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Potential Export Gains from Better BIMSTEC Integration: Empirical Study Using Gravity Model

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1. Introduction

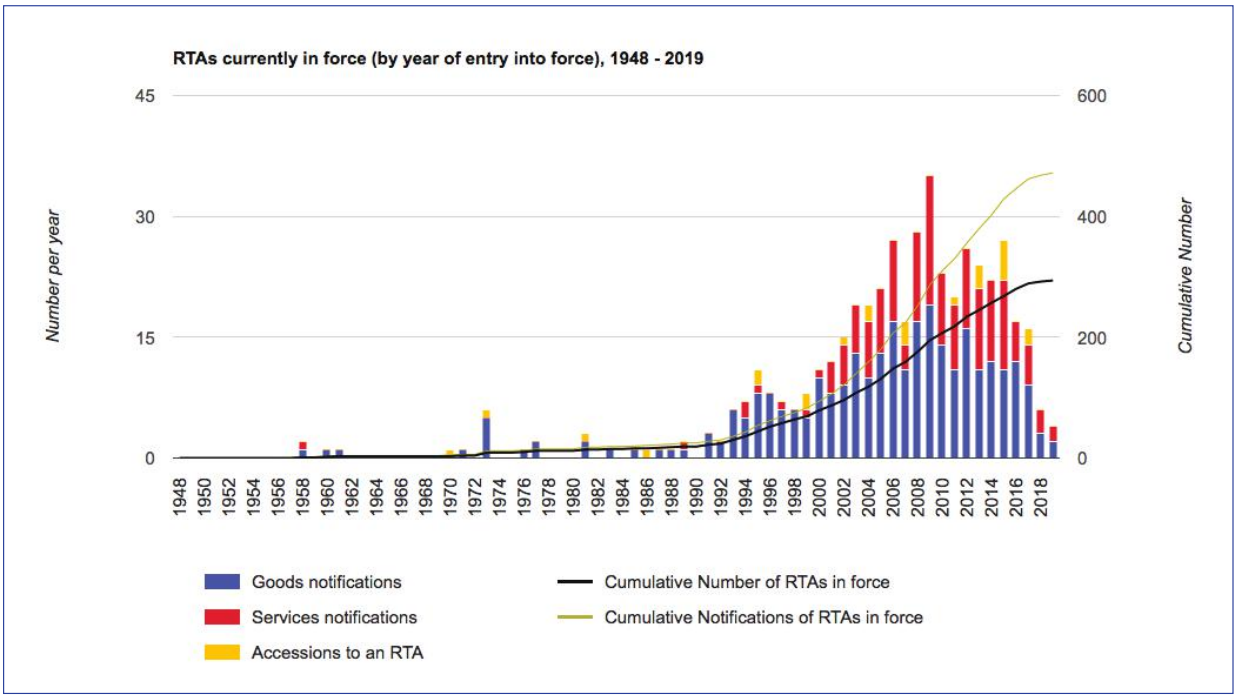
One of the primary features of the global trade landscape since the establishment of the WTO has been the concomitant rise in the number of regional trading agreements (RTAs) (Figure 1). Even though the General Agreements on Tariffs and Trade (GATT) came into effect in 1948, there were no RTAs until 1957. Although the first RTA came into effect in 1958, the rate of signing of new RTAs was very sluggish. It was only after the establishment of the World Trade Organization (WTO) in 1995, through Marrakesh declaration, that the RTAs really started to proliferate. In 2019, there were 472 cumulative notification of RTAs out of which 294 RTAs came in force (WTO 2019) and a few RTAs are currently under negotiations. The failure of Doha Round, which began in 2001, has often been cited as the reason for the rise of RTAs as the multilateral trading framework could not effectively address the needs of many WTO member states.

The Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC) was set up in June 1997 to foster socio-economic cooperation among Bangladesh, India, Sri Lanka, and Thailand and was known as BIST-EC, until Myanmar's inclusion later in that year, when it became Bangladesh, India, Myanmar, Sri Lanka and Thailand Economic Cooperation (BIMST-EC). Nepal and Bhutan joined in February 2004 and the name of the group was changed to Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC). It was initiated primarily as a combination of India's Look East Policy (now Act East Policy) and Thailand's Look West Policy. BIMSTEC is home to 1.5 billion people, amounting to 21 percent of the world population and a combined GDP of over $2.5 billion dollars.

Figure 2 shows that the BIMSTEC region is very poorly integrated. Although the intra-regional share of trade in the region has risen from 2.35 per cent in 1990 to 5.99 per cent in 2017, the level of integration is much lower than compared to other regional blocks like European Union (EU), Association of Southeast Asian Nations (ASEAN), and North American Free Trade Agreement (NAFTA).

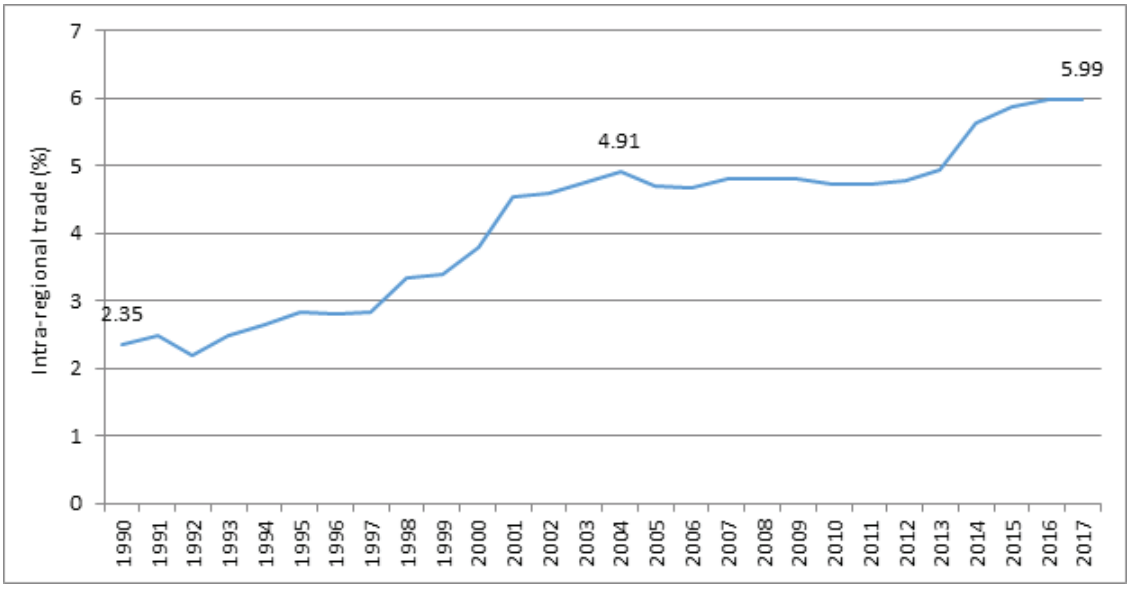
Although BIMSTEC has not signed a free trade agreement, BIMSTEC has identified 14 priority areas, where a member country takes the lead, viz. trade and investment; transport and communication; energy; tourism; technology; fisheries; agriculture; public health; poverty alleviation; counter-terrorism and transnational crime; environment and natural disaster management; culture; people to people contact and climate change.

Figure 1: RTAs Currently in Force



Source: World Trade Organization (WTO)

Figure 2: Intra-regional Trade Share in BIMSTEC Region



Apart from all these facts, the full potential of intra-regional trade remains untapped due to the existence of tariff & non-tariff barriers, lack of efficient communication and transportation & information gaps. Since a better regional integration, for example through an FTA, can help eliminate or reduce these tariff and non-tariff barriers, this study attempts to estimate the extent of exports that the region can achieve through efforts that increase the level of regional integration. We use a structural gravity model to estimate the potential gains in exports accruing from participation in BIMSTEC FTA.

