

Mechanics of Intra-Industry Trade and FTA
Implications for India in RCEP

Ram Upendra Das and Jay Dev Dubey

Discussion Paper # 190



RIS

Research and Information System
for Developing Countries

**Mechanics of Intra-Industry Trade
and FTA**
Implications for India in RCEP

Ram Upendra Das
Jay Dev Dubey

RIS-DP # 190

March 2014



RIS
**Research and Information System
for Developing Countries**

Core IV-B, Fourth Floor, India Habitat Centre
Lodhi Road, New Delhi – 110 003 (India)

Tel: +91-11-2468 2177/2180; Fax: +91-11-2468 2173/74

Email: publication@ris.org.in

RIS Discussion Papers intend to disseminate preliminary findings of the research carried out within the framework of institute's work programme or related research. The feedback and comments may be directed to the author(s). RIS Discussion Papers are available at www.ris.org.in

Mechanics of Intra-Industry Trade and FTA *Implications for India in RCEP*

Ram Upendra Das*
Jay Dev Dubey**

Abstract: Worldwide, free trade agreements (FTAs) have remained a debatable issue. This paper tries to demystify the recent myths that have surrounded the FTA strategy of India, especially as part of the *Look East Policy*. The paper does this by analysing the determinants of Intra-Industry Trade (IIT), which has remained as one of the most dominant forms of trade flows, not explained by the traditional trade theories. Most importantly, the paper highlights the economics of IIT in the context of FTAs in a manner not explored before, by building on the new trade theories. The paper demonstrates both theoretically and empirically, with robust econometric estimations, that an FTA in goods among ASEAN+6 countries under RCEP, especially with India's active presence and greater trade integration can, not only propel Intra-Industry type trade flows in the region under consideration but it can further help *sustain* such trade flows.

Keywords: RCEP, Free Trade Agreement, Intra-Industry Trade, Tobit

1. Introduction

Despite the fact that the global trade has been largely accounted for by free trade agreements (FTAs) as compared to MFN based trade under the multilateral trade agreements of the WTO, FTAs have remained a debatable issue, worldwide and India is no exception. Shedding light on this, is particularly relevant when India economically integrates with the East Asian region with ASEAN+6 countries negotiating the Regional Comprehensive Economic Partnership (RCEP) agreement.

The importance of a region-wide FTA in goods among ASEAN+6 countries is explored in this discussion paper by going deeper into

* Professor, RIS. Email: upendra@ris.org.in

** Consultant, RIS. Email: jd.dubey@ris.org.in

the very economics of FTAs. The paper analyses the Intra-Industry Trade (IIT), which occupies the largest share of world trade as also in the region under consideration, but is not explained by the traditional trade theories of the Ricardian Comparative Advantage or by the H-O framework based on factor-endowments and factor-intensities. Rather, IIT type flows are explained by the New Trade Theories *a la* Krugman and others.

Given the importance of trade flows of intra-industry type, the paper goes into the determinants of IIT and highlights how FTA in ASEAN+6 region could help sustain this type of flows, an aspect often not given adequate emphasis in the current literature, which gives rise to ambiguities even in the policy making processes.

The paper dwells into the issues of Vertical IIT (VIIT) and Horizontal IIT (HIIT). If the price-wedge between the products of export and import in a particular industry is higher than a critical minimum level, the products of exports and imports are considered as distinct, even if they belong to the same industry and called the VIIT type flows and are usually considered to be determined by the traditional theories of the comparative advantage. On the other hand, if the products of exports and imports in an industry have lesser price-difference, they are classified as HIIT and thus are explained by the new growth theories that give precedence to the role of technology and market imperfections. This is so because in the case of VIIT due to high price-wedge the products of exports and imports are considered distinct and dissimilar even if they belong to the same industry, hence explained by the traditional theories. In other words, it is the HIIT which is the relatively purer form of IIT which is explained in a more robust way by the new trade theories.

The paper brings in various conceptual and empirical insights that are novel and have remained unexplored in the literature. Most importantly, the paper highlights the economics of IIT in the context of FTAs in a manner not explored before. By these, the paper is able

to help pronounce the relevance of FTAs in the context of IIT which is the more dominant form of trade and argues how IIT can be sustained when the VIIT segment of IIT reaches a ceiling due to declining role of comparative advantage-related factors to trade. Regional trade integration among ASEAN+6 in goods through IIT has a special significance if the trade linkages are studied in the ambit of regional production chains.

Against this backdrop, literature survey is undertaken in Section 2. A brief analytical framework is provided in Section 3 with hypotheses and model specification. Methodology and data structure are given in Section 4. Results and their interpretation are presented in Section 5. Broad conclusions are presented in Section 6.

2. Literature Survey

The pioneering work explaining Intra-Industry Trade (IIT) flows through theoretical models is attributed largely to Krugman (1979, 1980). Further addition in this direction has been made by Lancaster (1980), Helpman (1981), Eaton and Kierzkowski (1984). All these models consider differentiated products. However, these products are of different varieties but they are of a similar quality. This kind of differentiation between similar products is called horizontal product differentiation. Krugman's model follows a neo-Chamberline approach and is based on the assumption that all varieties of a differentiated products affect the utility function in similar manner due to similarity in quality.

Contrary to this, the Lancaster model is based on the neo-Hotelling approach, which assumes that horizontally differentiated products affect the utility function asymmetrically. Krugman's model assumed consumption of as many different varieties of a given product as possible, captioned as the *love of variety* approach. In the latter, it is assumed that each consumer has different preferences for alternative varieties of a given commodity and every consumer prefers one variety

to all others captioned as *favourite variety* approach. In all these models it is being assumed that different variety is produced under decreasing costs and when the countries open to trade, the similarity of the demand leads to intra-industry trade. IIT in horizontally differentiated products is more likely to take place between countries which have similar factor endowments and may be with identical factor intensity. Such a phenomenon is called HIIT and therefore, it could not be explained by the traditional theories and models of the Heckscher-Ohlin type.

When consumers judge the products purely on the basis of their perceived notion of quality of products and design their preferences accordingly, these kinds of products belong to the category of vertical differentiation. Works such as by Falvey (1981), Falvey and Kierzkowski (1984), Shaked and Sutton (1984) and Flam and Helpman (1987) introduced the models based on vertically differentiated products. In this connection papers by Greenaway and Milner (1986), Greenaway, Hine and Milner (1994), Tharakan and Kerstens (1995) and Blanes and Martin (2000) argue that Vertical IIT (VIIT) can be explained by traditional theories of comparative advantage.

The labour-abundant countries have comparative advantage in labour-intensive products which are considered as lower quality varieties and the relative capital-abundant countries have comparative advantage in capital-intensive products. Thus, according to comparative advantage theory, the labour-abundant nations will export the labour-intensive varieties and the capital-abundant countries will export the capital-intensive varieties. These models come under the revised nomenclature and captioned as content version of Heckscher-Ohlin theorem, whereby the capital content of the net exports of the relative capital-abundant country will be higher in relationship to the net exports of the other country (Vanek, 1968). As explained by Davis (1995) goods can be differentiated due to their perceived quality from the consumers' point of view (demand side), whereas

from the producers' point of view (supply side) high quality goods are produced with greater capital availability. Hence, to analyse the modern trade pattern in connection with traditional trade theories it is important to exclude VIIT goods (varieties) produced under the same factor proportions. The literature to study the inter-linkages between new trade theories and traditional theories basically incorporates the consumer preference and economies of scale together with factor endowment to capture the fact that how nature of commodities have also a crucial role to determine trade patterns of an economy. It is therefore important to separate products based on VIIT and HIIT to observe how the new theory of international trade offers deeper insights into such trade flows which could not be explained by the theories based on comparative advantage such as the Ricardian trade theory and Heckscher-Ohlin trade theory.

