India's Competitive Advantage and Export Performance : A Gravity Model Approach

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Abstract

This paper investigated India's competitive advantage and the influence of trade gravity variables in determining India's exports with its top 50 trading partners. First, we used the Revealed Comparative Advantages Index (RCA) to study the competitiveness at the two and four-digit HS-classification levels during the period from 2000 - 2014. Later, we applied an augmented gravity model to India's exports and estimated the same in a panel data framework during the same period. Considering the random effect model into analysis, the findings revealed that India's exports with its top trading partners were more sensitive to distance, GDP, population, and real exchange rate. However, to our surprise, we could not find a significant evidence of the effect of trade agreements on India's exports.

Keywords: **competitiveness, gravity model, exports, panel data, trade agreement**

JEL Classification : C33, F11, F15, F41

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Attempts to understand the reason for export of a country is not a new phenomenon. In the theory of international trade, many advocated the benefit of international trade for the countries party to it. Starting from mercantilist views of Adam Smith (1776), Ricardo (1817, theory of comparative advantage), Hickscher - Ohlin (1934, Factor endowments), Leontief (1953, paradoxical conclusion on factor abundant), and Vernon (1966, Product life cycle), every trade theory subscribed to the dynamics of international trade with a different degree of sophistication or diversification.

Amongst the new trade proponents, Krugman (1983) incorporated the idea of imperfect competition, economies of scales, product differentiation, and intra - industry trade. Over the years, several literatures (the recent literatures include : Carlin, Glyn, & Van Reenen, 2001 ; León - Ledesma, 2005 ; Weldemicael, 2012 ; Xu & Lu, 2009, etc.) highlighted that factors such as macroeconomic environment, relative unit labour costs, technological advancement, etc. are important in determining export of a country. Similarly, the role of research and development and other institutional factors as a key driver of export was empirically validated by many studies (Athanasoglou & Bardaka, 2010 ; Djankov, La Porta, Lopez - De - Silanes, & Shleifer, 2002 ; Drine, 2012 ; Hummels & Levinsohn, 1993, etc.). These variables have a strong economic significance on the export growth of a country. Empirical studies investigating other demand and supply side determinants (viz. FDI, exchange rate, infrastructure, distance, entry regulations, rule of law, property rights, and other socio-cultural and political factors, etc.) of export performance using various econometric models is well documented in the literature

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(Acemoglu, Johnson, & Robinson, 2001 ; Baldauf, Cravens, & Wagner, 2000 ; Goel & Goel, 2014 ; Hall, Urga, & Whitley, 1996 ; Hummels, Ishii, & Yi, 2001 ; Paldam & Gundlach, 2008 ; Sahu, 2015, 2016, etc.).

Given the above, it is evident that the macroeconomic fundamentals of exports dynamics have been rigorously explored in the existing literatures. And one of the highly used tool to model the international trade and analyze the trade dynamics for many years is the use of gravity model (Brun, Carrère, Guillaumont, & de Melo, 2002 ; Liu & Xin, 2011 ; Redding & Venables, 2004 ; Novy, 2013, etc.). This model was successfully applied for the first time by Tinbergen (1962) in the international trade and subsequently extended and employed for empirical purpose in trade analysis. The application of the gravity model in international trade is crucial from the policy perspective, particularly, its application in the light of trade openness (Antonucci & Manzocchi, 2006; Raimondi & Olper, 2011, etc.), trade agreements (Bassem & Samir, 2014 ; Baier & Bergstrand, 2007 ; Frankel, 1997; Jayasinghe & Sarker, 2008; Sahu, 2014), and other trade frictions such as distance, geography, border effects, etc. (Anderson & Wincoop, 2003 ; Liu & Xin; 2011 ; Okubo, 2004, etc.). Mostly, studies that use this model to examine the trade flows across a large number of countries include the dummy variable in the regression, that takes the value one if there exists a trade relation between them or zero otherwise (for a survey see Di Mauro, 2000). Although, previous works have incorporated several variables and modified the basic gravity equation in context of India (Chakravarty & Chakrabarty, 2014 ; Kaur & Nanda, 2010 ; Nag & Nandi, 2006; etc.), but these did not cover extensively (i.e. in terms of number of trade partners) using the gravity equation in the backdrop of growing trade agreements.

