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An econometric analysis of India's bilateral trade with South Asian countries: A gravity model approach

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Abstract
South Asian Association for Regional Cooperation (SAARC) was established in 1985. One of the major objectives of SAARC was to improve economic growth and development in South Asian countries. This study aims to examine the bilateral trade flows between India and selected SAARC nations for the period of 1996-2018. Gravity model of trade is used to determine the trade flow. The findings of this study have shown that the trade flow depends positively on GDP of host nation and partner nation. This study makes use of panel data analysis for double log function of Gravity model for trade between India and selected SAARC nations. Study used annual data of SAARC countries except Afghanistan due to unavailability of Data. Study analyzed data for India's bilateral trade from 1996 t0 2018 for 6 countries and tested three econometric models to assess the impact of income of both nations, per capita, inflation, and trade openness on bilateral trade between India and SAARC. Study is intended to know the existence of H-O model or Linder model in the trade between India and SAARC. Study found that SAARC countries highly open in bilateral trade with India. Countries income is also increasing in bilateral trade with India. The income differential of SAARC countries indicates that there is the presence of Linder model of International trade. Study used Panel data analysis and FEM model to assess the effects of bilateral trade between India and SAARC countries.

Keywords: Gravity model, bilateral trade flow, saarc, panel data

Introduction
India is the member of SAARC since year 1985 from it's the year of formation and this covers world's 23 per cent population and 15% of the world's arable land but only 6% of purchasing power parity and 3% of world's foreign direct investment. South Asia is one of the emerging regions who achieved an average of 6.45 per cent of GDP growth rate and 5.1 GDP per capita growth rate in the last five years. India, Bhutan and Bangladesh have shown a significant improvement in the last decade. India as a part of SAARC is improving in both income and export growth while trade with SAARC nations. India's trade with SAARC nations is explained by the following graphs:

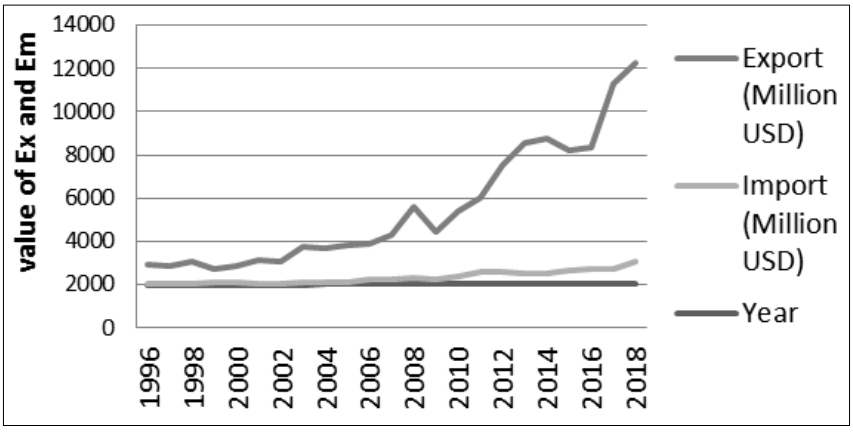

Fig 1: India's Trade with Bangladesh

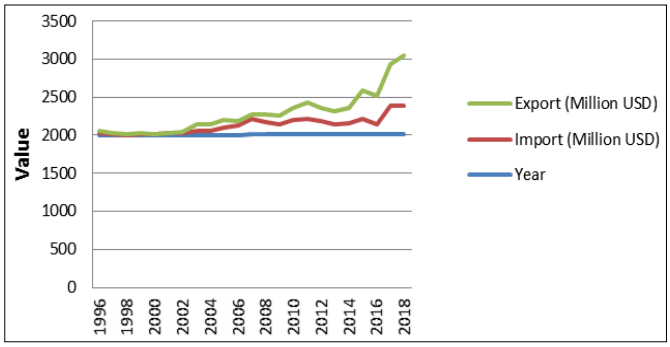

Fig 2: India's Trade with Bhutan

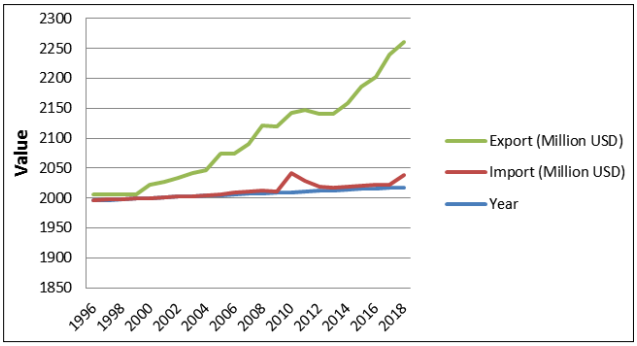

Fig 3: India's Trade with Maldives

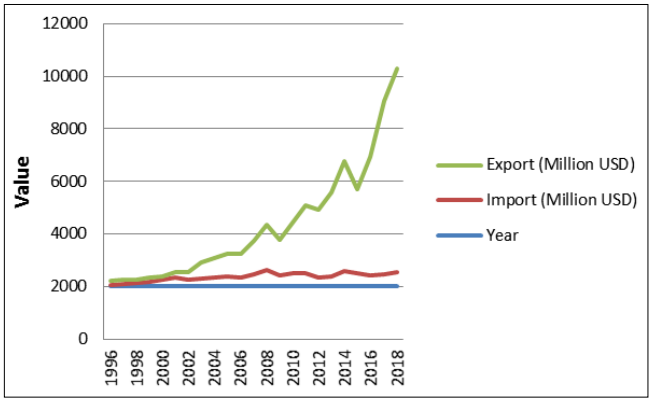

Fig 4: India's Trade with Nepal

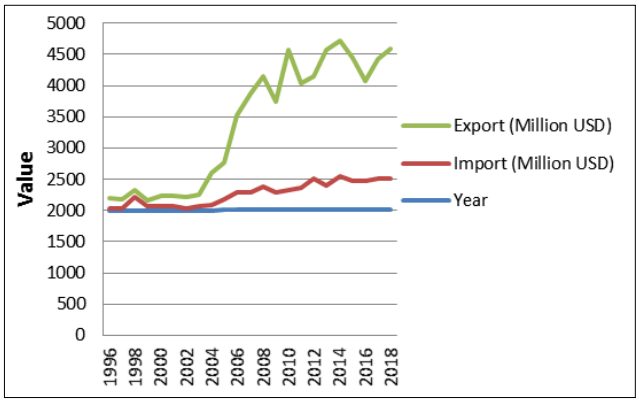

Fig 5: India's Trade with Pakistan

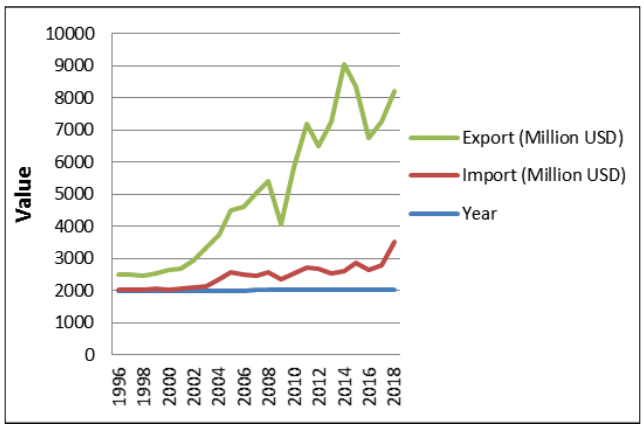

Fig 6: India's Trade with Sri Lanka

Source: Indian Exim Bank

Regional integration refers to the process of states coming together to sign agreements where they agree to cooperate in certain areas common to them. Regional cooperation can take different forms, such as economic, social, political, cultural depending on the objectives of the states that are involved. States may want to come together for economic reasons or even further to form a political alliance or union. The most significant consideration in joining a regional economic group however is the economic benefit each individual nation stands to gain (Gathi, 2009).

The objective of the SAARC is to promote the welfare of the people of South Asia and to improve their quality of life, social progress and economic development. Present study has aim to examine the bilateral trade flow of India with selected SAARC countries. Study has excluded Afghanistan from the analysis as the data of Afghanistan was not available from year 1996. Trade is beneficial for the economy's growth and development and this is known to everyone who understands even a little about economy. Regional cooperation and integration can facilitate the way for expanding markets and creating trade opportunities. The South Asian Association for Regional Cooperation was established in 1985 with the objective of accelerated growth and welfare of all the people in region. SAARC has taken several initiatives for enhancing integration like SAPTA, SAFTA and SATIS. Several studies have been carried out to know and empirically analyses the impacts of these arrangements.

