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Working Paper

Relative benefits/losses of India aligning with RCEP and BRICS countries under the conjecture of free trade area in goods

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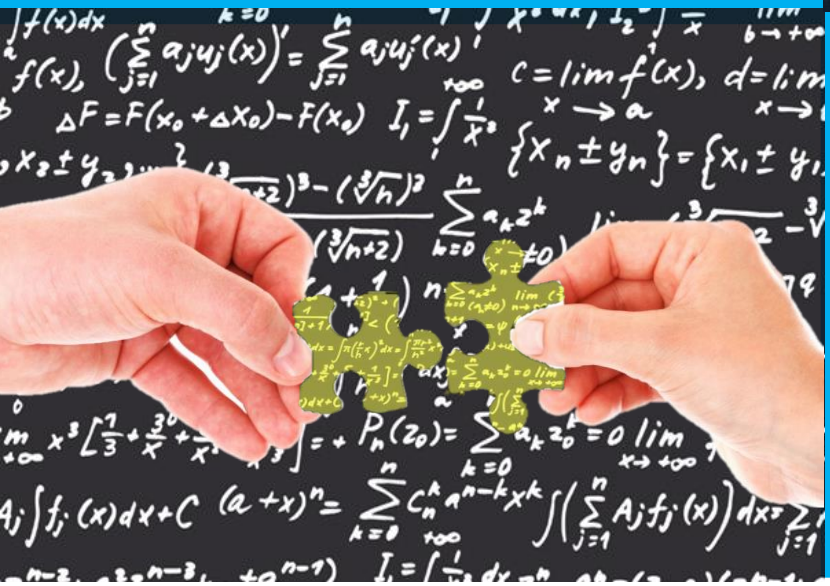

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ASIA-PACIFIC RESEARCH AND TRAINING NETWORK ON TRADE

WORKING PAPER

Relative benefits/losses of India aligning with RCEP and BRICS countries under the conjecture of free trade area in goods

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Abstract

The present study works out the relative benefits/losses of India aligning with RCEP and BRICS member countries under the conjecture of free trade area in good trade only. The study uses partial (SMART model) and general equilibrium (GTAP model) tools for this assessment. The main focus in the study is to compare the benefits/losses to Indian economy associated with both policy scenarios. The results reveal that it would be beneficial for India to align with other RCEP member countries under the policy of free trade area in goods trade. If India wants to join BRICS FTA in the near future then it must negotiate for the entry of its own specialized products into their markets and in reciprocity, it should allow the entry of their specialized products in to the domestic market. The results are in favor to make free trade area between RCEP countries which is more beneficial for India in comparison to make BRICS FTA.

Keywords: RCEP, BRICS, SMART, GTAP

JEL Classifications: F13, F14, F15

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1. Introduction

The policy of regional trading agreements (RTAs) is considered as building block towards multilateral trade liberalization. Almost all countries in the world today are party to, or are in the process of negotiating, at least one RTA. Asia has also seen a large number of trading agreements since the year 2000. In Asia, India also has an active participation in various trading arrangements emerging all over the world. As per the Asian Development Bank (ADB) FTA database, India is a part of 13 such existing arrangements (signed and in effect agreements), and in process to join 15 more such arrangements in the near future[1].In the whole world, the Asian region is in the limelight related to these types of policy arrangements. The emergence of mega trade deals including various members from Asian region is one of the main reasons behind this. Among the three main existing mega trade deals (TPP, TTIP, & RCEP), two (TPP and RCEP) are mainly concerned with the Asian region due to inclusion of many Asian powers in them as a member countries. The word mega has been attached to these trade deals because of the inclusion of many and important countries of the world. Also, these trade blocs individually cover significant portion of world GDP, trade and population.

The emergence of TPP in the Asia-Pacific region with its members from North and South America raised concerns for the non-member countries of Asian region. Among the non-members, India and China are the main economies in Asian region whose trade share within Asia is more than 50 percent. The exclusion of India and China from TPP emerged the serious concerns among the policy makers of both the countries because of expected diversion of their trade towards the member countries of TPP from North and South American region. Further, the emergence of TTIP between World's biggest economy (USA) and Largest trading bloc (EU) again raises the concerns among various producers in the developing countries. Ongoing discussions on these mega trade blocs termed RCEP a savior who will save the developing economies of Asia, particularly China and India, from the negative effects of other two mega blocs (TTIP and TPP).

