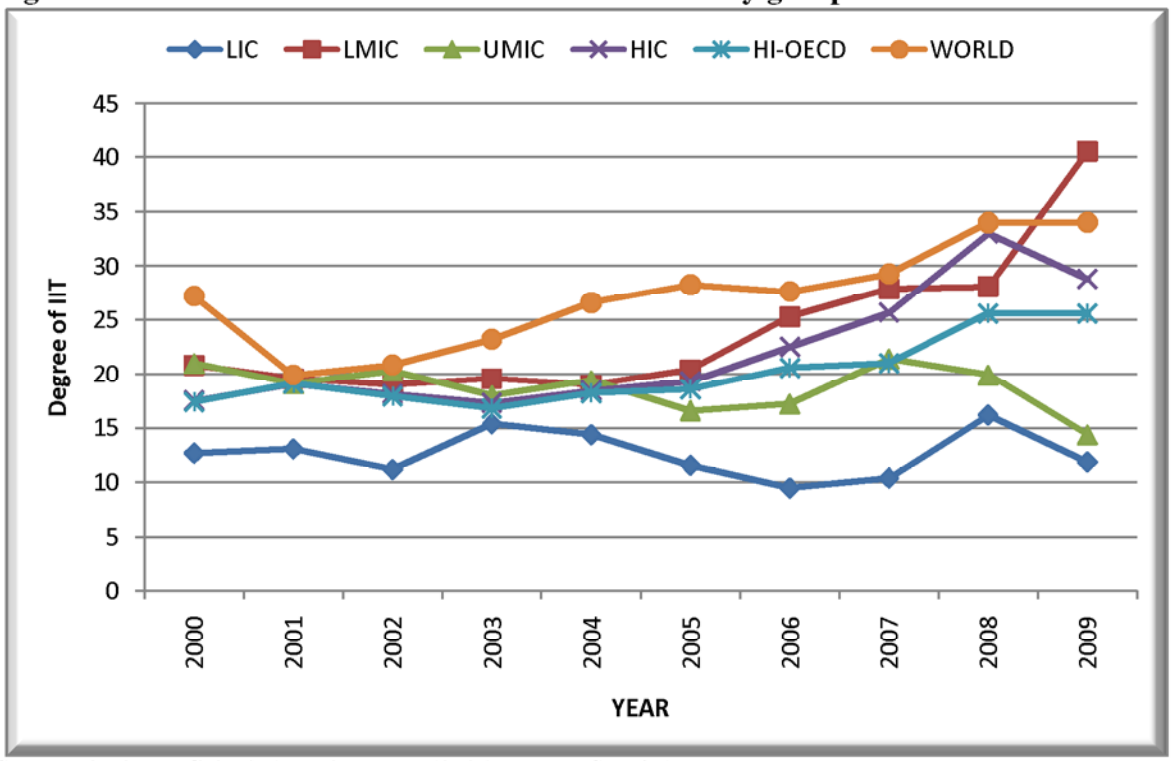
H_0 = *Intra-industry trade should be same with all economies.*

H_1 = *Intra-industry trade should be more with similar economies.*

To test the case eighth, India's trade data have been collected at 6-digit aggregation level, with all countries from the year 2000 to 2009 and then different groups of countries have been made. For example, for low-income countries (LIC), all 43 countries have taken and then export/import of all the 43 countries, for the same product code, has been added together. By this way total export/import of each product for the entire group has been calculated.

In the same way, the total of each product for all the groups have been calculated. Now this product wise total export and import data has been used to calculate intra-industry trade for each country group. Needless to say that in this calculation, India is treated as reporting country and all the export and import trade data means "export from" and" import by" India. Apart from calculating India's IIT with different country group, 6-digit India's IIT with world has also been calculated and used as reference. Figure 1 shows the pattern of India's IIT with different country group as well as with the world.

Figure 7.1: Pattern of India's IIT with different country groups and with world



Source: Author's Calculation (data compiled from WITS website)

Figure7.1 shows very interesting but expected trend. Although, India's IIT, not only with the world but also for all country group, has increased in 2009 as compared to the year 2000, but it was maximum with the LMIC (Lower-Middle Income group of countries) which means the group in which India also belongs to. This is in agreement with the theory that intra-industry trade should be maximum with the countries of similar economic condition. In-fact, India's IIT with LMIC has exceeded the India's IIT with the world. India's IIT with LIC is found to be minimum. Except UMIC, the degree of India' IIT, with all the country groups, has increased over the years.

Therefore the null hypothesis stands rejected and the alternate hypothesis that the degree of intra-industry trade should be more with the similar economies can be accepted.

(Since the data requirement and calculation of case ninth and tenth were almost similar, therefore these two calculations have been clubbed together.)

7.2. b) Case Nine: Degree of HIIT/VIIT with different economies.

H_0 = *HIIT and VIIT should be same with all economies.*

H_1 = *HIIT should be more with similar economies while VIIT should be higher with dissimilar economies.*

7.2. c) Case Ten: Contribution of HIIT/VIIT in total IIT with different economies.

H_0 = *Vertical intra-industry trade should be at the same level with the horizontal intra-industry trade.*

H_1 = *Vertical intra-industry trade should dominate the horizontal intra-industry trade.*

To test the case ninth and tenth, intra-industry trade has been disentangled into two categories, HIIT and VIIT, as already discussed Chapter 4. The dispersion factor, to disentangle IIT, used here is 15 percent. Although any other dispersion factor could have also been used, but 15 percent is most widely used one therefore it is used here. HIIT and VIIT is also calculated in the same manner, i.e., for all the country group as well as for world. The trend of HIIT and VIIT, to test both tenth and eleventh hypotheses, is shown in the Table 7.1.

Looking at the table 7.1, we can say that, specially since 2001, HIIT with similar economies have increased significantly and it is maximum with the group "LMIC", i.e., the same group to which India also belongs to. While on the other hand, VIIT is maximum with dissimilar economies, interestingly it is maximum with the group HI-OECD and then the second highest is with the group LIC. Apart from this, on analyzing the information shown in the table 7.1, it can be said that in all the cases the degree of vertical intra-industry trade is more than that of horizontal one, and this is applicable with all the groups of countries.

Table 7.1: India's HIIT and VIIT with different country groups as well as with world (figures are in percentage of total IIT)

		YEAR									
Country Group		**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
LIC	**HIIT**	12.1	13.4	13.4	18.9	20	17.9	16.2	14	13	12.7
	VIIT	87.4	85.4	84.8	80.6	80	81.8	83.2	85.3	86.3	86.9
LMIC	**HIIT**	9.8	11.2	10.7	16	17	17.4	17.3	14.2	15	14.7
	VIIT	90.2	81.1	83	78.4	78	77.8	79.5	82.2	82.6	83.4
UMIC	**HIIT**	9.1	10.2	10	14.3	15	15.5	16	12.1	11.4	11.9
	VIIT	86.1	82.5	85.3	82.2	82.8	81.1	81.1	85	86.1	86.6
HIC	**HIIT**	9	10.5	9.7	15	15.4	15.7	15.3	11.3	11.4	11.4
	VIIT	89.4	88.4	88.9	83.9	83.6	83.5	83.8	88.1	87.8	87.8
HI-OECD	**HIIT**	9.4	10.5	10.2	15.4	15.3	15.7	15.4	11.3	11.9	10.7
	VIIT	90	88.9	89.3	84.3	84.2	83.9	84.2	88.3	87.9	88.9
WORLD	**HIIT**	10.3	10.3	11.7	14.5	15.9	16.6	17.3	15.1	14.2	14.7
	VIIT	89.7	89.7	88.9	85.5	84.1	83.4	82.7	84.9	85.8	85.3

Source: same as Figure 7.1

Therefore null hypotheses of both the cases - ninth and tenth - stands rejected and their alternate hypotheses can be accepted and it can be said that in case of India, HIIT is more with similar economies while VIIT is more with dissimilar economies; as well as in all the cases vertical intra-industry trade dominates over horizontal one.

7.2. d) Case Eleven: Contribution of LQVIIT/HQVIIT in total VIIT.

H_0 = *Contribution of low-quality VIIT (LQVIIT) and high-quality VIIT (HQVIIT) should be same.*

H_1 = *Contribution of low-quality VIIT (LQVIIT) should be more than that of high-quality VIIT (HQVIIT).*

Regarding the bifurcation of vertical intra-industry trade into low-quality and high-quality intra-industry trade is concerned, the methodology used have already been discussed in Section 4.3, i.e., equation 4.3.2 of Chapter 4.

