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Abstract

Over the last decade India's integration in international production networks (IPNs) has deepened, with growing simultaneous export and import within product categories. This has been facilitated by India's entry into several regional trade agreements (RTAs) and multilateral tariff and non-tariff barriers reforms. The present paper examines the patterns and determinants of aggregate bilateral intra-industry trade (IIT) between India and 25 major trading partners during 2001-2015 in a panel data framework. India's bilateral IIT indices display an upward trend over the sample period. The empirical results indicate that Vertical Intra-industry Trade (VIIT) dominates Horizontal Intra-Industry Trade (HIIT) for the selected countries in the Indian context. The analysis further concludes that trade facilitation among the trading partners may significantly enhance bilateral IIT level with respect to India's high-income partners, while the same effect is non-significant for low-income countries. Interestingly, the preferential trade dummy is found to be non-significant, implying limited influence of the RTA partnerships on India's aggregate bilateral IIT. The empirical results underline the need for fast-tracking the trade facilitation related reforms.

Keywords: Trade Policy, Intra-Industry Trade, Trade Facilitation, LPI, Empirical Estimation
JEL Classification: F13, F14

1. Introduction

From 1960s onwards, the industrialization drive across developed countries led to emergence of simultaneous exports and imports within the same sectors. Balassa (1966) used the specific term 'intra-industry trade' (IIT) to describe the scenario. The literature on measurement if IIT was enriched through the early works of Grubel (1967), and Grubel and Lloyd (1971, 1975). The presence of IIT-type trade has been theoretically explained through product diversity argument (Dixit and Stiglitz, 1977), effect of home market and the presence of increasing returns (Krugman, 1979, 1980, 1981; Lancaster, 1980).

With the inception of World Trade Organisation (WTO) in 1995, the Member countries significantly reformed their manufacturing tariffs, which facilitated cross-border trade flows in this category. Consequently, the level of IIT between developed-developed and developed-developing countries increased, thereby deepening International Production Networks (IPNs). During the past three decades, global production sharing has led to a new form of division of labour between Asian economies, especially in East and Southeast Asia (UNESCAP, 2011). The process has been facilitated further with emergence of a number of Regional Trade Agreements (RTAs), paving the road for growing intra-bloc IIT, e.g., cross-country trade in

automobile sector involving parts and components and semi-finished products within ASEAN (WTO, 2011). Adoption of trade facilitation measures like harmonization of rules of origin (ROOs) provisions may further deepen such intra-bloc IPNs, reflected in higher IIT indices (Fukunaga and Isono, 2013).

India embarked on the path of the export-oriented growth model from 1991 onwards and relied primarily on export promotion through multilateral route up to the Cancun Ministerial (2003) meeting of WTO (Chaisse *et al*., 2011). Afterwards, it has entered into a number of RTAs, located both within and outside Asia. India's bilateral IITs with partner countries have increased over the period. The present paper intends to analyse the determinants of India's IIT with major trade partners over 2001-15 and arranged along following lines. First, a brief review of IIT literature is presented, followed by discussion on IIT evidence in India. The empirical model and the data used in the analysis are explained in the subsequent section. Finally on the basis of the empirical results, a few policy conclusions are drawn.

2. Literature Review

2.1 IIT Measurement and Evidence

IIT measurement was initially conducted with the Grubel-Lloyd Uncorrected (GLU) formula, used for country *j* for industry *i* as the following:

$$GLU = \frac{\sum_i (X_{ij} + M_{ij}) - \sum_i |X_{ij} - M_{ij}|}{\sum_i (X_{ij} + M_{ij})} \times 100$$

where, X_{ij} and M_{ij} denote the value of export and imports of a country with country *j* at HS 4-digit level respectively (i.e., over HS 0101 to HS 9999).

However when the GLU index is applied for measuring the IIT between developed and developing countries, possibility of underestimation cannot be ruled out due to trade imbalance. The Grubel-Lloyd Corrected (GLC) formula involving country *j* for industry *i*, uses the following formulation:

$$GLC = \frac{\sum_i (X_{ij} + M_{ij}) - \sum_i |X_{ij} - M_{ij}|}{\sum_i (X_{ij} + M_{ij}) - \left|\sum_i X_{ij} - \sum_i M_{ij}\right|} \times 100$$

While one branch of the literature focus on measurement of IIT among developed countries (Greenaway and Milner, 1983; Ito and Okubo, 2011), the other branch concentrate on IIT between developed-developing and developing-developing economies (Havrylyshyn and Civan, 1985; Manrique, 1987). The results indicate that higher IIT is associated with rise in development level of both partners and higher potential for product differentiation, in presence of lower trade barriers. While aggregate IIT in developing countries might be lower compared to their industrial counterparts, higher IIT indices is noticed at sectoral level, particularly for capital-intensive products.