[1] For 14 such arrangements, negotiations have been launched and for one such arrangement (India-GCC FTA), negotiations have been finalized and signed by all the member countries. For more information, see https://aric.adb.org/fta-country.

In particular, India is also taking an active participation in the ongoing negotiations of RCEP and all member countries are expecting to conclude these negotiations by the end of this year. At the same time, India is also looking outside Asia-Pacific region and exploring the possibilities of feasible trade agreements with other countries. The list is very long, as it includes many bilateral, multilateral and plurilateral existing and proposed trade agreements. In this long list of trade agreements, talks are also going on between member countries of BRICS[2], an association of five emerging and diverse economies, to make BRICS free trade zone. Those five countries are: Brazil, Russian Federation, India, China, and South Africa. The members of BRICS association meet every year in an annual summit since year 2009. Seven such summits have been held so far and the countries are planning to hold the next summit in India in this year. In these summits, many suggestions have come up to plan a free trade agreement between the member economies. If successful, then this FTA will also come under the category of mega trade blocs.[3] It is expected that this trade deal would also provide many benefits to Indian economy and contribute positively to fight against the negative effects of other mega trade deals of which India is not a member country.

Many recent studies have evaluated the impact of joining these mega trade blocs by India and found these policy options very advantageous. De Castro (2012) found that BRICS countries would show the positive result for the establishment of PTA when involved in bilateral trade between BRICS-EU using various trade indicators. Sharma and Kallummal (2012) also investigated the free trade agreement (FTA) using the GTAP model and found that the overall effect of BRICS FTA would be positive for India. Further, extending the FTA scenario, Sharma (2012) evaluated food and agricultural trade liberalization for BRICS countries with two growing nations of Republic of Korea and Mexico to see the economic and welfare impacts and found that Brazil and China are the main gainers with this liberalization.

Further, in the recent studies on assessment of RCEP, a proposed mega trade bloc, Li *et al.* (2014) in their study evaluated the China's participation in a trade agreement with main economies of proposed mega blocs and found that US will gain maximum if China will be a part of TPP but it will have negative impact on non-member countries. The study also found

[2] For details on BRICS, see Mathur and Dasgupta, 2013.

[3] Collectively, all BRICS countries cover more than 40 per cent of world population with more than quarter of world GDP.

that RCEP will generate maximum welfare to Japan, Republic of Korea and India. Arora *et al.* (2015) in their study on India RCEP FTA concluded that India would gain in terms of welfare and the joining of RCEP will provide some safeguard against the negative effects of TPP. Many other such studies existed which analyzed FTA of India with ASEAN countries (Kim (2002); Chandran (2010); Nag and Sarkar (2011); among others). The present study contributes the existing literature by providing the partial and general equilibrium assessment of two proposed FTAs (RCEP and BRICS) and their impact on Indian economy. To the best of our knowledge, no such study existed in the literature which compares these two options for Indian economy at times when the emergence of mega trade blocs in the world are in the limelight.

On this background, the present study is an attempt to evaluate the impact of existence of RCEP and BRICS free trade area on Indian economy. The present study also compares both policy options for India. The assessment has been carried out using partial and general equilibrium frameworks. SMART model has been used for partial equilibrium analysis and for general equilibrium analysis, GTAP model has been estimated. To present the whole discussion, the present study has been divided into five sections including the present introductory one. It also provides brief literature review to highlight the importance of the present study. In Section 2, tariff and trade profile of all member countries of two proposed trade blocs (RCEP and BRICS) has been presented and discussed. Section 3 explains briefly about the data aggregations and construction of simulation scenarios for the empirical analyses. In Section 4, simulation results have been presented and discussed. The final Section concludes the whole study.

2. Tariff and trade profile

The initial conditions of any proposed trade agreement can be assessed by evaluating the trade and tariff pattern of all the member countries. For interpretation of the expected benefits from trade, the information on existing trade relations is of utmost importance. This assessment can be done by using some of the statistical ratios known as trade indicators. There exist various such indicators whose calculation is based on the detailed trade and tariff data which are easily available in the present times. In this section, only those indicators have been utilized which are useful to know the likely impact of any proposed

trade agreement. Following two sub-sections demonstrates the tariff and trade profiles of all member countries of two trade blocs (RCEP and BRICS).