Table 7.2: India's LQVIIT and HQVIIT with different country groups as well as with world (figures are in percentage of total IIT)

Year		LIC	LMIC	UMIC	HIC	HI-OECD	WORLD
2000	LQVIIT	47.1	51.7	54.6	61.1	61.9	59
	HQVIIT	40.3	38.5	31.5	28.3	28.1	30.7
2001	LQVIIT	39.3	47.6	51.8	61.4	61.9	58.4
	HQVIIT	46.1	33.5	30.7	27	27	31.3
2002	LQVIIT	47	49.8	56.6	62.4	62.4	60
	HQVIIT	37.8	33.2	28.7	26.5	26.9	28.3
2003	LQVIIT	44.8	48.1	51.5	58.3	58.9	57.4
	HQVIIT	35.8	30.3	30.7	25.6	25.4	28.3
2004	LQVIIT	41	47	52.8	59	59.3	56
	HQVIIT	39	31	30	24.6	24.9	28.1
2005	LQVIIT	44.1	47.6	53.3	60.5	60.4	56.1
	HQVIIT	37.7	30.2	27.8	23	23.5	27.3
2006	LQVIIT	44.6	46.2	52	61.6	62	55.8
	HQVIIT	38.6	33.3	29.1	22.2	22.2	27
2007	LQVIIT	45.3	44.7	53.6	61.4	61.6	53.6
	HQVIIT	40	37.5	31.4	26.7	26.7	31.3
2008	LQVIIT	43	44.2	54.3	61.6	61.4	54.6
	HQVIIT	43.3	38.4	31.8	26.2	26.5	31.1
2009	LQVIIT	47	42.4	53	59.9	60	51.7
	HQVIIT	39.9	41	33.6	27.9	28.9	33.6

Source: same as Figure 7.1

Dispersion factor used here is 15 percent, therefore, if the ratio of unit value of export to the unit value of import is less than 0.85, i.e., between 0 to 0.85 then it will be treated as low-quality vertical intra-industry trade (LQVIIT); on the other hand, if the ratio is more

than 1.15, it will be treated as high-quality intra-industry trade (HQVIIT). The result of the analysis is shown in table 7.2.

Table 7.2 shows that, except in some cases, in general in case of India's intra-industry trade, LQVIIT is dominating over HQVIIT. Apart from this, the degree of LQVIIT is more with high-income group countries than with the same group or low-income group countries.

Therefore, in this case the null hypothesis does not hold and the alternate hypothesis that, in case of India low-quality vertical intra-industry trade dominates over high-quality, can be accepted.

Now the determinants of intra-industry trade of India have been discussed over here and to do so the technique used is called *panel-data analysis.* The cases to be analyzed over here are:

7.2. e) Case Twelve: Differences in per-capita income as a determinant of IIT.

H_0 = *Differences in per-capita income between countries does not have any effect on IIT, HIIT or VIIT.*

H_1 = *The greater the difference in per-capita income between countries lower will be the degree of intra-industry trade and horizontal intra-industry trade while higher will be the degree of vertical intra-industry trade.*

7.2. f) Case Thirteen: Differences in capital-labor ratio as a determinant of IIT.

H_0 = *Differences in capital-labor ratio between countries does not have any effect on IIT, HIIT or VIIT.*

H_1 = *The greater the difference in capital-labor ratio between countries lower will be the degree of intra-industry trade and horizontal intra-industry trade while higher will be the degree of vertical intra-industry trade.*

7.2. g) Case Fourteen: Trade share as a determinant of IIT.

$\mathbf{H_0}$ = *Trade share does not have any effect on IIT, HIIT or VIIT.*

$\mathbf{H_1}$ = *The greater the trade share between countries higher/lower will be the degree of IIT, HIIT or VIIT.*

In *panel data analysis* the same cross-sectional unit is surveyed over time. In short, panel data have space as well as time dimensions, for example, data regarding GDP, per-capita income and population of different countries (cross-section data) arranged chronologically for several years (time series). The advantage of using panel data is it gives a holistic view about the nature, pattern and determinants of the data under consideration. Moreover the technique has already been discussed in detail in the Section 4.5 in Chapter 4.

To do the analysis, intra-industry trade has been considered as dependent variable and the three independent variables considered over here are – per-capita difference in gross domestic product (PCGDPDIFF), differences in capital-labor ratio (CLDIFF) and trade share (TRDSHR). Since it is an overall study, therefore, the reporting country would be India while the partner country is considered as different country groups. The time period considered here is from 2000 to 2009 and the level of aggregation is 6-digit. The same analysis has also been performed by considering horizontal intra-industry trade (HIIT) and vertical intra-industry trade (VIIT) as dependent variables keeping independent variables same. The expected signs of the variables are given in Table 7.3:

Table 7.3: Expected signs of different independent variables used in analyzing India's IIT

	Expected Sign of		
Dependent Variable	**PCGDPDIFF**	**CLDIFF**	**TRDSHR**
IIT	Negative	Negative	Positive
HIIT	Negative	Negative	Positive/Negative
VIIT	Positive	Positive	Positive/Negative

To calculate PCGDPDIFF, per capita GDP of India and each country group have been calculated and then its difference has been taken. To calculate CLDIFF first of all capital-labor ratio of India has been calculated by dividing India's gross fixed capital formation value by the total labor force of India and similarly the values has been calculated for each country group and then differences have been taken. To calculate TRDSHR, total trade of each country group has been divided by total trade of India. The value of PCGDPDIFF and CLDIFF is in USD and TRDSHR is in percentage. To do the panel-data analysis, natural log of all these values have been calculated and used in the equation. In this case, since both PCGDPDIFF and CLDIFF are used as a proxy for differences in factor endowments, therefore they are negatively correlated with the level of IIT and HIIT, and will be positively correlated with the level of VIIT and inter-industry trade.

To investigate the determinants of India's IIT, a panel-data analysis has been performed for these entire country groups for the ten years period. The value of IIT used over here is taken from equation 4.2.2 and it has been divided by 100 to get the numeric value rather than percentage value. The value of IIT obtained by this will range within 0 to 1, depending upon the importance of intra-industry trade. But its loglinear transformation would give the value of IIT that will lie outside the range of 0 to 1. To avoid this problem, as discussed by Balassa and Bauwens (1987), logistic transformation of IIT has been done over here. But this would again not be able to handle the possible values of 0, and it would show that there is complete inter-industry specialization in that case. To handle the possible values of 0, as discussed by Balassa and Bauwens (1987), non-linear least squares estimation of IIT has been done. This has been shown in the equation 7.1,

$$IIT' = \frac{1}{(1+e^{-IIT}) + \mu} \qquad \text{..... (7.1)}$$

where

$$IIT' = \beta_{\circ} + \beta_1 PCGDPDIFF + \beta_2 CLDIFF + \beta_3 TRDSHR + \beta_4 DVLMIC + \beta_5 DVUMIC + \beta_6 DVHIC + \beta_7 DVHIOECD \quad \ldots\ldots\ldots\ldots\ldots \quad (7.2)$$

In the above equation, 7.2, PCGDPDIFF is the difference in per capita GDP between India and average per capita GDP of each country group, CLDIFF is difference in capital-labor ratio between India and each country group, TRDSHR is the total share of each country group in India's total trade. Apart from these variables few dummy variables have also been included in the regression. These dummy variables will capture the country group effects on the levels of IIT. Here DVLMIC, DVUMIC, DVHIC and DVHIOECD represents dummy variables of lower-middle income countries, upper-middle income countries, all high-income countries and OECD countries respectively, while the constant of the equation, β_0, represents the country group effect of low-income countries and μ refers to the error term in equation 7.1. The result of the panel-data analysis is shown below in table 7.4.

Looking at Table 7.4, we can say that the sign of PCGDPDIFF does not match with theory while that of CLDIFF is in agreement with the theoretical concepts. Therefore as far as the proxy of factor endowment is concerned, capital-labor ratio is better than per-capita GDP. TRDSHR is also positively correlated with the level of IIT which is again in consonance with the theory. Since R^2 is highest in the case of IIT so we can rely on the result of IIT. In case of HIIT, although the value of R^2 is quite low, but most of the parameters are significant at 10% level.

Table 7.4: Estimated Result of panel-data analysis of India's IIT with different country groups

Independent Variables	IIT	HIIT	VIIT
Constant	-3.558 **(-5.729)**	1.169 **(2.238)**	4.288 **(27.391)**
PCGDPDIFF	0.454 (0.869)	1.180 **(2.684)**	-0.114 (-0.867)
CLDIFF	-0.259 (-0.612)	-0.821 **(-2.310)**	0.097 (0.912)
TRDSHR	0.409 **(1.698)**	-0.231 (1.143)	0.160 **(2.643)**
DVLMIC	0.988 **(3.725)**	0.416 **(1.865)**	0.048 (0.716)
DVUMIC	-0.674 (0.894)	-1.984 **(-3.127)**	0.041 (0.214)
DVHIC	-1.653 **(-1.755)**	-2.194 **(-2.771)**	-0.213 (0.897)
DVHIOECD	-1.191 **(-2.142)**	-1.192 **(-2.548)**	-0.254 **(-1.808)**
R^2	0.663	0.313	0.476
Adjusted R^2	0.607	0.198	0.389
No. of Observation	50	50	50

Source: Authors' calculation (data compiled from UNCTAD Handbook of Statistics 2009)
Figures in the brackets represent "t" value and bold brackets are significant at 10% level.

Therefore out of the three cases – twelve, thirteen and fourteen – the null hypothesis of all the three cases may be rejected and the alternate hypothesis of case thirteen can be accepted fully while the result of case twelve is just opposite to the expected result. Hence we can say that capital-labor ratio is a better reflection of factor endowment as compared to per-capita difference. In case fourteen, it has been found that, trade share is also one of the important determinants as far as measuring intra-industry trade and vertical intra-industry trade is concerned, but for measuring horizontal intra-industry trade its role is doubtful.

7.3 RESULTS AND DISCUSSION

As far as India's intra-industry trade is concerned, the analysis reveals different dimensions of it. It has been found that, in general, India's intra-industry trade is increasing with the passage of time, not only with the world but also with different country groups. This may be correlated with the development of economic conditions because, as have already been discussed in the previous chapters, growing economies leads to increase in demand for similar kinds of product which ultimately would increase the level of intra-industry trade of the concerned economy. The analysis shows that, as expected, India's IIT is maximum with the similar economies rather than dissimilar economies, inspite of the fact that India's trade is more with the high-income economies, i.e., dissimilar economies.