Helpman and Krugman (1985) build a model which incorporates both vertical and horizontal intra-industry trade. This model is generalisation of both traditional and new trade theory as it incorporates factor endowments, decreasing costs and horizontal product differentiation. It is known as the Chamberlin-Heckscher-Ohlin model.

Turning our attention to the empirical literature, especially on IIT focusing on the region of Asia, we find that they can be generally divided into two different non exclusive sets. The first set of studies such as Hu and Ma (1999), and Zhang, Witteloostuijin and Zhou (2005) focus on the extent of IIT in specific Asian countries such as China, South Korea, Japan, India etc. Zhang and Li (2006) estimated the extent and determinants of China's IIT in manufactured goods over the 1990s. Shen and Gu (2007) have investigated China's bilateral IIT with the United States, Japan (Xing, 2007), and Korea (LeeHan, 2008). Country-specific analysis of IIT has been conducted for Korea (Bhattacharyya, 2005; Byun Lee, 2005), Japan (Wakasugi, 1997), and India (Das, 2005).

The second set of studies in this regard is dedicated to investigating IIT among Asian regions or trade blocs with special

emphasis on East Asia and the ASEAN. Thorpe and Zhang (2005) estimated East Asia's IIT levels and its determinants particularly for manufacturing sector and showed that the IIT index has grown more than 100 per cent during the last three decades of the previous century. Kimura and Ando (2005), and Ando (2006) followed by Wakasugi (2007) considered this phenomenon as an outcome of the increasing involvement of East Asian countries in vertical specialisation and the international fragmentation of production with focus also on creation of regional production networks. The dependence of East Asia on international specialisation has been found to be proportionally larger than in North America and Europe (Athukorala and Yamashita, 2006).

Cortinhas (2007), and Sohn and Zhang (2005) explain that IIT extensively promotes economic integration within East Asia and among ASEAN member countries. However, the literature has sparsely looked at the dynamics of FTAs contributing to IIT flows and helping it sustain over time. The establishment of regional value chains and supply chains in the ASEAN region by MNCs leads to growing IIT which consequently helps in stabilising business cycle in this region (Rana, 2006, 2007). The study by Bruelhart (2008) observes that during 2006, the level of intra-regional IIT in Northeast and Southeast Asia was around 27 and 34 per cent, respectively. These numbers stood at the second place, behind the highly integrated regions of North America and Western Europe where level of IIT accounts for 55 and 45 per cent, respectively. Further, it has also been shown by Bruelhart (2008) that IIT within South and Central Asia was almost absent. However, in a similar work by Rana (2006) the figures are tremendously high if intra-regional IIT is calculated after combining ASEAN and East Asia. The level of IIT in that case was almost 55 per cent which exceeds the IIT within NAFTA (45 per cent) and is close to the levels within the European Union (66.2 per cent). Further findings of Bruelhart (2008) show that East Asia was highly engaged in inter-regional IIT with developed countries (21 per cent) followed by trade with South Asia (8.5 per cent) and Latin America (5.9 per cent).

It is clear from the preceding literature survey that there are hardly any studies that have focused on the regional trade integration issues within ASEAN+6 region in the context of theoretical and empirical justification of it to augment IIT type flows on a sustained basis. While there are studies that have explored the determinants of IIT, VIIT and HIIT in terms of Revealed Comparative Advantage (RCA) Index, to suggest that overall IIT is explained by both the traditional and new trade theories, they do not provide an answer to unshackling the limits reached by RCA in explaining IIT behaviour. Similarly, there are studies that do empirically highlight the linkages between IIT and FTAs but do not do so in the context of FTAs providing a fresh impetus to the IIT type flows, which is especially so very relevant for creating and strengthening regional production networks. The contribution of this paper would be clearer in the analytical framework that is presented in the next section.

3. Analytical Framework

As per the traditional trade theories, in the situation of no trade countries fulfill their entire demand on their own, including the objects in which production efficiency is inferior. However, when trade opens up countries can channelise their efforts to produce the items in which they have comparative advantage and compensate their residual demand by international exchange. Factors of production are the fundamental basis for defining the comparative advantage of any country. Trade is an instrument for achieving higher economic growth of nation and it also plays a crucial role to reduce the problem of unemployment via industrial growth. With increasing economic growth, market size and per capita income also grow and this leads to increased domestic demand. Higher demand along with the global technological advancement and intensive innovation results in emergence of new products or the different variety of similar products. The above arguments help us draw two important inferences. Firstly, with bigger product basket more opportunities of trade occur and the minimal trade barriers become a pre-requisite. Secondly, a lot of intra-

industry trade takes place between the countries. The second outcome is quite crucial in the context of the present analysis when trade can take place even if the two nations are almost similar in terms of their consumers' taste factor endowments and factor intensity.

Under the Heckscher-Ohlin framework a country exports only those products which exhibit comparative advantage due to abundance in factor endowments and high factor-intensities in the most abundant factor of production, with technology as exogenous. However, this could not explain the more dominant form of global trade of the IIT variety. This was explained by the pioneering work on New Trade Theory by Krugman (1979, 1980) and further advancement by Lancaster (1980), Helpman (1981) and others as mentioned earlier. In all these works the main emphasis is to model how trade of similar products take place between two countries on the basis of product differentiation, which is achieved by technology factor and through economies of scale and market imperfections. Similar products of consumption, supplied and demanded through bilateral trade can be distinguished according to their quality or branding under a monopolistic competitive market condition. These are deemed as Intra-Industry Trade (IIT).

In the context of contemporary trade pattern, it has been observed that with the existence of infinite number of products countries do IIT even in the products which exhibit comparative advantage. This is the state which represents the coexistence of both traditional trade theory and the Krugman's version together in explaining trade flows of IIT variety. The reason behind this coexistence is the functional relationship between the measures of intra-industry trade and the comparative advantage. One of the principal objectives of this paper is to study this relationship empirically and to establish the growing role of intra-industry trade as a global phenomenon, reflected quite prominently in the East Asian region, as highlighted in the literature survey in the earlier section. We would revert to our basic contention

that the free trade agreements (FTAs) are not only one of the important determinants of intra-industry trade but also can relieve the constraints imposed by comparative advantage as the theoretical underpinning explaining a portion of IIT. This needs further and deeper explanation.

3.1 IIT and RCA: New and Traditional Trade Theories

As was explained earlier, studies have explored the determinants of IIT, VIIT and HIIT in terms of Revealed Comparative Advantage (RCA) Index, to suggest that overall IIT is explained by both the traditional and new trade theories.

We examine this by the argument that the determinants of IIT need to be explained not only in terms of the linear relationship whereby IIT is a function of RCA but also whether the rate of change in IIT is determined by the rate of change in RCA, in other words, if IIT is a non-linear function of RCA as well. This is so because when RCA increases, IIT may increase, reach a ceiling and beyond that point IIT may decrease.