2.1 Tariff profile of BRICS and RCEP members

Tariff profile of any region depicts the level of protection of that region over the traded products. The amount of own tariffs and non-tariffs barriers a country imposes on imports coming from partner countries determines a country's level of protection. It is calculated by evaluating the year-wise average tariff rate over all the products. As per the theory, if the level of trade between the member countries is very high then the gains associated with regional trade agreements are highly depend upon the level of protection of member countries. Higher level of initial protection would lead to larger gains afterwards. Table 1 shows various indicators of level of protection of all countries of both the groupings (BRICS and RCEP) towards their partner countries in the world.

It is observed that India and Brazil have the highest average MFN applied tariff rate among all RCEP and BRICS member countries. Reduction in this rate would lead to larger economic benefits for all the partner countries. Also, under reciprocal liberalization, wherein both of the countries i.e., reporter and the partner, has to reduce/eliminate tariffs increases the chances of more gains in comparison to single sided liberalization. On the other hand, Singapore is at the lowest level in case of imposition of tariff barriers. In addition, on an average, the average applied MFN tariff rate of RCEP as a grouping is less than the average applied MFN tariff rate of another grouping (BRICS) considered for the analysis purpose.

Further, country-wise detailed tariff tables[4] reveal that the average level of applied tariff rate in most of the countries is lower for non-agricultural products and higher for agricultural[5] products. Product-wise rates of tariffs reveal India imposes maximum duty on beverages & tobacco products followed by food products, cereals & grains, and animal products. India also imposes higher tariff rate on transport equipment which is greater than the average tariff rate given in Table 1. Moreover, among RCEP and BRICS member countries, India faces maximum tariffs from China and Indonesia in case of agricultural exports and from China

[4] See Country specific Tariff Tables in World Tariff Profiles 2015 at: https://www.wto.org/english/res_e/booksp_e/tariff_profiles15_e.pdf.

[5] Refer to classification given in WTOs Agreement on Agriculture under Uruguay Round.

only in case of non-agricultural exports. These countries come under the top five markets to export of India. If we take top ten markets then Brazil also comes at number nine and imposes tariffs on Indian exports of agricultural and non-agricultural products.

Table 1: Indicators of level of protection

Member Country	Year	AVE MFN Applied Tariff (%) (HS-6 digit Duty Averages)	Share of Duty Free HS-6 digit Subheadings	Share of HS-6 digit Subheadings Subject to Non-AV Duties	Share of HS-6 digit Subheadings With AVEs >15	Maximum Duty (%) (Ad Valorem)	Number Of MFN Applied Tariff Lines
Common Countries							
China	2014	9.6	7.9	0.4	14.2	65	13,069
India	2014	13.5	3	4.9	18.8	156	11,472
Other RCEP Countries							
Australia	2014	2.7	50.3	0.2	0.1	153	6,185
Japan	2014	4.2	53	3.3	3.6	783	9,610
New Zealand	2014	2	63.9	0.4	0	45	7,510
Republic of Korea	2014	13.3	15.1	0.5	10.3	887	12,298
Brunei Darussalam	2014	1.2	83.2	0.3	1.1	155	9,915
Cambodia	2014	11.2	15.6	0	10.1	35	9,557
Indonesia	2014	6.9	12.7	0.5	1.7	150	10,011
Lao PDR	2014	10	0	0.2	14.5	40	9,557
Malaysia	2014	6.1	65.6	0.7	15.3		
Myanmar	2013	5.6	3.9	0	5	40	9,820
Philippines	2014	6.3	3.4	0	3.2	65	10,276
Singapore	2014	0.2	100	0	0	948	9,557
Thailand	2014	11.6	20.6	9.3	25.9	258	9,564
Viet Nam	2014	9.5	35.1	0	24.6	135	9,557
Other BRICS Countries							
Brazil	2014	13.5	5.9	0	36.2	55	10,030
Russia	2014	8.4	14.3	9.8	8.8	278	11,673
South Africa	2014	7.6	61.5	2.6	20.6	642	7,308
Groupings							
RCEP*	2014	7.12	NA	NA	NA	NA	NA
BRICS*	2014	10.52	NA	NA	NA	NA	NA

Notes: AVE: Ad Valorem Equivalent; MFN: Most-Favoured Nation; Non-AV: Non Ad Valorem; *: Own calculations

Source: Authors' Construction using Data from World Tariff Profiles 2015.