During eighties, the need to segregate overall IIT in sub-categories, namely Horizontal Intra-Industry Trade (HIIT) and Vertical Intra-Industry Trade (VIIT) was increasingly felt. Horizontal IIT has been defined as the exchange of products that are similar in terms of quality

but have different characteristics or attributes, explained by the framework developed by Dixit and Stiglitz (1977), Lancaster (1980) and Krugman (1980, 1981). Helpman and Krugman (1985) concluded that the larger is the difference in factor endowments, the smaller (larger) the extent of HIIT (VIIT). In contrast, vertical IIT represents trade in similar products of different qualities, which are not the same in terms unit production costs and factor intensities (Falvey, 1981; Falvey and Kierzkowski, 1987). Flam and Helpman (1987) explained VIIT with differences in technology (labour productivity) and concluded that the most productive country, where wages are higher, exports the varieties with higher quality. Abd-el-Rahman (1991) proposed the methodology to segregate HIIT and VIIT based on the Stiglitz (1987) framework, assuming that prices represent quality, even under imperfect information. Based on the unit values (UV) method proposed by Abd-el-Rahman (1991), a branch of the literature disentangles IIT into HIIT and VIIT (Greenaway *et al*., 1995; Chin *et al*. 2014).

Another set of literature focuses on determinants of IIT, HIIT or VIIT through cross-country analysis. The analysis covers determinant of both overall as well as sectoral IIT (Algieri, 2005; Andersen, 2003; Bano, 2014; Bhattacharyya, 2005; Crespo and Fontura, 2001; Fontagne and Freudenberg, 1997; Jambor, 2013; Lapinska, 2016; Turkcan and Ates, 2010; Veeramani, 2001) in both developed and developing countries in a panel data framework. It is noted that income difference, technology difference, endowment difference, FDI flows, common border and language, presence of RTA etc. are among the key explanatory variables used for explaining IIT in this branch of literature.

2.2 IIT Evidence in Indian Context

India's bilateral IIT remained low upto late nineties, a period characterized by incomplete economic reform (particularly import tariff liberalization). The analysis of Pant and Barua (1986) over 1960-80 observed that in spite of rise in trade, there was no appreciable change in India's IIT indices barring a few commodity groups. Analyzing India's IIT with SAARC partners over 1981-92, Kantawala (1997) also reported low values of bilateral IIT. Considering capital goods industries, Veeramani (1999) noted marginal increase in aggregate IIT index over the years and observed that India's trade is predominantly vertical in nature. Comparing the multilateral IIT over 1987-88, 1994-95 and 1998-99 by analysing the influence of various country-specific factors on India's bilateral IIT, Veeramani (2001) arrived at a similar conclusion.

Higher IIT levels were reported during 2000-09, when economic reform effects were visible. Chakraborty and Chakraborty (2005) noted a rise in India's vertical IIT during 2003-04 as compared to preceding period. Burange and Chaddha (2008) assessed the growth in India's IIT over 1987-88 to 2005-06 at 4-digit level of HS classification across regions and attributed the rise in IIT index to the manufacturing sector.

In the post-2010 period, a number of India-centric RTAs have come up and through ROO provisions, trade flows has been streamlined. Srivastava and Medury (2011) analysed the nature and pattern of India's IIT at 6-digit level, which revealed that, overall, India's IIT is vertical in nature and decrease in tariff rate helped in increasing the degree of IIT. The 6-digit level analysis of Kelkar and Burange (2016) observed a rise in India's HIIT. A few other recent studies have focused on India's IIT pattern with select partner countries / trade blocs. Kumar and Ahmed (2014) investigated the IIT between India and Bangladesh at the three-digit level of SITC, underlining a need for export diversification from Bangladesh. Kaur *et al*. (2016) notice a rise in IIT between India and Thailand, while indicating the scope for deepening the

integration further by tariff reforms, reduction of non-tariff barriers and improvements in trade facilitation. The cointegration analyses of Singh (2014) underlines that improvement in institutional parameters causes both short run and long run improvements in bilateral trade and IIT.

