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Does Difference in Environmental Standard Influence India's Bilateral IIT Flows? Evidence from GMM Results

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Abstract

In the recent past, India has entered into several regional trading agreements (RTAs) with the objective of export promotion, on the one hand, and deepening participation in the global value chains, on the other. The consequent rise in Indian exports had been accompanied by a simultaneous import growth, given the trade preferences for partners through RTAs as well as ongoing unilateral tariff reforms. The rise in simultaneous exports and imports has enhanced the country's intra-industry trade (IIT) level. Recently, India has engaged in RTA negotiations with several developed countries, which are characterized by more stringent environmental standards. The current analysis attempts to identify factors that influence India's bilateral aggregate IIT index in a dynamic panel framework. In particular, it attempts to assess whether greater divergence in environmental standards adversely influence India's IIT patterns. The empirical estimates reveal that India's IIT is found to be relatively higher with countries that are technologically more advanced

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and have relatively stringent environmental standards. The observation indicates that India is possibly specializing in relatively low technology-intensive products vis-à-vis its developed trade partners. The analysis concludes that India would be better off by facilitating innovation and adhering to a higher level of environmental standard.

Keywords

Intra-industry trade, India, trade facilitation, environmental standards, product basket diversification, trade agreements, empirical estimation

JEL Codes: F13, F14, F15, F18

1. Introduction

With the gradual lowering of the industrial tariff barriers across countries, the incidence of overlapping trade flows within product categories, i.e., "intra-industry trade" (IIT), has become a common phenomenon over the decades (UNCTAD, 2014). While the dominance of IIT in trade flows was more common among the developed countries up until the 1980s, the scenario changed from the 1990s onward. Owing to a series of tariff reforms, for either compliance with the reform commitments mandated by the World Trade Organization (WTO) or through partnership in regional trade agreements (RTAs), the developing countries increasingly witnessed a rise in two-way trade flows in recent years (Bagchi, 2018; Burange & Kelkar, 2018; Hoang, 2019; Sawyer et al., 2010). There exists a rich literature that explores the determinants of IIT from both the theoretical (Krugman, 1981; Lancaster, 1980) and empirical (Bagchi & Bhattacharyya, 2021; Bergstrand & Egger, 2006; Bernhofen, 1999; Burange et al., 2017; Cole & Elliott, 2003; Greenaway et al., 1994; Yoshida, 2013) perspectives.

India, a major developing country, has witnessed interesting transitions in its trade policies over the years. While on the one hand, the country reformed the import tariffs significantly to meet its WTO commitments (Srinivasan, 1999), the participation in several Asia-centric RTAs led to a significant reduction through preferential tariff route on the other (Krishna, 2019). Since 2001, India has signed several RTAs, primarily partnering with Asian countries (Nag et al., 2021). The India-centric RTAs include India–Sri Lanka Free Trade Agreement (FTA) (2001), India–Singapore Comprehensive Economic Cooperation Agreement (CECA) (2005), South Asian Free Trade Area (2006), India–Bhutan Trade Agreement (2006),India–Chile Preferential Trade Agreement (PTA) (2007), India–MERCOSUR PTA (2009), India–ASEAN FTA (2010), India–South Korea Comprehensive Economic Partnership Agreement (CEPA) (2010), India–Japan CEPA (2011), India–Malaysia CECA (2011), and India–Mauritius Comprehensive Economic Cooperation and Partnership Agreement (2021). The tariff reforms in these RTAs have widened the trade opportunities by allowing exports and imports of both intermediate and final products at preferential duties. Moreover, India ratified that WTO Trade Facilitation Agreement in 2016 and introduced the National Trade Facilitation Action Plan in 2017, which also smoothened the trade flows (Chauhan & Vijayakumar, 2021). India's inclination to integrate with the world through RTAs continues as on February 18, 2022, the FTA with United Arab Emirates was signed (Government of India (GoI), 2022). The FTAs with Australia and the United Kingdom are expected to be concluded shortly.

It has been anticipated that the participation of India in the Asian RTAs will enable the country to deepen its presence in the regional production networks (Nag et al., 2017). India's participation in the global value chains has remained modest, and the need for technology upgradation has been acknowledged (Ray & Miglani, 2020). Conversely, the contributions of foreign value-added in India's manufacturing exports increased, as the unilateral as well as preferential tariff reforms, eased foreign import flows (Goldar et al., 2017; Veeramani & Dhir, 2017). In all, the preferences granted through the RTAs have widened trade deficits for India (Agarwal & Ghosh, 2017). As the country reformed the import tariff regime, its trade deficit widened from USD 40.51 billion in 2005 to USD 155.63 billion in 2019. With the urge to consolidate the domestic industrial sector, the GoI set up the National Manufacturing Competitiveness Council in 2004 and subsequently launched the National Manufacturing Policy in 2011. The initiative identified key sectors for receiving government supports for boosting competitiveness. The Make in India (2014) scheme was launched afterward, with the objective to transform India as a global manufacturing hub through requisite supports to the identified sectors (GoI, undated). Subsequently, on May 2020, the GoI launched the "Atmanirbhar Bharat Abhiyan," which aspires to make India self-reliant in the upstream value chain of several manufacturing sectors and also to revive the economy from the COVID-19 aftershocks.