2.2 Trade profile

The trade profile of any country depicts its trading relationship with other trading partners. It includes country's main exporting market, main traded product, and the identification of the products which possess comparative advantage within the bloc among others. The study uses four main trade indices to show the case in favor of existence of RCEP and BRICS FTA. Those trade indices are: Similarity in merchandise trade structures (Grubel-Lloyd, 1975); Trade Complementarity Index (TCI) (Michaely's, 1996); Revealed Comparative Advantage index (RCA); and Trade Intensity Index (TII).All these indices have been calculated and explained in the following sub-sections.

Trade prospects

The first two indicators, such as trade similarity index (*SI*) and trade complementarity index is used to find out the trade prospect between the partners of proposed FTA. The study uses the value of these indices for each member country from UNCTAD STAT[6]. The similarity of merchandise trade indicator provides the extent of similarity of a country's trade structure with its partner country. In other words, this indicator helps to determine whether the trade structures of two economies are similar or not. Using the formula given by Grubel-Lloyd (1975), this index can be calculated by using the following formula:

$$S_{jk} = 1 - \frac{1}{2}\sum_{i} |h_{ij} - h_{ik}|$$

Where, S_{jk} is the indicator of similarity in merchandise trade structures; h_{ij} is the share in total merchandise exports or imports of product *i* of country *j*; h_{ik} is the share in total merchandise exports or imports of product *i* in country *k*. As per the decision rule, value closer to one reveals the greater similarity of the trade structure between two countries. Table 2 presents the value of similarity index calculated for each member country within the group. The results do not depict any strong similarity in trade structure, as no pair has the value equal to one or near it.

[6] http://unctadstat.unctad.org/EN/Index.html.

Table 2: Value of similarity index in merchandise trade structures

Panel A: RCEP Countries														
RCEP Countries	**AUS**	**BRN**	**KHM**	**CHN**	**IND**	**IDN**	**JPN**	**MYS**	**MMR**	**NZL**	**PHL**	**SGP**	**KOR**	**THA**
Australia	--	0.38	0.23	0.13	0.22	0.40	0.22	0.25	0.23	0.30	0.27	0.18	0.42	0.19
Brunei Darussalam	0.38	--	0.50	0.02	0.03	0.28	0.25	0.16	0.41	0.06	0.32	0.03	0.12	0.04
Cambodia	0.23	0.50	--	0.19	0.19	0.35	0.08	0.16	0.35	0.25	0.14	0.08	0.13	0.19
China	0.13	0.02	0.19	--	0.40	0.34	0.45	0.44	0.11	0.18	0.44	0.38	0.24	0.53
India	0.22	0.03	0.19	0.40	--	0.33	0.35	0.33	0.24	0.23	0.28	0.44	0.33	0.45
Indonesia	0.40	0.28	0.35	0.34	0.33	--	0.28	0.49	0.30	0.26	0.39	0.21	0.28	0.37
Japan	0.22	0.25	0.08	0.45	0.35	0.28	--	0.40	0.09	0.21	0.41	0.46	0.35	0.51
Malaysia	0.25	0.16	0.16	0.44	0.33	0.49	0.40	--	0.17	0.22	0.56	0.57	0.23	0.50
Myanmar	0.23	0.41	0.35	0.11	0.24	0.30	0.09	0.17	--	0.24	0.29	0.08	0.21	0.14
New Zealand	0.30	0.06	0.25	0.18	0.23	0.26	0.21	0.22	0.24	--	0.24	0.19	0.28	0.25
Philippines	0.27	0.32	0.14	0.44	0.28	0.39	0.41	0.56	0.29	0.24	--	0.54	0.32	0.44
Singapore	0.18	0.03	0.08	0.38	0.44	0.21	0.46	0.57	0.08	0.19	0.54	--	0.30	0.47
Republic of Korea	0.42	0.12	0.13	0.24	0.33	0.28	0.35	0.23	0.21	0.28	0.32	0.30	--	0.41
Thailand	0.19	0.04	0.19	0.53	0.45	0.37	0.51	0.50	0.14	0.25	0.44	0.47	0.41	--

Panel B: BRICS Countries					
BRICS Countries	**Brazil**	**China**	**India**	**Russia**	**South Africa**
Brazil	--	0.23	0.35	0.26	0.39
China	0.23	--	0.39	0.13	0.23
India	0.35	0.39	--	0.38	0.33
Russia	0.26	0.13	0.38	--	0.26
South Africa	0.39	0.23	0.33	0.26	--