3. Methodology and Data

The present study first determines the composite IIT for India with rest of world (ROW) over 2001-15 through both GLU and GLC indices and then compares the outcome. Next, India's major trade (i.e., export and import) partners are selected on the basis of their share in the country's trade basket. A total of 25 countries are selected for the analysis. Then, India's bilateral IIT indices for the selected countries are computed over 2001-15. Finally the following panel data model is estimated to explore the determinants of India's bilateral IITs over 2011-15 in line with the framework developed by Cole and Elliott (2003):

$$LIIT_{it} = \alpha_0 + \beta_1 LDPCGDP_{it} + \beta_2 LD\left(\frac{K}{L}\right)_{it} + \beta_3 LWDIST_{it} + \beta_4 L(LPI_i LPI_j) + \beta_5 BORDER + \beta_6 LANGUAGE + \beta_7 FTA + \beta_8 INCOME + \varepsilon_0$$

where,

α	represents the *constant* term
βs	are *coefficients*
L	represents logarithmic transformation of the variables
IIT_{it}	represents GLC between India and country *i* for year *t*
$DPCGDP_{it}$	represents difference of Per Capita GDP between India and country *i* for year *t*
$D(K/L)_{it}$	represents difference of Capital-Labour ratio between India and country *i* for year *t*
$WDIST_{it}$	represents weighted distance between India and country *i* for year *t*
$DIST_{it}$	represents geographical distance between the capital of India and the capital of country *i* for year *t*
LPI_iLPI_j	represents an interaction term of the Logistics Performance Index (LPI) of India and country *i* for year *t*
BORDER	represents a dummy variable which takes a value of 1 if India share a common border with country *i* and 0 otherwise
LANGUAGE	represents a dummy variable which takes a value of 1 if India and the partner country share a common language (English) with country *i* and 0 otherwise
FTA	represents a dummy variable which takes a value of 1 if India shares an RTA with country *i* and 0 otherwise
INCOME	represents Per Capita Gross National Income (GNI) (atlas method, current US$) of country *i* for year *t*, where
LIC	represents the low income country (*PCGNI*: US$1,005 or less) dummy, which has a value of 1 for the corresponding countries and 0 otherwise.
LMIC	represents the lower-middle income country (*PCGNI*: US$1,006 - 3,975) dummy, which has a value of 1 for the corresponding countries and 0 otherwise

UMIC	represents the upper-middle income country (*PCGNI*: US$3,976-12,275) dummy, which has a value of 1 for the corresponding countries and 0 otherwise
HIC	represents the high income country (*PCGNI*: US$12,276 or more) dummy, which has a value of 1 for the corresponding countries and 0 otherwise
ε_{it}	represents the error term

The regression model uses logarithmic transformation of the variables, so that the estimated coefficients can be interpreted as relevant elasticities. India's bilateral *IIT*, calculated through GLC method, is considered as the dependent variable for the analysis.

The Difference in Per Capita GDP (*DPCGDP*) has been considered as a key independent variable in the analysis in line with the literature. According to Linder (1961), the countries with similar per capita incomes tend to have similar demand patterns for differentiated goods. Hence, a greater difference in per capita income would imply a greater disparity in the demand structure, which would be reflected in higher levels of VIIT and vice versa (Bojnec and Ferto, 2016). Difference in Capital-labour Ratio (*DKL*) of India with select trading partners have also been incorporated in the model. As vertically differentiated products differ in terms of factor intensities and unit production costs, higher DKL implies higher VIIT (Andersen, 2003).

The literature notes that IIT is negatively correlated with geographical distance, as transportation and insurance costs increase with distance (Türkcan, 2011). The traditional gravity models generally consider geographical distance between the capitals of two countries or the distance between the major trade centres. However, one problem with this approach is that the distance remains constant throughout the period of empirical analysis. To tackle this concern, in line with existing weighted literature (Turkcan and Ates, 2010), the present analysis considers *WDIST* between trading partners as an independent variable:

$$\mathrm{WDIST}_{it} = \frac{DIST_i * GDP_{it}}{\sum_{i=1}^{25} \mathrm{GDP}_{it}}$$

where, $DIST_i$ represents the direct distance in km. between the India's capital and the respective trading partners' capital. GDP_{it} represents the GDP of partner i in year t.