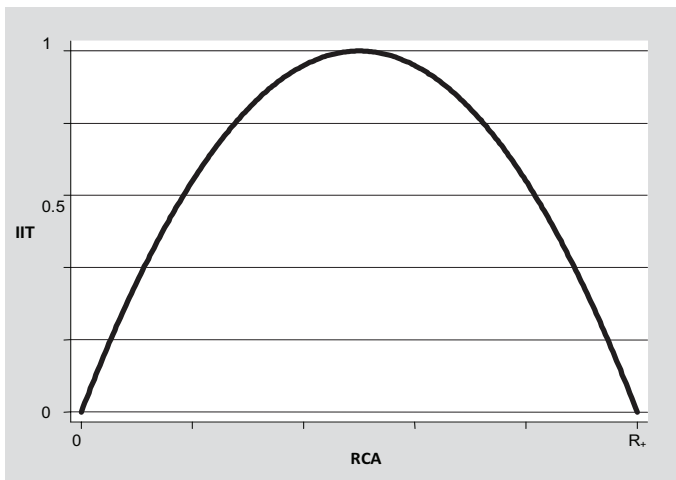
This explanation relates IIT with RCA in a quadratic form and postulates an inverted-U shaped curve. We construct a model which assumes IIT as a function of RCA with positive first derivative. This accounts for the fact that as RCA increases, IIT also increases. IIT is also assumed to be a function of square of RCA with negative second derivative. This captures the fact that after reaching an inflexion point IIT starts falling.

The quadratic relationship between IIT and RCA is expected to yield a humped shape (or inverted-U shape) curve. We will now briefly elaborate the theoretical explanation of the proposed hypothesis. Following the argument of Helpman and Krugman (1985) it may be assumed that the IIT should be inversely related to RCA. Intra-Industry Trade is sensitive to nature of production and a lower value of IIT index implies lower product market competition due to smaller innovation in production process. This situation allows the

firms to differentiate their products through prices, and indicators of differentiation like quality are subjects of less importance. In this situation trade takes place more due to the factors suggested by traditional theories and therefore, IIT depicts a positive relationship with RCA. However, in long run due to technological advancement and growing innovation, emergence of new production processes is quite likely. In the long run, consequently, the production process of a rival is known to other producers in the same industry. Therefore, the comparative advantages based on technologies across producers cannot prevail any longer. With wide variety of choice among similar products the importance of horizontal differentiation becomes more pronounced for producers of similar products in the same industry. In such a situation trade cannot be explained by traditional theories and the relationship between IIT and RCA turns negative.

The above economic rationale between the relationship between IIT and RCA in both short and long runs can be captured through the hypothetical representation in Figure 1.

Figure 1: Inverted-U Relationship between IIT and RCA Hypothesis



Source: Authors' hypothesis.

From Figure 1 it is evident that while the RCA represented on the X-axis varies without any binding restriction between 0 and any other positive value, the IIT, by its very definition, is bound to vary only between 0 and 1.

As stated before we are also examining the above issue after bifurcating the trade pattern in two different heads viz. horizontal and vertical intra-industry trade.

At this juncture, we need to explain more clearly about the dynamics of product differentiation as an important aspect of analysis of IIT, which is presented now.

3.2 Decomposing IIT: VIIT and HIIT

As highlighted earlier, one of the important determinants of IIT as per the New Trade theory is product differentiation. Let us try and understand this phenomenon. Several products falling into the same industry can be differentiated in terms of their perceived and actual characteristics. For instance, from the producer's point of view products can be differentiated through branding and they may practice this discrimination through advertisements. Consumers, on the other hand, differentiate products as per their tastes and preferences and through their capabilities of quality-judgement. One important observation with regard to product differentiation is that it is a matter of degree and not a state. From the consumers' point of view two products can be differentiated but they may consider these as substitutes. Differentiation between two products can be ranked as the parameters of differentiation may make few products close substitutes whereas some products can be competently dissimilar even if they belong to same industry. Some of the varieties affect the utility function of a consumer homogeneously but others may heterogeneously.

The microeconomic foundations of IIT such as above help bifurcate IIT in two categories as Horizontal IIT (HIIT) and Vertical

IIT (VIIT). When consumers differ in their rankings of a group of products even if their prices are same or close to same then it is called Horizontal IIT. But in case of vertical differentiation, products differ in quality and if all products have the same price, people would only buy the one with the highest quality. Quality is a perceived notion and there are in general no direct parameters to measure it. Similar products can be differentiated by the observable characteristics but this will hold true only for horizontal differentiation. Thus, the price-wedge between products has been accepted widely to measure and distinguish between VIIT and HIIT.

The above discussion helps in analysing the relationship between RCA and IIT which is further divided into HIIT and VIIT. Under vertical IIT, products which *prima facie* belong to similar category turn into two different goods due to quality difference. In this case, trade can be explained through the traditional trade models of absolute or comparative advantage as creation of high quality products can be factor-specific. Considering that RCA can represent and capture the traditional theories of trade, RCA should be positively correlated with IIT, especially the VIIT. On the other hand, HIIT includes goods that are close to each other in terms of their quality and price and can be explained by the Krugman's model.

It is also important here to discuss the possible determinants of intra-industry trade, especially in terms of RCA. In studies, IIT is used as a proxy of new trade theories whereas RCA as a proxy for traditional trade theory of comparative advantage is a determinant of IIT. We use these indices by assuming a functional relationship to determine the nature of intra-industry trade. We assume that this relationship is quadratic and hence can be represented by following equation

$$\ln IIT_{it} = \alpha_0 + \alpha_1 \ln RCA_{it} + \alpha_2 (\ln RCA_{it})^2 + \mu_{it} \dots \dots \dots (1)$$

3.3 Mechanics of FTAs and IIT

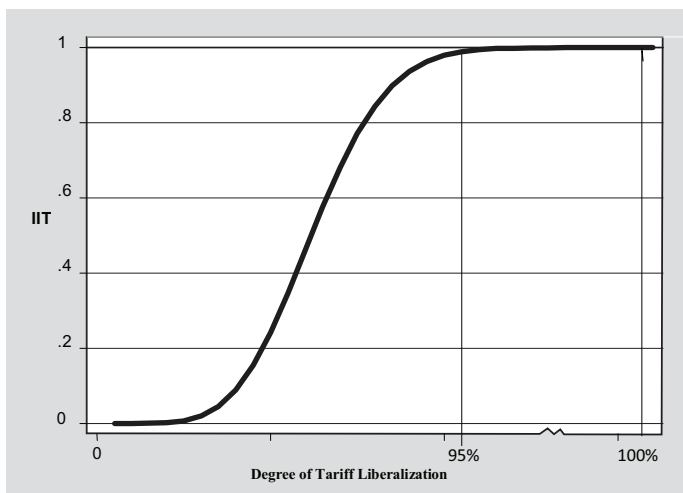
Menon and Dixon (1996) theoretically elaborate the issue of intra-industry trade promotion through regional agreements. Bojnec (2001) studied the East and Central European agricultural intra-industry trade and the role of regional agreements as propelling factor. Zhang and Thorpe and Zhang (2005) is one of the recent empirical treatments which studies the determinants of IIT in East Asia and highlight the relevance of RTAs. The other Asia-centric studies by Bhattacharya (2005), Ando (2006) and Xing (2007) stand out as some of the influential work which focuses upon the determinants of trade pattern through IIT. Sawyer *et al.* (2010) makes a fresh attempt in this direction which covers the growing trade due to RTAs at very micro level among some of the Asian countries. It may, however, be pointed out that the study by Sawyer *et al.* (2010) has its limitation.

The potential gains from industrial agglomeration has been recognised widely and we understand that the actual realisation of these gains in ASEAN+6 region requires a major policy intervention. The idea is to develop advance production methods to boost production in order to cater to the huge market that exists in the ASEAN+6 region. Policies should promote higher intra-industry trade to create sustainable production chains within this region. Our study argues in favour of a larger role of RTAs in determining IIT, as also in sustaining it and puts forth the following hypothetical shape depicting the relationship between the degree of tariff liberalisation under an RTA among ASEAN+6 and IIT in the course of creating robust value chains in this region (Figure 2).