The core gravity equation for empirical analysis has been used since the econometric studies of trade by Tinbergen (1962) and Poyhonen (1963). The theoretical bases to the model are of recent origin. The most classic and early application of the gravity model to study the international trade has been done by Linnenman (1966) (Batra, 2006). Linnenman adopted partial equilibrium model of export supply and import demand based on simplifying assumptions (Rahman, 2003).

The theoretical underpinning of gravity model of trade started in later 1970s by several economists. Such initial attempt was done by Anderson (1979) based on the Armington assumption of complete specialization of each nation in a single commodity. He took the assumption of product differentiation to derive the gravity model (E. Cuenca Garcia *et al*., 2013).

Bergstand (1985) found that general equilibrium approach is better than partial equilibrium approach for gravity model estimation as later excludes the price variable. He included price variable in gravity equation along with income and distance. His analysis was based on imperfect competition i.e. goods of the trading partners are imperfect substitutes.

(Rahman, 2003) used panel data approach for analyzing the trade flows of Bangladesh with SAARC nations and estimated three models. He investigated the impact of taxes,

trade openness, distance and inflation rate on the SAARC countries trade.

Bhattacharya (Nov, 2004) discussed comparative static using gravity model that was developed by Frankel *et al*. (1993). Akhtar and Ghani (2010) and presented the model measure SAARC countries for years 2003 to 2008. They also have said that trade can be enhanced by diverting the trade agreement with non-members.

Kien (2009) examined the determinants of export flows of countries in the ASEAN Free Trade Area (AFTA) through estimations of panel data using a gravity model. Peera (2009) discussed the trade policy on Sri Lanka using the Global Trading analysis Project.

Khandare and Babar (2012), discussed about trade among South Asian Countries. They discussed the growth of regional trade blocks and the countries of SAARC, their trade increases due to the growth of trade blocks. The recent trade pattern of SAARC has been discussed and found that Maldives is the highly dependent country among the all and its trade openness ratio is also the highest among all countries (161%) whereas Pakistan is the least open country in the SAARC. The rest of the countries are fairly open to the trade.

Moinuddin (2013), investigated the trade impact of SAFTA using General Equilibrium model and concluded that 43 countries which had importance with regard to South Asia' trade and used panel data for the study

(Akhtar & Ghani, 2010) used gravity model to analyze the bilateral trade flows between the SAARC countries after signing the SAFTA. Pooled data and cross section data has been used to estimate the results. According to them, if SAARC member countries would divert their trade with non-member countries may be benefitted more as there are lot much potentialities of trade between them. Linder (1961) suggested hypothesis that the demand structure will be similar for the similarities of per capita income. So more similar countries are in per capita income, larger is the bilateral trade. Difference of per capita will be taken as absolute value which will have a negative effect on bilateral trade.

However, (Deardorff, 1997) argues that H-O model can also be viewed in the gravity model. Markusen (1986) explains that high income consumers tend to consume larger budget share of capital-intensive goods, then it follows that capital rich countries will trade more with capital rich countries and capital poor countries will trade more with their own kind. These are the same predictions as those of the Linder hypothesis (Frankel, 1997).

Objectives

1. To study the impact of GDP on bilateral trade of India with SAARC countries.
2. To investigate the impact of trade openness on bilateral trade of India with SAARC countries.
3. To examine the impact of inflation rates on bilateral trade of India with SAARC countries.
4. To examine the impact of population on bilateral trade of India with SAARC countries.
5. To investigate either H-O theorem or Linder hypothesis does hold in context of bilateral trade of India with SAARC nations.

Hypotheses

H_1: Product of GDPs of participating countries significantly affects the bilateral trade of India with SAARC countries.

H_2: Trade openness is significantly affecting factor of bilateral trade between India and SAARC nations.

H_3: Inflation rate is the significantly affecting factor of bilateral trade between India and SAARC nations.

H_4: Distance between the countries significantly affects the bilateral trade between India and SAARC nations.