Since the Singapore Ministerial (1996) meeting of WTO, the countries are negotiating for improvement in trade facilitation, which covers customs procedure, timeliness of operations, port and transport infrastructure etc. A rich empirical literature exist on the influence of trade facilitating framework on export promotion (Djankov *et al*., 2010; Fontagné *et al*., 2016; Nordås *et al*., 2006; Portugal-Perez and Wilson, 2010; Puertas *et al*., 2013). In the current context trade facilitation has been proxied with Logistic Performance Index (LPI) published by the World Bank and an interaction effect of LPI of India and the respective trading partners has been included in the model (Saslavsky and Shepherd, 2012). The interaction effect of LPI serves as the proxy for Trade Facilitation scenario prevailing in both countries and is expected to positively influence IIT.

Finally, a few dummy variables are included in the analysis in line with the gravity literature. First, a geographic proximity (Border) dummy is included which takes the value of 1 if India shares border with a trading partner and 0 otherwise (Anderson, 2003). A common border is expected to increase the intensity of IIT. Second, an ease of trade (Language) dummy is

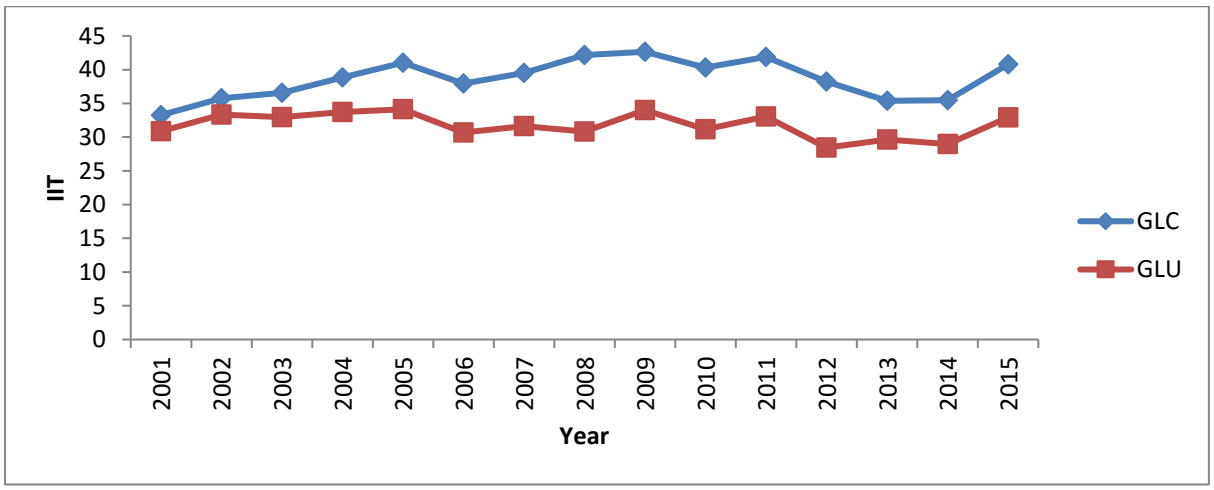
included which takes the value of 1 if English is the common language and 0 otherwise. A commonality of language is expected to promote commercial exchange in general and IIT in particular. Third, a trade preference (FTA) dummy is included which takes the value of 1 if India is engaged with a trading partner through an RTA and 0 otherwise. An FTA is expected to increase the intensity of IIT, as tariff preference and trade facilitation measures therein enhances the ease of bilateral trade (Kumar and Ahmed, 2015), including sourcing of raw materials, parts and components. Finally, a development (Income) dummy is included in the analysis to understand which type of IIT dominates in India's trade with partners lying within various income groups. The dummy takes a value of 1 for LICs and LMICs, while is it 0 for UMICs and HICs. It is expected that India will exhibit HIIT with the former group, while getting engaged in VIIT with the latter. The description of the variables used in the empirical analysis and the data sources are summarized in Table 1.

The evolving export and import partnership of India with the 25 major trading partners are reported in Table 2. For observing the temporal perspective, their average shares in India's export and import baskets are compared during 2001-05, 2006-10 and 2011-15 respectively. It is observed that in the export basket, the share of these countries have gradually declined over the study period from 68.41 percent to 59.31 percent. Conversely, on the import front, their share have increased from 55.77 percent to 61.31 percent over the same period. On the whole, the analysis covers the major trade partners of India, barring UAE and Iraq, which accounts for around 10 percent of India's trade with the World. These two countries have been dropped from the analysis due to non-availability of data on various explanatory variables included in the empirical model, e.g., Per Capita GDP, Labour and Capital Stock.