It is clear from the analysis that India's IIT is dominated by vertical IIT and this has also been discussed in earlier studies on India's IIT by Veeramani (2001, 2003). The importance of the result is that, it clearly shows that although VIIT is dominating with all the country groups but the level of HIIT has significantly improved with the similar economies, i.e., with LMIC and this has not been discussed earlier.

Another interesting finding of the study, which has not been discussed with earlier work on India's intra-industry trade is that, although India's IIT is vertical in nature but low-quality vertical IIT is dominating and interestingly this LQVIIT is maximum with high income group of countries and least with the similar group. This again throws some lights on the nature of India's international trade that it is more with little improvement in value-addition of the product (like assembly business) rather than doing a high end job, specially with high-income countries. Although it is immature to comment on the nature of India's trade at this stage with such a little information but we can make some guesses and interpret the findings in the light of intra-industry trade.

The econometric analysis shows that as far as using a proxy for factor endowment is concerned, capital-labor ratio is better than that of per-capita GDP. Now the question is that why the sign of per capita GDP difference is not matching with the theoretical expectations? One of the reasons can be given over here is that may be income

distribution between and within countries also plays some role in influencing the level of IIT. This kind of study have already done by Gullstrand (2002) although he found a very weak support of his hypothesis but definitely this may be one of the reasons and can be explored in coming time.

CHAPTER 8

INTRA-INDUSTRY TRADE OF INDIA: FEW SELECTED SECTOR SPECIFIC EXAMPLES

CHAPTER 8

INTRA-INDUSTRY TRADE OF INDIA: FEW SELECTED SECTOR SPECIFIC EXAMPLES

So far the nature, pattern and determinants of intra-industry trade of India with respect to the World and for all the product groups have been discussed. Some specific works have also been discussed regarding a group of products as well as group of countries. The discussion regarding different dimensions of intra-industry trade of India would be incomplete if we do not discuss the sector specific examples. Although a part of it has already been discussed in Chapter 6 of the present thesis, but more than one sector had been clubbed there to form a group of products, as well as the analysis was more general in nature rather than specific. Here in this chapter the condition of few selected sectors have been analyzed specifically so as to get better understanding regarding the condition of India's intra-industry trade.

To perform sector specific analysis, the biggest question is which are the sectors selected for study. The criteria used over here for selecting different sectors is that it should be one of the highest traded product as well as there should be a possibility of product differentiation so that we can analyze the condition and potential of intra-industry trade in the sector. Therefore, it would be better if we discuss a little bit about the composition of India's foreign trade so that it would be easy to select the sectors to be studied.

8.1 COMPOSITION OF INDIA'S INTERNATIONAL TRADE

Composition of international trade means what are the products which are exported from and imported by India. 2-digit ITC-HS (Indian Trade Classification – Harmonised System) code is used here to discuss the exports/imports of the products. In this classification, at 2-digit the products are categorized into 98 chapters and each chapter represents a particular category of products, for example Ch 10 represents all the products

of Cereals, Ch 71 represents natural and cultured pearls and so on. Chapter wise details of products are shown in Annexure I. Table 8.1.1 shows the rank-wise export of products from India from 1992 to 2009.

Table 8.1.1 Rank-wise export of products (of different Chapters) from India, 1992 – 2009

Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1992	71	62	52	61	42	3	57	9	23	27	84	87	26	64	72
1994	71	62	52	3	61	9	42	84	87	29	72	57	23	64	63
1997	71	62	52	29	3	84	9	61	72	23	10	42	85	63	87
2000	71	62	52	61	29	27	3	84	72	85	63	42	73	30	87
2003	71	27	62	61	29	72	84	52	85	30	87	63	73	10	3
2006	27	71	29	62	72	84	26	85	87	61	52	73	30	74	39
2009	71	27	85	84	29	62	26	87	61	30	72	73	89	52	10

Source: Authors' Calculation (Data compiled from WITS website)

Table 8.1.1 shows that, specially for the last few years, the export composition of India is almost same. But on comparing the export composition between 1992 to 2009, it has been found that out of the top 15 products in 2009, 9 products were also there in the top 15 in the year 1992. While looking at other's year top 15 products it was found that in most of the years about 70 to 80 per cent of the products of top 15 products are same. Apart from this, Table 8.1.2 shows the top 15 products of the year 2009 and their percentage contribution in total export in both the years 1992 and 2009.

Table 8.1.2 Percentage contributions of export of Top 15 products of the year 2009 and their contribution in total export for the year 1992

S.No.	Chapter	Product Name	1992	2009
1	71	Natural/cultured pearls, prec stone …	16.91	18.44
2	27	Mineral fuels, oils & product of …	2.88	13.59
3	85	Electrical mchy equip parts thereof	1.48	5.44
4	84	Nuclear reactors, boilers, mchy & …	2.83	4.05
5	29	Organic chemicals.	1.76	3.94
6	62	Articles of apparel & clothing …	9.55	3.46
7	26	Ores, slag and ash.	2.38	3.28
8	87	Vehicles o/t railw/tramw roll-stock	2.70	3.23
9	61	Articles of apparel & clothing …	3.59	2.93
10	30	Pharmaceutical products.	1.89	2.83
11	72	Iron and steel.	2.21	2.48
12	73	Articles of iron or steel.	1.80	2.43
13	89	Ships, boats and floating structure	0.00	2.13
14	52	Cotton.	5.84	1.81
15	10	Cereals	1.89	1.69
		Total	**57.71**	**71.75**

Source: same as Table 8.1.1

According to the Table 8.1.2, except for products of four Chapters – 62, 61, 52 and 10, the contribution of all other products in total trade have increased in the year 2009. These top 15 products of the year 2009 together contribute 71.75 and 56.93 per cent of total export of 2009 and 1992 respectively. Table 8.1.2 shows that the contribution of top 15 products of the year 2009 have increased significantly over the years and therefore it can be said that as far as India's export composition is concerned, it has not been changed drastically between 1992 to 2009 and Pearls (Ch 71), Mineral Fuels (Ch 27) and Electrical Machinery (Ch 85) have been the major export items of India.

Now the import composition of India, from World, for the period 1992 to 2009 has been discussed here:

Table 8.1.3 Rank-wise import of products (of different Chapters) by India, 1992 – 2009

Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1992	27	71	84	72	29	85	28	31	90	39	25	74	10	73	87
1994	27	84	71	29	72	85	31	28	88	17	39	90	74	25	8
1997	27	71	84	85	29	72	28	15	31	90	39	74	48	73	44
2000	27	71	84	85	29	15	28	72	90	39	89	44	31	25	48
2003	27	71	84	85	29	15	72	90	28	39	88	89	44	7	48
2006	27	71	84	85	29	72	88	26	89	90	39	31	28	15	73
2009	27	71	85	84	29	72	31	88	15	39	90	26	28	89	73

Source: same as Table 8.1.1

Table 8.1.3 shows the import composition of India with world between the periods of 1992 to 2009, for the top 15 products only. It is clear from the table that import composition of India is relatively same throughout the period. Out of top 15 products in the year 2009, 11 products were also there in 1992 top 15 list. There is 100 per cent similarity in the composition of import of top 15 products for the year 2006 and 2009. For all other years, the composition is almost 70-90 per cent same. Therefore, it can be said that as far as the composition of India's import is concerned, it has not been changed significantly. Now to find out the contribution of top 15 products of the year 2009 for both the years - 2009 and 1992, we need to refer to Table 8.1.4.

Table 8.1.4 Percentage contributions of import of Top 15 products of the year 2009 and their contribution in total import for the year 1992

S.No.	Chapter	Product Name	1992	2009
1	27	Mineral fuels, oils & product of ….	31.43	31.03
2	71	Natural/cultured pearls, prec stone	13.03	16.00
3	85	Electrical mchy equip parts thereof	4.05	9.07
4	84	Nuclear reactors, boilers, mchy & …	8.50	9.04
5	29	Organic chemicals.	4.07	3.18
6	72	Iron and steel.	5.22	3.18
7	31	Fertilisers.	3.40	2.28
8	88	Aircraft, spacecraft, and parts thereof	0.60	1.95
9	15	Animal/veg fats & oils & their clea	0.48	1.94
10	39	Plastics and articles thereof.	2.15	1.94
11	90	Optical, photo, cine, meas, checkin	2.36	1.73
12	26	Ores, slag and ash.	0.46	1.29
13	28	Inorgn chem; compds of prec metal ..	3.83	1.21
14	89	Ships, boats and floating structure	0.48	1.13
15	73	Articles of iron or steel.	1.16	1.12
		Total	**81.21**	**86.10**

Source: same as Table 8.1.1

Table 8.1.4 shows an interesting trend that out of top 15 products in the year 2009, the import contribution of 8 products have decreased in the year 2009 as compared to the year 1992, but even then the contribution of these 15 products in total import have increased from 81.21 per cent to 86.10 percent for the same time period. On careful analysis, it can be found that in the recent years the import of Natural/Cultured Pearls (Ch 71) and Electrical Machinery (Ch 85) have increased significantly while the contributions of all other products have either decreased or increased a little bit. Therefore, as far as the trend in India's import composition, for the period 1992 to 2009, is concerned it can be said that the overall composition is almost same.

Now it would be easy to select the sectors for the study of intra-industry trade and therefore those few sectors which contribute maximum to the trade (export/import) have been selected for study.