Data and methodology

Study used the data of SAARC nations except Afghanistan. Study analyzed data for India's bilateral trade from 1996 t0 2018 for 6 countries. The study shall use the secondary data on trade, exports, imports, GDP, GDP per capita, inflation rate. The data will be taken from WDI, WITS and UNCTAD

For estimating distance between countries consider between-country transaction costs (TC), as percentage of imports, represented by the difference of *cif* (cost, insurance and freight) and *fob* (free on board) values which are reported in *Direction of Trade Statistics Yearbook* of the International Monetary Fund, using TCijt = (1 – Exjit / IMijt), where TCijt represents transaction costs between country i and j for the period t, IMijt stands for import (*cif* price) of country i from country j for the period t, and EXjit denotes export (fob price) of country j to country i for the period t. Many measures have been constructed to measure transaction (transport) cost. The most straightforward measure in international trade is the difference between the so-called *cif* and *fob* quotations of trade. The difference between these two values is a measure of the cost of getting an item from the exporting country to the importing country. Here, Bangladesh's transaction costs do not cover the years 1997 and 2003 [1],

Theoretical background

Gravity model

The gravity model of trade is an important model in the arena of international economics. It is like the other gravity models that are present in the domain of social sciences. It makes predictions on the bilateral trade flows and these predictions are based on the distance within two units as well as their respective economic dimensions. The bilateral trade between two countries is proportional to their respective sizes, measured by their GDP, and inversely proportional to the geographic distance between them. While the role of economic size is well understood, the role played by distance remains a mystery.

The equational representation of the Gravity model of trade is as follows:

$$Trade_{ij} = \alpha \frac{Y_i^{\beta} Y_j^{\gamma}}{D_{ij}}$$

$Trade_{ij}$ is the bilateral trade between the country I and j, α is the constant, Y_i is the GDP of country I, Y_j is the GDP of country j and D_{ij} is the geographical distance between the country I and j. This is the basic gravity model, but we can add other variables also that can have impact on the trade flow.

The gravity model is typically a model of two country that is it is helpful in analyzing the trade relations between two

[1] Source: Calculated by authors based on DOTS CD-ROM 2006, IMF.

trading nations or partners only and the third-party effects are not taken into consideration and not being analyzed.

Econometric model

Present study used three econometric models to analyze the impact of growth, inflation, trade openness on the bilateral trade of India with SAARC nations.

On the basis of availability of data set, three gravity models of Indian bilateral trade with SAARC nations will be estimated as:

(a) The gravity model of Indian trade (exports + imports)
(b) The gravity model of Indian exports
(c) The gravity model of Indian imports

Variables

Trade-openness

This will be measured with Trade to GDP ratio. Higher the trade to GDP ratio higher the bilateral trade.

Per capita differentials

Linder hypothesis explains that more similar in per capita countries, larger the trade volume. This variable measured with absolute value of per capita income differences of the participating nations. Larger the difference in per capita income shows the presence of H-O model.

Product of GDP

Product of GDP both countries indicate the size of economy. Bigger the size of economy larger the trade.

Product of per capita income

This indicates the country's infrastructure and development. Larger the value of this resulting higher trade volume.

Export to GDP ratio

Higher the Export to GDP ratio, higher the exports and relatively less imports.

Import to GDP ratio

Higher the ratio higher the imports and lower the exports.

Per capita income

Positive coefficient of this may indicate the country is economies of scale, but the negative coefficient explains less exports from the country.

(A) The gravity model of Indian trade (total trade)

Since the dependent variable in the gravity model is bilateral trade (sum of exports and imports) between the pairs of countries, the product of GDP and the product of per capita GDP will be used as independent variables. A number of additional independent variables will be used in the model. Thus, the gravity model of trade is as follows: [2].

$$\ln TR_{it} = \alpha_0 + \alpha_1 + \ln(Y_{it} * Y_{jt}) + \alpha_2 \ln(y_{it} * y_{jt}) + \alpha_3 \ln D_{it} + \alpha_4 \ln(yd_{ijt}) + \alpha_5 \ln(TR/Y)_{it} + \alpha_6 \ln(TR/Y)_{jt} + \mu_{it}$$

(B) The gravity model of Indian Exports [3]

$$LnX_{itj} = \beta_0 + \beta_1 LnY_{it} + \beta_2 LnY_{ij} + \beta_3 Lny_{it} + \beta_4 Lny_{ij} + \beta_5 LnDijt + \beta_6 Lnyd_{ijt} + \beta_7 Ln\inf_{it} + \beta_8 Ln\inf_{ijt}$$
$$+ \beta_9 (IM/Y)_{jt} + \beta_{10}(TR/Y)_{it} + \beta_{11}(TR/Y)_{jt} + \mu_{ijt}$$