4. Results

The analysis first computes India's overall IIT with rest of the world over 2001-15, reporting both GLU and GLC indices. It is observed that at the composite level, India's IIT has witnessed a fluctuating trend. While the IIT level increased over 2001-05, it fluctuated at regular intervals over 2005-14. However, over 2014-15, an increasing trend has been noted. On the whole, the GLC index has increased from 33.25 to 40.76 over 2001 to 2015. In other words, the rise in India's overall IIT has been moderate, despite significant increase in the country's trade integration with the world.

Figure 1: India's Overall IIT with ROW (2001-2015)



Source: Authors' computation

Since the present study undertakes a country-level analysis of India with its major trading partners, henceforth only GLC index is used for calculation of IIT. Table 3 summarizes India's average IIT levels with respect to the selected countries. To view the results in wider perspective, the countries are arranged separately in accordance with their development status. In addition, the FTA partnership status of the selected countries are also noted along with the corresponding IIT values. For observing the temporal perspective, the average IIT values are compared during 2001-05, 2006-10 and 2011-15.

A mixed pattern is observed in IIT level of *developed* economies. For EU members, IIT has generally shown an upward trend. It is expected that once the ongoing BTIA comes into effect, it will significantly enhance trade in general and IIT in particular. For USA and Hong Kong, which have no current FTA link with India, moderate fall in IIT has been captured. Interestingly, India's IIT with Singapore and Japan, the comprehensive trade partners have increased after formation of the preferential trade agreement, indicating greater volume of trade within commodity groups. Since the analysis is conducted at the overall level, it might not capture all the sectoral dynamics explaining the declining IIT for Australia. IIT for the remaining developed economies have generally shown an upward trend over the years.

Growth in IIT figures with respect to several *developing* economies has been observed which can be attributed to their preferential trade agreements with India, barring the exceptions of China, South Africa, Nigeria and Iran. The reason for weaker IIT growth for Iran can be attributed to the economic sanctions, while the same for South Africa and Nigeria can be explained by political and structural undercurrents. For instance, the average IIT for Nigeria over 2006-10 and 2011-15 dropped to 0.53 and 0.47 respectively.

The summary statistics for the variables selected for the empirical analysis is provided in Table 4. The panel data regression analysis has been undertake with help of STATA Software (version 14). To understand the working of the model, Hausman test is first conducted and it suggests the presence of underlying random effect model. LM Test is then performed to detect the presence of first order autocorrelation. It is observed that chi-square test statistic of 193.39 (Prob: 0.0000) is statistically significant. Breusch-Pagan / Cook-Weisberg test for heteroscedasticity has been conducted to check the existence of heteroscedasticity in the estimated model. The Chi-square test statistic is 57.99 (Prob 0.0000). Estimated mean variance inflation factor (VIF) is 4.89 and so for all the variables, and the values of VIF are within the tolerance limit of multicollinearity. Based on the diagnostic tests, the present analysis adopts Feasible General Least Squares (FGLS) method with time specific random effects. The estimated model makes correction for the existence of heteroscedasticity and first order autocorrelation (AR1) within balanced panel data framework. The empirical estimates are summarized in Table 5. Since the logarithmic transformations are used on both sides, the estimated coefficients can be interpreted as elasticities.

Several conclusions emerge from the results. First, the coefficient of DPCGDP is positive and significant in the first model, indicating that with growing difference in income level, the IIT also rise, but in less than proportionate manner. Second, the coefficient of D(K/L) also is positive and significant in several models, indicating that with growing difference in technology level, bilateral IIT increases. The results for DPCGDP and D(K/L) indicate presence of VIIT in India's trade pattern with select partners. Third, both WDIST and DIST variables are found to be negative and significant, in line with the theoretical predictions. Fourth, the LPI interaction term is positive and significant for all model specifications,

indicating that one percent improvement in trade facilitation both in India and the partner country leads to a more than proportionate increase in India's IIT level with that partner. This can be attributed to the improving trade facilitation scenario across countries. Fifth, the coefficient of the border dummy is positive and significant, indicating that sharing a land border may promote IIT, as movement of parts and components is facilitated. Sixth, the coefficient of the language dummy is negative and significant, indicating that India's IIT may be relatively higher with non-English speaking nations. The result can be attributed to India's rising IIT with countries like China, Japan, South Korea, and several EU members (Germany, France) etc. in recent period. Finally, the FTA dummy is not found to be significant. The result can be explained by the fact that India is enjoying higher IIT index with a number of developed countries, which are yet to be India's FTA partners (e.g., Belgium, Germany, UK, USA).

