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Institute of South Asian Studies  
National University of Singapore  
29 Heng Mui Keng Terrace  
#08-06 (Block B)  
Singapore 119620  
Tel: (65) 6516 4239 Fax: (65) 6776 7505  
[www.isas.nus.edu.sg](http://www.isas.nus.edu.sg)  
<http://southasiandiaspora.org>



## **India in the International Trade of Intermediates & Final Products – A Sector Level Study**

*International trade is redefined today in terms of trade in value added and global value chains. Most countries trade both in finished goods as well as intermediates. India, a less talked about country in the context of trade through value chains cannot remain insulated from the new trend. This paper investigates key factors associated with India's international trade of both intermediates and finished products at a sectoral level. The significance of bilateral and multilateral trade agreements is specifically analysed in furthering each type of trade. Finally industry specific effects of trade in intermediates and final products are also brought to light.*

Deeparghya Mukherjee<sup>1</sup>

### **Introduction**

The world trade architecture has been changing significantly from trading finished products to outsourcing only particular stages of production. Over the last decade, we have shifted to an era where products are “Made in the World”. Falling transport and communication costs have made it possible to source the most economic inputs from various parts of the world to manufacture products and services. We are thus living in an age of Global value chains.

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<sup>1</sup> Dr Deeparghya Mukherjee is a Visiting Research Fellow at the Institute of South Asian Studies (ISAS), an autonomous research institute at the National University of Singapore (NUS). He may be contacted at [isasdm@nus.edu.sg](mailto:isasdm@nus.edu.sg). The author, not ISAS, is responsible for the facts cited and opinions expressed in this paper.

While the narrative of the Automobile value chain and those of electronic products sourced from the Asian value chain are better known, most countries today are integrating to a greater degree with others. Hence, studying trade patterns of any country based on aggregate exports and imports alone has lost significance. Analysing exports and imports that get used as intermediate inputs or for final demand has become important. Of late, statistics on sectoral exports and imports being used as intermediate inputs or final demand have been made available. This has thus opened the door for studies on sectoral trade flows with a focus on studying the differences between trade flows for intermediate inputs and final demand.

Academic literature has thus turned towards investigations of patterns of integration in a value chain through supplying intermediate inputs as well as causes of the same. Preliminary studies suggest that India, like other countries, is also integrating into value chains. In fact, to increase trade participation and facilitate economic growth, India has been signing various trade agreements with various countries.

Studies in assessing the similarities and differences in sectoral trade of India drilling down into intermediates and final products trade are almost absent. It is this gap in the literature that this paper wishes to address. In this paper, we try to concentrate on the trade linkages of India with other economies as (i) a supplier of both raw materials and finished products and (ii) as a user of exports from other economies in its own production or final demand. In doing so, we investigate and establish differences and similarities across sectors in their export and import pattern. The role of the Free Trade Agreements (FTAs) signed by India in furthering such linkages with partner countries are also investigated to find out if India typically trades more with countries who have a FTA with India. The major questions which the paper seeks to answer are: (1) Are India's exports and imports mostly for final demand or intermediate inputs? Do the answers vary according to the sector in question? (2) Do all FTAs signed by India imply greater trade with the countries in question? Are some agreements faring better than others? These questions are probed with a focus on difference in pattern for trade in intermediate inputs and for final demand. The paper thus helps understand if India is principally a supplier of intermediate products to the world or a final good supplier drilling down into the sectors.

The paper belongs to the strand of literature assessing effects of trade agreements using a variant of the augmented gravity equation model which has been extensively used to assess the effect of trade agreements. However, we use sectoral production and trade statistics for our

purpose and thus improvise on the traditional gravity equation setup which uses country level statistics alone. The novelty of the paper lies in the fact that, this is the first attempt at analysing India's sectoral trade data for intermediate inputs trade and trade of final products using the augmented gravity equation framework testing for differential effects of India's trade agreements in intermediate and final products trade.

## **Related Literature**

A body of literature exists on the advent and growth of trade in the value chain paradigm, starting with intermediates trade and participation by countries in value chains (Mattoo, Wang, & Wei, 2013)(Antras, et al 2012) etc..Baldwin & Lopez-Gonzalez,(2013) offer a detailed analysis of cross border flows of intermediate goods and services. Computation General Equilibrium (CGE) based studies evaluate the effects of fragmentation into the value chains on labour income (Timmer, et al 2012). The role played by FTAs and preferential trade agreements (PTAs) in furthering value added exports and imports of intermediates also exists with focus on Rules of Origin and most favoured nation (MFN) routes(Nedalla & Rosellon, 2012).