On the horizontal axis a movement from origin to the right illustrates the higher trade liberalisation whereas on the vertical axis we are measuring the indicator of IIT which is bounded between zero and one. The graph shows that IIT has become asymptotic to the value one when the degree of liberalisation reaches up to 95 per

cent level which implies that volume of export and import of country being in close proximity and thus, IIT is moving to its highest level. Going by the WTO condition for an effective and meaningful RTA, 95 per cent tariff liberalisation can be safely considered as *substantial trade coverage*. Further movement towards complete liberalisation (i.e. 100 per cent level), IIT will always tend to the value one and will show that a very high degree of trade liberalisation will help the IIT sustain in the long run.

Figure 2: Relationship between Degree of Tariff Liberalisation under RTA and IIT



Source: Authors' hypothesis.

Our basic argument stands around the fact that the current era of enormous production of varieties of commodities necessitates tapping strong demand, given the several emerging economies in the region, through greater market access under an ASEAN+6 RTA. What is more, this would help sustain the supply chains and IIT type flows that can be ensured through region-wide trade agreement. One needs to understand at this stage the channels through which an RTA

can help sustain IIT through various economic effects. With the help of an ASEAN+6 FTA in goods, IIT can be sustained via the effects of FTA on trade-FDI nexus, efficiency-seeking economic restructuring, horizontal and vertical integration, development-oriented rules of origin, economies of scale, competition, technological improvements and product differentiation, in turn facilitating regional value chains in the region by propelling goods-services linkages (see Das, 2006, 2009, 2013; Das and Ratna, 2011; and Kumar 2007).

The basic aim of the above discussion is to highlight an important hypothesis. This pertains to whether India as a source of IIT would lead to propelling higher trade among the ASEAN+6 region, especially through an FTA under RCEP.

Against this backdrop, we now present a deterministic framework for IIT using an augmented gravity model. We use Grubel-Lloyd index of IIT as a dependent variable. We consider all possible bilateral pairs of India with individual ASEAN+5 countries. We then use the bilateral data on import and export to calculate IIT index. Among the independent variables the first is relative difference of the size of two countries, where size of an economy is represented by its GDP. A smaller gap in GDP between two countries indicates similar market size and a high potential for intra-industry trade due to overlapping demand. This relative difference in GDP following Sawyer *et al.* (2010) is measured by the following identity:

$$dgpd_{ijt} = 1 + \frac{X \ln(X) + (1 - X) \ln(1 - X)}{\ln 2}$$

where

$$X = \frac{GDP_{it}}{GDP_{it} + GDP_{jt}}$$

The next variable captures the difference in purchasing power over the differentiated products between two countries. This can be measured by per capita GDP gap. Countries with similar per capita

GDP may reflect higher IIT. Per capita GDP gap has been calculated using similar formulae. Manufactures exports as a percentage of merchandize exports and trade as a percentage of GDP as a proxy of openness are also assumed to be positively associated with IIT. In manufacturing sector the scope of product penetration are generally higher and with lower trade barriers (i.e. openness) therefore this seems to be a realistic assumption. We also include distance between countries as geographical proximity affects trade via transportation cost. Foreign direct investment as a percentage of GDP is also included in the model because of trade-FDI linkages. The indicator of trade agreement is taken as dummy variable. The dummy variable of RTA is the main focus of this model as it is the only variable that is purely exogenous in the sense that it indicates policy regime. In this context, we focus on the Indian position IIT with other countries of ASEAN+5 region.

The presence of both cross-section and time element make our model suitable for panel estimation in an augmented gravity framework. Our model is given by following equation:

$$IIT_{ijt} = \alpha_1 DGDP_{ijt} + \alpha_2 DPCGDP_{ijt} + \alpha_3 DIST_{ij} + \alpha_4 EDU_{it} + \alpha_5 OPEN_{it} + \alpha_6 MANU_{it} + \alpha_7 FDI_{it} + \alpha_8 RTA + \epsilon_{ij} + \mu_{ijt} \quad \dots\dots\dots(2)$$

4. Methodology

In this section, we highlight some of the important empirical set up of the paper. Our analysis which largely focuses upon India's trade potential with ASEAN+5 countries adopts a two stage approach. First, we calculate two different indices among which the first one is the index of intra-industry trade, also known as Grubel-Lloyd (GL) index, calculated by the following identity;

$$IIT_i = 1 - \frac{|X_i - M_i|}{X_i + M_i}$$

Where X_i is the export of i -th country and M_i is the import of same country. Note that IIT lies between 0 and 1. Moving from 0 to 1 implies no intra industry trade to full or only intra industry trade.

The second is calculation of Revealed Comparative Advantage (RCA) index for each product at six digit classifications. We use the following formula for purpose of RCA calculation:

$$RCA = \frac{X_{ij}}{X_{it}} \div \frac{X_{wj}}{X_{wt}}$$

where, X_{ij} = Export of j th commodity from i th country to the world. X_{it} = Total export of i th country to the world. $X_{wj} = \sum X_{ij} \quad i(1)w$ = world's total export of j th commodity. $X_{wt} = \sum X_{it} \quad i(1)w$ = world's total export of all the commodities. Where, w denotes the set of country.

We will now shortly discuss about the estimation procedure that has been adopted. In this regard, we will first explain how we have calculated the index of intra-industry trade on the one hand also the rule of bifurcation of IIT in terms of vertical and horizontal categories on the other.

For calculations we use UNCOMTRADE database to get India's export and import data for the period ranging from 2007 to 2011.

We take bilateral export and Import for India with rest of the ASEAN+5 countries to calculate IIT index. To carry out the analysis with extensive details we require highly disaggregated data. The database contains product-wise information up to HS six-digit classification. It is important here to explain that although we start our analysis from six-digit classification but the empirical analysis has been done only after re-aggregating the data up to four digit. This is due to the fact that IIT is sensitive to degree of disaggregation of

data. The two-digit classification represents economic sectors and the six-digit is a product-specific disaggregation. Since we are analysing intra-industry and not intra-product the four digit classification is the most optimal to define industry. Bifurcating into two categories of HIIT and VIIT requires comparison of export and import prices. We assume a cut off point of 25 per cent to categorise products in terms of HIIT and VIIT. We assume that if the average price gap (average during 2007 to 2011) between import and export for a particular product exceed this limit should be considered as VIIT and the rest belongs to the category of HIIT.

Existing studies on bifurcation of IIT in vertical and horizontal categories assume a 15 per cent price gap between prices of import and export of similar product to split the IIT. In our view this selection is arbitrary and may not be considered as a general rule due to the heterogeneous trade patterns among the various trade blocs across the globe. In the context of contemporary trade patterns the value of 15 per cent leads to a strong bias towards vertical IIT as a large number of products fall into this category.

We illustrate this point by taking the example of Automobile sector in the context of India displaying wide range of price gaps in similar products at HS 6-digit level in order to justify our 25 per cent cut off point to bifurcate IIT.

HS	Description
86-89	Transportation
87	Vehicles Other Than Railway Or Tramway Rolling
8703	Motor cars & vehicles for transporting persons
870322	Other Vehicles, Spark-Ignition Engine Of a cylinder capacity exceeding 1,000cc but not exceeding 1500cc.

As a preamble to Table 1 the above provides detailed definition of motor vehicles used for transporting individuals according to HS 6-digit classification. But to understand the 6-digit description of

motor vehicles we found it relevant to begin from an aggregated level of 2-digit classification and move down to the 6-digit level. On this basis we collected information related to price and other specifications of few motor vehicles of different brands which are available in Indian market at a given point of time, in this case as on 29 March 2014.