Stability analysis has been conducted by dividing the 25 sample countries in two income-oriented groups, with LICs and LMICs in one group and UMICs and HICs on the other. The results are reported in models 6 and 7 respectively. A couple of interesting observations emerge from the analysis. First, for both groups, the coefficient of the DPCGDP variable is positive and significant, but the coefficient is higher for the latter group. In other words, with higher-income countries, the income level difference may increase the IIT, further underlining the presence of VIIT-type trade. Second, D(K/L) is however found non-significant for both groups. Third, the WDIST variable is negative and significant for low-income countries, while it is non-significant for the higher-income group. The result can be explained by the presence of similar IIT levels for countries such as Germany, Singapore and South Korea in the latter group, which are geographically situated far apart. Fourth, interestingly the trade facilitation variable is found to be non-significant for the low-income countries but positive and significant for the high-income countries. The result implies that, improvement in trade facilitation scenario in both the partners would significantly enhance India's IIT level for higher-income countries. The IIT involving low-income countries with limited differentiation in manufacturing export basket on the other hand may not change, even in the presence of trade facilitation. Fifth, the border dummy is not significant for both group of countries. Sixth, the language dummy is negative and significant for both group of countries, in line with the pooled regression models. Finally, the FTA dummy is not significant for both the groups.

5. Conclusion

India is increasingly relying on export-oriented growth strategy, and with this objective has partnered several countries through RTAs. The tariff and trade facilitation reforms under these RTAs have enabled India to deepen its presence in Asian IPNs, resulting into simultaneous bilateral export and import flows within product categories. The current analysis intends to analyse the trends and determinants of India's bilateral IIT with major trade partners. India's IIT has shown an upward trend over the study period (2001-15) with most of the developed and developing nations, and might be vertical in nature. The rising IIT can be attributed to the technology and income difference on one hand and trade facilitation improvement through unilateral reforms undertaken by most of India's trade partners on the other. In addition, India is in the process of entering into preferential trade relationship with a number of countries across development spectrum, which are expected to reduce the border hassles further. The scenario is likely to improve further as the Trade Facilitation Agreement at WTO Bali Ministerial (2013) requires reform commitment from all members, as per their multilateral obligations. All these development are likely to influence IIT trends positively, thereby strengthening the IPNs and global value chains further.

There is a need to introduce newer variables for explaining India's IIT with respect to its trading partners, so as to arrive at focused policy prescriptions. The literature on determinants of India's IIT with respect to trade facilitation measures is relatively unexplored. The Logistic Performance Index, computed by World Bank, captures the impact of trade facilitation between two trading partners and hence necessitates their inclusion in the empirical analysis. In this current context, coefficient of LPI interaction variable is found to be positively and significantly influencing IIT trade pattern of India with respect to its partners in general and in relation to high income groups in particular. This indicates the need for facilitating interventions in the area of infrastructure and connectivity development, and other logistics activities both through unilateral and multilateral routes for further promotion of trade. It also underlines the need to strengthen the economic infrastructure in low-income countries, so that the consequent product differentiation can facilitate their entry in regional IPNs. Finally, the moderate level of India's IIT even with RTA partners deserves attention of the policymakers. With the rising trend in India's IITs in recent period and the deeper integration of the country in Asian IPNs, future research may focus on determinants of the sectoral IITs for select product groups.