In context of the above, the present paper attempts to study two aspects of exports. First, India's competitive advantage in export of goods and second, what factors affect India's export growth with its top trading partner. The competitive advantage of Indian export (products) is studied at two-digit HS classification level (97 chapters) by using the "revealed comparative approach" (RCA). Ideally, the comparative advantage should be used in a pre-trade environment to observe the Autakry. Since every country, including India, is involved in international trade, we use Balassa's "revealed comparative approach" in a way to approximate comparative advantage in autarky. Though this approach is criticized by many, but it remains as the most widely used RCA index (Eaton & Kortum, 2002; Laromain & Orefice, 2013; Sadhna 2017, etc.) and it provides an insight to the competitiveness of a country in its export of products.

The next section tries to access empirically the factors affecting India's export growth with its major trading partner by employing gravity equation. The surge in trade agreement in the world trading system have directed India's trade policy towards increasing economic cooperation, both bilateral (in effect with Afghanistan, Bhutan, Chile, Japan, Malaysia, Singapore, Sri Lanka, Nepal, South Korea, etc.) and regional agreements (in effect with ASEAN, Asia Pacific FTA, South Asia FTA) to reap the prospects of trade and market access. Though India has launched several trade agreements over the years, but many are still into the negotiation process and not into effect. For example, India has launched bilateral trade agreement with Australia, Canada, Egypt, Indonesia, Israel, Mauritius, Thailand and New Zealand, but it is not yet completed and into effect. Similarly, many regional agreements such as Bay of Bengal initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC) ; Custom Union of Russia, Belarus, and Kazakhstan ; European Union FTA ; Southern African Custom Union ; and Regional Comprehensive Economic Partnership (RCEP) negotiations are ongoing with India. In this backdrop, we want to access the relevant determinants of India's export to its major trading partners by adopting the gravity approach as detailed in the methodology section.

The study takes the period from 2000-2014 covering the top 50 countries, which represent 95% of the total export during this period. The estimation uses both the fixed effect model and random effect model for the gravity equation, and the interpretation of the results is based on the estimated statistics of both the models.

Review of Literature

The revealed comparative advantage as an index to measure the advantage and the disadvantage of a country in certain products was introduced by Balassa (1965). Several studies supported it as a useful guide to study the comparative advantage, while some others vehemently criticized it. Though this index is debated in the literature, but it remained as one of the most widely used revealed comparative advantage index and was used in several studies in the recent past (Amighini, Leone, & Rabellotti, 2011 ; De Benedictis, Gallegati, & Tamberi, 2008 ; Laursen, 2015 ; Ma & Xiao, 2010, etc.).

The gravity model as a tool of trade analysis was first introduced by Tinbergen (1962) and Poyhonen (1963), though its application was already there in various other sub-fields of social science. Later, many studies (Anderson, 1979; Deardorff, 1998 ; Helpman & Krugman 1985; Sen & Smith, 1995, etc.) strengthened the theoretical base of the model over the years. This model has been used extensively in trade analysis dynamics for many years. For example, be it the estimation of models for geography and trade (Brun et al., 2002 ; Hummels et al., 2001; Novy, 2013 ; Narayan & Nguyen, 2016 ; Redding & Venables, 2004, etc.), or assessing post trade effects of a monetary union (Buongiorno, 2015 ; Egger, Larch, Staub, & Winkelmanni, 2011 ; Gil - Pareja, Llorca - Vivero, & Martinez - Serrano, 2008, etc.), or estimation of the trade creation and diversion effect of free and regional trade agreements (Baier & Bergstrand, 2007; Egger et al., 2011 ; Frankel, 1997; Jayasinghe & Sarker, 2008 ; Lawless, 2010 ; Narayan & Nguyen, 2016 ; Soloaga & Winters, 2001, etc.), or other macroeconomic determinants of trade (Caporale, Sova, & Sova, 2015 ; Kyoung, Cho, & Koo, 2003 ; Nguyen, 2010), this model is used as a major tool for modelling purpose.