As the export and import dynamics in the aftermath of tariff reforms widened the trade deficit, India's outlook toward further reforms has accordingly been influenced. The country's simple average tariff has increased from 8.9% in 2010–2011 to 11.1% in 2020–2021 (Shukla, 2021). In 2019, India pulled out from a mega-RTA negotiation involving partners located in East and Southeast Asia as well as Asia-Pacific, namely, the Regional Comprehensive Economic Partnership (RCEP), citing potentially adverse economic consequences (GoI, 2019). Afterward, the country expressed inclination to enter into RTAs with several developed countries, including the EU, the UK, and the USA. However, India has faced standard-related trade barriers in the past, particularly in the developed countries (ADB, 2020; Exim Bank, 2019). In this background, there is a need to judge whether the environmental standard difference and participation in RTAs, particularly involving the developed partners, might negatively influence India's bilateral IIT patterns.

The rest of the analysis is arranged as follows. A brief literature review is conducted in the following section. The data and empirical model are described next, followed by empirical analysis and discussion of results. Finally, based on the observations, a few policy conclusions are drawn.

2. Literature Review

When countries enter into RTAs, they may opt for different levels of integration depending on mutual consensus. On the basic level the integration may cover FTA in goods, while on the next level the same may be extended to goods, services, and investment provisions (i.e., a comprehensive agreement) as well. Deeper integration from this level may involve formation of customs, economic or monetary union (Azar et al., 2017; Ferreira, 2011). There exists a rich branch of literature on the influence of RTA partnership on the IIT pattern, indicating that entry into RTAs may enhance IIT indices (Egger et al., 2008; Menon & Dixon, 1996; Sledziewska, 2016).

India till date has only entered into FTAs but not any customs union, which can be explained by its relatively higher tariff rates vis-à-vis the partners (Nag et al., 2021). The country has, however, entered into comprehensive agreements with Singapore, Japan, South Korea, and Malaysia for enhancing trade in merchandize products as well as services and investment and technology transfer promotion. The comprehensive agreements are expected to enhance the trade flows, on the one hand, and enable India to participate more effectively in the Asian production networks on the other (Das, 2014). It is observed from the literature that India's aggregate IIT has generally shown an increasing trend. There exists a rich literature that attempts to identify both aggregate and sectoral IITs of India (Banerjee & Bhattacharyya, 2004; Kaur et al., 2016; Singh, 2014; Veeramani, 1999). Interestingly, the influence of the bloc formation on trade and IIT flows in several Indian RTAs has been limited so far, as prior trade relationships with the bloc partner countries had been narrow (Pant & Paul, 2018).

The relationship between environmental impacts of trade agreements is a widely researched area. Yao et al. (2019) observed that developing/low-income countries generally witness a greater pollution effect in the aftermath of an RTA, owing to the presence of "lenient environmental standards" therein. The analysis underlined the importance of learning from their developed counterparts. There also exists a rich literature on both theoretical and empirical relationships among trade flows, IIT and environment (Aidt, 2005; Antweiler et al., 2001; Chichilnisky, 1994; Copeland & Taylor, 1994; Fung & Maechler, 2007; Mehra & Kohli, 2018). Roy (2017) observed that the presence of IIT-type trade is beneficial for the environment. A section of the literature has focused on the implications of environmental regulations on trade in general and on IIT-type trade in particular (Shapiro, 2021). It is observed that intra-bloc IIT is conducive for lowering emissions and consequently the adverse effects of climate change (Leitão & Balogh, 2020). Acknowledging the role of institutional factors, Gallucci et al. (2019) observed that IIT-type trade of EU member countries is influenced by their eco-innovation index scores. The cross-country analysis of Cole and Elliott (2003) noted that rising IIT is associated with declining environmental regulation differences.

For a long time, India had not endorsed the developed country proposal on mainstreaming the environmental provisions at the WTO forum, underlining the potential trade-restrictive implications on developing country exports. India actively opposed the EU-US proposal on this front during the Seattle Ministerial Meeting (1999) and other subsequent forums (Srivastava & Ahuja, 2002). The country has also opposed the NGO participation in voluntary environmental standard preparation, considering them to be "potentially exclusionary" and trade-distorting (Gandhi, 2006). However, it deserves mention that sustainability issues have recently been discussed during India–UK FTA negotiations (Economic Times, 2022). It is anticipated that similar provisions may be pushed by other developed countries as well, with whom India is currently negotiating for a trade agreement. It is noted in the literature that tighter environmental regulations can improve environmental quality (Gürtzgen & Rauscher, 2000). However, abuse of environmental standards can emerge as barriers to trade flows as well (Ederington & Minier, 2003). It has been observed that growing stringency of regulations in trading partners can adversely affect IIT levels (Kohli, 2021).