(C) The gravity model of Indian imports
[4].

$$LnIM_{itj} = \beta_0 + \beta_1 LnY_{it} + \beta_2 LnY_{ij} + \beta_3 Lny_{it} + \beta_4 Lny_{ij} + \beta_5 LnDijt + \beta_6 Lnyd_{ijt} + \beta_7 Ln\inf_{it} + \beta_8 Ln\inf_{ijt}$$
$$+ \beta_9 (EX/Y)_{it} + \beta_{10}(TR/Y)_{it} + \beta_{11}(TR/Y)_{jt} + \mu_{ijt}$$

Estimation of Model

Model (A): **The Gravity model of India's total Trade**

Study used the panel data approach to analyze the model (A), the results of FEM and REM is as follow:

Table 1: Comparisons of Result

Dependent variable trade flow (LnTRijt)				
	Fixed effect		Random effect	
Variables	**Coefficient**	**T statistics**	**Coefficient**	**T statistics**
Cons	-16.99291	-9.27***	-6.788576	-15.11***
Ln(Yi*Yj)	1.779339	6.52***	.4921192	12.11***
Ln(yi*yj)	-.8269622	-1.95**	.2160494	1.48
Ln(Ydij)	-.1144384	-2.29**	.1334852	2.51**
Ln(TR/Y)it	369.0446	7.72***	616.7101	12.84***
Ln(TR/Y)jt	4.175083	8.92***	5.934133	9.36***
$\ln D_{ij}$	1.111965	3.37***	.5515023	3.17**
R^2	0.7148		0.9650	

Table 2: Correlated Random Effects - Hausman Test
Test cross-section random effects

Null Hypothesis Ho: difference in coefficients not systematic				
Variables	**Coefficients**			
	FE (b)	**RE (B)**	**Difference (b-B)**	**S.E (v_b-V_B)**
Ln(Yi*Yj)	1.779339	.4921192	1.28722	.2803333
Ln(yi*yj)	-.8269622	.2160494	-1.043012	.
Ln(Ydij)	-.1144384	.1334852	-.2479236	.
Ln(TR/Y)it	369.0446	616.7101	-.247.6654	.
Ln(TR/Y)jt	4.175083	5.934133	-1.759051	.2697869
lnD_{ij}	1.111965	.5515023	.5604628	.3971004
Chi2 =193.39***				
Prob>Chi2=0.000				
There is systematic difference between the coefficients				

Table 3: Country-Wise India's Trade

Variables	Coefficient	T statistics
Cons	-16.99291	-9.27***
Ln(Yi*Yj)	1.779339	6.52***
Ln(yi*yj)	-.8269622	-1.95**
Ln(Ydij)	-.1144384	-2.29**
Ln(TR/Y)it	369.0446	7.72***
Ln(TR/Y)jt	4.175083	8.92***
lnD_{ij}	1.111965	3.37***
Bangladesh (Reference Country)	-20.54704	-8.18***
Bhutan (D1)	7.224329	4.87***
Maldives (D2)	8.567083	5.18***
Nepal (D3)	2.366958	4.70***
Pakistan (D4)	-.5471474	-4.39***
Sri Lanka (D5)	3.713584	6.77***

$$LnTR_{ijt} = -20.55 - 13.23D_{1it} - 11.98D_{2it} - 18.18D_{3it} - 21.095D_{4it} - 16.83D_{5it} + 1.77LnY_{it} * Y_{jt} - 0.83(y_{it} * y_{ij}) - 0.114LnYd_{ijt} + 369.04Ln(TR/Y)_{it} + 4.17Ln(TR/Y)_{jt} + 1.11LnD_{ijt} + \mu_{it} \quad (1)$$

Model (B): The gravity model of export

Model estimations are as follows. Fixed effect model is appropriate than random effect model confirmed by the Hausman specifications.