Soloaga & Winters,(2001) were amongst the first to evaluate effects of PTAs in the gravity model framework using PTA dummies.<sup>2</sup> Francois (2005) establishes the impact of FTAs and trade costs on intermediates trade and production based on econometric evidence from intra-Organisation of Economic Cooperation and Development (OECD) countries for motor vehicles and motor vehicle parts. Nicita, Ognivtsev, & Shirotori (2013) argue the importance of trade and economic policies in shaping the business environment of least developed countries (LDCs) which in turn facilitate their participation in higher stages of the value chain.Miroudot, Rouzet, & Spinelli (2013) find that in the context of value chains, bilateral or regional trade agreements have little effect. They thus suggest a move towards consolidation of Regional Trade Agreements (RTAs) moving towards the multilateral framework again.

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<sup>2</sup> The gravity model of trade in economics is inspired from Physics. The attraction between two bodies is positively related to the masses of the bodies and negatively affected by the distance between the same. In economic literature, the trade flow between two countries is akin to attraction in physics and this is explained by the mass of a particular country i.e. the gross domestic product (GDP) of the country while the distance is measured normally as the geographical distance between the capitals of the two countries. See "Analyzing Bilateral Trade using the gravity equation" <http://vi.unctad.org/tpa/web/docs/ch3.pdf>

Baier & Bergstrand (2007) find that PTAs increase total trade by 58%. Studies by Kazunobu & Yamashita,(2011) find that PTAs have a positive impact on final goods trade both in the short and long run but significant positive impact on parts and components trade only emerge in the long run. Amongst other studies assessing the effectiveness of PTAs on trade volume, Medvedev,(2010) shows that effects of PTAs vary by type of agreements and total trade between partners is a poor proxy for trade in tariff lines where PTAs matter.

Our paper focuses primarily on the inter-sectoral differences and similarities in intermediates and final product trade of India and the effects of FTAs. Recent studies on firm level data as well as aggregate trade data have found India's efforts at increasing bilateral as well as preferential trade agreements to be falling short of expectations. India fares better in promoting multilateral liberalisation (Srinivasan & Archana, 2009). Joshi (2010) however finds positive trade creation effects of the India-Sri Lanka FTA.

We use the Gravity model framework (Tinbergen, 1962) in the context of estimating effect of PTAs on India's exports and imports of both intermediate products and final goods at an industry level. The effect of PTAs has been studied through the gravity model framework amongst others by Frankel,(1997); Fratianni & Hoon Oh.,(2009) and Kazunobu & Yamashita,(2011).Tharakan, Beveren, & Ourti,(2005) have used the gravity model in India's context for studying the trade patterns of India's software and goods exports. They find the presence of English speaking professionals and a network of immigrant Indian population in the west to be crucial for software services exports from India. Batra,(2004) use the gravity framework to conclude on positive effects of proximity and size of trade partner on India's trade flows. In our formulation, we use an approach closest to Srinivasan & Archana, (2009) using log values of trade partner's sectoral production only as the model only caters to India's bilateral trade.

## **Data & Methodology**

We use the augmented gravity model in a cross section setting with trade policy and common language related variables for our analysis. The statistics on industry specific trade in intermediates and final products are sourced from the UNCTAD-Eora-Multi-Regional Input-Output database (MRIO) database (Lenzen, Kanemoto, Moran, & Geschke, 2012) and

(Lenzen, Moran, Kanemoto, & Geschke, 2013). Data at the level of 26 sectors and inter-sectoral international trade are used for the analysis. The sectors used are: agriculture; fishing; mining and quarrying; food and beverages; textiles and wearing apparel; wood and paper; petroleum, chemical and non-metallic mineral products; metal products; electrical and machinery, transport equipment; other manufacturing; recycling; electricity, gas and water; construction; maintenance and repair; wholesale trade; retail trade; hotels and restaurants; transport; post and telecommunications; financial intermediation and business activities, public administration; education, health and other services; private households; others and re-export & re-import. We use data only for 2011 as this is the latest year for which the data is available. Since the principal motive of the paper is to spot inter-sectoral differences in trade of intermediates and final products among trade partners, we start our analysis in a cross section frame. The present study is thus incapable to offer inferences on trade creation and diversion through trade agreements or changes in trends of exports and imports from sectors over time. Future improvements of the study are possible by extending it to a panel setup. The Eora database furnishes us with data for a total of 188 trade partners of India. This is the primary reason for sourcing our data from Eora. Other sources like the World Input-Output Database (WIOD) and OECD Trade in Value Added (TiVA) data are limited in terms of their country coverage.