Source: UNCTAD (See: http://unctadstat.unctad.org/wds/ReportFolders/reportFolders.aspx for value of similarity Index for the year 2013)

Further, trade complementarity index (TCI) measures to what extent the export profile of country *j* matches the import profile of country *k*, who is the trade partner of country *j* (Michaely's, 1996). It can be calculated using the following formula:

$$Se_j m_k = 1 - \frac{\sum_i |E_{ij} - M_{ik}|}{2}$$

Where, Se_jm_k is the index of trade complementarity of exporter *j* with importer *k*; *i* represents goods at 3-digit SITC Revision3[7]; E_{ij} is the share of goods *i* in country *j*'s total exports to the world; M_{ik} is the share of goods *i* in country *k*'s total imports from the world. The value of this index lies between zero to one. Zero indicates that there is no correspondence between country *j*'s export structure and country *k*'s import structure and one indicates a perfect match in their export-import pattern. Table 3reports the value of complementarity index taken from UNCTAD for the year 2013 for the main member economies.

Table 3: Value of trade complementarity index

Panel A: RCEP Countries							
Exporters	**ASEAN**	**Australia**	**China**	**India**	**Japan**	**Republic of Korea**	**New Zealand**
Australia	0.3	--	0.4	0.3	0.4	0.3	0.2
China	0.5	0.5	--	0.3	0.5	0.4	0.5
India	0.5	0.5	0.3	--	0.4	0.5	0.4
Japan	0.5	0.5	0.5	0.4	--	0.5	0.4

Panel B: BRICS Countries		
Exporter	**Importers**	**Index**
India	Brazil	0.4
	China	0.3
	Russia	0.5
	South Africa	0.5

Source: UNCTAD (See: http://unctadstat.unctad.org/wds/ReportFolders/reportFolders.aspx for value of complementarity Index for the year 2013)

The results do not depict perfect matching between export and import pattern of two partner countries within the grouping but the value near to 0.5 or equal represents the existence of trade complementarity within the grouping. China, India, and Japan have the prospect of increasing their exports towards ASEAN member countries, Australia, Republic of Korea and New Zealand. On the other hand, among BRICS members, the values of trade complementarity in panel B show that India has weak trade complementarity with Russia and South Africa which may have positive impact on India's trade after the existence of BRICS FTA.

[7] UNCTAD uses SITC Revision 3, 3-digit level data for the calculation purpose.

Comparative advantage and trade intensity

To assess the country-wise sectoral advantage, the study calculates and reports the value of Revealed Comparative Advantage (RCA) index by taking one member country on one side as a reporter and World on the other hand as a partner country. It is the ratio of country's (*i*) total exports of the commodity *k* in its total exports to the share of world exports of the same commodity in total world exports.

$$RCA = \frac{\left(\frac{X_{iwt}^{k}}{X_{iwt}}\right)}{\left(\frac{X_{wwt}^{k}}{X_{wwt}}\right)}$$

Where, X_{iwt}^{k} is the value of exports of country *i* of commodity *k* to the World at time *t*; X_{iwt} is the value of total exports of country *i* to the World at time *t*; X_{wwt}^{k} is the value of exports of all countries of the World of commodity *k* to the World at time *t*; and X_{wwt} is the value of total exports of all countries to the World at time *t*; If the value of this index exceeds unity then the corresponding country in a given product is said to be revealed comparative advantage in that product. Table 4 reports the results of RCA index for each member country.

In case of India, as per the new product classification, nine products are such in which India has a comparative advantage (the value of RCA is greater than 1). From this set of nine products, India can avail benefits by exporting more textiles and clothing products to members of both groupings, except China because China also enjoys the comparative advantage in the same product. In addition to this, India can also exploit its comparative advantage in chemicals in BRICS region particularly because in RCEP grouping Singapore enjoys very high level of comparative advantage in chemicals. Overall, the results show that India has a comparative advantage in nine products which many other member countries does not have hence shows the possibility of increase in trade after trade agreement.