With rising prevalence of IIT in world trade, the relationships between trade openness and implications on the factor markets have emerged as a major area of research. It has been observed that presence of higher IIT indices is associated with lower structural adjustment costs for industries (Brulhart & Elliott, 2002; Greenaway & Milner, 1986; Hamilton & Kniest, 1991). So, higher IIT indices in the aftermath of RTA formation can strengthen the regional integration process. The IIT indices can be further decomposed in two categories: horizontal intra-industry trade (HIIT) and vertical intra-industry trade (VIIT). HIIT is witnessed when the exchange of products is characterized by similar quality, but different attributes. Conversely, VIIT may occur because of difference in technology, where the countries characterized by higher productivity and wages specialize in and export superior quality products and vice versa (Aditya & Gupta, 2019; Shaked & Sutton, 1984; Yoshida, 2013). It is evident that VIIT may prevail when the two trading partners might be characterized by different income and technology levels, while the HIIT would occur in case of countries belonging to similar development patterns. The existence of both HIIT (Kelkar & Burange, 2016) and VIIT (Srivastava & Medury, 2011) has been noted in the Indian context.

There is a growing branch of literature on determinants of bilateral IIT in the Indian context (Agarwal & Betai, 2021; Aggarwal & Chakraborty, 2017, 2019; Bagchi & Bhattacharyya, 2019; Veeramani, 2001, 2007). However, an empirical analysis on influence of difference in environmental standards on India's bilateral IIT indices is relatively scarce. In addition, given the growing presence of developed countries among India's RTA partners in recent times, it is important to note how the difference in environmental standards influences trade flows with the RTA partners. The current analysis intends to bridge this gap.

3. Data and Empirical Model

For the empirical analysis, we consider India's aggregate bilateral IITs with 25 major trading partners, who are spread across development spectrum. Some of these countries are already enjoying RTA relationship with India. The IIT index is calculated using Grubel–Lloyd corrected (GLC) formula, given its optimality over Grubel–Lloyd uncorrected index (Gray, 1979). The bilateral IIT scenario, presence in India's trade basket, trade balance scenario, RTA partnership status, and environmental performance involving the selected countries are summarized in Annexure 1. The selection of trade partners has consciously attempted to include countries with diverse environmental achievements. The panel data model in equation (1) is estimated to explore the determinants of India's bilateral composite IIT involving these partner countries over 2001–2019.

$$LIIT_{it} = \alpha_0 + \beta_1 LIIT_{it-1} + \beta_2 LDPCGDP_{it} + \beta_3 LD\left(\frac{K}{L}\right)_{it} + \beta_4 LWDIST_{it} + \beta_5 L(LPI_i * LPI_j) + \beta_6 BORDER + \beta_7 LANGUAGE + \beta_8 Tariffline_{it} + \beta_9 StdDiff_{it} + \beta_{10} RTA(L(LPI_i * LPI_j)) + \beta_{11} RTA(StdDiff)_{it} + T_t + C_i + \varepsilon_{it} \quad (1)$$

where

α represents the *constant* term

βs are the *coefficients*

L represents logarithmic transformation of the variables

IIT_{it} represents bilateral composite IIT indices between India and country *i* for the year *t*

IIT_{t-1} represents bilateral composite IIT indices between India and country *i* for the year ($t - 1$)

$DPCGDP_{it}$ represents difference of per capita GDP between India and country *i* for year *t*

$D(K/L)_{it}$ represents difference of capital–labor ratio between India and country *i* for year *t*

$WDIST_{it}$ represents income-weighted distance between India and country *i* for year *t*

$LPI_{i*}LPI_j$ 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 shares 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 *i* share a common language (English) and 0 otherwise

$Tariffline_{it}$ represents the number of commodities at HS 8-digit level being exported by India to country *i* for year *t*

$StdDiff_{it}$ represents absolute difference between the Environmental Performance Index (EPI) of India and country *i* for year *t*

$RTA(L(LPI_{i*}LPI_j))$ represents an interaction term of an RTA dummy and LPI of India and country *i* for year *t*. The RTA dummy takes the value of 1 if India has a trade agreement with the country and 0 otherwise.

$RTA(StdDiff)_{it}$ represents an interaction term of the RTA dummy and absolute difference between the EPI of India and country *i* for year *t*

T_t represents the year dummies
C_i represents the country dummies
ε_{it} represents the error term

The estimated coefficients are interpreted as relevant elasticities with the variables reported in logarithmic terms. The dependent variable, i.e., India's bilateral IIT with a partner country *j,* has been computed by using the GLC index in the following manner:

$$GLC_{it} = \frac{\sum(X_{it} + M_{it}) - \sum|X_{it} - M_{it}|}{\sum(X_{it} + M_{it}) - |\sum X_{it} - \sum M_{it}|} \times 100$$

where X_{it} and M_{it} denote the export and import figures of India with partner country *i* for year *t* at HS 4-digit level, respectively.