8.2 SELECTED SECTORS FOR THE STUDY

The criteria used over here for selecting different sectors is that it should be one of the highest traded product as well as there should be possibility of product differentiation so that we can analyze the condition and potential of intra-industry trade in the sector. Therefore four different Chapters out of 98 Chapters of HS-Code have been selected for study. The details of the four selected Chapters have been shown below in table 8.2.1:

Table 8.2.1: Selected Sector and their details

CHAPTER	DETAIL
HS-27	Mineral fuels, mineral oils and products of their distillation; bituminous substances; mineral waxes
HS-29	Organic chemicals
HS-71	Natural or cultured pearls, diamonds, precious or semi-precious stones, precious metals, metals clad with precious metal and articles thereof; imitation jewelry; coin.
HS-85	Electrical machinery and equipment and parts thereof; sound recorders and reproducers, television image and sound recorders and reproducers, and parts and accessories of such articles

As discussed in Section 8.1, these are the products which remain on the top on the India's trade list. Apart from this the chances of product differentiation are also high. Now the degree of intra-industry trade of these products will certainly depend upon the export-import policy adopted by the Government of India to promote IIT. If the EXIM policy is

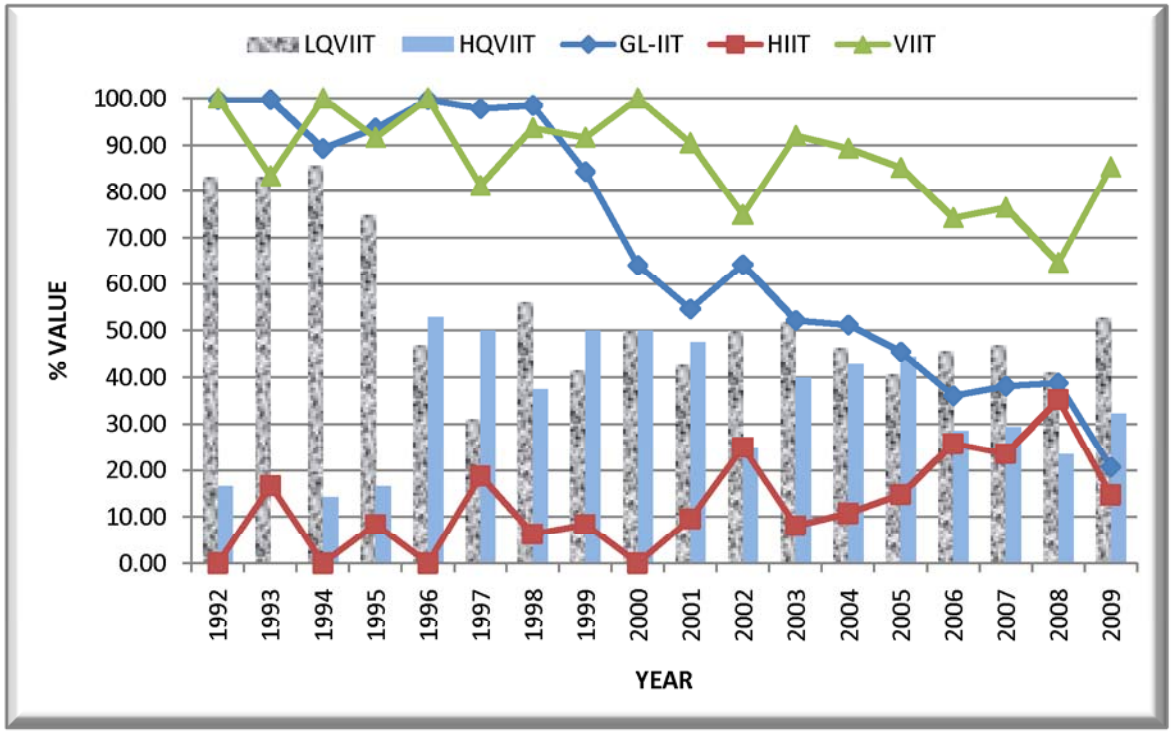
conducive then the degree of intra-industry trade should be high otherwise it would be low.

Now each of the four sector has been discussed one-by-one. The time period for the study is between 1992 to 2009, i.e., 18 year period and the level of aggregation is 6-digit, for all the sectors.

8.3 SECTOR SPECIFIC EXAMPLE: HS-27 – MINERAL FUELS

Mineral fuel is one of the most traded products of India. In the year 2009, it ranked 2nd in terms of export and fetched about 13.59 percent of the share in India's total exports; while it ranked 1st in import and fetched about 31.03 percent of the share in India's total import. On the other hand, its rank and percentage contribution in export were 10th and 2.88%, and for import – 1st and 31.43% respectively for the year 1992. As far as possibility of intra-industry trade in this sector is concerned, normally India is importing raw fuel and exporting the refined one. India is having capacity and potential in refining crude oil and this makes the possibility of intra-industry trade in this sector. Here the degree of intra-industry trade and percentage of HIIT and VIIT in the sector has been calculated, and their analysis would throw some light on the nature of the trade policy that whether it is matching with the India's potential or not. After analyzing it we would have some understandings about the effectiveness of our trade policy that whether the trade policy is able enough to exploit the potential India have. Figure 8.3.1, shown below, depicts the condition of intra-industry trade of India for Mineral Fuels (HS-27):

Figure 8.3.1: The degree of different types of IIT of India for HS-27, between 1992 to 2009



Source: Author's Calculation (data compiled from WITS website)

Figure 8.3.1 shows the degree of adjusted GL-IIT at 6-digit level of aggregation of Mineral Fuels for India. It is clear from the figure that with the passage of time, specially after the year 1998 the degree of intra-industry trade for the product has decreased drastically. Between 1992 to 1998 its value was very high and ranging about 98% - 99%. Its value was about 98.5% in the year 1998 but after then it decreased drastically and reached to about 20.7% in the year 2009. As far as horizontal and vertical IIT is concerned the sector has been dominated by vertical IIT, but since 2000 the contribution of HIIT also picked up and it increased significantly. The sector had mainly VIIT till the year 2000 while by the end of 2009 the degree of VIIT has decreased to 85.3% and the contribution of HIIT has increased from almost 0% till 2000 to about 14.7% in the year 2009.

Another interesting trend which has been observed that VIIT was dominated by low-quality components (LQVIIT) in the year 1992, but with the passage of time the

contribution of low-quality VIIT has decreased and high-quality VIIT has increased (interestingly in some of the years HQVIIT dominates over LQVIIT). This is a very important finding because India's IIT is mainly dominated by VIIT that too by LQVIIT, but here in sector HS-27, it has been observed that high-quality VIIT has increased and become an important component of trade of the sector (Mineral Fuels – HS-27). This trend clearly reflects the potential of India in refining crude oil.

Therefore, after analyzing the condition it can be said that the trade policy is not promoting the intra-industry trade of Mineral Fuels, in-fact it has decreased it. As it has been discussed above that although India is not a major producer of oil but it has refining capacity, therefore the degree of intra-industry trade should have increased, but in practice the case is just reverse. This finding can also be cross-checked by looking at the trend of Import-Weighted Average Tariff (IWAT)" for the sector HS-27 for the period between 1992 to 2008. It has been depicted in the table 8.3.1:

Table 8.3.1: Import-Weighted Average Tariff of Sector HS-27, for the period 1992 - 2008

S.No.	Year	IWAT	% Change
1	1992	0.53	----
2	1997	12.68	2306.71
3	1999	21.95	73.06
4	2001	17.70	-19.36
5	2004	11.19	-36.77
6	2005	10.26	-8.34
7	2007	5.34	-47.94
8	2008	4.52	-15.27
Overall % Change		**758.41**	

Source: same as Figure 8.3.1

The trend of IWAT of sector HS-27, as discussed in table 8.3.1, shows that although in the last few years it has decreased but its value for the year 2008 is still higher than that

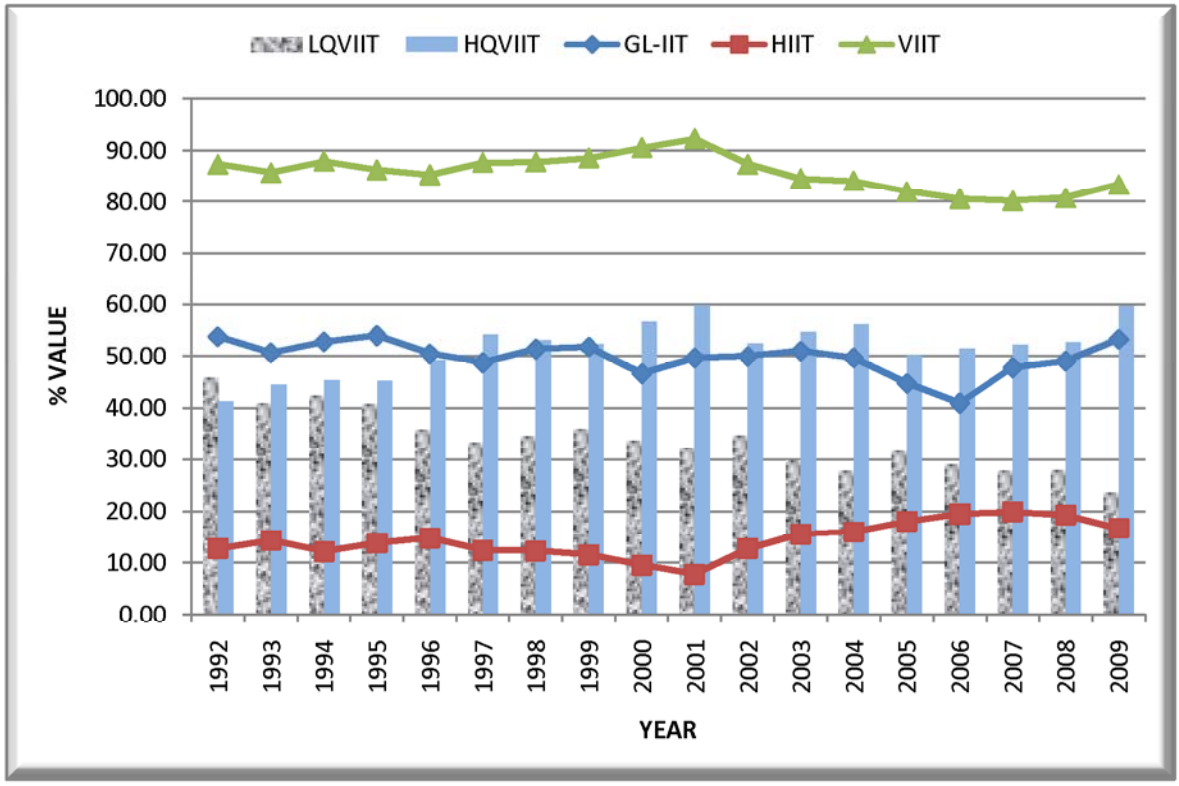
of 1992. Moreover, specially after 1999 the value of IWAT has decreased continuously therefore it should promote intra-industry trade of the sector but actually this has not happened and GL-IIT has decreased for the same time period.