Common spoken language and common native language between India and other countries are drawn from the CEPII database (Melitz & Toubal, 2012).<sup>3</sup> While the common spoken language refers to ease of communication, a common native language reflects common ethnicity and trust. The two attributes thus capture different aspects in explaining trade behaviour. A complete log of completed FTAs between India and other countries is sourced from the website of the department of Commerce, Ministry of Commerce and Industry, Government of India.<sup>4</sup> We do not get into the depths of the agreements. In other words, we do not capture how detailed a particular agreement is in comparison with another agreement that the same country has signed. We also do not capture any special provisions given in a particular trade agreement which is not made in other trade agreement. Dummies are constructed for each country with which India has a FTA. The trade agreements covered in this study include: India-Japan, India-Korea, India-Mercosur, India-Nepal, India-Singapore Comprehensive Economic Cooperation

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<sup>3</sup> See CEPII Research and expertise on the world economy [http://www.cepii.fr/cepii/en/bdd\\_modele/bdd.asp](http://www.cepii.fr/cepii/en/bdd_modele/bdd.asp)

<sup>4</sup> See "Trade Agreements" ([http://www.commerce.nic.in/trade/international\\_ta.asp?id=2&trade=i](http://www.commerce.nic.in/trade/international_ta.asp?id=2&trade=i))

Agreement (CECA), India-Bhutan, India-Malaysia, India-Chile, India-Africa, India-Sri Lanka, India-Afghanistan, India-ASEAN (Association of South East Asian Nations), Asia Pacific Trade Agreement (APTA) and the South Asian Free Trade Agreement (SAFTA). We do not consider agreements that are still under negotiation. Statistics on population and exchange rates are sourced from the World Development Indicators of the World Bank. Distance between trade partners and India is obtained from CEPII Database (Mayer & Zignago, 2011).

We improvise on the traditional idea of gravity studies by using sectoral GDPs for each country instead of country GDPs in the cross section framework. The gravity framework relates trade flows between countries to their economic size (GDP), population and geographic distance. Given that our data is at the level of country-sector we use the sectoral outputs in place of country GDPs.

We analyse the trade flows of India at three levels catering to exports and imports of India as intermediate inputs in production or for final demand. Specifically, we try to capture:

- 1) (i) Exports of India from all sectors used as intermediate inputs in the  $j$ th sector of country  $i$  ( $X_{ij}^I$ )  
(ii) Exports of India from the  $j$ th sector used as intermediate inputs in any sector of country  $i$  ( $X_{ji}^I$ )
- 2) (i) Imports of India from all sectors of country  $i$  used as intermediate inputs in India's  $j$ th sector ( $M_{ij}^I$ )  
(ii) Imports of India from  $j$ th sector of country  $i$  used as intermediate inputs in any sector of India ( $M_{ji}^I$ )
- 3) (i) Exports from  $j$ th sector of India used as final demand in country  $i$  ( $X_{ji}^F$ )  
(ii) Imports of India from  $j$ th sector of country  $i$  used as final demand in India ( $M_{ji}^F$ ).

The equation estimated is:

$$\ln X_{ij}^I = \alpha_0 + \beta_0 * \ln GDP_{ij} + \beta_1 * \ln(Pop * Pop_i) + \beta_2 * Dist_i + \beta_3 * rer_i + \beta_4 * Csl + \beta_5 * Cnl + \beta_6 * Com\_col + \sum \beta_k * Dum_i + \sum_{m=1}^{25} \beta_m * D_j + \varepsilon_{ij}$$

The following table describes the variables in the above equation:

Variable	Description
$X_{ij}^I$	Exports of intermediates from all sectors of India to $i$ th country used as intermediates in $j$ th sector
Rer	Bilateral real exchange rate (Ratio of US\$ per INR to US\$ per unit of $i$ <sup>th</sup> country's currency)
GDP <sub>ij</sub>	GDP of $j$ th sector in country $i$
Pop	Population of India, 2011
Pop <sub><math>i</math></sub>	Population of the $i$ th country, 2011
Dist <sub><math>i</math></sub>	Dist between India and $i$ th country
Csl	Common Spoken Language
Cnl	Common Native language
Com_col	Common Coloniser connection as India i.e. ex British Colony dummy
Dum <sub><math>i</math></sub>	Dummy for FTA with India
D <sub><math>j</math></sub>	Sector Dummy

The above equation is further estimated by replacing exports from all sectors of India to trade partner “ $i$ ” in the  $j$ th sector i.e.  $X_{ij}^I$  by  $X_{ji}^I$ . Similarly, we estimate for  $M_{ij}^I$  and  $M_{ji}^I$ . Finally, exports and imports for final consumption are estimated using  $X_{ji}^F$  and  $M_{ji}^F$ . We use product of India's population with trade partner's population so as to capture the size of both economies in the analysis.

## Results and Discussion

The results of the regression analyses are presented in Table 1 at the end of the paper.

Our findings throw light on the sectoral differences in the pattern of exports and imports for intermediate usage in production and for final demand respectively. Before we get into the differences between results of each of our dependent variables, we note that the basic gravity relation stands good and is found to hold true at the sectoral level for both imports and exports. Hence the trade partner's production, population and distance from India are key factors influencing the exports from and imports into India for both intermediate and final demands. The bilateral real exchange rate is significant only for the exports of India's products used as

intermediate inputs elsewhere. The common colony link is particularly important for exports of both intermediate products and final products. However, for imports, the common colonial link is less important. We report the results of exports for intermediate usage, imports for intermediate usage, and exports and imports as final products in the three subsections below.

### ***Indian Exports used as Intermediates by the trade partner***

Column 1 of results in the table gives the estimation results with India's sector wise exports for intermediate usage in any sector of the partner as the dependent variable. Column 2 tabulates the results with India's exports from all sectors combined, which are used as intermediate inputs in the trade partner's sector. While there are no differences in the results with respect to the main gravity variables of total production, distance, population product and real exchange rate, there are differences at the sectoral level as we measure different attributes as the dependent variable. In the first column, we are looking to track variations in India's sector-wise exports for intermediate usage to partners. In the second column, we are capturing India's total exports spanning all sectors used as intermediate inputs in each sector of the partner. We compare and contrast between the two results as we detail on them.

For India's sector-wise exports for intermediate usage, the two language variables are significant. Although common national language comes out to be very significant, common spoken language is insignificant for India's total exports for usage as intermediate goods in particular sectors of the trade partner. Given the construction of the language variables, this proves that India's total exports as intermediate production varies less across its trade partners but experiences increases with trade partners of the region which have a common native language. In other words, Indian exports to be used as intermediate inputs are important in the region. Comparing the effects of trade agreements signed by India and their effects on India's exports of intermediates, trade partners with trade agreements show greater imports of intermediates from India than other countries. Korea, the Mercosur countries, Nepal, Singapore, Malaysia, Chile, Africa and Sri Lanka tend to import more than other trade partners, and India has trade agreements with each of them. However, the trade agreements with ASEAN and APTA countries do not show any significant greater exports compared to India's other trade partners. Although the APTA effect is insignificant, ASEAN has a negative significant coefficient. This reflects lower exports to ASEAN countries for intermediate usage compared



to other trade partners of India who do not have a trade agreement with India. The SAFTA and the agreements with Afghanistan and Japan are also seen to generate no extra exports from India to be used as intermediates in these countries compared to other trade partners.

Considering sectoral exports from India for intermediate usage in production by its trade partners, the most significant sectors for exporting products for intermediate usage are agriculture, mining and quarrying, food & beverages, textiles and wearing apparels, wood and paper, petroleum, chemical and non-metallic mineral products, metal products, electrical and machinery, transport equipment, other manufacturing, recycling, transport, financial intermediation and business activities. The sectors which export comparatively less for intermediate usage of their output are fishing, electricity, gas and water, construction, maintenance and repair, wholesale trade, hotels and restaurants, public administration, education, health and other services and private households. The results are in line with expectations. The sectors which are found to be exporting less for intermediate usage are sectors where India participates less in world trade.