To check the dynamism of the dependent variable, the lagged value of IIT is included in the model (Brülhart, 2000; Faustino & Leitão, 2007). The underlying logic of selecting the variables is as follows. A rising difference in per capita income (DPCGDP) implies a greater disparity in demand structure, and the love of variety can lead to higher IIT level (Aggarwal & Chakraborty, 2017). Rise in IIT along with growing similarity in income levels indicates the presence of HIIT. IIT in the presence of greater difference in technology plane (K/L ratio) and income levels, on the other hand, indicate the divergence in technology embodied in exports, in turn, underlining the existence of VIIT-type trade (Bojnec & Fertő, 2016). The stringency of environmental management policies influences the production process, and types of manufactured items produced, emission patterns, compliance cost etc., and in turn, bilateral trade flows (Gallucci et al., 2019; Gürtzgen & Rauscher, 2000). The environmental policy variable was proposed by Cole and Elliott (2003) to analyze how the difference in the environmental regulations influence trade in general and IIT-type trade in particular. The current analysis considers the absolute difference in the EPI scores of India and the partner countries (*StdDiff*) as a proxy for measuring difference in the environmental regulatory frameworks. Common border and language dummies are included in the model in line with the standard gravity framework. While time-invariant geographic distance is considered in the traditional gravity models, the current analysis incorporates the income-weighted distance as an improved indicator of distance-related trade costs (Türkcan & Ates, 2011) in the following manner:

$$WDIST_{it} = \frac{DIST_i * GDP_{it}}{\sum_{i=1}^{25} GDP_{it}}$$

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

The role of trade facilitation–related costs has emerged as a major factor influencing trade flows in general (Martí et al., 2014) and IIT in particular (Banik & Gilbert, 2008; Bergstrand & Egger, 2006; Hastiadi, 2012). The LPI published by the World Bank is therefore considered as an indicator of trade facilitation. For observing the effect of trade facilitation measures in both partners, a multiplicative interaction term consisting of the LPI of India and the respective countries are included (Aggarwal & Chakraborty, 2019). For considering product diversity, we consider the number of HS 8-digit-level products exported by India (Tariff line) (Soo, 2016). The usual country and year-specific dummies are incorporated as well.

Finally, two proposed interaction terms are incorporated in the model. First, an interaction term of the RTA dummy and the LPI multiplicative term are considered. This is done to understand whether the presence of the trade agreement along with an improved trade facilitation framework helps India's bilateral IIT-type trade. Second, an interaction term of the RTA dummy and the difference in the environmental policy are also considered. This term is included in the model to analyze how the RTA in the presence of similarity in environmental regulations impacts India's IIT patterns. The data source along with variable descriptions is summarized in Annexure 2.

4. Empirical Analysis and Results

The current analysis estimates a generalized method of moments (GMM) model to alleviate the bias resulting from using simple panel data methodology. Following Pesaran (2015) to avoid the estimation of spurious results, we control for nonstationarity in the data. The Harris–Tzavalis Panel Unit Root Test (1999) is performed to detect the presence of unit root among the explanatory variables. All the variables used in the regression analysis are found to be stationary. The summary statistics for the variables selected for the empirical analysis is provided in Table 1. The Harris–Tzavalis Panel Unit Root Test results are summarized in Table 2. The relationship between IIT and six key variables has been shown in scatter plots with the help of Figure 1.

Table 1. Summary Statistics

Variable	Observation	Mean	Standard Deviation	Min	Max
LIIT(t)	500	1.240	0.442	–0.592	1.895
LIIT(t-1)	500	1.169	0.511	–0.592	1.895
LDPCGDP	500	4.046	0.841	0.545	5.297
LD(K/L)	500	2.034	0.668	–3.379	2.913
LWDIST	500	1.672	0.791	0.028	3.544
$L(LPI_i{*}LPI_j)$	500	1.031	0.074	0.853	1.159
Border	500	0.120	0.325	0.000	1.000
Language	500	0.320	0.466	0.000	1.000
Tariffline	500	3,551.98	1,213.82	1,034	9,587
Standard Difference	500	23.547	12.978	0.540	56.850
$RTA(L(LPI_i{*}LPI_j)))$	500	0.355	0.483	0.000	1.151
RTA (Standard Difference)	500	6.270	10.662	0.000	50.55

Source: Authors' estimation.