Table 4: Value of revealed comparative advantage index

ISO Code→	Other BRICS countries			Common countries		Other RCEP countries								
Product*	BRA	RUS	ZAF	CHN	IND	AUS	BRN	IDN	JAP	MYS	NZL	SGP	KOR	THA
Animal	3.83	0.33	0.6	0.39	1.71	3.14	0.04	0.96	0.11	0.31	22.38	0.2	0.15	0.71
Vegetable	5.26	0.67	1.65	0.29	2.15	1.7	0.02	4.4	0.04	2.27	1.71	0.32	0.05	1.57
Food Prods.	3.66	0.33	1.39	0.39	0.65	0.58	0.08	1.15	0.13	0.9	2.83	2.11	0.26	2.51
Minerals	9.21	0.67	9.57	0.13	0.75	21.77	0.01	0.83	0.09	0.33	0.1	0.03	0.09	0.36
Fuels	0.71	5.39	0.82	0.11	1.52	2.05	7.15	2.24	0.18	1.71	0.24	16.76	0.71	0.41
Chemicals	0.58	0.49	0.73	0.53	1.21	0.5	0.5	0.69	0.87	0.58	0.53	9.28	0.77	0.61
Plastic & Rubber.	0.57	0.26	0.55	0.89	0.59	0.1	0.02	1.26	1.24	1.41	0.24	4.34	1.59	2.79
Hides & Skins	2	0.12	0.72	2.21	1.82	0.74	0.02	0.38	0.06	0.09	1.82	0.22	0.37	0.71
Wood	1.83	1.03	1.07	0.73	0.25	0.47	0.02	2.44	0.26	1.05	4.29	1.93	0.27	0.76
Text. & Cloth.	0.27	0.04	0.33	2.9	2.87	0.43	0.02	1.7	0.29	0.34	0.65	0.54	0.64	0.78
Footwear	0.66	0.06	0.32	3.59	1.25	0.04	0	3.01	0.03	0.09	0.13	0.27	0.14	0.46
Stones & Glass	0.43	0.54	3.29	0.98	2.82	1.16	0.01	0.65	0.53	0.4	0.35	2.11	0.22	1.09
Metals	1.03	1.17	1.88	1.13	1.16	0.76	0.07	0.75	1.32	0.7	0.55	2.76	1.24	0.62
Mach. & Elec. Equip.	0.3	0.11	0.41	1.67	0.29	0.14	0.04	0.36	1.37	1.52	0.2	43.64	1.41	1.22
Trans.	0.72	0.12	1.07	0.45	0.82	0.18	0.03	0.32	2.2	0.13	0.1	2.9	1.87	1.18
Misc.	0.34	0.29	0.2	1.02	0.19	0.5	0.06	0.28	1.44	0.62	0.66	12.58	0.83	0.43

Note: *: For detailed product classification, see Appendix Table A1.

Source: Trade Outcome Indicators in WITS.

Further, the study has also calculated the trade intensity index (*TII*) which uses the similar logic to that of RCA index but calculated for markets rather than products. It indicates whether a reporter exports more, as a percentage, to a partner than the world does on average. It is measured as country *i*'s exports to country *j* relative to its total exports divided by the world's exports to country *j* relative to the world's total exports.

$$TII = 100 * \frac{\frac{x_{ijk}}{X_{ik}}}{\frac{x_{wkj}}{X_{wk}}}$$

Where, *x* is the value of exports of product *k* from origin country *i* to destination *j*; *X* is total exports from *i* of product *k*; *w* indicates the world as origin. A value greater than 100 indicates a relationship more intense than the world average for the partner. The study has

calculated the trade intensity of India in both the groupings, RCEP and BRICS, and the results are reported in Table 5.

Table 5: Value of trade intensity index of India with RCEP and BRICS grouping

Reporter: India		**Partner: Other RCEP countries (15)**	**Partner: Other BRICS countries (4)**
S.N.	**Product**	**Value of Trade Intensity index for the year 2014**	
1.	Animal	217.36	28.33
2.	Vegetable	77.72	36.47
3.	Food Prods.	112.8	58.74
4.	Minerals	99.65	99.99
5.	Fuels	102.05	192.78
6.	Chemicals	100.35	103.48
7.	Plastic & Rubber.	75.34	78.54
8.	Hides & Skins	60.63	41.88
9.	Wood	47.39	27.66
10.	Text. & Cloth.	75.54	126.89
11.	Footwear	74.29	111.25
12.	Stones & Glass	29.86	9.79
13.	Metals	112.9	125.81
14.	Mach. & Elec. Equip.	71.04	53.51
15.	Trans.	99.82	91.4
16.	Misc.	92.57	60.43

Note: *: For detailed product classification, see Appendix Table A1.