Table 4: Comparisons of Result

Dependent Variable Trade Flow (LnXijt)				
	Fixed Effect		**Random Effect**	
Variables	**Coefficient**	**T statistics**	**Coefficient**	**Z**
Cons	-15.53892	-1.32	-16.17235	-1.07
LnYit	2.289263	3.70***	0.6143633	11.31***
LnYjt	1.121485	0.55	1.926042	0.77
Ln(Ydij)	-.1383207	-1.77*	0.2597577	3.41***
Lnyit	-.1593597	-0.07	-1.753361	-0.60
Lnyjt	Omitted because of multicollinearity		-.2062272	-2.44**
Ln(TR/Y)jt	346.9432	4.22***	607.8465	10.02***
Ln(TR/Y)jt	7.995522	8.89***	7.849707	7.59***
lnD_{ij}	2.455914	4.00***	Omitted because of multicollinearity	
Ln(IM/Y)jt	-2.975093	-1.50	-4.53025	-2.03**
LnInfit	.0488718	0.56	-.0083915	-0.07
LnInfjt	.0858025	1.81*	.1353326	2.36**
R^2 (overall)	0.6636		0.9549	

Table 5: Correlated Random Effects - Hausman Test
Test cross-section random effects

Null Hypothesis Ho: difference in coefficients not systematic				
Variables	**Coefficients**			
	FE (b)	RE (B)	Difference (b-B)	S.E (v_b-V_B)
LnYit	2.289263	0.6143633	1.6749	.6158625
LnYjt	1.121485	1.926042	-.8045573	.
Ln(Ydij)	-.1383207	0.2597577	1.594002	.

Lnyit	-.1593597	-1.753361	-.3980783	.0177896
Ln(TR/Y)jt	346.9432	607.8465	-260.9032	55.621
Ln(TR/Y)jt	7.995522	7.849707	.1458151	
Ln(IM/Y)jt	-2.975093	-4.53025	1.555157	
LnInfit	.0488718	-.0083915	.0572633	
LnInfjt	.0858025	.1353326	-.04953	
Chi2=130.02***				
Prob>chi2=0.000 (Fixed Effect Model is appropriate)				

Table 6: Country Wise Analysis

Variables	Coefficient	T statistics
LnYit	2.289263	3.70***
LnYjt	1.121485	0.55
Ln(Ydij)	-.1383207	-1.77*
Lnyit	-.1593597	-0.07
Lnyjt	2.455911	-4.00***
Ln(TR/Y)jt	346.9432	4.22***
Ln(TR/Y)jt	7.995522	8.89***
Ln(IM/Y)jt	-2.975093	-1.50
LnInfit	.0488718	0.56
LnInfjt	.0858025	1.81*
Bangladesh (Reference Country)	-17.59099	-1.53
Bhutan (D1)	8.858501	2.63**
Maldives (D2)	11.78375	3.18***
Nepal (D3)	2.577268	2.28**
Pakistan (D4)	-.7598797	-3.82***
Sri Lanka (D5)	4.588107	3.83***

$$LnX_{ijt} = -17.59 - 8.73D_{1it} - 5.80D_{2it} - 15.01D_{3it} - 18.35D_{4it} - 13.00D_{5it} + 2.29LnY_{it} + 1.12LnY_{jit}$$
$$- 0.138LnYd_{ijt} - 0.159Lny_{it} + 2.45Lny_{ijt} + 346.94Ln(TR/Y)_{it} + 7.99Ln(TR/Y)_{jt} + 0.48LnInf_{it} + .085LnInf_{jt} - 2.97(IM/Y)_{it}\mu_{it} \quad (2)$$

Model (C): The gravity model of imports

Model estimations are as follow. Fixed effect model is chosen over random effect as per the Hausman specifications.

Table 7: Comparisons of Result

Dependent Variable Trade Flow (LnIMijt)				
	Fixed Effect		Random Effect	
Variables	**Coefficient**	**T statistics**	**Coefficient**	**Z**
Cons	-14.86522	-10.42***	-12.92959	-8.05***
LnYit	.5845394	1.66	.2361605	2.68**
LnYjt	1.028869	3.13**	1.2273	6.53***
Ln(Ydij)	-.1790138	-1.73*	-.6460106	-7.25***
Ln(TR/Y)jt	3549.204	10.17***	5072.621	10.60***
Ln(TR/Y)jt	1.170819	1.17	7.158867	5.25***
Ln(EXY)it	-3833.408	-10.55***	-4883.37	-9.70***
LnInfit	.0050688	0.38	.0364528	1.66*
LnInfjt	.0212852	2.19**	.0465951	3.01**
R^2 (overall)	0.7089		0.8954	