There are several applications of the gravity model in the international trade. One thing that is mostly common in the application of the gravity model is that its use is primarily focused on examining trade relations within a regional block or trading partners (Anderson & Wincoop, 2003 ; Antonucci & Manzocchi, 2006 ; Bussiere & Schnatz, 2009 ; Frankel, 1997 ; Lawless, 2010 ; Limão & Venables, 2001; Narayan & Nguyen, 2016 ; Nguyen, 2010 ; Sohn, 2005, and many others). Most of these studies tried to examine how the distance between these partner countries affected the trade growth. Frankel (1997), in emphasizing the geographical factors (distance, border sharing, and population), revealed that a percentage increase in GDP would led to one tenth (0.1%) increase in bilateral trade flows. Limão and Venables (2001) investigated the trade volume in a general setting using world endowment data. The findings broadly focused on the dependence of transport costs on geography and infrastructure using the gravity equation. It revealed that deterioration of infrastructure raised the transport costs and reduced trade volumes. Antonucci and Manzocchi (2006) examined the likely impact on Turkey's trade over a time span of 35 years (1967 - 2001) on the backdrop of EU's preferential treatment to Turkey but ahead of EU membership. The empirical findings using the gravity model covered over 45 countries and found no strong evidence of any additional merchandised trade between the two, irrespective of the specification. Sohn (2005) used the gravity model to analyze Korea's bilateral trade flows with 30 major trading patterns in 23 disaggregated sectors during 1995. It found that Korea's trade was more of interindustry in nature and the distance variable was the most important in explaining Korea's bilateral trade flows. Limão and Venables (2001), using the shipping cost as the transportation cost to various destinations in the world, concluded that poor infrastructure and other unfavorable geographic topographies such as landlocked increased the transportation cost significantly for the countries.

Nguyen (2010), using both the static and the dynamic gravity model in a panel data framework, found a positive growth of Vietnam's export with the income growth of its trading partners. In addition, the study also revealed that the transport cost (distance), exchange rate, and the membership into ASEAN also significantly affected Vietnam's export performance. Similarly, several studies (Mukhtar & Malik, 2010; Mukherjee & Pozo, 2011, etc.) found the effect of exchange rate on the trade in a gravity equation framework. Mukhtar and Malik (2010), using the vector error correction model, found that the volatility in real exchange rate had a significant negative

effect on the exports. Mukherjee and Pozo's (2011) study, using the gravity model with a semi parametric regression method, found that exchange rate volatility reduced the trade and increased the uncertainty which, in fact, increased the trade cost and hedging.

In a slightly different context, studies such as the ones conducted by Taglioni (2004) ; Baldwin, Skudelny, and Taglioni, 2005; Font (2010) ; Frankel (2010) ; Egger et al. (2011) ; Buongiorno (2015), etc. examined the effect of a monetary union on trade using the gravity model. Gil - Pareja et al.'s (2008) study found the effects of European Monetary Union on trade flows using a sample of 25 organizations for OECD countries. The results showed the evidence that monetary agreement played a positive and significant role in influencing trade in the region. Similarly, Buongiorno (2015) examined the bilateral trade between 12 euro countries from 1988 to 2013 using a differential gravity model. Estimating it in a fixed effect model, the results showed either positive or neutral effect of Euro on different commodity groups. Citing the lack of theoretical foundation and the limitation of the basic gravity model, there are many studies which modified it over the years. Anderson and Wincoop (2003), citing the lack of theoretical foundation of the gravity equation, developed a modified gravity equation that correctly estimated the trade movement of countries involved. Applying their modified equation to 1993 data, they found that national border declined the trade volume by 44% between the U.S. and Canada and by 30% among other industrialized countries.

Data Sources

The present study uses the secondary data collected from various sources. The variables 'export' used for revealed comparative advantage and gravity model are taken from International Trade Centre. Other variables, such as, GDP, population, and real exchange rate are taken from the 'World Bank' data sources. The variable 'distance' is taken from CEPII. The 'trade agreement' variable, that is, whether India has an existing agreement with the partner country or not is taken from the World Trade Organization. In addition, the country specific sources such as Ministry of Commerce, Govt. of India is used to cross check the accuracy of India's existing trade agreements.