Comparing this to the results of India's total exports in partner's sectors read from column 2, a negative coefficient is observed for all sectors. This does not reflect anything about India's sectoral differences in supplying inputs to trade partners. The negative coefficients in combination with trade agreement dummies and traditional gravity variables only show that there is a strong positive impact of partner sector production on India's total supply of intermediate products and the sectoral differences in sourcing pattern from India in aggregate are negligible. Some of the country trade agreements are more significant when we measure India's total contribution of intermediate goods to their sectors. While Korea loses significance along with Mercosur; a positive effect is observed for Malaysia. Japan stands out with a negative coefficient, signalling that among other sample countries, it receives lesser total intermediate inputs from India.

### ***India's imports used as intermediates***

We now focus on columns 3 and 4. Similar to our discussion on exports, column 3 shows the results for India's sector-wise imports for usage as intermediate inputs from all sectors of the trade partner while column 4 shows the results of imports from each sector of the trade partner used as intermediate product anywhere in India.

In this case for India's sector-wise imports for intermediate usage, both *cnl* and *csl* are highly significant but in opposite directions. A common spoken language with a positive sign reflects the incremental effect on India's imports due to higher coordination on spoken language. However, a negative coefficient on native language proves that India's integration in the region or sourcing from its immediate neighbours for usage in domestic production is lower on average. Amongst the sample countries, all trade partners with whom India has a trade agreement, export more intermediate products to India, compared to other countries. The only exceptions are the African countries, the APTA and ASEAN countries.

Sectors that stand to receive maximum inputs in their production are also the ones that were found to export more, compared to other sectors to cater to intermediate demand of other countries. This is true with the exception of mining and quarrying, wood and paper products, food and beverages, transport equipment, other manufacturing and transport where India is principally an intermediate exporter. Coefficients for imports for production in wholesale trade, retail trade, hotels and restaurants, post and telecommunications are significant and negative. These are sectors which import less than others for their own production. Most of the production in these sectors for India are domestically sourced and domestically consumed as intermediates or final demand.

There are no significant inter-sectoral differences that we could comment on from column 4. India's total imports from trade partner's sectors are uniform and have a strong positive correlation with the level of production. The intercept for the regressions are all negative and these vary across sectors. These offer little detail on which sectors tend to export more to India. Japan, Singapore, Nepal, Malaysia, Chile and Bhutan stand out in their more significant sector-wise exports to India for intermediate usage compared to other countries. We could only conclude that sectors like recycling and transport of partner countries export relatively less to India than for other sectors. Their coefficients are less significant.

### ***India's exports and imports of final products***

Columns 5 and 6 tabulate the results of India's sector-wise exports and imports for final consumption respectively. The common coloniser attribute is important for India's exports for final consumption but not for imports. While common native language is important for exports for final consumption, it has a totally opposite effect for India's imports for final consumption.

For India's imports, a common spoken language of the trade partner is most significant with a positive impact. Hence, although India exports significantly to its neighbourhood to cater to final demand, it does not import as much from the region to satisfy its own final demand.

Almost all trade agreements have no separate effect on India's exports for final consumption demand. The only trade agreements that generate a positive impact are the ones with Africa, Sri Lanka and Bhutan.

The sectors that are most important for exports for final consumption demand are: agriculture, food and beverages, textiles and wearing apparels, wood and paper, petroleum, chemical and non-metallic mineral products, metal products, electrical and machinery, transport equipment, other manufacturing, recycling, transport, hotels and restaurants, financial intermediation and business activities, and education and health. The sectors that are performing worse than the others include fishing, maintenance and repair, wholesale trade, public administration and electricity gas & water supply.

For Imports, the trade agreements with Japan, Mercosur, Singapore, Chile, Sri Lanka, Malaysia and Nepal have shown significant positive influence in terms of greater imports from these countries compared to those from other countries. The transport sector stands out in having a high positive coefficient i.e. imports in this sector are higher than other sectors all else being equal. Imports from all other sectors are highly dependent on their levels of production and no significant difference from each other in terms of affecting imports into India for final consumption.