Table 8: Correlated Random Effects - Hausman Test Test cross-section random effects

Null Hypothesis Ho: difference in coefficients not systematic				
Variables	**Coefficients**			
	FE (b)	RE (B)	Difference (b-B)	S.E (v_b-V_B)
LnYit	.5845394	.2361605	.3483789	.3483789
LnYjt	1.028869	1.2273	-.1984312	.2696863
Ln(Ydij)	-.1790138	-.6460106	.4669968	.0522752
Ln(TR/Y)jt	3549.204	5072.621	-1523.417	
Ln(TR/Y)jt	1.170819	7.158867	-5.988048	
Ln(EXY)it	-3833.408	-4883.37	-.031384	
LnInfit	.0050688	.0364528	-.0253099	
LnInfjt	.0212852	.0465951	1049.961	
Chi2=428.19***				
Prob>chi2=0.000 (Fixed Effect Model is appropriate)				

Table 9: country Wise Analysis

Variables	Coefficient	T statistics
LnYit	.5845394	3.70***
LnYjt	1.028869	0.55
Ln(Ydij)	-.1790138	-1.77*
Ln(TR/Y)jt	3549.204	-0.07
Ln(TR/Y)jt	1.170819	-4.00***
Ln(EXY)it	-3833.408	4.22***
LnInfit	.0050688	8.89***
LnInfjt	.0212852	0.56
Bangladesh (Reference Country)	-14.86392	-12.92***
Bhutan (D1)	1.447692	0.87
Maldives (D2)	-1.834827	-1.23
Nepal (D3)	.8110491	1.01
Pakistan (D4)	-.8654439	-3.26**
Sri Lanka (D5)	.433725	1.16

$$LnIM_{ijt} = -14.86392 - 13.41D_{1it} - 13.02D_{2it} - 14.05D_{3it} - 15.72D_{4it} - 14.43D_{5it} + 0.58LnY_{it} + 1.02LnY_{jit} - 0.179LnYd_{ijt} + 3549.20Ln(TR/Y)_{it} + 1.17Ln(TR/Y)_{jt} + 0.005LnInf_{it} + .021LnInf_{jt} + \mu_{it} \quad (3)$$

Diagnostic tests

Models are also checked on Pesaran, and Berush Pegan LM test to check whether there is any cross-sectional dependence, means error terms are correlated but, in the results, it's found that there is no cross-section dependence. Also, there is not the presence of heteroskedasticity

Results and conclusion

Model (A) presents the Total Trade model which is the function of product of GDP of host country and partner country. FEM results indicates that product of GDP has positive coefficient and significantly affecting India's trade. Product of GDP is considered as size of economy, larger the value larger the impact (1.77). If we look at the country-wise impact there is variation in intercepts. This is affecting positively when India trade with SAARC nations except the country Bangladesh and Pakistan.

Variable per capita income is also the good measure for the level of development and infrastructures that are essential to conduct trade. More developed countries more would be the trade between the partner countries (Frankel 1993). We expect the positive sign here but results indicate negative sign with (-0.8269) which also has significant impact on trade. This further reveal that per capita income of SAARC countries affecting India's trade as most of the member countries are poor in terms of resources and infrastructure. In fact, the countries are least developed in nature in the SAARC trade block. Saxena (2005) discusses that India has a vast domestic market, hence trade forms a substantially smaller percentage of GDP, especially when compared with East Asian economies, that are small and essentially require trade for growth.

According to the H – O theory, the sign of the coefficient of per capita income would be positive. On the other hand, based on the Linder hypothesis, the sign would be negative. Results indicates that there is a negative coefficient for the per capita differential between India and other member of SAARC countries (-.114) which is significantly affecting India's bilateral trade with SAARC countries. This further indicates that there is the existence of Linder hypothesis in SAARC countries as most of the countries are same in nature of demand patterns and per capita income.

TR / Y variable indicates the openness of the country. The more open the country is, the more would be the trade. Results for this variable indicate that there is a positive and significant impact on India's trade supported by the study of Khandare and Someshwar (2012) explained that Maldives is highly dependent on external sector with 161 per cent trade openness ratio (Trade-GDP ratio) while Pakistan is least open country in the SAARC region as also corroborated by the results of FEM model where Pakistan has negative intercept will be resulting into negative impact.