Methodology

(1) Revealed Comparative Advantages (RCA) Index : Revealed comparative advantage index measures the competitiveness of a product in countries' export to the world market. In other words, the competitiveness of trade specialization from India to the rest of the world is examined over the 10-year period from 2000 to 2014. The analysis of comparative advantages is based on sector wise two digit and four-digit level of HS classification. Using Balassa's (1965) version of RCA index, we rewrite the index as follows to examine the competitiveness of country *'i'* to the importing country (India/ Malaysia) :

$$RCA^{*}X_{ij} = (X_{ij}/X_{i})/(C_{ij}/C_{w})$$

where,
X_{ij} is India's total imports/export of commodity *'j'* from country *'i'* ;
X_{i} is India's total imports/exports from country *'i'* ;
C_{ij} is India's total imports/exports of commodity *'j'* ;
C_{w} is India's total imports/exports.

If the estimated RCA* is more than 1, it implies that country *'i'* has a comparative advantage in exporting to India commodity *'j'* rather than any other commodity. On the other hand, it indicates the opposite if the ratio is found to be less than 1. Moreover, the comparative advantages will be accessed in two different perspectives

namely, pattern of comparative advantages and changes in comparative advantages over the years. The patterns of comparative advantage of Malaysia attempts to identify the commodity which has comparative advantages during that particular year ; whereas, the changes in comparative advantages identify which commodities gain or loss in comparative advantages over the years.

(2) The Gravity Model : The specification of the Gravity model as proposed by Tinbergen (1962) and Poyhonen (1963) is in line with Newton's law of universal gravitation and is specified as :

$$X_{ij} = \alpha \frac{(Y_i Y_j)}{D_{ij}} \quad \text{--- (1)}$$

where,
X_{ij} = export from *i* to *j* (or total trade),
Y = economic size (GDP, population),
D_{ij} = bilateral distance,
and α is constant of proportionality.

Expressing the model in logarithmic estimable form :

$$\text{Ln}\, X_{ij} = \alpha + \beta_1 \text{Ln}\, Y_i + \beta_2 \text{Ln}\, Y_j + \beta_3 \text{Ln} D_{ij} + u_{ij} \text{ --- (2)}$$

where, the β's are coefficients and attach a random error term (u_{ij}). The gravity model gives a hypothesized relationship where, the coefficients of β_1 and β_2 are expected to be positive, indicating that the export from country *'i'* to country *'j'* is positively associated with the economic size and negatively associated with the distance between them ; hence, expecting a negative coefficient for β_3 (Anderson, 1979 ; Deardorff, 1998 ; Frankel, 1997 ; Helpman & Krugman, 1985 ; Sohn, 2005; 2010 ; Tinbergen, 1962 ; Nguyen, 2010 ; Narayan & Nguyen, 2016, etc.). The incorporation of trading agreement dummy in the equation has been used by ample number of studies ever since exhaustive experiment of Frankel (1997). Similarly, the inclusion of multilateral resistance factors (viz. trade agreements, common language, and colonial base, etc.) have been used in a number of studies (Anderson & Wincoop, 2003 ; Baier & Bergstrand, 2009, etc.). For the present purpose, the basic gravity model is extended as follows by adding the dummy that may influence the trade levels of India with its top 50 trading partners in the world. In the line of the recent developments, the present study includes only the time variant variables to the basic gravity model and the augmented gravity model is expressed as :

$$\text{Ln}\, X_{ijt} = \alpha_0 + \beta_1 \text{Ln}\,(GDP_{it} GDP_{jt}) + \beta_2 \text{Ln}\,(POPN_{it} POPN_{jt}) + \beta_3 \text{Ln}\,(REXR_{jt}) + \beta_4 \text{Ln}\,(DIST_{ijt}) + \beta_5 (TA_t) + \varepsilon \quad \text{--- (3)}$$