Therefore it can be said that India's trade policy is not supporting its potential for intra-industry trade for the sector HS-27 and it must be relooked and re-framed so that India can also reap the benefits of its potential and increase the trade of the sector concerned.

8.4 SECTOR SPECIFIC EXAMPLE: HS-29 – ORGANIC CHEMICALS

It is the kind of product where very high degree of intra-industry trade is possible because product differentiation is easy in this case. It occupied 5th position in both India's export and import with a total contribution of about 3.94% and 3.18% respectively for the year 2009. Since for different types of works, different quality of the same chemical is required and this leads to increase the possibility of intra-industry trade in this category of the product. Economic growth and Industrialization also increase the consumption of organic chemicals and this may lead to both increasing productions as well as increase in imports of the product therefore intra-industry trade should be of high degree for the sector. Figure 8.4.1 shows the trend and pattern of intra-industry trade of Organic Chemicals:

Figure 8.4.1: The degree of different types of IIT of India for HS-29, between 1992 to 2009



Source: same as Figure 8.3.1

Figure 8.4.1 supports the expectations and depicts that degree of intra-industry trade is moderately higher for the sector. In most of the year the value of GL-IIT is above 50%. Interestingly, over the years the contribution of horizontal trade has increased while that of vertical trade has decreased, this also shows the growing condition of the economy. Another very interesting trend is shown in the figure that over the years the contribution of low-quality vertical intra-industry trade has decreased and that of high-quality vertical trade has increased. In the year 1992, the LQVIIT and HQVIIT was 46.01% and 41.31% respectively while in the year 2009 it has become 23.7% and 59.6 % respectively. This increase in intra-industry trade of high-quality product shows that over the years not only the consumption and import but also the production and export of high-quality chemicals have increased. This trend supports the view that the trade policy of the sector is conducive to promote intra-industry trade as well as overall trade. This finding can also be cross-checked by looking at the trend of Import-Weighted Average Tariff (IWAT) for

the sector HS-29 for the period between 1992 to 2008. It has been depicted in the table 8.4.1:

Table 8.4.1: Import-Weighted Average Tariff of Sector HS-29, for the period 1992 - 2008

S.No.	Year	IWAT	% Change
1	1992	58.46	----
2	1997	23.22	-60.27
3	1999	29.35	26.37
4	2001	29.67	1.09
5	2004	25.29	-14.76
6	2005	14.29	-43.49
7	2007	11.84	-17.16
8	2008	6.04	-49.01
Overall % Change		**-89.67**	

Source: same as Figure 8.3.1

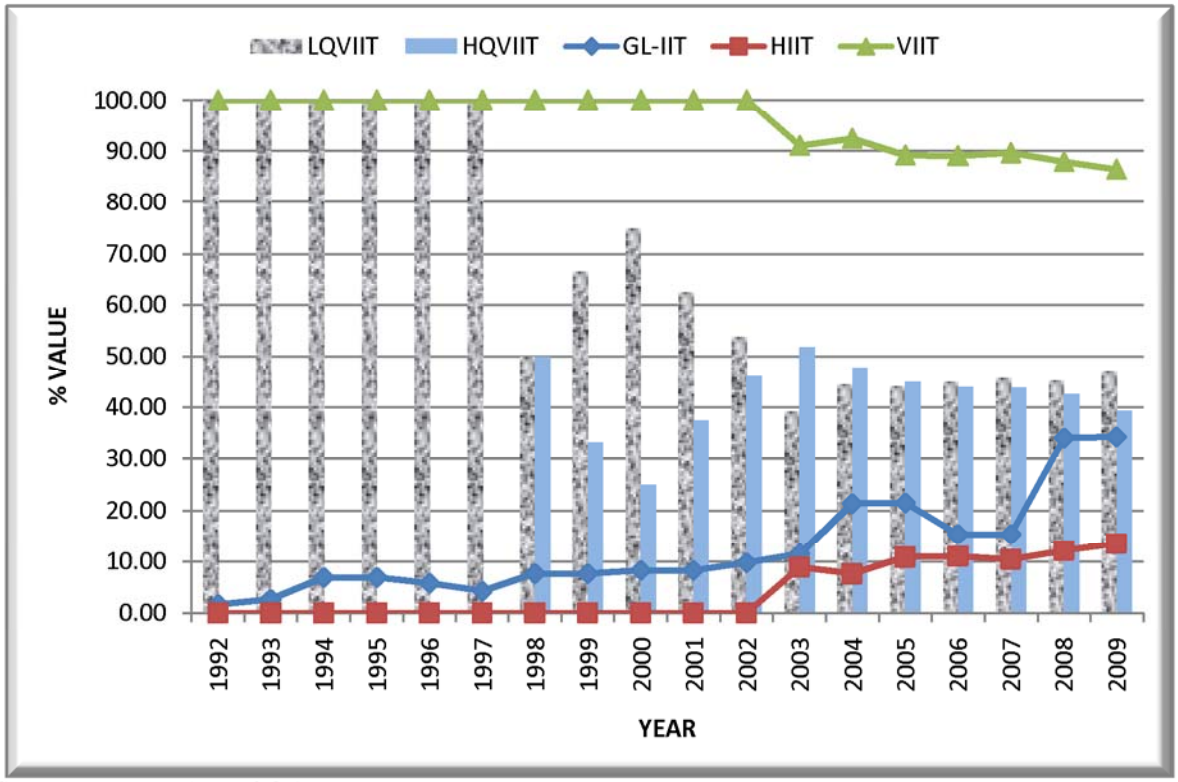
The trend of IWAT for the sector HS-29, as depicted in the table 8.4.1, shows that IWAT has been continuously decreasing year-after-year, except for two years; and overall IWAT has also been decreased significantly in the year 2008 as compared to the year 1992. This trend of IWAT again is in consonance of the above findings that intra-industry trade of the sector is moderately higher.

Since IWAT has decreased much but it did not lead to that much increase in GL-IIT therefore, it can be said that India's trade policy is not very much supporting its potential for intra-industry trade for the sector HS-29. A little rework in the policy may lead to increase in not only intra-industry trade but also overall trade for the concerned sector.

8.5 SECTOR SPECIFIC EXAMPLE: HS-71 – NATURAL / CULTURED PEARLS, DIAMONDS

The product of Chapter HS-71 has been highest foreign-exchange earner for India for last so many years, but interestingly India do not have enough mines which produces raw stones. India has only a few mines, the most important one is in Madhya Pradesh, but the production is not sufficient to make this sector as a highest forex earner. Actually India import raw stones from different countries of the World, mainly from African countries, and process the raw stones into finished products and then export it and therefore it makes the possibility of intra-industry trade in the sector, specially at a disaggregated level, little less. HS-71 occupied the first position in India's export with the percentage contribution of 18.44% and occupied 2nd position in India's import with the contribution of about 16% for the year 2009. The trend and pattern of intra-industry trade for the products of HS-71 has been shown below in the figure 8.5.1:

Figure 8.5.1: The degree of different types of IIT of India for HS-71, between 1992 to 2009



Source: same as Figure 8.3.1

The trend and pattern of intra-industry trade of HS-71 is shown in the figure 8.5.1 and it shows that, except for recent years, the level of GL-IIT is used to be lower, which is matched with the expectations. But interestingly the level of GL-IIT has increased in the recent year which is quite surprising but it may be explained with the growing domestic demand of gems and jewelry. This trend is very much linked with the economic condition and it shows the economic condition is improving because the increase in economic conditions will lead to increase in per-capita income which ultimately leads to increase in the demands of these products. This argument can also be justified with the trends of HIIT/VIIT as well as LQVIIT/HQVIIT. Over the years, VIIT has decreased and HIIT has increased and as well as, interestingly, the contribution of high-quality VIIT has increased significantly. This reflects India's capacity in participating in high-end jobs also. The nature of trade policy of the sector can be analyzed by looking at the pattern of IWAT of the sector, which is shown below:

Table 8.5.1: Import-Weighted Average Tariff of Sector HS-71, for the period 1992 - 2008

S.No.	Year	IWAT	% Change
1	1992	5.68	----
2	1997	20.49	260.63
3	1999	40.00	95.26
4	2001	33.97	-15.08
5	2004	34.52	1.63
6	2005	13.35	-61.32
7	2007	12.50	-6.41
8	2008	6.38	-48.96
Overall % Change		**12.28**	

Source: same as Figure 8.3.1

The trend of IWAT for the sector HS-71 is shown in the table 8.5.1 and it depicts that specially after 1999, it has decreased significantly, which may be one of the reasons for the increase in GL-IIT of the sector for that period. Although IWAT has decreased in the recent years but still its value is quite high and intra-industry trade as well as overall trade

of the sector can be promoted if IWAT is decreased further and trade policy is framed with the objective to increase IIT in the sector.