Distance between the countries should have negative impact on trade but the model estimated positive and highly significant value (1.11) and its impact on India's trade. India is the emerging market for SAARC countries, therefore recent trends says that export performance has increased for all the SAARC countries being the member of it or after the agreement of SAFTA. These countries are neighboring countries and well connected with all routes might causing this value to affect positively with the high trade volume.

Model (B) explains the impact of GDP, per capita income, inflation rate, per capita differentials of both partner countries on the exports of India. The coefficient for GDP and per capita income are positive as expected and affecting significantly on the exports of India, which also supports the macroeconomic theory that the high per capita income of foreign nation increases absorption of the country resulting in high imports and therefore the more exports from India. This is supported by the results of the table 4, in which the highly significant and positive coefficient was estimated by the model for per capita of country j. however, coefficient of per capita income is also found positive for India which is not significant at 0.05% which further indicates that there is no statistical evidence to judge the impact of this variable on India's trade.

As discussed in model A, in estimation of model b we found same results with reference to the existence of linder hypothesis in India and other SAARC nation (-0.138). Also for trade openness which indicates that trade is relatively higher than the income of both nations. Except Pakistan and Bangladesh, all countries are fairly trade open in the SAARC.

Variable Imports to GDP ratio is not found significant in the analysis, there is no statistical evidence to prove that this variable affecting India's trade however, the coefficient

found negative which supports macroeconomic theory.

Study also has estimated the impact of inflation rate on India' trade. Study found the positive coefficient for the both host and partner countries. However, the estimates with reference to India are not found statistically significant where as other SAARC nations it was found at 10% level of significance. According to macroeconomic theory, higher the inflation supports higher the exchange rate and thereby more exports. Analysis did not have taken variable measure exchange rate which can further be included for more evidence. However, the positive coefficient of inflation in India induces the more exports can make economic interpretation.

Model (C) interprets the impact of GDP, per capita income, trade to GDP ratio on the imports of India. This is also estimating the impact of exports to GDP ratio on the imports of India with SAARC. Estimates explain that GDP of India and other SAARC nations are positively affecting to the India's imports. In which India's income is significantly affecting its consumption and exports which also supported with macroeconomics, higher the income, higher the consumption and thereby higher the imports.

Exports to GDP ratio is affecting negatively and significantly to the imports of India from SAARC (-3833.408), which indicates that the exports of India to SAARC countries are higher than imports supported by the figures presented above (Fig1, fig 2, fig 3, fig 4, fig 5, fig 6). Therefore, higher the exports to GDP will be negatively associated with imports.

Results of per capita differentials and trade openness were found positive and highly significant.

Rehman (2003) found that Bangladesh in trade with SAARC is more nearer to H-O than Linder hypothesis, supported the results estimated by the model.

The objective of the study was to assess the India's trade with SAARC nations. Export, import and total trade models were estimated in this regard and found that India's bilateral with SAARC nations is positively affecting with trade-openness, per capita income, GDP of the partner countries, and negatively affecting with per capita income differentials. Its transportation cost is responding a positive relation with India's trade this indicates India should also explore the market in other than neighboring countries may be Asian or middle east countries where it may have larger trade partnership and more gains. Study also suggests that India should remain the part of such trade blocks for the longer results with regard to welfare of the economy as whole. With such policy implications India may more likely can reduce its trade deficit which it's facing overall for last many years. A significant rise in exports and trade for the last decade is the evidence that free trade agreement and regional trade agreements have significant impact on the growth least or developing countries.

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10. TRij = Total trade between India (country i) and country j,
    Yi* Yj= Gross Domestic Product of country i (j),
    yi*yj = Per capita GDP of Country i (j),
    Dij = Distance between country i and country j,
    ydij= Per capita GDP differential between country i and j,
    TR/Y = Trade- GDP ratio of country i (j),
    Uij = error term; t = time period, αs = parameters
11. X= exports, Y=GDP, y = per capita GDP, D= distance, yd= per capita GDP differential, ER = exchange rate, In = inflation rate, TE = total export, TI =total import, IM/Y = Import-GDP ratio, TR/ Y= trade-GDP ratio, ln= natural log.
12. M= imports, EX/Y= export-GDP ratio, and other variables are the same as defined in the Export model.