Source: Trade Outcome Indicators in WITS.

The results show that India's trade intensity is higher with RCEP members as a group in comparison to the BRICS members. As per the literature, the product with comparative advantage and high trade intensity can play significant role in enhancing the trade between partner countries. This hypothesis seems to be valid in case of India for products such as: Animal, Fuel, Chemicals, textiles & clothing, Footwear, and Metals among others.

3. Sources of data, data aggregations and simulation scenarios

Data aggregations and definition of simulation scenarios are the main requirement of any ex-ante analysis. As per the objective, the study uses both partial and general equilibrium approaches to compare the proposed changes in trade policies by RCEP and BRICS member countries. The application of these methodologies requires the preparation of simulation scenarios and some data aggregations beforehand to get the results on required variables.

3.1 Sources of data and data aggregations

For partial equilibrium analysis, the study has used WITS database, online free database, provided by the World Bank. It provides time-series data on import and export flows between all countries of the world over various product groups. It also has the utility named SMART which is used to analyze the partial equilibrium impact of change in trade policy such as changes in rate of tariffs imposed by countries on their imports. The present study also utilized the same tool for the simulation purpose. On the other hand, for general equilibrium analysis, the study has utilized the GTAP-8[8] database provided by Purdue University under Global Trade Analysis Project (GTAP). It is the most suited available database used for the purpose of general equilibrium analysis which provides data for 2007 reference year. The whole database is the reflection of World economy and consists of data on all-important macroeconomic variables such as output, employment, wages, prices and income.

For partial and general equilibrium analyses, the study aggregates all goods into 14 main products using GTAP product classification (see Appendix Table A1). The SMART tool in WITS allows the researchers to take 6-digit data for the analysis purpose but due to comparison purpose, we use the same GTAP classification for SMART analysis. GTAP-8 aggregates all the sectors into 57 aggregated sectors which further aggregated into 15 new products in which first 14 are related to merchandise trade and the last one consist of all other services sectors (see Appendix Table A1 for detail).

[8] Aguiar, A., McDougall, R., & Narayanan, B. (2012). Global Trade, Assistance, and Production: The GTAP 8 Data Base. *Center for Global Trade Analysis, Purdue University*.

In addition, for partial equilibrium assessment, the study has considered all member countries of both groupings individually and aggregated the other countries into rest of the world group. Similarly, for GTAP analysis, all 137 GTAP regions have been aggregated into 18 regions (See Appendix Table A2). Among 18 aggregated regions, 17 regions cover the member countries of RCEP and BRICS and rest all the countries are under Rest of world.

3.2 Simulation scenarios

The simulations have been conducted mainly under two broad categories of liberalization: full and partial trade liberalization.

Full liberalization: Under full trade liberalization scenario, tariff on all the products is assumed to be zero and its effect on member countries has been reported in a post-simulation environment. The main disadvantage of the SMART model is that one cannot assume the reciprocal liberalization at one time in one simulation, therefore, in case of partial equilibrium analysis, the study considers the case of tariff liberalization by India on exports coming from other RCEP and BRICS member countries separately in two simulations and compares the results. However, using GTAP model, the study considers reciprocal trade liberalization wherein all the member countries have to eliminate all tariffs on each other's exports under full trade liberalization. In sum, under this category, the following four scenarios have been defined for the simulation purpose:

A) Removal of all import tariffs by India on imports coming from Other RCEP member countries;

B) Removal of all import tariffs by India on imports coming from Other BRICS member countries;

C) Reciprocal removal of all import tariffs by India on imports coming from all other member countries of RCEP; and

D) Reciprocal removal of all import tariffs by India on imports coming from all other member countries of BRICS.

The first two scenarios (A and B) are defined for SMART analysis and the last two scenarios (C and D) have been constructed for GTAP analysis.