2. Literature Review

Newton's Law of Gravity implies that particles are mutually attracted in proportion to their sizes and proximity. When this logic is applied to international trade, countries trade in proportion to their respective market sizes vis-s-vis gross domestic products and proximity. Prominent examples include Ravenstein (1885) and Tinbergen (1962), who used gravity to study immigration and trade flows, respectively. In a seminal paper, Anderson (1979) offered a theoretical economic foundation for the gravity equation under the assumption of product differentiation by place of origin and Constant Elasticity of Substitution (CES) expenditures. Another early contribution to gravity theory of trade is Bergstrand (1985).

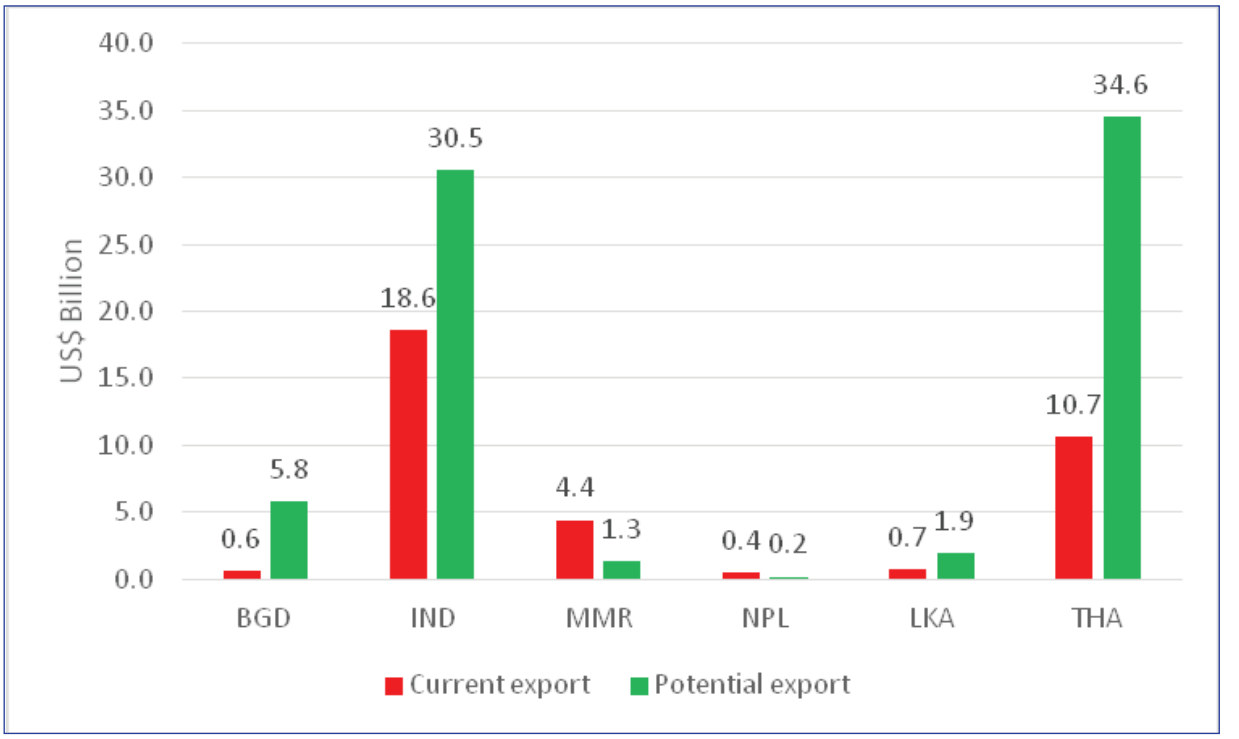
Despite these theoretical developments and its solid empirical performance, the gravity model of trade struggled to make much impact in the profession until the late 1990s and early 2000s. Arguably, the most influential structural gravity theories in economics are those of Eaton and Kortum (EK) (2002), who derived gravity on the supply side as a Ricardian structure with intermediate goods, and Anderson and van Wincoop (2003), who popularized the Armington-CES model of Anderson (1979) and emphasized the importance of the general equilibrium effects of trade costs.