In sum, we spot clear differences in India's performance in exports and imports for intermediates and final demand, and the differences are more pronounced when we focus on trade with countries with which India has an FTA, comparing them with others. India's exports have a significant exposure to countries which were earlier British Colonies. The same is not true for India's imports. While a common spoken language is important for India's exports of intermediate products and imports of both in intermediates and final products, the common native language connection is found to increase exports of both intermediates and final products only. For imports, the common native language connection has a negative role. The FTAs signed by India thus far have not seen incremental exports for final demand in those countries barring Bhutan, Sri Lanka and Africa. Most trade agreements have boosted India's exports of

intermediates and to a lesser extent India's imports of final products. The agreements which have resulted in no significant increase in trade are ASEAN, SAFTA and APTA. The India-Singapore CECA stands out as the most significant in terms of India's exports and imports of intermediates and imports of final products. However, India does not export significantly more to Singapore for final demand vis-à-vis other trade partners. Mining and quarrying is one sector which primarily exports for intermediate usage while hotels and restaurants and education and health are exclusively exporting for final demand. The sectors that do not participate in international trade as the other sectors are fishing, retail and wholesale trade, public administration and post and telecommunications. The transport sector stands out in both exports and imports spanning intermediate and final demand.

## **Conclusion**

This paper is an attempt to investigate India's exports and imports segmented by intermediate usage in production and final demand at a sectoral level based on India's trade flows in the year 2011. Our inferences throw light on sectoral differences in trade in intermediates and final demand and bring out the effectiveness of trade agreements signed by India in increasing trade in each category. Testing our hypotheses in a gravity model framework, we find that India's bilateral trade flows at the sectoral level confirm the basic gravity equation and are thus affected by the production level, population, distance and real exchange rate.

We establish that India's trade agreements have not resulted in greater exports from India to cater to the partner's final demand vis-à-vis countries which have no agreement with India. The countries with trade agreements however are seen to import significantly more from India for usage in their production vis-à-vis countries without a trade agreement. The trade agreements of India with ASEAN, APTA and SAARC (i.e. SAFTA) do not show any effects of incremental trade with these countries compared to other trade partners. India's most successful trade agreements are the CECA with Singapore and the agreement with Sri Lanka in terms of greater trade, both in intermediates and final demand.

At a sectoral level, India's exports as intermediate inputs stand out for most of the manufacturing industries, while agriculture, petrochemicals, textiles and wearing apparels, transport, financial intermediation and business activities stand out in both intermediate as well

as final demand exports. India's imports for intermediate usage are most significant in sectors like petrochemicals, electrical machinery, and metal products.

Based on our findings with respect to shared language and previous colonial connections we conclude that while India is a significant exporter of final goods and intermediate products to some countries within the region for final demand with similar native language, most inputs are sourced from countries which have a common spoken language with India like Hindi or English. However, these are not the countries to which India exports significantly more to cater to final demand. The common colony link is particularly important for India's exports of both intermediates and final products and imports of intermediate products.

We conclude that India's exports of intermediate products are substantially more to countries with which a trade agreement exists. India is a significant exporter of final products to countries in the region sharing the same native language and to countries which have been colonies of the erstwhile British Empire.

While we cannot comment on trade creation and diversion effects of India's trade agreements, we intend to extend our study to a bigger panel studying the time variant effects of India's trade at a sectoral level which would throw greater light on the changing patterns of India's trade at a sectoral level. We also wish to explore the sector specific effects of the trade agreements as the next steps of this study.

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**Table 1: Regression Results**