Table 2. Harris–Tzavalis Panel Unit Root Test

Variables	Rho	*Z*
LIIT(t)	0.6779	–6.0590***
LIIT(t-1)	0.2333	–21.0880***
LDPCGDP	0.5480	–7.1026***
LD(K/L)	0.2742	–9.8640***
Border	0.0000	–28.9726***
LWDIST	0.3751	–8.1152***
$L(LPI_i{*}LPI_j))$	0.7170	–4.7358***
Language	0.0000	–28.9726***
Tariff line	0.3334	–17.7039***
StdDiff	0.6587	–6.7062***
$RTA(L(LPI_i{*}LPI_j)))$	0.4574	–7.9842***
RTA(StdDiff)	0.8028	–1.8370**

Source: Authors' estimation.
Notes: *** and ** denote the statistical significance at 0.01 and 0.05 levels, respectively.

In addition, the endogeneity check for the explanatory variables is performed using two-stage least squares method. It is observed that Wald Chi-square test statistic of 46.53 (Prob: 0.00) is statistically significant. The null hypothesis of the Durbin and Wu–Hausman tests is that the variable under consideration can be treated as exogenous. A Durbin score of 0.5178 (Prob: 0.502) and Wu–Hausman statistic is 0.4807 (Prob: 0.478), which are not significant, so null hypothesis of exogeneity is not rejected. The result indicates that explanatory variables used in the model are not endogenous.

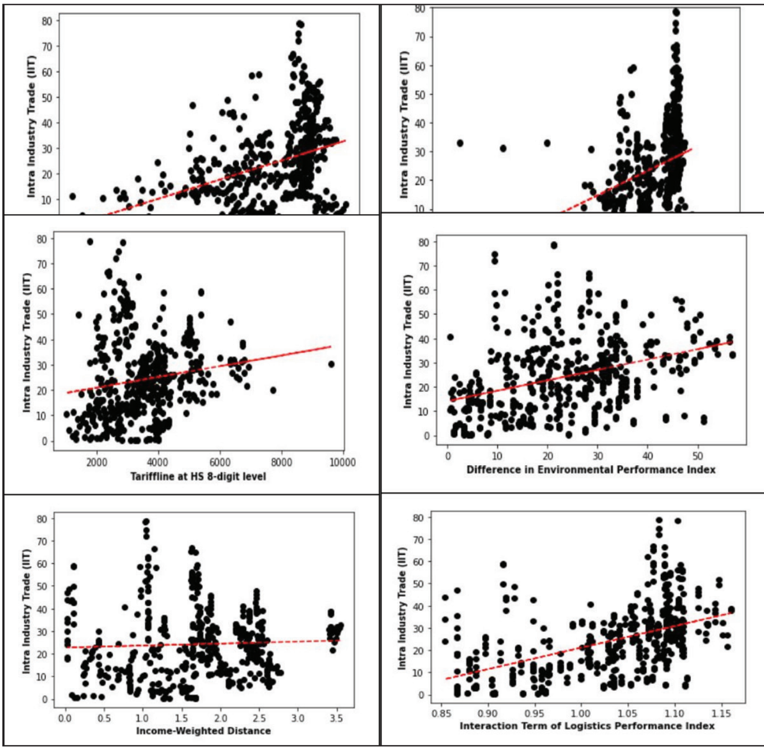

Figure 1. Relationship Between India's Bilateral IIT and Select Independent Variables

Source: Constructed by the authors.

The AR model works best when $|\beta_1| < 1$, that is, the effect diminishes gradually. The Hansen's *J* test statistic is reported as it provides a test of overidentifying restrictions, that is, a test of the null hypothesis that the instrument set is appropriate for the data. Because the *P* value is greater than 0.1 as shown in Table 3, the null hypothesis is not rejected, indicating that appropriate set of instrumental variables is used. Thus, the analysis considers that the instrumental variables are uncorrelated with the errors. The empirical estimates for India's composite IIT in a dynamic framework are summarized in Table 3.

It is observed from Table 3 that all the explanatory variables are found to be significant. A couple of interesting observations emerge from the empirical results. First, the coefficients of the lagged IIT indices are positive and significant for all the model specifications. This indicates persistence of trade patterns in the model, with the past values of IIT influencing the