Table 1: Source of Data used in the IIT Determinant Analysis

Sl. No.	Variable	Variable Description	Data Source
1	LIIT	GLC index of IIT, computed with import and export data in US '000 $ obtained from Trade Map, ITC (undated).	Computed by author
2	DPCGDP	Difference in *Per Capita GDP* computed on the basis of data taken from the online World Development Indicator (WDI) database, which report data in US $ at current prices (World Bank, undated a).	Computed by author
3	D(K/L)	Difference in K/L ratio on the basis of capital and labour data. The *Capital Stock* data is taken from Federal Reserve Economic Database (FRB, undated), which report data in US $ Mn. The *Labour Stock* data has been taken from WDI (World Bank, undated a).	Computed by author
4	WDIST	Computed with the direct distance in km. between the India's capital and the respective trading partners' capital from and the GDP of partner countries obtained from WDI (World Bank, undated a).	Computed by author
5	DIST	Measures direct distance in km. between the India's capital and the respective trading partners' capital.	Obtained from Distance Calculator
6	LPI_i*LPI_j	Multiplication of Logistic Performance Index (LPI) of India and partner country from World Bank (undated b), which report the performance of the countries in a 1 to 5 scale.	Computed by author
7	BORDER	Countries sharing border with India has a dummy value of 1 and 0 otherwise.	Constructed by author
8	LANGUAGE	Countries with national *LANGUAGE* as English have dummy value of 1 and 0 otherwise.	Constructed by author
9	FTA	The information on FTA partnership of India has been collected from FTA database maintained by Asia Regional Integration Centre (ARIC), ADB (undated). An FTA partner has been assigned dummy value of 1 from the year it has come into existence and 0 otherwise.	Constructed by author
10	INCOME	The dummy takes a value of 1 for LICs and LMICs, and 0 for UMICs and HICs, by considering the income ranges defined under World Bank (undated c).	Constructed by author

Source: Authors' compilation

Table 2: Average Shares of India's Major Trade Partners in the Trade Basket

No.	Country	Export Share (%)			Import Share (%)		
		2001-05	**2006-10**	**2011-15**	**2001-05**	**2006-10**	**2011-15**
1	Australia	0.90	0.75	0.87	2.93	3.63	2.49
2	USA	18.50	12.51	12.98	6.38	6.41	4.87
3	China	4.41	6.46	4.67	5.30	10.66	12.52
4	Indonesia	1.47	1.61	1.67	2.26	2.38	3.20
5	Japan	2.97	2.11	1.95	3.22	2.53	2.37
6	Korea	1.24	1.89	1.43	2.86	2.76	2.88
7	Iran	1.14	1.22	1.18	0.43	3.80	2.28
8	South Africa	1.01	1.46	1.62	2.51	1.70	1.63
9	UK	4.78	3.80	3.06	4.11	1.88	1.35
10	Qatar	0.20	0.29	0.30	0.34	1.29	3.00
11	Malaysia	1.43	1.53	1.50	2.23	2.24	2.19
12	Thailand	1.25	1.06	1.12	0.77	0.98	1.22
13	Sri Lanka	1.77	1.51	1.66	0.24	0.19	0.15
14	Germany	3.82	3.14	2.54	3.83	3.81	2.97
15	Switzerland	0.73	0.36	0.40	4.91	4.71	5.59
16	Netherland	2.06	3.05	2.64	0.77	0.66	0.55
17	Singapore	3.53	4.46	4.02	2.47	2.62	1.66
18	Hong Kong	4.95	3.96	4.24	1.60	1.69	1.73
19	Vietnam	0.62	0.95	1.65	0.06	0.15	0.53
20	Bangladesh	2.22	1.43	1.73	0.09	0.11	0.13
21	Brazil	3.02	2.48	2.03	0.57	0.66	1.00
22	Belgium	0.72	1.40	1.83	4.90	2.08	2.22
23	Italy	2.66	2.27	1.63	1.34	1.40	1.02
24	Nigeria	0.93	0.79	0.89	0.10	2.93	2.96
25	France	2.08	1.85	1.70	1.55	1.68	0.80
	Total	**68.41**	**62.34**	**59.31**	**55.77**	**62.95**	**61.31**

Source: Authors' computation from ITC (undated)