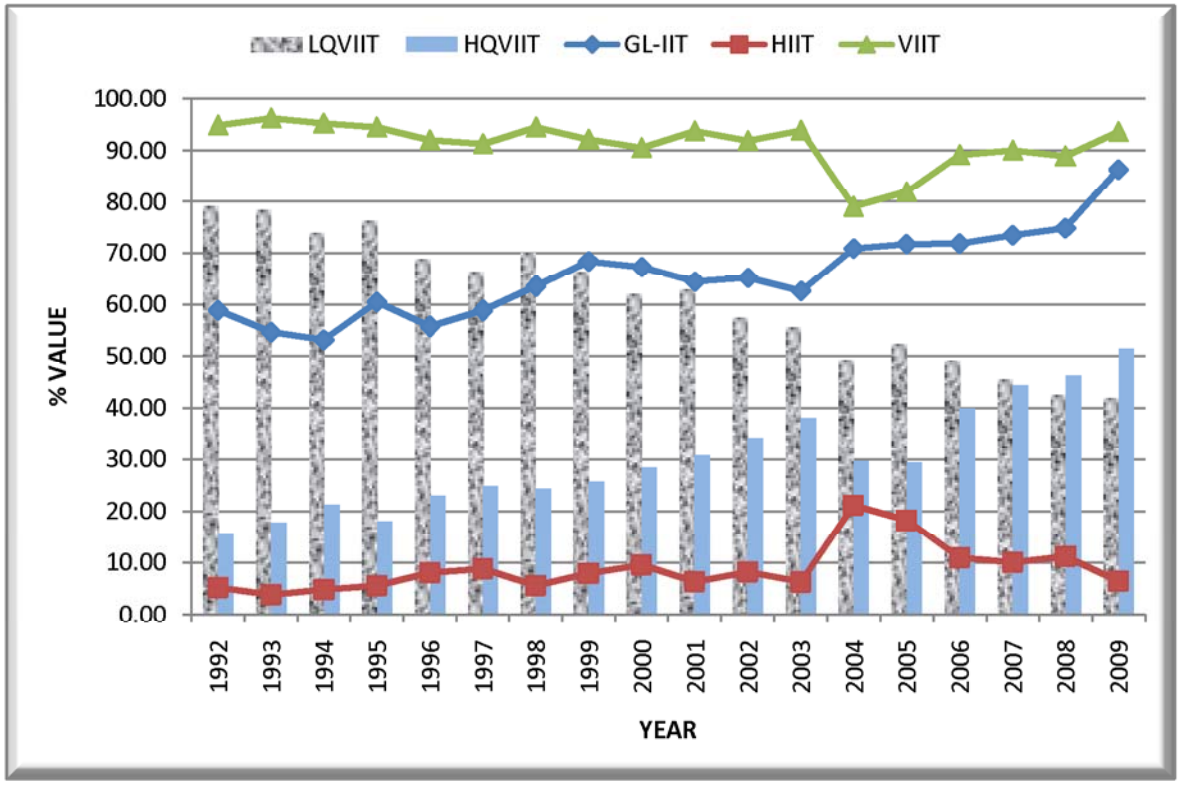
Therefore it can be said that this is a sector where trade policy must be relooked and re-designed according to the potential India has.

8.6 SECTOR SPECIFIC EXAMPLE: HS-85 – ELECTRICAL MACHINERY AND EQUIPMENTS AND PARTS THEREOF

This sector has been selected because of the fact that it is on the top 5 list of products which India is trading with the World, but the other and very important reason is that this sector is one of the most important sectors for manufacturing section and most of the theories of intra-industry trade have been developed by studying the pattern of trade in the manufacturing sector. Apart from this, India is developing as an outsourcing destination for all big Auto majors and manufacturers of electronic items. Most of the developed countries are outsourcing their low-end assembly operation to India because of the availability of cheap labor, and hence this makes the importance of this sector as a major contributor to intra-industry trade of India.

Chapter HS-85 occupied 3rd position in both India's export and import with the percentage contribution of 5.44% and 9.07% respectively for the year 2009. This sector is also a consistent performer for India and has been on the list of top 10 sectors, both for export and import, for the last 10 years. Therefore we can expect a high degree of intra-industry trade among the products of this sector. Apart from this, since India is a developing country and is becoming a major outsourcing hub for the developed countries, therefore dominance of VIIT is expected. Moreover, low-quality VIIT is supposed to be dominating over high-quality VIIT because of the obvious reason that India is performing mainly lower end job in the outsourcing industry. All this can be discussed only by looking at the trend and pattern of intra-industry trade of the concerned sector, which is shown below:

Figure 8.6.1: The degree of different types of IIT of India for HS-85, between 1992 to 2009



Source: same as Figure 8.3.1

The trend and pattern of intra-industry trade of the sector HS-85 is matching with the expectations that degree of IIT is moderately high for all the periods and it has increased significantly specially in the recent years. Except for the year 2004, the trend of VIIT/HIIT is also matched with the expectations that VIIT should dominate over HIIT. But the interesting thing is the trend of high-quality VIIT has increased and low-quality VIIT has decreased significantly in the recent years, which is quite. It was assumed that, India – being performing lower end outsourcing job, therefore low-quality VIIT should dominate over high-quality VIIT, but the trend is reversed since 2007. Increase in the contribution of high-quality VIIT reflects the potential of India for performing higher end job. This again clearly signifies that Indian economy is growing very fast and the quality of production is increasing day by day. Therefore India should not be looked as a country for low-end job only but it can perform the high-end job also.

Favorable trade policy could also be a reason for increasing IIT of the sector and it can be analyzed only by looking at the trend and pattern of IWAT for the concerned sector, which is shown below:

Table 8.6.1: Import-Weighted Average Tariff of Sector HS-85, for the period 1992 - 2008

S.No.	Year	IWAT	% Change
1	1992	58.09	----
2	1997	18.96	-67.37
3	1999	19.13	0.92
4	2001	17.27	-9.73
5	2004	16.34	-5.40
6	2005	5.75	-64.81
7	2007	4.48	-22.01
8	2008	3.38	-24.65
Overall % Change		**-94.18**	

Source: same as Figure 8.3.1

Looking at the trend of IWAT for the sector HS-85, it can be said that the trade policy very much supports the sector and IWAT has decreased continuously. As compared to 1992, its value has decreased by almost 94% in the year 2008. The increase in GL-IIT of the sector is very much corresponds to the decreased in IWAT and it confirms that the trade policy is very much supportive for the sector concerned.

Therefore, it can be said that the trend of intra-industry trade for the Chapter HS-85 is matching with the expectations.

SECTION III. FINDINGS, CONCLUSION AND DIRECTION FOR FUTURE RESEARCH

CHAPTER 9

FINDINGS OF THE STUDY

CHAPTER 9

FINDINGS OF THE STUDY

The present study was based on analyzing overall nature and pattern of India's intra-industry trade and to find out its potential in different sectors. The study also tries to explore the effectiveness of trade policy for some selected sectors so that suitable trade policies can be framed which can harp India's potential and improve its trade performance. The study reveals that intra-industry trade is becoming an integral part of India's international trade and its contribution cannot be overlooked. Major findings of the study have been discussed below:

- The study shows that intra-industry trade has become an integral part of India's international trade and the degree of intra-industry trade has increased significantly with the passage of time. Although the increasing trend is not very smooth, because of varying economic conditions of both India and World, but overall it has increased. The phrase "passage of time" has been used here to represent the overall growth in the economy, here it has been assumed that in general the economy grows with the passage of time. Interestingly, Indian economy has been growing continuously with the passage of time, so this assumption holds valid for the study.

- The study reveals that the effect of aggregation level on the degree of intra-industry trade is same as expected, that means, the degree of intra-industry decreases with the decrease in aggregation level. Interestingly, in this case the decrease in the degree of intra-industry trade is not very steep which reflects that, for India, intra-industry trade is a real phenomenon and not mere the case of categorical aggregation.

- The study shows that not only the degree but also the contribution of intra-industry trade in India's total trade has increased significantly over the years. This again reinstates the fact that intra-industry trade has become an integral part of India's international trade.

- The study shows that India's intra-industry trade is import-dominating that means the contribution of import in intra-industry trade is more than that of export. This trend specifically has become visible since 2001. This finding goes in parallel with the trend and pattern of export/import in international trade. India's international trade is also dominated by import.

- The study reveals that India's intra-industry trade is vertically dominated. This result was expected because India is a developing country and its majority of the trade is with dissimilar economies. But interestingly, it has been observed that over the years the contribution of HIIT has increased, this trend also supports the fact that the economy is growing with the passage of time. Apart from this, the study also shows that the contribution of high-quality VIIT has increased with the passage of time which shows that Indian economy is gradually moving towards high-end job from lower to lower-middle end job.

- The study shows that the liberalization process, since 1991, has promoted the degree of intra-industry trade. The liberalization process leads to decrease in tariff rate which ultimately promoted the degree of intra-industry trade.