Table 3. GMM Regression Results on Determinants of India's Bilateral IIT

Independent Variables	Dependent Variable: LIIT								
	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)	Model (7)	Model (8)	Model (9)
LIIT(t-1)	0.554***	0.582***	0.515***	0.517***	0.521***	0.557***	0.522***	0.498***	0.475***
	(0.030)	(0.035)	(0.052)	(0.056)	(0.057)	(0.034)	(0.064)	(0.069)	(0.058)
LDPCGDP	0.076***	0.089***							
	(0.015)	(0.021)							
LD(K/L)	0.037	0.038	0.025***	0.023***	0.026***	0.055**	0.075***	0.042***	0.032**
	(0.027)	(0.029)	(0.032)	(0.040)	(0.041)	(0.046)	(0.070)	(0.046)	(0.044)
Border		0.217**	0.238**	0.236**	0.224**	0.232**	0.204**	0.218**	0.212**
		(0.018)	(0.026)	(0.025)	(0.021)	(0.024)	(0.016)	(0.019)	(0.017)
LWDIST			–0.182**	–0.174**	–0.196**	–0.258**	–0.304**	–0.062**	–0.068**
			(0.095)	(0.099)	(0.093)	(0.145)	(0.136)	(0.166)	(0.145)
$L(LPI_i{*}LPI_j))$				0.020***	0.024***	0.038***	0.007***		
				(0.094)	(0.095)	(0.119)	(0.149)		
Language					–0.210*	–0.217*	–0.196*	–0.214*	–0.194*
					(0.038)	(0.036)	(0.028)	(0.037)	(0.027)
Tariff line						0.001***	0.001**	0.001***	0.001**
						(0.001)	(0.001)	(0.001)	(0.001)
StdDiff							0.002**	0.002**	
							(0.004)	(0.004)	
$RTA{*}(L(LPI_i{*}LPI_j)))$								0.114***	0.223***
								(0.052)	(0.055)

RTA(StdDiff)*									0.003** (0.001)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	475	475	475	475	475	475	475	475	475
Sargan test statistic	22.89	22.93	22.96	22.97	23.02	23.12	20.82	22.24	21.42
Hansen's J Chi-square statistic	0.428	0.417	0.409	0.405	0.394	0.386	0.528	0.476	0.493
P value	0.408	0.405	0.403	0.345	0.316	0.282	0.347	0.272	0.208

Source: Authors' estimation.

Notes: Figure in the parentheses shows the standard errors of the estimated coefficient.

***, ** and * imply estimated coefficient is significant at the 0.01, 0.05 and 0.10 levels, respectively.

current levels. Second, the coefficient of difference in per capita GDP (DPCGDP) is positive, implying that a higher difference in average income level with partner countries leads to higher bilateral IITs for India. Third, the coefficient of *D*(*K/L*) is positive, that is, with the growing difference in technology level, bilateral IIT increases. These two results collectively indicate the presence of VIIT in India's bilateral trade patterns with the partner countries, where the difference in product qualities (given the income and technology divergence) is influencing IIT levels. The relatively higher composite IIT levels of India with developed countries (Germany and the USA) as compared with the developing countries (e.g., Brazil and South Africa) underline this aspect. Fourth, the WDIST variable is found to be negative, which can be explained by the trade cost escalation effect associated with growing distance. Fifth, the coefficient of border dummy is positive, indicating that having a common land border with a partner country is associated with higher IIT. The last two results can be rationalized considering India's growing bilateral IIT levels with several neighboring countries, namely, Bangladesh, China, and Sri Lanka. Sixth, the coefficient of the language dummy is however found to be negative, underlining higher bilateral IIT of India with both non–English-speaking Asian countries (e.g., China, Japan and Republic of Korea) as well as prominent EU non-Anglophonic member countries (Germany and France) over the study period.

A couple of interesting observations emerge from the sign and coefficients of the variables proposed in the current analysis. First, the LPI interaction term is found to be positive, indicating that improvement in trade facilitation both in India and the partner country leads to an increase in the bilateral IIT index. The rising IIT resulting from the improvement in trade facilitation scenario can be expressed in terms of better container handling, customs efficiency, and improved port infrastructure, which help in reducing the shipping cost of consignments. This aspect facilitates trade in both intermediate as well as final products. Second, the product diversity variable is found to be positive, implying that a rise in number of commodities traded at the HS 8-digit level is leading to higher IIT. This result indicates growing importance of the manufacturing sector's maturity, as reflected through expanding production base, in influencing India's bilateral IIT patterns. Production and export of newer product categories in the country may create import demand for raw materials as well as part and components. The high import-dependence in several manufacturing sectors deserves mention in this context, where rising import of intermediate products facilitates a corresponding rise in export of final products (Veeramani & Dhir, 2017). Third, the higher differences in product standards, as reflected through differences in environmental regulations are found to be positive and significant. This implies that India's IIT with countries at comparable EPI levels is relatively low. It is observed that all the partner countries having higher bilateral IIT with India (e.g., the UK, France, Germany, Japan and the USA) are enjoying significantly better EPI levels. It may be noted that all these countries are also characterized by higher differences in per capita GDP and D(K/L) in comparison with India. The result indicates that the bilateral trade between India and these countries is characterized by qualitative difference in technology. Moreover, for exporting to the developed country partners, India requires to comply with relevant production standards (EXIM, 2019). Fourth, it is observed that the interaction term between RTA dummy and LPI multiplicative term has been positive. This indicates that removal of trade costs, even while trading with the RTA partners, are important for increasing IIT. Fifth, a similar result follows for the interaction term between RTA dummy and difference in environmental standard. The last two results can be explained by India's growing IIT relationships with Japan and South Korea, where the deepening trade preferences coupled with improved trade facilitation and improved compliance with diverging standard is leading to higher IIT levels.