where,
X_{ijt} = Exports of country *'i'* to country *'j'* at time *'t'*, measured as the total value of exports between trading partners. This is taken from the International Trade Centre.
GDP_{it}/GDP_j = Gross Domestic Product of country *'i'* and country *'j'* at time *'t'*.The proxy of economic size, where larger the economic size of country in terms of GDP, the larger is the number of varieties of goods offered to trade and is taken from the World Bank Database.
$POPN_{it}/ POPN_{jt}$ = Population of country *'i'* and country *'j'* at time *'t'*. This is derived from the World Bank Database.
$DIST_{ijt}$ = Distance between country *'i'* and *'j'* at time *'t'*. It is the proxy of transportation or trade cost and is taken from the CEPII database.
$REXR_{jt}$ = Real exchange rate of the currencies of importing countries at time *'t'*. Large exchange rate volatility is

likely to effect the export adversely. This is taken from World Bank which averages the real exchange rate of the currencies of importing countries.
TA_t = A dummy variable 1 indicates if country *'i'* and country *'j'* belong to any trade agreement ; otherwise, it is 0 at time *'t'*. This is based on the information available with the World Trade Organization.
ε = error term and Ln= natural log.

The above specification is estimated during the period from 2000 - 2014 with 50 major export destinations of India. Three main models, that is, pooled model, fixed effect model (FEM), and random effect model (REM) can be used in gravity model. In the present study, we use both the FEM and REM for our estimations as multilateral resistance factors could bias the estimation of the gravity model (Anderson & Wincoop, 2003 ; Baier & Bergstrand, 2009, etc.) . However, the choice of methods for the interpretation of the estimated results would depend upon the estimated test statistics, that is, Hausman test and Langrangian multiplier statistics.

Analysis and Results

(1) Competitive Advantage - Evidence from RCA : The revealed comparative advantage (RCA) for all 97 chapters of the HS classification is estimated during the period from 2000 and 2014 at both the sector and product levels. In order to calculate the RCA for 2014, we consider 2000 as the reference year for comparative purposes. However, it may be possible that the pattern of comparative advantage may differ across different levels of disaggregation and sectors. Therefore, the study also analyzes RCA at more disaggregated level of 4-digit HS classification.

Results based on the RCA index show that at two-digit HS classification level, India enjoyed a comparative advantage for 40 sectors in the world market during the year 2000. India's comparative advantage was mostly concentrated in sectors like silk, lac, gums, cotton, carpets and other textile floor coverings, and cereals, etc. Over the years, the change in many countries' (including India) specializations and productivity shift altered India's comparative advantage from one product to other. For example, silk, which remained the most competitive in 2000, found no place in the top 10 competitive products in 2014, based on the RCA value. This could be because

Table 1. India's Top 10 Most Competitive Sectors Based on RCAI over 2000 - 2014

2000			2014		
HS Code	Product Description	RCA Score	HS Code	Product Description	RCA Score
50	Silk	12.9	13	Lac, gums, resins, vegetable saps and extracts nes	17.84
13	Lac, gums, resins, vegetable saps and extracts nes	11.8	52	Cotton	8.86
57	Carpets and other textile floor coverings	9.4	57	Carpets and other textile floor coverings	5.89
71	Pearls, precious stones, metals, coins, etc	8.2	10	Cereals	5.09
63	Other made textile articles, sets, worn clothing etc	7.3	14	Vegetable plaiting materials, vegetable products nes	4.49
26	Ores, slag and ash	7.0	53	Vegetable textile fibres nes, paper yarn, woven fabric	4.26
52	Cotton	5.7	63	Other made textile articles, sets, worn clothing etc	4.06
14	Vegetable plaiting materials, vegetable products nes	5.1	71	Pearls, precious stones, metals, coins, etc	3.84
53	Vegetable textile fibres nes, paper yarn, woven fabric	4.9	9	Coffee, tea, mate and spices	3.49
09	Coffee, tea, mate and spices	4.9	54	Manmade filaments	3.01