The academic interest in the gravity model was recently stimulated by the influential work of Arkolakis et al. (2012), who demonstrated that a large class of models generates isomorphic gravity equations which preserve the gains from trade. The gains from trade are invariant to a series of alternative micro-foundations including a single economy model with monopolistic competition (Anderson, 1979; Anderson and van Wincoop, 2003); a Heckscher-Ohlin framework (Bergstrand, 1985; Deardoff, 1998); a Ricardian framework (Eaton and Kortum, 2002); entry of heterogeneous firms, selection into markets (Chaney, 2008; Helpman et al., 2008); a sectoral Armington-model (Anderson and Yotov, 2016); a sectoral Ricardian model (Costinot et al., 2012; Chor, 2010); a sectoral input-output linkages gravity model based on Eaton and Kortum (2002) (Caliendo and Parro, 2015)iew, and a dynamic framework with asset accumulation (Olivero and Yotov, 2012, Anderson et al. 2015C, and Eaton et al., 2016). Most recently, Allen et al. (2014) established the universal power of gravity by deriving sufficient conditions for the existence and uniqueness of trade equilibrium for a wide class of general equilibrium trade models.

Other studies on impact of proposed FTAs had been done using different methodology. Hosein and Khadan (2011) in their study investigated the potential benefits that can be derived from the proposed CARICOM-Canada FTA for CARICOM countries by using trade complementarity approach and a partial equilibrium model approach to identify the potential gains from FTA. The welfare effect is captured by the partial equilibrium model which is based on an imperfect substitution framework which shows that there will be a significant fall in tariff revenues and welfare for each of the listed CARICOM member states with the extent differing for all the members.

Strutt (2008) used GTAP model to analyse the potential impacts of a BIMSTEC-Japan Free Trade Agreement (FTA) using GEMPACK

Figure 3: Current and Potential Intra-Regional Exports in BIMSTEC (for the year 2015)



Note: The analysis doesn't include Bhutan because of lack of data.

Source: Authors' estimates.

software. The study suggest that if the FTA is extended to include Japan, significant gains are likely for both the BIMSTEC region as a whole and for Japan with substantial variation in the impacts on individual BIMSTEC member economies with Thailand gaining the most.

Chirathivat and Mallikamas (2002) focused on the benefits that can be reaped from the proposed ASEAN-China FTA. The paper used GTAP model with a sample of 45 countries/ regions and 50 production sectors. The result of the study is that proposed FTA would result in increased market access, competitiveness, reduction in prices, increased domestic demand as well, trade creation, economies of scale, increased efficiency and skill of labour.

Cheong (2004) focused on the implications of the proposed bilateral US-Korea FTA in the context of emerging regionalism in East-Asia. The paper also proposes that US-Korea should focus on economic interests as well as non-economic interests that could be reaped from US-Korea FTA. The study makes use of multi-region, multi-sector CGE modelling with increasing returns to scale. This paper concludes that US-Korea should enter into a FTA as both the countries would be benefitted from it.

Neogi and Chawdhury (2017) conducted a study to find whether India-BIMSTEC economic integration has helped in increasing India's trade in the region by using a panel data where base shifting index has been used to standardize GDP (at Constant US$) of BIMSTEC countries. The study has taken GDP of 2010-11 as base to study the impact of GDP, Exchange rate, distance between countries and average weighted tariff rates on India's trade with BIMSTEC countries. Regional Integration is evaluated where Hausman Specification Test is conducted to evaluate the appropriateness of using fixed effect model or random effect model

for which random effect model is found to be more appropriate. The study found that economic integration through Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation has positive and significant impact on India's exports to the entire region of BIMSTEC.

3. Empirical Model

The data on export flows between BIMSTEC countries and 210 importers for the years 2002-2017 are drawn from UN-COMTRADE obtained from the World Integrated Trade Solution (WITS). The MFN tariff data are sourced from the WITS as well. The data on GDP are obtained from World Development Indicators by the World Bank. The data on gravity variables (distance, contiguity, common colonial origin, common language, FTA) are sourced from CEPII database which builds upon the original works of Head, Mayer and Ries (2010).