The selected brands can further be differentiated in terms of many other technical peculiarity but those inherent characteristics are redundant from the view point of HS definition at six digit and allow use to assume all the selected brands belong to same classification. The last column of the table represents the price difference relative to the costliest car. The range of these price gaps varies from a minimum of 9 per cent to a maximum of 31 per cent and makes the criterion of mere 15 per cent an ambiguous and arbitrary one for bifurcating IIT into horizontal IIT and vertical IIT. Therefore, we have taken an average of the different price gap, i.e. considering a 25 per cent cut-off point as a relatively more scientific and closer to reality in bifurcating IIT into horizontal IIT and vertical IIT.

Table 1: Extent of Price Differential across Similar Products at HS 6-digit level at a given point of time: An Illustration of Automobile Prices in India (2014)

Brand	Fuel Type	Engine Displacement (in cc)	Price as on 29/3/2014 (in Rs)	% Price Gap*
Nissan Micra	Petrol	1198	665490	20
Renault Pulse	Petrol	1198	571800	31
Honda Brio	Petrol	1198	599900	28
Volkswagen Polo	Petrol	1197	830700	0
Hyundai	Petrol	1197	722491	13
Honda	Petrol	1198	755000	9
Maruti Swift Dzire	Petrol	1197	633920	24
Chevrolet Sail	Petrol	1199	630982	24

Note: * Price difference of each car's price with the highest priced car i.e. Volkswagen Polo.
Source: Authors' calculation based on information on car prices from various sources.

Now we turn to the issues relating to calculation of RCA. According to the definition the index of RCA is a relative measure of comparative advantage due to its dependence on the export flows of other countries to world. In order to compute index of RCA we consider taking all the products categorised at six digit level which are being exported by each of the ASEAN+6 nations to the world. We aggregate the export data up to four digit before calculating the index by applying the formulae mentioned in the section of analytical framework. We later extract this index for India to use it as an independent variable in the model given by equation (1).

The last step before moving to the econometric estimation is to match the vector of RCA index with the vector of IIT index both calculated for all industries at 4-digit level.

We will now move to the next section to explain the estimation procedure implemented on the model specified by equation (1) and (2) in the previous section. We will also discuss the estimation results and there economic implications.

5. Estimation Procedure and Results

We use a Panel Tobit model to fit the first model under all categories of IIT. The rational for is that as per the definition of IIT index, it always belongs to a bounded set and lies between zero to one. We are using natural logarithm of IIT as dependent variable and due the compactness of IIT the dependent variable would be upper truncated by value zero in Equation (1).

Although the structure of our data includes both cross-section and time element we start our analysis by simply fitting the model using an ordinary least square method to confirm the sign of the coefficients in order to confirm the theoretical nature of the model. While fitting the model using least square technique the signs of the coefficients are analogous to the hypothesis but it yields a very low R-square value reflecting that the model is not a good fit.

We then compare the results by fitting a random effect panel model as well as a Tobit panel model. The result obtained in these cases are similar in all aspects but the value of rho is robust in the case of Tobit model. The Tobit model is also more suitable as the dependent variable i.e. IIT which belongs to bounded reality, varying between 0 and 1, is a limited dependent variable. The Tobit panel model also results in higher Chi square value and indicates that the Tobit panel model is a good-fit. Further, we also observe that the panel-level variance component authenticates the suitability of panel Tobit model and we use this model in the case of overall IIT, HIIT and VIIT, separately. The estimation results are presented in Table 2.

Table 2: IIT and RCA Relationship

	ln(RCA)	ln(RCA)²	cons	chi²	df	N
ln(IIT)	.1274527 (4.68)	-.1037528 (-9.48)	-1.723529 (-30.59)	185.14	2	3100
ln(HIIT)	.1557896 (3.58)	-.1206149 (-6.81)	-1.627579 (-21.35)	114.99	2	1415
ln(VIIT)	.1797523 (3.52)	-.0816552 (-4.64)	-1.796727 (-24.17)	92.77	2	1685

Notes: Z Statistics in parenthesis; Standard errors in parentheses;*** p>0.001, ** p>0.01, * p>0.05

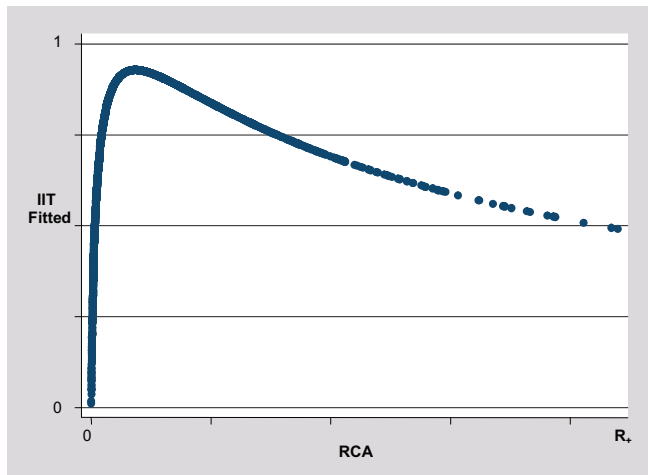
Source: Authors' calculation.

From Table 2 it is clear that the coefficients in all the cases are significant and their signs conform to the hypothesis of inverted –U shape relationship between IIT and RCA. The Chi square value in all the three estimated model are sufficiently high and the corresponding probabilities are zero. These suggest that the explanatory power of the models in all the three specifications is very high.

It may be highlighted at this stage that while IIT is actual trade flows between India and each country from the ASEAN+5 region, the RCAs are indicative or notional values for potential trade as the latter is calculated on the export (import) data of one country for a specific product vis-à-vis the rest of the world export (import) of the same product. Using the estimated coefficients of overall IIT we calculate

the projected value of IIT to examine the relationship graphically. We plot the estimated value of IIT on the vertical axis and the actual RCA values on the horizontal axis (Figure 3).

Figure 3: Fitted Plot - IIT and RCA



Source: Authors' estimations.

Comparing Figures 1 and 3, the former depicting our hypothesis and the latter displaying the relationship based on our estimation, presents us with some interesting and important insights. First, the estimated plot-fit confirms our hypothesis of an inverted-U relationship between the two variables, i.e. IIT and RCA. Secondly, Figure 3 depicts that the actual relationship between IIT and RCA is left-skewed or is characterised by a *positive skew*. This is indicated when that the tail on the right side is longer than the left side. Thirdly, this implies that India's IIT with the ASEAN+5 region increases at a much faster rate for the initial values of RCA, when RCA values are quite low. Moreover, it attains the peakedness when the RCA is very low and then after from the inflexion point IIT decreases, albeit at a slower rate, with increasing RCA value. Fourthly, the most important implication of this result is that not only our hypothesis is

true, the estimates provide further credence to the economics of VIIT hitting a ceiling very fast and at lower values of RCA, implying that the traditional theories of comparative advantage determining IIT wane in oblivion much faster than expected, making IIT increase unsustainable if countries do not find a solution to arrest this trend. This only makes our subsequent econometric estimation more relevant whereby we try to probe into a possible policy solution to help sustain the IIT, especially the HIIT component, that is determined by product differentiation, economies of scale and imperfections in market as propounded by the new trade theories.

We now estimate equation 2 which examines the role of RTA as a determinant of IIT and the results are presented in Table 3. In this case also a panel Tobit model would be the most appropriate for regression as our dependent variable is limited dependent variable, i.e. the IIT index (bounded between zero to one). We also show the results obtained from the random effects model for the purposes comparison. Note that we construct our panel entities as each of the partner countries of India among ASEAN+5 nations combined with all the products categorised at HS four digit classification for the time period 2007 to 2011.