Note : * Sectors ranked in descending order

Table 2. Inter- Temporal Movement of India's RCA

Total number of products for which India holds advantage			
In 2000: 39	In 2014: 40		
Number of products retained advantage: 32			
Number of products gained advantage: 8		Number of products lost advantage: 7	
HS Code	**Products gained advantage**	**HS Code**	**Products Lost advantage**
02	Meat and edible meat offal	26	Ores, slag and ash
17	Sugars and sugar confectionery	97	Works of art, collectors pieces & antiques
27	Mineral fuels, oils, distillation products	08	Edible fruit, nuts, peel of citrus fruit…
30	Pharmaceutical products	82	Tools, implements, cutlery of base metal
75	Nickel and articles thereof	38	Miscellaneous chemical products
78	Lead and articles thereof	28	Inorganic chemicals, precious metal compound, isotopes
79	Zinc and articles thereof	40	Rubber and articles thereof
89	Ships, boats and other floating structures		
	Number of products Gained more than 10 ranks in 2014		**Number of products lost more than 10 ranks in 2014**
58	Special woven or tufted fabric, lace, tapestry etc	50	Silk
02	Meat and edible meat offal	26	Ores, slag and ash
79	Zinc and articles thereof	97	Works of art, collectors pieces and antiques
78	Lead and articles thereof	08	Edible fruit, nuts, peel of citrus fruit, melons
89	Ships, boats and other floating structures	74	Copper and articles thereof
17	Sugars and sugar confectionery	82	Tools, implements, cutlery, etc. of base metal
27	Mineral fuels, oils, distillation products, etc	28	Inorganic chemicals, precious metal compound, isotopes

of the cost competitive production of silk materials in countries like Taiwan and Vietnam. Based on the RCA value, the Table 1 shows India's comparative advantages of top 10 products at two - digit level in the world market during 2000 and 2014.

At the disaggregated level, 4 digits RCA index is calculated for all 1258 commodities exported by India to the world in 2014. For 343 commodities, the RCA values greater than 1 indicate that India enjoys comparative advantages in these products in the world market. Of which, organic chemicals ranked the highest with index value of 39.8 followed by items like human hair, worked ; wool/animal hair, and other textile material, prepared for wigs (RCAI = 33.50) human hair, unworked (RCAI = 31.60), and so on. Out of these, for a maximum number of commodities, India holds comparative advantage in the world market in organic chemicals (27 commodities) followed by inorganic chemicals, precious metal compounds, isotopes (16 commodities) and salt, sulphur, earth, stone, plaster, lime, and cement (14 commodities). It is observed that most of the sectors have shown a significant decrease at disaggregates 4-digit level. Similarly, only one sector (inorganic chemicals, precious metal compounds, and isotopes) do not enjoy comparative advantage in the world market at the HS 2-digits level, but enjoy comparative advantages in disaggregated HS 4-digit levels in term of number of commodities (RCA > 1).
Similarly, the intertemporal movement of RCA at two-digit level shows that India's advantage remained roughly the same over the years. In other words, India enjoyed a comparative advantage in 40 products in 2014 as compared to 39 in 2000 (Table 2).

A disaggregated finding shows that India retained comparative advantage in 32 products of the 39 products of 2000 and gained comparative advantage in eight new products, making the total comparative advantages to 40 in 2014. During the same period, it is observed that seven products gained a comparative advantage and an equal number of products lost the comparative advantage by more than 10 points during the same period.

Table 3. Appropriation of Method : Hausman Test and LM Test

Test Statistics	Chi-Square	*p* - value
Hausman Test	6.74	0.3453
LM Test	2043.9	0

(2) Estimation Results of the Gravity Model : The estimated results of India with its top 50 partners is reported in the Table 4. The augmented gravity equation (equation 3) is estimated with the use of both fixed effect and random effect model. The appropriation of the method, that is, fixed effect or random effect model for our analysis is based on the Hausman test and LM statistics. The results of both statistics favors the use of random effect over the fixed effect in the gravity model as evident in the Table 3. Thus, the estimated results summarized in random effect model is considered for analysis.