General Model

The traditional gravity model that is estimated for the study is expressed as the following:

$$\ln X_{ijt} = \alpha_0 + \alpha_1 \ln GDP_{it} + \alpha_2 \ln GDP_{jt} + \alpha_3 lndist_{ij} + \alpha_4 \ln tariff_{jt} + \alpha_5 FTA_{ij} + \sum_z \alpha_z G_{ij} + \epsilon_{ijt} \quad (1)$$

where X_{ijt} is the total exports by country i to country j in year t, GDP_{it} is exporter's GDP in current prices in year t, GDP_{jt} is importer's GDP in current prices in year t, $tariff_{jt}$ is j's MFN average applied tariff rate in year t, FTA_{ij} is a dummy variable to indicate whether the country pairs have a preferential or free trade agreement in year t or not, G_{ij} is a vector of common bilateral gravity controls like contiguity, common language, etc. and ϵ_{ijt} is the error term.

However, the specification in equation (1) is not a theoretically consistent specification for a gravity model as it doesn't control for multilateral resistance terms (MRT), which would result in a serious omitted variable bias, producing bias results. Thus, following Feenstra (2004), we control for MRT using exporter fixed effects and importer fixed effects. Thus, our empirical strategy is as follows:

$$\ln X_{ijt} = \beta_0 + \beta_1 lndist_{ij} + \beta_2 \ln tariff_{jt} + \beta_3 FTA_{ij} + \sum_z \beta_z G_{ij} + \delta_i + \delta_j + \delta_t + \epsilon_{ijt} \quad (2)$$

where δ_i is the importer-fixed effect, δ_j is the exporter fixed effect, and δ_t is the time fixed effect.

Note that the specification in equation (2) doesn't have variables for GDP and tariff because the importer fixed effect and the exporter fixed effect would absorb these components.

4. Analysis

Table 1 provides the estimates of the traditional gravity model (column 1) as well as the structural gravity model (column 2). We see in column (1) that the exporter's GDP and importer's GDP have high elasticities, as found in literature. Similarly, distance is highly significant and so is the presence of an FTA. In other words, increase in distance between countries reduces exports and presence of an FTA strongly increases exports. Further, same common language between countries also boosts trade. The only unexpected result is that tariffs are insignificant. However, this could be because of the use of MFN rates at aggregate level rather than the effectively applied rates at the product level. Or, it could also mean that tariffs are no longer significant given the increasing

importance of non-tariff measures. However, we should not be overly concerned because our main model is given by the structural gravity in column (2) which controls for tariffs and other exporter and importer characteristic (for example, GDP) through importer and exporter fixed effects as in Feenstra (2004).

The structural gravity model in column (2) is theoretically consistent as it controls for multilateral resistance term (MRT)[1]. Alongside distance and FTA, contiguity and common language are also significant under the structural gravity model.

Table 1: Results of Estimated Gravity Equation

	(1) Pooled OLS	(2) Fixed Effects, LSDV
VARIABLES	**Log export**	**Log export**
Exporter GDP	1.664***	
	(0.047)	
Importer GDP	0.851***	
	(0.031)	
Log MFN tariff	0.117	
	(0.101)	
Log distance	-0.646***	-1.957***
	(0.123)	(0.271)
FTA	1.250***	0.648***
	(0.278)	(0.164)
Contiguity	0.718	1.077**
	(0.521)	(0.541)
Common language	-0.591**	0.302*
	(0.235)	(0.177)
Common colony	0.0635	-0.185
	(0.179)	(0.157)
Constant	-42.41***	28.24***
	(1.920)	(2.658)
Observations	7,805	13,646
R-squared	0.69	0.84

Notes: Robust standard errors clustered at importer exporter pair level. $^{*}p<0.10$, $^{**}p<0.05$, $^{***}p<0.01$.