- As far as the nature of intra-industry trade with different product groups are concerned, the study shows that it is maximum with that category of product where product differentiation is maximum and this result is matched with the expectation. But interestingly, in most of the cases it has been observed that intra-industry trade is not minimum with that category of the product where product differentiation was least. This finding, although unexpected, but may indicate that

India is having potential for intra-industry trade with this category of the product which may be tapped to increase its trade in the sector.

- The study shows a very interesting result that although India's trade is maximum with dissimilar economies, but specially in recent years, its intra-industry trade is found to be maximum with similar economies. The next rank comes to the High-Income Countries with which intra-industry trade is maximum.

- As far as the level of HIIT and VIIT with different country groups are concerned, the study shows that it is matched with the expectations that HIIT is found to be maximum with similar economies while VIIT is maximum with dissimilar economies. Apart from this the study also shows that low-quality VIIT dominates over high-quality VIIT.

- The study reveals that differences in capital-labor ratio is a better proxy of factor endowment for determining the determinants of India's intra-industry trade, than that of differences in per-capita GDP and trade share. Then after, trade share acted as second best determinants for measuring intra-industry trade. These factors act as an important determinants of measuring intra-industry trade of India with low income countries, lower-middle income countries, high-income countries and high-income OECD countries, but not reliable for upper-middle income countries.

- The findings of the study reflect the changes in economic conditions of India that Indian economy is growing very fast and due to increase in disposable income, the demand of varieties of a product increase which ultimately leads to increase in the degree and contribution of intra-industry trade. This trend is visible since the beginning of liberalization process but specially after the year 2000.

- The findings of the study clearly reflect that if India align its trade policy which suits to its potential of intra-industry trade then the contribution and degree of IIT will certainly increase. Since the adjustment costs of intra-industry trade is lesser

than that of inter-industry specialization thus it would be beneficial for India that without doing major changes in the industrial structure of the country, foreign trade can be increased.

Therefore the present study discusses different dimensions of India's intra-industry trade and its benefits to India.

CHAPTER 10

CONCLUSION

CHAPTER 10

CONCLUSION

The present study reveals that intra-industry trade has become an integral part of India's international trade and both contribution & level of IIT have increased significantly with the passage of time. Reducing trade barriers promoted the degree of IIT and VIIT dominates HIIT. These results have important policy implications like India can increase its foreign trade by framing the policy which supports IIT.

The present study may provide a basis for framing a suitable trade policy. The study helps in finding the sector which has a potential for intra-industry trade but the overall trade policy is not supporting it (as discussed in Chapter 8). By doing a detailed study of the particular sector, it can be find out that which product (at 6- or 8-digit level of aggregation) of the sector needs attention for reframing the trade policy.

Therefore it can be said that if India frame suitable trade policy which promotes intra-industry trade then it would be able to increase not only its foreign trade but also its share in the world trade. Now, looking at its potential, India should focus more on its intra-industry trade rather than inter-industry specialization because it incur lower adjustment costs and does not require major industrial restructuring.

Hence it can be concluded that intra-industry trade has become an important component for India's international trade (its contribution in total trade has increased from about 67% in 1992 to more than 96% in 2009 at both 4-digit and 6-digit level of aggregation) and it can proved to be very much beneficial for the growth and development of Indian economy if favorable trade policy is framed.

CHAPTER 11

DIRECTION FOR FUTURE RESEARCH

CHAPTER 11

DIRECTION FOR FUTURE RESEARCH

Although the present study has some limitations, as discussed in Section 4.6 in Chapter 4, but it may prove to be a base for understanding the nature and pattern of India's intra-industry trade.

The present study is a significant contribution to the literature to India's intra-industry trade. It provides a basis for conducting a specific study of intra-industry trade of not only for India but also for any other country, because the same concept and methodologies can be extended. The author is hopeful that the present study ignites some more minds in this direction and some detailed study with more useful results may come in the future.

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ANNEXURE I

ITC-HS CLASSIFICATION CODES

Section 1: Live Animals; Animal Products (Chapter 1 to 5)

Chapter 1	:	Live Animals
Chapter 2	:	Meat and Edible Meat Offal
Chapter 3	:	Fish and Crustaceans, Molluscs and other Aquatic Invertebrates
Chapter 4	:	Birds" Eggs; Natural Honey; Edible Products of Animal Origin, not elsewhere specified or included
Chapter 5	:	Products of Animal Origin, not elsewhere specified or included

Section 2: Vegetable Products (Chapter 6 to 14)

Chapter 6	:	Live trees and other Plants; Bulb, Roots and the like; Cut flowers and Ornamental Foliage
Chapter 7	:	Edible Vegetables and Certain Roots and Tubers
Chapter 8	:	Edible Fruit and Nuts; Peel of Citrus Fruit or Melons
Chapter 9	:	Coffee, Tea, Mate and Spices
Chapter 10	:	Cereals
Chapter 11	:	Products of the Milling Industry; Malt; Starches; Inulin; Wheat Gluten
Chapter 12	:	Oil Seeds and Oleaginous Fruits; Miscellaneous Grains, Seeds and Fruit; Industrial or Medicinal Plants
Chapter 13	:	Lac; Gums, Resins and other Vegetable Saps and Extracts
Chapter 14	:	Vegetable Plaiting Materials; Vegetable Products not elsewhere specified or included

Section 3: Animal or Vegetable Fats and Oils and their cleavage Products; Edible fats; animal or Vegetable waxes (Chapter 15)

Chapter 15	:	Animal or Vegetable Fats and Oils and their Cleavage Products; Prepared Edible Fats; • Animal or Vegetable

Section 4: Prepared Foodstuffs; Beverages, Spirits and Vinegar; Tobacco and Manufactured Tobacco substitutes (Chapter 16 to 24)

Chapter 16	:	Preparations of Meat, of Fish or of Crustaceans, Molluscs or Other Aquatic Invertebrates
Chapter 17	:	Sugars and Sugar Confectionery
Chapter 18	:	Cocoa and Cocoa Preparations

Chapter 19	:	Preparations of Cereals, Flour, Starch or Milk; Pastry Cooks" Products
Chapter 20	:	Preparations of Vegetables, Fruit, Nuts or Other Parts of Plants
Chapter 21	:	Miscellaneous Edible Preparations
Chapter 22	:	Beverages, Spirits and Vinegar
Chapter 23	:	Residues and Waste from the Food Industries; Prepared Animal Fodder
Chapter 24	:	Tobacco and Manufactured Tobacco Substitutes

Section V-Mineral Products (Chapter 25 -27)

Chapter 25	:	Salt; Sulphur; Earths & Stone; Plastering Materials; Lime & Cement
Chapter 26	:	Ores, Slag and Ash
Chapter 27	:	Mineral Fuels, Mineral Oils and Products of their Distillation; Bituminous Substances; Mineral Waxes

Section 6: Products of the Chemicals or Allied Industries (Chapter 28 to 38)

Chapter 28	:	Inorganic Chemicals; Organic or Inorganic Compounds of Precious Metals, of Rare-Earth Metals, of Radioactive Elements or of Isotopes
Chapter 29	:	Organic Chemicals
Chapter 30	:	Pharmaceutical Products
Chapter 31	:	Fertilisers
Chapter 32	:	Tanning or Dyeing Extracts; Tannins and their Derivatives; Dyes, Pigments and Other Colouring Matter; Paints and Varnishes; Putty and other Mastics; Inks
Chapter 33	:	Essential Oils and Resinoids; Perfumery Cosmetics or Toilet Preparations
Chapter 34	:	Soap,Organic Surface-Active Agents,Washing preparations, Lubricating Preparations, Artificial Waxes,Prepared WaxesPolishing or Scouring Preparations, Candles and similar Articles, modelling Pastes, "Dental Waxes" and Dental Preparations with Basis of Plaster
Chapter 35	:	Albuminoidal substances; Modified Starches; Glues; Enzymes
Chapter 36	:	Explosives; Pyrotechnic products; Matches; Pyrophoric Alloys; certain combustible preparations
Chapter 37	:	Photographic or Cinematographic Goods
Chapter 38	:	Miscellaneous Chemical Products

Section 7: Plastics and Articles thereof; Rubber and Articles Thereof (Chapter 39 and 40)

Chapter 39	:	Plastics and articles thereof
Chapter 40	:	Rubber and articles thereof

Section 8: Raw Hides and Skins, Leather, Furskins and Articles thereof; saddlery and Harness; travel goods, Handbags and similar Containers; Articles of animal gut (other than worm Gut) (Chapter 41 to 43)

Chapter 41	:	Raw Hides and Skins (other than furskins) and leather
Chapter 42	:	Articles of leather; saddlery and harness; travel goods, handbags and similar containers; articles of animal gut (other than silk-worm gut)
Chapter 43	:	Furskins and artificial fur; manufactures thereof

Section 9: Wood and Articles of Wood; Wood Charcoal; cork and articles or cork; Manufactures of Straw, of Esparto or of other Plaiting Materials; Basketware and Wickerwork (Chapter 44 to 46)

Chapter 44	:	Wood and articles of wood; Wood charcoal
Chapter 45	:	Cork and articles of cork
Chapter 46	:	Manufactures of Straw, of esparto or of other plaiting materials; basketware and wickerwork

Section 10: Pulp of wood or of other Fibrous Cellulosic Material; Recovered (Waste and Scrap) Paper or Paperboard; Paper and Paperboard and articles thereof (Chapter 47 to 49)