Independent Variables	Dependent Variables					
	Ln ( )					
	$X_{ji}^I$	$X_{ij}^I$	$M_{ij}^I$	$M_{ji}^I$	$X_{ji}^F$	$M_{ji}^F$
ln GDP <sub>ij</sub>	0.532*** (0.02)	0.803*** (0.01)	0.635*** (0.02)	0.599*** (0.02)	0.483*** (0.02)	0.740*** (0.03)
Dist <sub>i</sub>	-0.000*** (0.00)	-0.000*** (0.00)	-0.000*** (0.00)	-0.000*** (0.00)	-0.000*** (0.00)	-0.000*** (0.00)
Ln (Pop*Pop <sub>i</sub> )	0.201*** (0.02)	0.114*** (0.02)	0.303*** (0.03)	0.011 (0.03)	0.177*** (0.03)	0.024 (0.03)
rer <sub>i</sub>	0.002*** (0.00)	0.002*** (0.00)	0.000 (0.00)	0.001 (0.00)	0.001 (0.00)	0.001 (0.00)
com_col	0.463*** (0.08)	0.646*** (0.06)	0.359*** (0.08)	0.116 (0.08)	0.647*** (0.10)	0.106 (0.10)
Csl	2.555*** (0.44)	0.559 (0.29)	6.231*** (0.52)	3.331*** (0.53)	-0.076 (0.57)	5.198*** (0.65)
Cnl	2.575** (0.79)	3.575*** (0.52)	-10.549*** (0.98)	-6.329*** (1.11)	7.508*** (1.05)	-8.135*** (1.47)
Japan	0.504 (0.38)	-0.538* (0.26)	1.278*** (0.19)	1.018* (0.44)	-0.866 (0.62)	1.361* (0.56)
Korea	1.076** (0.39)	-0.297 (0.26)	2.130*** (0.30)	0.512 (0.59)	0.385 (0.43)	0.811 (0.72)
MERCOSUR	0.619*** (0.15)	0.175 (0.11)	1.191*** (0.14)	0.409 (0.21)	-0.277 (0.21)	0.871** (0.27)
Nepal	1.026* (0.48)	1.392*** (0.28)	3.475*** (0.33)	2.001*** (0.58)	1.008 (0.56)	2.262** (0.75)
Singapore	1.177* (0.48)	1.596*** (0.27)	3.398*** (0.26)	2.179*** (0.59)	-0.076 (0.72)	2.457*** (0.75)
Bhutan	1.159*** (0.32)	1.519*** (0.25)	3.769*** (0.33)	2.005*** (0.49)	0.999** (0.38)	1.976** (0.62)
Malaysia	0.726 (0.48)	1.073*** (0.24)	2.284*** (0.28)	1.520** (0.53)	0.238 (0.43)	1.628* (0.66)
Chile	1.478*** (0.29)	0.841*** (0.15)	2.434*** (0.32)	1.115** (0.39)	-0.556 (0.51)	1.430** (0.44)
Africa	0.337*** (0.08)	0.575*** (0.06)	-0.023 (0.10)	0.181 (0.10)	0.651*** (0.10)	0.225 (0.13)
Sri Lanka	1.895*** (0.43)	1.781*** (0.28)	1.996*** (0.27)	0.974* (0.48)	1.933*** (0.42)	1.648* (0.65)
APTA	-0.188 (0.22)	0.059 (0.13)	-0.028 (0.17)	0.209 (0.29)	-0.304 (0.26)	0.099 (0.37)
ASEAN	-0.344** (0.13)	-0.441*** (0.09)	-0.575*** (0.14)	-0.223 (0.18)	-0.033 (0.17)	-0.029 (0.23)
SAFTA	-0.359	-0.357	-0.931***	-0.278	0.113	0.004