Both the models fits quite strongly as the value of Chi square is high in both the cases. In terms of other determinants like the relative GDP gap and per capita GDP the coefficients turn out to be negative and significant. Since GDP measures the size of an economy, for the relatively smaller partners like Lao PDR, the capacity of absorbing India's exports would be low and on the other hand, its export supply capacity vis-à-vis India would also be low, implying low IIT between India and lesser developed countries of ASEAN+5 region. Therefore, even if aggregate trade volume increases, the IIT as a relative measure does not increase or rather decrease. This could well explain the negative sign but only partially and more work on this may be needed. This argument would be possibly more valid in the case of per capita GDP gap as a measure of purchasing power. It could well be inversely

related to IIT as the higher GAP shows lesser trade capability. The impact would be from both side: one when India's per capita is higher than some of the lesser developed economies like Laos and two, in cases when India's per capita GDP is lower than some of the bigger ASEAN+5 partners like Japan, Singapore, among others.

**Table 3: RTA as a Determinant of IIT:
Augmented Gravity Model**

	IIT (RE)	IIT (TOBIT)
gdpgap	-0.0225***	-0.0262***
	(-9.67)	(-9.25)
pcgdpgap	-0.0716***	-0.0935***
	(-6.37)	(-6.84)
fdi	-0.0219***	-0.0246***
	(-9.03)	(-7.42)
manu	0.00809***	0.00841***
	(-4.66)	(-3.53)
open	0.00852***	0.00896***
	(-11.09)	(-8.52)
Indist	-0.00047	-0.00087
	(-0.78)	(-1.19)
rta	0.0294***	0.0327**
	(-3.48)	(-3.18)
_cons	-0.549***	-0.563**
	(-3.66)	(-2.77)
rho	0.390634	(.3223061)
N	22977	23565

Notes: (i) Z Statistics in parenthesis; Standard errors in parentheses;*** p>0.001, ** p> 0.01, * p> 0.05

(ii) gdpgap: relative difference between GDP defined by the identity in section analytical framework; pcgdpgap: partner countries per capita GDP as ratio of India's per capita GDP; fdi: foreign direct investment, net inflows (per cent of GDP); manu: manufactures exports (per cent of merchandise exports); open: trade (per cent of GDP); Indist: natural logarithm of simple distance (most populated cities, km); rta: dummy variable for free trade agreements; _cons: constant; rho: per cent contribution to the total variance of the panel level variance component; N: number of observations.

Source: Authors' calculation.

It is also found that FDI as share of GDP inversely affects intra-industry trade in a significant manner. This needs to be explained. While India recently has been a host to large inward FDI flows it has still not been able to influence exports and imports of the intra-industry variety in a positive manner as most of the FDI have been either of the *tariff-jumping* or *market seeking* types. In fact, as a proportion of GDP, with greater pace of increase in denominator they could well be inversely associated with IIT. This is also because India is still not an effective player in the regional value chains in the ASEAN+5 region, whereby FDI could have had a positive relationship with India's IIT with this region.

The positive and significant signs of manufacturing as percentage of total merchandise trade and the degree of openness are quite obvious as they are indicators of higher trade-induced manufacturing production and a trade facilitating-liberalised economy. The sign and magnitude of distance is significant as per the theory of gravity. The most crucial variable of the present model as argued in previous sections is the indicative variable of trade agreements. India is associated with free trade agreements with many ASEAN+5 nations bilaterally and with ASEAN as a grouping. The results show that the RTA is with a positive expected sign and with significant coefficient. This shows its importance in determining the IIT, lending support to our hypothetical argument that with the help of an ASEAN+6 FTA in goods IIT can be sustained via the effects of FTA on trade-FDI nexus, efficiency-seeking economic restructuring, horizontal and vertical integration, economies of scale, competition, technological improvements and product differentiation, in turn facilitating regional value chains in the region by propelling goods-services linkages.

6. Conclusion

The paper demonstrates both theoretically and empirically, with robust econometric estimations, that an FTA in goods among ASEAN+6 countries, especially with India's active presence and greater trade

integration can, not only propel Intra-Industry type trade flows in the region under consideration but it can further help *sustain* such trade flows. This is particularly important when trade flows measured through Revealed Comparative Advantage (RCA) index hit a ceiling in determining IIT flows in the region, as the paper empirically establishes. However, the paper further empirically elucidates that such a constraint imposed by RCA on IIT can be addressed by FTA in goods.

While this has significant theoretical implications for augmenting IIT flows of the horizontal IIT type, determined primarily by product differentiation, economies of scale and market imperfections, as propounded by the New Trade Theories, it has important policy implications, whereby India's pro-active participation in RCEP negotiations towards greater trade in goods integration, would help generating greater Intra-Industry trade flows. This in turn would be an important vehicle of India's increased participation in the regional production networks and supply chains in the East and South-east Asian region, given the nature of Intra-Industry trade flows, thereby sustaining the two types of consumer preferences, i.e. *love of variety* and *favourite variety* as explained in the paper.

One needs to understand at this stage the channels through which an RTA can help sustain IIT through various economic effects. With the help of an ASEAN+6 FTA in goods IIT can be sustained via the effects of FTA on trade-FDI nexus, efficiency-seeking economic restructuring, horizontal and vertical integration, development-oriented rules of origin, economies of scale, competition, technological improvements and product differentiation, in turn facilitating regional value chains in the region by propelling goods-services linkages

The findings and arguments of the paper could well contribute to demystifying the recent myths that have surrounded the FTA strategy of India, especially as part of the *Look East Policy*.

References

- Abd-el-Rahman, Kamal. 1991. "Firms' Competitive and National Comparative Advantages as Joint Determinants of Trade Composition", *Weltwirtschaftliches Archiv*, Springer, Bd. 127, H. 1, pp. 83-97.
- Aitken, Norman D. 1973. "The Effect of the EEC and EFTA on European Trade: A Temporal Cross-Section Analysis". *American Economic Review* 5, 881–892 (December).
- Anderson, James E. 1979. "A Theoretical Foundation for the Gravity Equation", *American Economic Review* 69 (1), 106–116 (March).
- Anderson, James E. 2011. "The Gravity Model-Review" *Annual Review of Economics*, vol. 3. I. Boston College and NBER.
- Anderson, James E. and Eric van Wincoop. 2003. "Gravity with Gravitas: A Solution to the Border Puzzle", *American Economic Review* 93 (1), 170–192 (March).
- Ando, M. 2006. "Fragmentation and Vertical Intra-industry Trade in East Asia", *North American Journal of Economics and Finance*, 17, pp. 257–281.
- Athukorala, P. and N. Yamashita. 2006. "Production Fragmentation and Trade Integration: East Asia in a Global Context", *North American Journal of Economics and Finance*, 17, pp. 233-256.
- Baier, Scott L. and Jeffrey H. Bergstrand. 2001. "The Growth of World Trade: Tariffs, Transport costs, and Income Similarity", *Journal of International Economics* 53 (1), 1–27 (February).
- Bergstrand, Jeffrey H. 1985. "The Gravity Equation in International Trade: Some Microeconomic Foundations and Empirical Evidence", *Review of Economics and Statistics* 67 (3), 474–481 (August).
- Bhattacharyya, R. 2005. "Economic Development and Intra-Industry Trade in the Republic of Korea", *Journal of Economic Integration*, 20, pp. 809–831.
- Blanes, José V. and Carmela Martín. 2000. "The Nature and Causes of Intra-Industry Trade: Back to the Comparative Advantage Explanation? The Case of Spain", *Weltwirtschaftliches Archiv*, Springer Bd. 136, H. 3, pp. 423-441.
- Bojnec, Štefan. 2001. "Trade and Revealed Comparative Advantage Measures: Regional and Central and East European Agricultural Trade", *Eastern European Economics*, Vol. 39, No. 2 (March - April), pp. 72-98.
- Brander, James A. 1980. "Intra Industry Trade in Identical Commodities", *Journal of International Economics*, 11: 1-14.
- Brander, James and Paul Krugman. 1983. "A 'Reciprocal Dumping' Model of International Trade", *Journal of International Economics*, 15: 313-321.
- Bruelhart, M. 2008. "An Account of Global Intra-Industry Trade, 1962-2006", *The University of Nottingham Research Paper Series Globalisation, Productivity and Technology*. 2008/08.