5. Conclusion

The last two decades have witnessed a widening trend in India's trade deficit with several trade partners, which is noted at certain sectoral levels as well. The persistence of trade deficits, despite rise in bilateral trade flows and hence, IIT, is a concern for policymakers. The country has attempted to adjust to the challenges through a two-fold strategy so far. On one hand, it has attempted to ensure industrial consolidation through launch of the domestic policies, e.g., National Manufacturing Policy (2011), "Make in India" (2014) and "Atmanirbhar Bharat Abhiyan" (2020). On the other hand, it has entered into RTAs with a number of Asian partners since 2001 and recently showed inclinations to have RTA negotiations with several developed countries (e.g., Australia, EU, the UK, and the USA) as well. However, India's unease with deep RTA tariff reform processes vis-à-vis "East" came to forefront when in 2019 the country decided to opt out from the RCEP arrangement after engagement in six-year long negotiations. If India formalizes trade engagements through RTA relationship with the "West" including developed partners, it would be crucial in the country's own interest that IIT-type trade prevails therein. The existing literature notes that trade overlap is generally associated with lesser intersectoral adjustment challenges in domestic factor markets, e.g., labor (Brülhart, 2000; Devadason, 2012).

In this background the current analysis, which analyses the key determinants of India's IIT flows, arrives at the following conclusions. First, the empirical results indicate toward India's possible specialization in lower quality products, with technology difference explaining the past IIT patterns with developed countries. Given this observation, the country's RTA tryst with the developed countries, which are generally characterized by lower import tariffs vis-à-vis India, may lead to a rise in IIT along with worsening trade deficits. Second, the positive relationship between export basket diversity and IIT is a welcome development because one-way inward trade (i.e., imports) can further worsen the trade deficits. The "Make in India" (2014) and "Atmanirbhar Bharat" (2020) initiatives can crucially contribute to efficiency enhancement in coming years, enabling the country to graduate toward manufacturing of newer products within middle-to-higher quality bands. Third, higher IIT with countries characterized by greater divergence in environmental performance indicates possible compliance with more stringent standards in partner countries. Fourth, the higher IIT with RTA partners characterized by better trade facilitation and greater divergence in environmental performance is also important in this context. The results collectively indicate that India needs to consciously support product innovation and trade facilitation for securing higher levels of IIT-type trade, as presence of two-way trade leads to lesser disruption in domestic factor markets, primarily the labor market. The conclusion is that India can speed up the RTA engagements with developed countries (e.g., EU and the UK) because the process may offer preferential markets to Indian firms, on the one hand, and provide access to updated technology, on the other. The technology transfer may result in two dynamic benefits for Indian firms, namely, enhanced competitiveness and improved environmental compliance.

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Annexure 1. IIT, Trade Importance, and Environmental Standards for India's Select Trade Partners

Sl No.	Average Bilateral IIT Between India and Trade Partner		Average Export Share in India's Trade Basket (%)		Average Import Share in India's Trade Basket (%)		Average Trade Balance Scenario (USD Billion)		RTA Partnership Status with Partner Country	Environmental Status (EPI Average)	
	2001–2010	2011–2019	2001–2010	2011–2019	2001–2010	2011–2019	2001–2010	2011–2019		2001–2010	2011–2019
Asia Pacific											
Bangladesh	14.76	22.44	1.83	2.06	0.10	0.16	1.75	5.53	FTA Partner	46.44	35.88
China	15.10	23.60	5.44	4.63	7.98	13.78	–9.64	–47.75	PTA Partner	57.25	50.13
Hong Kong, SAR	62.17	47.63	4.46	4.31	1.65	2.25	1.97	2.87	No FTA	69.63	72.05
Japan	15.54	23.83	2.54	1.75	2.88	2.45	–1.92	–5.76	CEPA Partner	81.49	72.72
Indonesia	13.05	18.94	1.54	1.53	2.32	3.27	–2.29	–10.07	FTA Partner	60.18	51.49
Malaysia	20.83	22.45	1.48	1.66	2.24	2.17	–2.01	–4.74	CECA Partner	81.60	63.94
Singapore	34.80	34.92	4.00	3.72	2.55	2.00	0.61	2.25	CECA, FTA	69.63	72.05
South Korea	23.81	40.58	1.57	1.43	2.81	3.11	–2.92	–9.67	CEPA Partner	74.21	62.76
Sri Lanka	30.29	44.49	1.64	1.57	0.22	0.17	1.50	3.94	FTA Partner	67.49	59.47
Thailand	22.98	31.99	1.16	1.19	0.88	1.34	–0.35	–2.40	FTA Partner	68.80	58.51
Vietnam	13.30	12.75	0.79	1.89	0.11	0.84	0.79	1.95	FTA Partner	58.69	49.72
Europe											
Belgium	56.80	52.02	1.06	1.92	3.49	2.04	–1.62	–3.04	Under Negotiations	74.61	70.26
France	21.12	34.14	1.97	1.70	1.62	0.83	–0.53	1.39	Under Negotiations	83.12	78.06
Germany	30.48	40.86	3.48	2.63	3.82	2.90	–2.73	–5.16	Under Negotiations	80.16	77.02
Italy	25.99	31.37	2.47	1.67	1.37	1.02	0.33	0.47	Under Negotiations	80.01	75.82