Table 3: India's IIT Results for Top Trade Partners

Country	Intra Industry Trade Index			Partnership / Negotiations with India through Trade Bloc	Status
	2001-05	2006-10	2011-15		
Developed Economies					
Australia	11.25	12.84	7.69	CECA, RCEP	Under Negotiations
Belgium	62.88	50.72	51.98	India-EU BTIA	Under Negotiations
France	19.42	22.82	33.19	India-EU BTIA	Under Negotiations
Germany	25.57	35.39	40.10	India-EU BTIA	Under Negotiations
Hong Kong, SAR	60.05	64.29	57.84		No FTA
Italy	27.85	24.12	30.87	India-EU BTIA	Under Negotiations
Japan	13.03	18.05	19.56	JICEPA, RCEP	CEPA
Netherlands	23.91	24.88	25.49	India-EU BTIA	Under Negotiations
Qatar	1.22	7.11	15.11	GCC	Framework Agreement signed
Singapore	21.19	48.41	39.44	ISCECA, IASEAN FTA, RCEP	FTA, CECA
South Korea	17.71	29.90	38.03	IKCEPA, RCEP	CEPA
Switzerland	36.86	43.54	36.10	India-EFTA Agreement	Under Negotiations
UK	18.22	25.85	27.53	India-EU BTIA	Under Negotiations
USA	31.21	26.63	29.82		No FTA
Developing Economies					
Bangladesh	12.66	16.85	22.74	SAFTA, BIMSTEC	FTA
Brazil	6.69	10.28	7.76	India Mercosur PTA, IBSA	PTA
China	15.07	15.12	20.36	APTA, RCEP	PTA
Indonesia	11.74	14.36	13.22	IICECA, IASEAN FTA, RCEP	FTA
Iran	9.00	9.35	3.43	GSTP	No FTA
Malaysia	19.03	22.63	24.01	IMCECA, IASEAN FTA, RCEP	CECA
Nigeria	7.56	0.53	0.47	GSTP	No FTA
South Africa	4.97	5.64	3.97	IBSA, SACU PTA	Under Negotiations
Sri Lanka	29.80	30.77	43.33	ISLFTA, BIMSTEC	FTA
Thailand	20.35	25.61	30.29	BIMSTEC, IASEAN FTA, RCEP	FTA
Vietnam	10.55	16.04	12.87	IASEAN FTA, RCEP	FTA

Source: Authors' computation from ITC (undated)

Table 4: Summary Statistics

Variable	Observation	Mean	Std. Dev.	Min	Max
LIIT	350	1.22	0.43	-0.59	1.89
$LDPCGDP_i$	350	3.92	0.89	0.54	4.98
LD(K/L)	350	2.04	0.58	-0.02	2.73
$LogLPI_iLPI_j$	350	1.02	0.07	0.85	1.11
LTWD	350	1.65	0.80	0.03	3.54
BORDER	350	0.12	0.32	0.00	1.00
LANGUAGE	350	0.32	0.46	0.00	1.00
LDISTANCE	350	3.51	0.26	2.94	3.97
LDC	350	0.20	0.40	0.00	1.00
FTA	350	0.30	0.46	0.00	1.00

Source: Authors' estimation

Table 5: Regression Results on Determinants of India's Bilateral Intra-Industry Trade

Independent Variables	Dependent Variable: LIIT						
	Model (1)	**Model (2)**	**Model (3)**	**Model (4)**	**Model(5)**	**Model(6): LICs and LMICs**	**Model (7): UMICs and HICs**
Constant	-0.540	-0.894**	-1.141***	-0.058	-1.165***	-0.277	-1.379***
	(0.422)	(0.416)	(0.411)	(0.530)	(0.402)	(1.079)	(0.504)
LDPCGDP	0.104*	0.0523	0.079	0.061	0.079	0.137*	0.237**
	(0.058)	(0.060)	(0.059)	(0.056)	(0.059)	(0.071)	(0.102)
LD(K/L)	0.051	0.262*	0.226**	0.216**	0.219**	0.326	-0.002
	(0.086)	(0.101)	(0.098)	(0.097)	(0.098)	(0.245)	(0.132)
$LLPIi*LPI_j$	1.456***	1.478***	1.760***	1.604***	1.819***	1.124	1.730***
	(0.494)	(0.473)	(0.467)	(0.462)	(0.456)	(1.130)	(0.570)
LWDIST	-0.085**	-0.063**	-0.087**		-0.096***	-0.430**	-0.035
	(0.035)	(0.032)	(0.034)		(0.034)	(0.172)	(0.034)
LDIST				-0.278***			
				(0.105)			
Border		0.419***	0.389***	0.285**	0.401***	0.059	0.141
		(0.115)	(0.112)	(0.122)	(0.109)	(0.188)	(0.147)
Language			-0.119***	-0.115***	-0.123***	-0.632**	-0.093**
			(0.042)	(0.042)	(0.041)	(0.322)	(0.041)
FTA					-0.029	-0.110	0.003
					(0.037)	(0.073)	(0.043)
N	350	350	350	350	350	70	280
F-Statistics	46.37	61.05	74.83	74.22	84.15	65.84	52.34

Source: Authors' estimation

Note: Figure in the parenthesis shows the autocorrelation and heteroscedasticity-corrected standard errors of the estimated coefficient.

***, **, and * implies estimated coefficient is significant at 0.01, 0.05, and 0.10 level, respectively.

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