- Byun, J. and S. Lee. 2005. "Horizontal and Vertical Intra-Industry Trade: New Evidence from Korea, 1991-1999", *Global Economy Journal*, 5, pp.1-29.
- Cortinhas, C. 2007. "Intra-Industry Trade and Business Cycles in ASEAN", *Applied Economics*, 39, pp. 893-902.
- Das, G. 2005. "Growth and Pattern of Intra-Industry Trade in Manufactures in India's Overall Trade: A Quantitative Analysis", *Indian Journal of Economics and Business*, 4, pp.161-184.
- Das, Ram Upendra. 2006. 'Regional Trading Arrangements of India: Conceptual and Policy Issues' at International Conference on 'The Indian Economy in the Era of Globalisation' organised by Maison des Sciences de l'Homme and University of Paris –X, Paris, on 28-29 September (http://economix.fr/pdf/colloques/2006_India/Upendra.pdf)
- Das, Ram Upendra. 2009. "Imperatives of Regional Economic Integration in Asia in the Context of Developmental Asymmetries: Some Policy Suggestions." *ADB Working Paper* 172, Tokyo: ADBI.
- Das, Ram Upendra. 2013. "Regional Economic Integration: New Context and Analytical Constructs" in Byasdeb Dasgupta (ed.) *External Dimensions of an Emerging Economy, India*. London and New York: Routledge.
- Das, Ram Upendra and R S Ratna. 2011. *Perspectives on Rules of Origin*, UK: Palgrave-Macmillan.
- Davis, D.R.1995. "Intra-Industry Trade: A Heckscher- Ohlin-Ricardo Approach", *Journal of International Economics*, 39, pp.201-226.
- Davis, Donald R. and David E. Weinstein. 1996. "Does Economic Geography Matter for International Specialization?" *NBER Working Paper* 5706. National Bureau of Economic Research.
- Davis, Donald R. and David E.Weinstein. 2001. "Do Factor Endowments Matter for North-North Trade?" *Working Paper* 8516. National Bureau of Economic Research.
- Davis, Donald R., David E. Weinstein, Scott C. Bradford, and Kazushige Shimpo. 1996. "The Heckscher-Ohlin-Vanek Model of Trade: Why does it fail? When does it work?" *Working Paper* 5625. National Bureau of Economic Research.
- Davis, Donald R., David E. Weinstein, and Scott C. Bradford. 1997. "Using International and Japanese Regional Data to Determine When the Factor Abundance Theory of Trade Works", *The American Economic Review*, Vol.87, No.3, 421-446.
- Davis, Donald R. 1994. "Intra-Industry Trade: A Heckscher-Ohlin-Ricardo Approach", *Journal of International Economics*, 39: 201-226.
- Deardorff, Alan. 1998. "Does Gravity work in a Neoclassical World?" In: Frankel, Jeffrey A. (ed.) *The Regionalization of the World Economy*. The University of Chicago Press, Chicago.

- Eaton, Jonathan and Henryk Kierzkowski. 1984. "Oligopolistic Competition, Product Variety, Entry Deterrence, and Technology Transfer", *The RAND Journal of Economics*, Vol. 15, No. 1, pp. 99-107.
- Falvey, R. E. 1981. "Commercial Policy and Intra-Industry Trade," *Journal of International Economics*, 11: 495-511.
- Falvey, Rodney E. and Henryk Kierzkowski. 1987. "Product Quality, Intra-Industry Trade and (im) Perfect Competition" in Henryk Kierzkowski (ed) *Protection and Competition in International Trade*. Oxford: Basil Blackwell.
- Faustino, Horacio. 2008. "Intra-Industry Trade and Revealed Comparative Advantage: An Inverted-U Relationship." *Working Paper*. School of Economics and Management, Technical University of Lisbon.
- Flam, H. and E. Helpman. 1987. "Vertical Product Differentiation and North-south Trade", *American Economic Review*, 77, pp.810-822.
- Flam, Harry and Elhanan Helpman. 1987. "Vertical Product Differentiation and North-South Trade" *The American Economic Review*, Vol. 77, No. 5, pp. 810-822.
- Greenaway, David and Chris Milner. 1986. *The Economics of Intra-Industry Trade*. Cambridge, MA: Basil Blackwell.
- Greenaway, David, Robert Hine and Chris Milner. 1994. "Country-Specific Factors and the Pattern of Horizontal and Vertical Intra-Industry Trade in the UK". *Weltwirtschaftliches Archiv*, Springer, Bd. 130, H. 1, pp. 77-100.
- Greenaway, David, Robert Hine and Chris Milner. 1995. "Vertical and Horizontal Intra-Industry Trade: A Cross Industry Analysis for the United Kingdom", *The Economic Journal*, Vol. 105, No. 433, pp. 1505-1518.
- Greenaway, David, Robert Hine, Chris Milner and Robert Elliot, Robert. 1994. "Adjustment and the Measurement of Marginal Intra-Industry Trade", *Weltwirtschaftliches Archiv*, Springer, Bd. 130, H. 2, pp. 418-427.
- Helpman, E. and P. Krugman. 1985. *Market Structure and Foreign Trade*. Brighton: Harvester Wheatsheaf.
- Helpman, Elhanan. 1981. "International Trade in the Presence of Product Differentiation, Economies of Scale and Monopolistic Competition: A Chamberlain-Heckscher-Ohlin Approach", *Journal of International Economics*, 11: 305-340.
- Hu, X. and Y. Ma 1999. "International Intra Industry Trade of China", *Weltwirtschaftliches Archiv*, *Review of World Economics*, 135, pp.82-101.
- Kimura Fukunari T. and Mitsuyo Ando. 2005. "Two-dimensional fragmentation in East Asia: Conceptual framework and empirics", *International Review of Economics and Finance*, 14: 317-348.
- Krugman, Paul. 1979. "Increasing Returns, Monopolistic Competition and International Trade", *Journal of International Economics*, 9: 469-479.