(Annexure 1 continued)

(Annexure 1 continued)

	Average Bilateral IIT Between India and Trade Partner		Average Export Share in India's Trade Basket (%)		Average Import Share in India's Trade Basket (%)		Average Trade Balance Scenario (USD Billion)		RTA Partnership Status with Partner Country	Environmental Status (EPI Average)	
Sl No.	2001–2010	2011–2019	2001–2010	2011–2019	2001–2010	2011–2019	2001–2010	2011–2019		2001–2010	2011–2019
Netherlands	24.40	25.52	2.56	2.50	0.72	0.59	2.15	4.88	Under Negotiations	77.47	74.23
Switzerland	40.20	35.24	0.55	0.39	4.81	4.87	–7.90	–20.83	Under Negotiations	84.99	85.16
UK	22.04	30.71	4.29	3.03	3.00	1.30	0.67	3.26	Under Negotiations	84.60	77.90
North America											
USA	28.92	32.02	15.51	14.38	6.40	5.49	5.11	18.53	No FTA	77.50	69.27
South America											
Brazil	8.49	9.87	2.75	1.60	0.62	0.96	0.30	0.20	PTA Partner	76.77	63.37
Africa											
Nigeria	4.05	0.46	0.86	0.87	1.52	2.58	–2.94	–9.01	GSTP	46.40	47.21
South Africa	5.31	4.21	1.24	1.46	2.11	1.53	–1.71	–2.48	Under Negotiations	62.27	50.82
Middle East											
Iran	9.18	3.46	1.18	1.09	2.12	2.20	–3.82	–6.68	Under Negotiations	70.36	55.17
Qatar	4.17	10.59	0.25	0.35	0.82	2.56	–1.63	–10.54	Framework Agreement Signed	48.88	60.40
Asia Pacific											
Australia	12.05	7.52	0.83	0.98	3.28	2.57	–5.16	–8.65	Under Negotiations	78.60	74.04

Source: Authors' own computation and construction.
Note: The EPI index values have been averaged with the available years during the time range.

Annexure 2. Source of Data used in the Empirical Model

Sl. No.	Variable	Variable Description	Data Source
1	*IIT*	GLC index of IIT, computed with import and export data at HS 4-digit levels in US$ '000, as obtained from Trade Map, ITC (undated).	Computed by authors
2	*DPCGDP*	Difference in *per capita GDP* computed with data obtained from the online World Development Indicator (WDI) database, which reports data in US $ at current prices (World Bank, undated a).	Computed by authors
3	*D(K/L)*	Difference in K/L ratio as derived from capital and labor data. The *Capital Stock* data are taken from Federal Reserve Economic Database (FRB, undated), which reports data in US $ Mn. The *labor stock* data have been taken from WDI (World Bank, undated a).	Computed by authors
4	*WDIST*	Computed with the direct distance in km. between India's capital and the respective trading partners' capital (Distance Calculator, undated) and the GDP of partner countries, as obtained from WDI (World Bank, undated a).	Computed by authors
5	LPI_i*LPI_j	Multiplication of Logistic Performance Index (LPI) of India and partner country obtained from World Bank (undated b), which report the logistics sector performance of the countries in a 1 to 5 scale. To make the series continuous, the authors have adjusted the values.	Computed by authors
6	*BORDER*	Countries sharing border with India have a dummy value of 1 and 0 otherwise.	Constructed by authors
7	*LANGUAGE*	Countries with English as national language have dummy value of 1 and 0 otherwise.	Constructed by authors
8	*Tariff line*	Product differentiation variable, constructed on the basis of number of India's export commodities at HS 8-digit level to ROW, as obtained from Trade Map, ITC (undated)	Constructed by authors
9	*StdDiff*	Absolute difference in EPI score of India and partner country, as obtained from the Yale Center for Environment Law and Policy (undated). As the data are not available for all the years, it has been adjusted by the authors.	Computed by authors
10	$RTA*(LPI_i*LPI_j)$	Multiplication of FTA with LPI of India with partner country (LPI_iLPI_j)	Computed by authors
11	*RTA*(StdDiff)*	Multiplication of FTA with absolute difference in EPI scores of India and partner country.	Computed by authors

Source: Authors' compilation.

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