Potential BIMSTEC exports under Deeper integration the structural gravity model given in table 1 is used to estimate the potential export gains that could be obtained under deeper regional integration (for example, an FTA that is currently under discussion). However, we have to be mindful that having an FTA doesn't automatically eliminate all the non-tariff barriers and hence these estimates should be taken as an upper bound estimates rather than the impact of FTA. To measure the true impact of a potential FTA, we need to augment our specification to include other variables such as non-tariff measures.

1 For a detailed treatment of a theoretically-consistent (structural) estimation, please refer to Anderson and van Wincoop (2003), and refer to Feenstra(2004) for the use of fixed effects to account for MRT..

The potential export gains are computed using the formula:

Potential Exports = Predicted Exports-Actual Exports

where 'Predicted Exports' is the export level predicted by the structural gravity model and the 'Actual Exports' is the current level of exports. The estimates of export potential for the year 2015 are presented in Figure 3.[2] It is observed that Bangladesh, India, Sri Lanka and Thailand could have realized that greater exports to the region under deeper regional integration whereas Nepal and Myanmar are currently over exporting to the region and could see a loss in their intraregional exports. In the case of Nepal, the results could have been driven by Nepal's overwhelming exports to India. The results are also tabulated in Table A.1.

Table 2 and Table 3 presents some of the cases of over-exports and under-exports in the region. Over-exports refer to when the potential exports predicted by the gravity model is lower than the current level of exports and under-exports refer to the case of potential exports being higher than the actual exports.

Table 2: Cases of Over-Exports in the Region (US$ million)

Exporter	Importer	Year	Current Exports	Potential Exports	Difference	
India	Sri Lanka	2015	5501.02	2301.01	-3200.01	
Myanmar	Thailand	2015	3359.36	797.12	-2562.24	
Myanmar	India	2015	1013.99	413.41	-600.58	
Nepal	India	2015	419.09	148.62	-270.47	

Source: Authors' estimates

Table 3: Cases of Under-Exports in the Region (US$ million)

Exporter	Importer	Year	Current Exports	Potential Exports	Difference
Thailand	India	2015	5211.84	28755.97	23544.14
India	Bangladesh	2015	5521.52	19250.51	13728.99
Bangladesh	India	2015	517.89	5519.03	5001.14
India	Thailand	2015	3113.56	7001.55	3887.99
Thailand	Bangladesh	2015	844.90	2996.23	2151.33
Sri Lanka	India	2015	642.39	1808.11	1165.72
Sri Lanka	Thailand	2015	33.48	116.87	83.39
Myanmar	Bangladesh	2015	18.82	80.60	61.77

Source: Authors' estimates

Although there are cases of over-exports in the region, the total intraregional exports will be much higher from a better BIMSTEC integration. Our estimates show the overall potential exports by BIMSTEC member states in the region stands at 38.9 billion US dollars.

2 We present the case of 2015 as an example to avoid too many tables. Furthermore, 2015 was the last year where data for all the countries (except for Bhutan) was available. Our estimates of other years are robust as well.

5. Conclusion

We use a theoretically consistent structural gravity model to estimate the potential intra-regional exports by BIMSTEC member states. Our estimates show that potential BIMSTEC exports, as indicated by the structural gravity equation, is at a significantly higher level than the current exports. BIMSTEC exports seem to be around US$39 billion lower than its potential. Only Nepal and Myanmar seem to be over-exporting to the region. Thus, a deeper BIMSTEC integration indicates a significant potential for regional export gains.

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Annex

Table A.1: Potential Exports by BIMSTEC Countries as predicted by gravity equation (for the year 2015)

Country	Current exports	Potential exports	Difference	per cent change
BGD	0.6	5.8	5.2	859.6
IND	18.6	30.5	12.0	64.4
MMR	4.4	1.3	-3.1	-70.6
NPL	0.4	0.2	-0.3	-63.3
LKA	0.7	1.9	1.2	155.6
THA	10.7	34.6	23.9	224.4
BIMSTEC*	35.4	74.3	38.9	109.8

Note: * The analysis doesn't include Bhutan because of lack of data.

Source: Authors' computations