- Krugman, Paul. 1980. "Scale Economies, Product Differentiation, and Pattern of Trade", *The American Economic Review*, Vol. 70, No. 5, pp. 950-959.
- Kumar, Nagesh. 2007. "Regional Economic Integration, Foreign Direct Investment and Efficiency Seeking Industrial Restructuring in Asian: The Case of India", *RIS Discussion Paper No. 123*. New Delhi: Research and Information System for Developing Countries.
- Lancaster, Kelvin. 1980. "Intra-industry Trade under Perfect Monopolistic Competition", *Journal of International Economics*, Vol. 10, Issue 2, pp. 151-175.
- Lee, J., and S. Han. 2008. "Intra-Industry Trade and Tariff Rates of Korea and China", *China Economic Review*, 19, pp. 697-703.
- Linnemann, Hans. 1966. *An Econometric Study of International Trade Flows*. Amsterdam: North-Holland Publishing Company.
- Martijn J. Burger, Frank G. van Oort, and Gert-Jan M. Linders. 2009. "On the Specification of the Gravity Model of Trade: Zeros, Excess Zeros and Zero-Inflated Estimation", *Spatial Economic Analysis*. Taylor & Francis.
- Menon, Jayant and Peter B Dixon. 1996. "Regional Trading Agreements and Intra-industry Trade", *Journal of Economic Integration*, Vol. 11, No. 1, pp. 1-20.
- Plümper Thomas, and Vera E Troeger. 2007. "Efficient Estimation of Time-Invariant and Rarely Changing Variables in Finite Sample Panel Analyses with Unit Fixed Effects", *Political Analysis*. 15 (2): 124-139.
- Rana, P.B. 2006. "Economic integration in East Asia: Trends, prospects and a possible roadmap", *Asian Development Bank Working Paper Series on Regional Economic Integration No. 2*. Asian Development Bank.
- Rana, P.B. 2007. "Trade Intensity and Business Cycle Synchronization: The Case of East Asia", *Asian Development Bank Working Paper Series on Regional Economic Integration No. 10*. Asian Development Bank.
- Rodney E. Falvey. 1981. "Commercial Policy and Intra-industry Trade", *Journal of International Economics*, Vol. 11, Issue 4, pp. 495-511.
- Sapir, Andre. 1981. "Trade Benefits under the EEC Generalized System of Preferences", *European Economic Review* 15, 339-355.
- Sawyer William C, Richard L Sprinkle, and Kiril Tochkov. 2010. "Patterns and Determinants of Intra-industry Trade in Asia", *Journal of Asian Economics*, 21: pp. 485-493.
- Shaked, Avner and John Sutton. 1982. *Natural Oligopolies and International Trade: an introduction*. Theoretical Economics; TE/1982/50, TE/1982/50. Suntory and Toyota International Centres for Economics and Related Disciplines, London School of Economics and Political Science, London, UK.
- Shen, G. and A. Gu. 2007. "Revealed Comparative Advantage. Intra Industry Trade and the US Manufacturing Trade Deficit with China", *China and World Economy*, 15, pp. 87-103.

- Sohn, C.H. and Z. Zhang. 2005. "How Intra Industry Trade is Related to Income Difference and Foreign Direct Investment in East Asia", *Asian Economic Papers*, 4, pp.143-156.
- Tharakan, P. K. M. 1988. "Bilateral Intra-industry Trade Between Countries with Different Factor Endowment Patterns", *Working Paper 121*, Centre for Development Studies, Antwerpen.
- Tharakan, P.K.Mathew and Birgit Kerstens.1995. "Does North-South Horizontal Intra-Industry Trade Really Exist? An Analysis of the Toy Industry", *Weltwirtschaftliches Archiv*, Springer, Bd. 131, H. 1, pp. 86-105.
- Thorpe, M. and Z. Zhang. 2005. "Study of the Measurement and Determinants of Intra-industry Trade in East Asia", *Asian Economic Journal*, 19, pp. 231–247.
- Tinbergen, J. 1962. "Shaping the World Economy; Suggestions for an International Economic Policy". Twentieth Century Fund, New York.
- Vanek, J. 1968. "The Factor Proportions Theory: The N-Factor Case", *International Review of Social Sciences*, Volume 21, Issue 4, pp.749-756.
- Wakasugi, R. 1997. "Missing Factors of Intra-industry Trade: Some Empirical Evidence based on Japan", *Japan and the World Economy*, 9, pp.353-362.
- Wakasugi, R. 2007. "Vertical Intra-Industry Trade and Economic Integration in East Asia", *Asian Economic Papers*, 6: 26–39. The Earth Institute at Columbia University and the Massachusetts Institute of Technology.
- Xing, Y. 2007. "Foreign Direct Investment and China's Bilateral Intra-industry Trade with Japan and the US", *Journal of Asian Economics*, 18, pp. 685–700.
- Zhang, J., A. Witteloostuijin and C. Zhou. 2005. "Chinese Bilateral Intra-Industry Trade: A Panel Data Study for 50 countries in the 1992-2001 Period", *Weltwirtschaftliches Archiv*, Review of World Economics, 141, pp.510-540.
- Zhang, Z. and C.Li. 2006. "Country Specific Factors and the Pattern of Intra-Industry Trade in China's Manufacturing", *Journal of International Development*, 18, pp.1137-1149.

RIS DISCUSSION PAPERS

Available at: http://ris.org.in/index.php?option=com_content&view=article&id=21&Itemid=21

- DP#189-2014 *An Assessment of India's Innovation Policies* by Biswajit Dhar and Sabyasachi Saha
- DP#188-2014 *Demographic Change, Brain Drain, and Human Capital: Development Potentials in Services-Driven South Asia* by Biswajit Dhar and Sayan Samanta
- DP#187-2014 *The Changthang Borderlands of Ladakh: A Preliminary Inquiry* by Siddiq Wahid
- DP#186-2014 *India-Japan Comprehensive Economic Partnership Agreement (CEPA) Some Implications for East Asian Economic Regionalism and RCEP* by Ram Upendra Das
- DP#185-2013 *Transatlantic Trade and Investment Partnership* by V. S. Seshadri
- DP#184-2013 *Financial Crisis of 2008 and Shifting Economic Power Is there Convergence* by Manmohan Agarwal and Sayan Samanta
- DP#183-2013 *Balancing State and Community Participation in Development Partnership Projects: Emerging Evidence from Indian SDPs in Nepal* by Sachin Chaturvedi, Sushil Kumar and Shashank Mendiratta
- DP#182-2013 *The Trans Pacific Partnership (TPP)* by V. S. Seshadri
- DP#181-2013 *Logistics, Trade and Production Networks: An Empirical Investigation* by Prabir De and Amrita Saha
- DP#180-2012 *India and Africa: Development Partnership* by Ambassador Shyam Saran
- DP#179-2012 *Towards a More Equitable Outcome from Rio Plus 20* by Ambassador A. Gopinathan
- DP#178-2012 *India 2050: Can We Celebrate the Centenary of the Republic as a Developed Country?* by Ramgopal Agarwala
- DP#177-2012 *BRICS and South-South Cooperation in Medicine: Emerging Trends in Research and Entrepreneurial Collaborations* by Sachin Chaturvedi and Halla Thorsteinsdóttir
- DP#176-2011 *The R&D Scenario in Indian Pharmaceutical Industry* by Reji K Joseph
- DP#175-2011 *India-Baltic Sea Region Trade and Connectivity: Myth or Reality?* by Prabir De

RIS A Think-Tank of Developing Countries

Research and Information System for Developing Countries (RIS), a New Delhi based autonomous think-tank under the Ministry of External Affairs, Government of India, is an organisation that specialises in policy research on international economic issues and development cooperation. RIS is envisioned as a forum for fostering effective policy dialogue and capacity-building among developing countries on international economic issues.

The focus of the work programme of RIS is to promote South-South Cooperation and assist developing countries in multilateral negotiations in various forums. RIS is engaged in the Track II process of several regional initiatives. RIS is providing analytical support to the Government of India in the negotiations for concluding comprehensive economic cooperation agreements with partner countries. Through its intensive network of policy think tanks, RIS seeks to strengthen policy coherence on international economic issues.

For more information about RIS and its work programme, please visit its website: www.ris.org.in

— Policy research to shape the international development agenda



RIS
Research and Information System
for Developing Countries

Core IV-B, Fourth Floor, India Habitat Centre, Lodhi Road, New Delhi-110 003, India.
Ph. +91-11-2468 2177-80, Fax: +91-11-2468 2173-74, Email: publication@ris.org.in
Website: www.ris.org.in