Chapter 47	:	Pulp of wood or of other fibrous cellulosic material; recovered (waste and scrap) of paper or paperboard
Chapter 48	:	Paper and paperboard; articles of Paper pulp, of paper or of paperboard
Chapter 49	:	Printed books, Newspapers, Pictures and other products of the printing industry; Manuscripts, Typescripts and Plans

Section 11: Textile and Textile Articles (Chapter 50 to 63)

Chapter 50	:	Silk
Chapter 51	:	Wool, fine or coarse animal hair, horse hair yarn and woven fabric
Chapter 52	:	Cotton
Chapter 53	:	Other vegetable textile fibres; paper yarn and woven fabrics of paper yarn
Chapter 54	:	Man-made filaments
Chapter 55	:	Man-made staple fibres

Chapter 56	:	Wadding, felt and nonwovens; special yarns; twine, cordage, ropes and cables and articles thereof
Chapter 57	:	Carpets and other textile floor coverings
Chapter 58	:	Special woven fabrics; tufted textile fabrics; lace; tapestries; trimmings; embroidery
Chapter 59	:	Impregnated, coated, covered or laminated textile fabrics; Textile articles of a kind suitable for industrial
Chapter 60	:	Knitted or crocheted fabrics
Chapter 61	:	Articles of apparel and clothing accessories, knitted or crocheted
Chapter 62	:	Articles of apparel and clothing accessories not knitted or crocheted
Chapter 63	:	Other made up textile articles; sets; worn clothing and worn textile articles; rags

Section 12: Footwear, Headgear, Umbrellas, Sun Umbrellas, Walking-sticks, seat sticks, whips, Riding-crops and Parts thereof; Prepared Feathers and articles Made therewith; artificial Flowers; Articles of Human Hair (Chapter 64 to 67)

Chapter 64	:	Footwear, gaiters and the like; parts of such articles
Chapter 65	:	Headgear and parts thereof
Chapter 66	:	Umbrellas, sun umbrellas, walking sticks, seat-sticks, whips, riding-crops, and parts thereof
Chapter 67	:	Prepared feathers and down and articles made of feathers or of down; artificial flowers; articles of human

Section 13: Articles of Stone, Plaster, Cement, Asbestos, Mica or similar Materials; Ceramic Products; Glass and Glassware (Chapter 68 to 70)

Chapter 68	:	Articles of stone, plaster, cement, asbestos, mica or similar materials
Chapter 69	:	Ceramic Products
Chapter 70	:	Glass and Glassware

Section 14: Natural or Cultured Pearls, Precious or Semi-Precious Stones, Diamonds, Precious Metals, Metals clad with Precious Metal, and articles thereof; Imitation Jewellery; Coin (Chapter 71)

Chapter 71	:	Natural or Cultured Pearls, Precious or Semi-Precious Stones, Diamonds, Precious Metals, Metals clad with Precious Metal, and articles thereof; Imitation Jewellery; Coin

Section 15: Base Metals and Articles of Base Metal (Chapter 72 to 83)

Chapter 72	:	Iron and Steels
Chapter 73	:	Articles of Iron or Steel
Chapter 74	:	Copper and articles thereof

Chapter 75	:	Nickel and articles thereof
Chapter 76	:	Aluminium and Articles thereof
Chapter 77	:	Reserved for Possible Future Use
Chapter 78	:	Lead and articles thereof
Chapter 79	:	Zinc and articles thereof
Chapter 80	:	Tin and articles thereof
Chapter 81	:	Other Base metals; Cermets articles thereof
Chapter 82	:	Tools, implements, cutlery, spoons and forks, of base metal; parts thereof of base metal
Chapter 83	:	Miscellaneous articles of base metal

Section 16: Machinery and Mechanical Appliances; Electrical Equipment; Parts thereof; sound Recorders and Reproducers, Television Image and Sound Recorders and reproducers, Television Image and sound Recorders and Reproducers, and Parts and Accessories of such article (Chapter 84 to 85)

Chapter 84	:	Nuclear reactors, boilers, machinery and mechanical appliance; parts thereof
Chapter 85	:	Electrical machinery and equipment and parts thereof; sound recorders and reproducers, television image and sound recorders and reproducers and parts and accessories of such articles

Section 17: Vehicles, Aircraft, Vessels and Associated Transport Equipment (Chapter 86 to 89)

Chapter 86	:	Railway or tramway locomotives, rolling-stock and parts thereof; rail-way or tramway track fixtures and fittingsand parts thereof; mechanical (including electro-mechanical)traffic signalling equipment of all kinds
Chapter 87	:	Vehicles other than railway or tramway rolling stock, and parts and accessories thereof
Chapter 88	:	Aircraft, Spacecraft and parts thereof
Chapter 89	:	Ships, Boats and Floating Structures

Section 18: Optical, Photographic, Cinematographic, measuring, checking, precision, medical or surgical Instruments and apparatus; clocks and watches; musical instruments; part and accessories thereof (Chapter 90 to 92)

Chapter 90	:	Optical, Photographic, Cinematographic, measuring, checking, precision, medical or surgical instruments and apparatus; parts and accessories thereof
Chapter 91	:	Clocks and watches and parts thereof
Chapter 92	:	Musical instruments; parts and accessories or such articles

Section 19: Arms and Ammunition; Parts and Accessories thereof (Chapter 93)

Chapter 93	:	Arms and Ammunition; Parts and Accessories thereof

Section 20: Miscellaneous Manufactured Articles (Chapter 94 to 96)

Chapter 94	:	Furniture; Bedding, Mattresses, Mattress supports, cushions and similar stuffed furnishings; Lamps and Lighting fittings, not elsewhere specified or included; illuminated signs, illuminate name-plates and the like; Prefabricated
Chapter 95	:	Toys, Games and Sports Requisites; Parts and Accessories thereof
Chapter 96	:	Miscellaneous manufactured articles

Section 21: Works of art, Collectors' Pieces and Antiques (Chapter 97 to 98)

Chapter 97	:	Works of Art, Collectors" Pieces & Antiques
Chapter 98	:	Project Imports; Laboratory Chemicals; Passengers; Baggage; Personal importation' s by Air or Post; Ship

ANNEXURE II

Different Country Groups as classified by World Bank

S.No.	Group	Countries
1.	Low-Income Countries (LIC)	Afghanistan, Bangladesh, Benin, Burkina Faso, Burundi, Cambodia, Central African Republic, Chad, Comoros, Democratic Republic of Congo, Eritrea, Ethiopia, Gambia, Ghana, Guinea, Guinea-Bisau, Haiti, Kenya, Democratic Republic of Korea, Kyrgyz Republic, Lao PDR, Liberia, Madagascar, Malawi, Mali, Mauritania, Mozambique, Myanmar, Nepal, Niger, Rwanda, Senegal, Sierra Leone, Somalia, Tajikistan, Tanzania, Togo, Uganda, Uzbekistan, Vietnam, Yemen Republic, Zambia, Zimbabwe.
2.	Lower-Middle Income Countries (LMIC)	Albania, Angola, Armenia, Azerbaijan, Belize, Bhutan, Bolivia, Cameroon, Cape Verde, China, Congo Republic, Cote d'Ivoire, Djibouti, Ecuador, Egypt-Arab Republic, El Salvador, Georgia, Guatemala, Guyana, Honduras, India, Indonesia, Islamic Republic of Iran, Iraq, Jordon, Kiribati, Kosovo, Lesotho, Maldives, Marshall Islands, Federal States of Micronesia, Moldova, Mongolia, Morocco, Nicaragua, Nigeria, Pakistan, Papua New Guinea, Paraguay, Philippines, Samoa, Sao Tome and Principe, Solomon Islands, Sri Lanka, Sudan, Swaziland, Syrian Arab Republic, Thailand, Timor-Leste, Tonga, Tunisia, Turkmenistan, Ukraine, Vanuatu, West Bank and Gaza

3.	Upper-Middle Income Countries (UMIC)	Algeria, American Samoa, Argentina, Belarus, Bosnia and Herzegovina, Botswana, Brazil, Bulgaria, Chile, Colombia, Costa Rica, Cuba, Dominica, Dominican Republic, Fiji, Gabon, Grenada, Jamaica, Kazakhstan, Latvia, Lebanon, Libya, Lithuania, Macedonia FYR, Malaysia, Mauritius, Mayotte, Mexico, Montenegro, Namibia, Palau, Panama, Peru, Poland, Romania, Russian Federation, Serbia, Seychelles, South Africa, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Suriname, Turkey, Uruguay, Venezuela.
4.	High-Income Countries (HIC)	Andorra, Antigua and Barbuda, Aruba, Australia, Austria, The Bahamas, Bahrain, Barbados, Belgium, Bermuda, Brunei Darussalam, Canada, Cayman Islands, Channel Islands, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Equatorial Guinea, Faeroe Islands, Finland, France, French Polynesia, Germany, Greece, Greenland, Guam, Hong Kong (China), Hungary, Iceland, Ireland, Isle of Man, Israel, Italy, Japan, Republic of Korea, Kuwait, Liechtenstein, Luxembourg, Macao SAR (China), Malta, Monaco, Netherlands, Netherlands Antilles, New Caledonia, New Zealand, Northern Mariana Islands, Norway, Oman, Portugal, Puerto Rico, Qatar, San Marino, Saudi Arabia, Singapore, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Trinidad and Tobago, United Arab Emirates, United Kingdom, United States, Virgin Islands
5.	High-Income OECD Countries (HIOECD)	Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Republic of Korea, Luxembourg, Netherlands, New Zealand, Norway, Portugal,

Slovak Republic, Spain, Sweden, Switzerland, United Kingdom, United States