	(0.29)	(0.21)	(0.21)	(0.32)	(0.32)	(0.41)
	Ln()					
Independent Variables	X <sub>ji</sub> <sup>I</sup>	X <sub>ji</sub> <sup>I</sup>	M <sub>ij</sub> <sup>I</sup>	M <sub>ji</sub> <sup>I</sup>	X <sub>ji</sub> <sup>F</sup>	M <sub>ji</sub> <sup>F</sup>
Afghanistan	0.339 (0.33)	0.457* (0.22)	0.760* (0.33)	-0.261 (0.44)	0.49 (0.39)	-0.094 (0.56)
Agriculture	2.136*** (0.19)	-1.650*** (0.13)	0.877*** (0.24)	-1.760*** (0.21)	2.849*** (0.22)	-1.120*** (0.29)
Fishing	-0.692*** (0.17)	-1.208*** (0.10)	-0.451* (0.20)	-2.696*** (0.14)	-0.473* (0.20)	-3.043*** (0.19)
Mining and Quarrying	1.546*** (0.20)	-1.539*** (0.12)	0.402 (0.22)	-1.225*** (0.23)	0.151 (0.20)	-4.045*** (0.21)
Food & Beverages	1.629*** (0.19)	-1.070*** (0.14)	0.225 (0.24)	-3.107*** (0.17)	3.299*** (0.23)	-2.815*** (0.25)
Textiles and Wearing Apparel	2.651*** (0.18)	-0.335** (0.13)	0.953*** (0.22)	-1.854*** (0.17)	5.051*** (0.22)	-1.577*** (0.24)
Wood and Paper	1.330*** (0.19)	-1.074*** (0.12)	0.021 (0.22)	-1.969*** (0.19)	1.183*** (0.20)	-2.505*** (0.24)
Petroleum, Chemical and Non-Metallic Mineral Products	3.510*** (0.20)	-0.393** (0.14)	1.263*** (0.25)	-0.742** (0.26)	4.338*** (0.21)	-1.764*** (0.28)
Metal Products	3.014*** (0.20)	-0.604*** (0.13)	0.939*** (0.24)	-0.962*** (0.23)	2.852*** (0.21)	-2.600*** (0.23)
Electrical and Machinery	2.887*** (0.19)	-0.646*** (0.14)	0.969*** (0.24)	-1.905*** (0.21)	4.828*** (0.22)	-1.272*** (0.30)
Transport Equipment	1.596*** (0.19)	-0.596*** (0.13)	0.313 (0.23)	-2.663*** (0.18)	3.899*** (0.24)	-2.535*** (0.26)
Other Manufacturing	1.805*** (0.18)	-0.613*** (0.12)	0.423 (0.23)	-1.936*** (0.17)	4.182*** (0.22)	-1.987*** (0.24)
Recycling	2.450*** (0.17)	-1.509*** (0.13)	1.154*** (0.20)	-0.376* (0.19)	3.972*** (0.19)	-1.016*** (0.22)
Electricity, Gas and Water	-1.356*** (0.18)	-1.824*** (0.13)	-0.321 (0.23)	-4.385*** (0.17)	-0.617** (0.20)	-5.495*** (0.21)
Construction	-2.189*** (0.21)	-1.315*** (0.14)	-0.082 (0.28)	-3.743*** (0.19)	0.08 (0.25)	-4.661*** (0.24)
Maintenance and Repair	-2.046*** (0.21)	-1.695*** (0.11)	-2.665*** (0.22)	-2.857*** (0.23)	-1.892*** (0.25)	-3.233*** (0.27)
Wholesale Trade	-0.905*** (0.23)	-1.846*** (0.13)	-1.797*** (0.27)	-3.745*** (0.20)	-0.619* (0.26)	-4.518*** (0.25)
Retail Trade	-0.102 (0.23)	-2.190*** (0.12)	-0.993*** (0.26)	-3.602*** (0.19)	0.184 (0.27)	-4.362*** (0.25)
Hotels and Restaurants	-0.424* (0.19)	-1.677*** (0.12)	-1.138*** (0.23)	-1.438*** (0.17)	2.806*** (0.28)	-0.036 (0.24)
Transport	2.007*** (0.19)	-1.243*** (0.13)	0.177 (0.25)	-0.435* (0.20)	3.314*** (0.22)	0.924*** (0.27)

Post and Telecommunications	-0.056 (0.18)	-1.975*** (0.12)	-2.037*** (0.23)	-2.171*** (0.17)	0.239 (0.21)	-1.800*** (0.22)
Independent Variable	Ln()					
	$X_{ji}^I$	$X_{ij}^I$	$M_{ij}^I$	$M_{ji}^I$	$X_{ji}^F$	$M_{ji}^F$
Financial Intermediation and Business Activities	0.949*** (0.21)	-2.054*** (0.14)	-1.103*** (0.26)	-4.022*** (0.28)	1.502*** (0.23)	-4.806*** (0.35)
Public Administration	-2.544*** (0.20)	-1.601*** (0.14)	-4.068*** (0.25)	-3.792*** (0.19)	-1.916*** (0.24)	-4.690*** (0.24)
Education, Health and Other Services	-0.621** (0.20)	-1.559*** (0.13)	-1.208*** (0.26)	-2.176*** (0.19)	0.813*** (0.24)	-2.073*** (0.25)
Private Households	-8.682*** (0.16)	-1.758*** (0.15)	-5.130*** (0.25)	-2.112*** (0.24)	-8.884*** (0.16)	-2.004*** (0.28)
Others	-3.850*** (0.17)	-1.585*** (0.12)	-0.449* (0.22)	-3.997*** (0.17)	-3.976*** (0.18)	-4.885*** (0.22)
Constant	-8.524*** (0.77)	-6.374*** (0.55)	-12.760*** (0.89)	-0.481 (0.86)	-8.752*** (0.96)	-4.567*** (1.06)
R-Squared	0.84	0.83	0.77	0.56	0.79	0.58
# Obs	3637	3637	3637	3637	3637	3637

Note: \*\*\*, \*\*, \* refer to significance at 99%, 95% and 90% levels respectively.  
Numbers in parentheses indicate robust standard errors of the estimates reported above.

Key Words: Value chains, Intermediates trade, India, Trade Agreements

JEL Classification: F15, F53, F14

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