The Table 4 reports the estimated results of both the fixed effect and the random effect. In line with many existing studies, the present gravity model considers the variables namely - economic size, market size, real exchange rate, distance, and trade agreement as determinants of India's export to its top trading partners. The findings of this study are consistent with other studies in explaining bilateral trade by using the gravity model.

The estimated results reveal that the economic size (GDP) of the exporter country (India) has a positive and significant effect on its exports. In other words, an increase by 1% of India's GDP will increase its exports by an average index of 0.71%. Though the economic size of the importing country shows a negative sign, but insignificant results do not explain the fact that the growth in importer countries' GDP reduces India's exports to that country. The proxy of the market size (i.e. population) of the importing country is positive and significant, indicating that India's export increases with increase in the population of the importing country, but the population growth of India has no significant impact on its exports to its trading partners. On the other hand, it appears that the impact of trade cost (i.e. distance) and the real effective exchange rate inversely affect India's exports. The negative and significant coefficient of trade cost reveals that a percentage increase in trade cost is likely to reduce India's exports by 0.96% on an average.

Similarly, the negative elasticity of export demand with respect to REER implies that the real appreciation of

Table 4. Results of the Gravity Model

VARIABLES	Fixed Effect Export	Random Effect Export
Gross Domestic Product of Exporter Country *(lngdp)*	0.76825*** (0.09716)	0.70844*** (0.07647)
Gross Domestic Product of Importer Country *(lngdpi)*	-0.15432 (0.68300)	-0.08334 (0.68128)
Population of Exporter Country *(lnpop)*	0.57340* (0.21436)	0.17076 (0.11757)
Population of Importer Country *(lnpopi)*	8.52872** (3.72010)	8.92181** (3.72428)
Distant *(lndist)*	-	-0.96380*** (0.27161)
Real Exchange Rate *(lnREER)*	-0.53006*** (0.16879)	-0.42451*** (0.15060)
Trade Agreement Dummy (TA)	0.13255 (0.16494)	0.09454 (0.15106)
Constant	-180.58506*** (58.92478)	-174.48327*** (59.12120)
Observations	500	500
R-squared	0.84378	0.8421
Number of country	50	50

Source: estimated using equation (3).

Notes: Standard errors in parentheses, Significant level is indicated as, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

rupee or depreciation of the importing country's currency against that of the Indian rupee affects India's exports adversely. Statistically, the finding shows that 10% appreciation in Indian currency would reduce the export demand by 4.2%. This result is in line with the earlier findings of Carre`re, (2006), Oskooee and Hegerty (2007), and Vieira and MacDonald (2016), Narayan and Nguyen (2016), and many others. The results, surprisingly, suggest that India's trade agreements with its trading partners do not affect exports significantly, though its influence is positive.

Most of our variables using the gravity equation are similar with the findings of majority of the existing studies (Anderson & Wincoop, 2003 ; Baier & Bergstrand, 2007 ; Carre`re, 2006 ; Jayasinghe & Sarker, 2008 ; Okubo, 2004 ; Narayan & Nguyen, 2016, etc.). However, our results for the variable 'importing country's GDP' contradicts some of the earlier works which argued that importing country's GDP positively affects the export growth from the partner country (India in this case). The insignificant effect of partner importing country's GDP on India's exports could be because of growing agreements (viz. FTA, PTA, and others) of these trading partners with the rest of the world, hence making the trade diversion effect stronger. In other words, as a country grows (higher GDP), it strengthens its relation with other countries by strengthening its economic partnership (via trade agreements and various other economic treaties). Growing economic partnership of these trading partners with the rest of the world could increase the trade diversion and reduce exports from India, hence showing an insignificant effect on India's export growth to these countries.

Similarly, the results show no significant impact of trade agreements in influencing exports from India to its top partners. This result is in contrast to some of the previous estimations (e.g. Carre`re, 2006), which have shown a significant increase in trade during the ex-post trade agreements. The insignificant result of trade agreements dummy may be because of the following facts - first, despite India's trade agreement into effect with some countries, its export growth seems to be more with the USA, European Union, China etc., with whom India do not have a FTA in effect. Second, the involvement of some of India's trading partners in regional agreement to which India is not a party may have increased the trade diversion of these partner countries and reduced exports from India, indicating an insignificant effect of variable *TA* on India's exports. For example, Banga and Sahu (2015) showed that the recently concluded TPP would reduce India's exports to the TPP countries by an estimated US$190 million despite India having FTA in effect with many TPP signatories. Third, it is seen that after India's trade agreement came into effect with some countries, the total trade volume has declined over the years instead of increasing. For example, though Malaysia-India Comprehensive Economic Cooperation Agreement (MICECA) came into effect in July 2011, but there was a decline in India's exports to Malaysia in recent years (2014 and 2015) by 27% and 5%, respectively. Hence, these possible reasons may have shown insignificant sign of *TA* variable in the estimated results.

Policy Implications

For every study, the policy implementations have to be well realized. The competitiveness of products raises some important policy issues. First, it is observed that over the years, many Indian manufacturing products lost their competitive advantage ; whereas, some other products gained it, though there is an overall gain in the competitive advantage. In this context, it is important that better government support and policies would help the competitiveness of other products too. The State should have a mechanism to support the manufacturer through proper coordination and meetings between the policy makers and the manufacturers. This would keep them aware about the products, international market conditions, production techniques, competition, and help them increase their competitiveness too.

Similarly, FTAs raise some important policy issues. FTAs serve as a long - term national interest and trade policy objectives. It is important for the government to look into the interests associated with FTAs. For example, some of the FTAs may hurt the interest of the domestic manufacturers and their ability to survive and sustain

because of the free inflow of products across the border. Hence, the State should be proactive in deciding which type of FTA agreements would serve the national interests and what should be the criteria in choosing FTA partners. Are FTAs a substitute for or a complement to India's commitments and interests in promoting a multilateral trading system via the World Trade Organization (WTO)? It is well known that each trade liberalizing measure can have positive effects on some sectors and adverse effects on others. Hence, the states should make a proper assessment in determining which countries would be an appropriate FTA partners for India with minimum adverse effect on its people.

Concluding Remarks

This paper highlighted two aspects of Indian exports, namely the competitive advantages and the influence of trade gravity variables to Indian exports to its top 50 exporting partners with recent database. It is interesting to underline that the comparative advantage (at HS two-digit level) has changed for a number of products over a period of 15 years. Some of the most competitive products like silk, ores, and slag which remained as the top 10 competitive products lost their comparative advantage in a span of one and a half decade. The same is also observed in the estimation at the four digit HS classification level. However, inter-temporal movement of RCA at two-digit level shows a marginal increase in India's comparative advantage from 39 products in 2000 to 40 products in 2014.

Our empirical analysis using an augmented gravity model shows the results for majority of the variables at par with many existing studies. Taking random effect result into account, the variables such as GDP of India, population of importing country, and distance have shown the results as expected. But some variables such as trade agreements with exporting countries did not show the expected results. Taking into account the estimated results, our findings make a point that India's exports are crucial to its GDP, importer country's population, distance, and exchange rate, but not for the established trade agreements.

Limitations of the Study and Scope for Further Research

Improving export performance is one of the key objectives of many countries, including India. Although India's export performance has lagged behind the expectations, but it has increased much faster following the liberalization. In this context, the study considered the top 50 trading partners of India during the period from 2000 - 2014. Though the empirical findings are as per our expectations, but given the coverage and the methodology, the findings may have certain limitations. First, the inclusion of the number of countries may be cited as a limitation in the study as the countries having minimum trade relation with India or zero trade flow are not included. Second, choice of the gravity model, while estimating the exports, is undertaken differently in different studies, each one with its strengths and limitations.

The present paper used an augmented gravity model, which can be presented differently by different researchers. For example, some studies have included dummies such as common language, common border in their augmented gravity model, which are not included here. Similarly, choice of explanatory variables is also different in different studies. Given the above, there lies ample scope of estimating export performance of Indian firms by incorporating other variables and may use the dummies in the model as the conventional gravity model is not quite sensible under some circumstances. There is a need for more in-depth analysis with wider coverage of study period, number of countries, and the methodology, particularly the inclusion of explanatory variables in the augmented gravity model.

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