Partial liberalization: Under partial liberalization, instead of removing import tariffs on all the products, the study considers only specialized products of each member country and assumes zero tariffs only for those products for the simulation purpose. These specialized products are given in the Appendix Table A3 which is constructed using the information contained in Table 4. The specialized products have been decided on the basis of value of RCA corresponding to that product. In this category, to estimate the SMART model, the study assumes zero tariffs by India on the combined set of specialized products of other RCEP and BRICS member countries. The list of those products is given in Appendix Table A3. However, for GTAP model estimation, the study assumes removal of import tariffs on each other's specialized products. In sum, under this category, the following four scenarios have been defined for the simulation purpose:

E) Removal of import tariffs by India on combined list of specialized products of Other RCEP countries;

F) Removal of import tariffs by India on combined list of specialized products of Other BRICS countries;

G) Reciprocal removal of all import tariffs by India on imports of specialized products of all other member countries of RCEP; and

H) Reciprocal removal of all import tariffs by India on imports of specialized products of all other member countries of BRICS.

The first two scenarios (E and F) are defined for SMART analysis and the last two scenarios (G and H) have been constructed for GTAP analysis. Finally, under partial equilibrium analysis, all the scenarios have assumed India as a small country which is the inbuilt assumption of SMART model. On the other hand, under general equilibrium analysis, general equilibrium standard closures have been utilized with fixed technology and population.

4. Simulation results

4.1 Single market partial equilibrium tool (SMART)

SMART tool in WITS can be used to anticipate the likely economic effects of various trade policy alternatives. It allows us to investigate the impact of preferential trade reforms at home or abroad on various variables such as trade flows (imports and exports volumes, trade creation and trade diversion), tariff revenue, economic welfare and world prices[9]. SMART model is easily implemented in WITS database available online and uses the inbuilt data on applied tariff rates and imports. One can chose between the two tariff rates available: MFN applied and Bound rates, while making the simulation scenario. The model has also assumed the given values of elasticity parameters. To pursue the study objectives, four scenarios (A, B, E, and F) have been defined in the previous section under which simulations using SMART model have been conducted and the results have been reported in Tables 6 to 9 as follows.

The results show that in case of full trade liberalization by India with other RCEP members, South Africa will lose maximum among other BRICS countries (Brazil, Russia and South Africa only) in terms of trade diversion effect. However, China will gain maximum because of significant trade creation in a post-simulation environment. Further, in case of India, the loss in terms of tariff revenue is greater than welfare effect as shown in the panel B of Table 6.

[9] See Jammes and Olarreaga, 2005 for detail on SMART model and its derivation. Also see the contribution of Arora, Singh and Mathur (2017), upcoming publication in the Edited book by Mathur, Arora and Singh, 2017 (in press), in correcting the final formula of trade diversion under inelastic export supply elasticity and the formula of welfare effect as per the theory.

Table 6: Simulation A - Trade effect of India's aligning with other RCEP countries (USD million)

Country	Total trade effect	Trade creation effect	Trade diversion effect
Brazil	-32.96	0.00	-32.96
Russia	-76.25	0.00	-76.25
South Africa	-100.53	0.00	-100.53
China	11,569.31	10,164.00	1,405.31
India	--	--	--
Australia	1,203.39	826.62	376.76
Brunei Darussalam	4.30	0.82	3.48
Cambodia	1.41	1.26	0.15
Indonesia	2,573.62	2,393.06	180.55
Japan	3,287.56	2,820.38	467.18
Lao PDR	4.22	1.59	2.63
Malaysia	2,060.97	1,927.08	133.89
Myanmar	224.74	168.10	56.64
New Zealand	76.71	51.15	25.57
Philippines	90.70	77.83	12.87
Singapore	1,096.62	807.88	288.74
Republic of Korea	3,547.60	3,059.72	487.89
Thailand	2,122.53	1,906.72	215.81
Viet Nam	1,283.50	1,219.37	64.13
Panel B: Trade, welfare and revenue effects to the world			
Products	**Total trade effect**	**Welfare effect**	**Change in tariff revenue effect**
Wood	1,391.94	68.79	-235.33
Vegetable	1,233.54	534.84	-489.29
Trans.	5,371.97	507.23	-1,739.40
Text. & Cloth.	971.29	53.26	-139.12
Stones & Glass	1,079.37	54.99	-92.91
Minerals	438.71	9.46	-2,631.45
Metals	3,176.29	172.88	-2,729.22
Mach. & Elec. Equip.	5,416.05	308.53	-3,096.88
Hides & Skins	1.46	0.28	-5.58
Fuels	211.65	8.86	-155.67
Footwear	423.84	22.91	-45.00
Food Prods.	2,922.58	1,238.10	-1,427.51
Chemicals	2,779.57	150.82	-2,021.70
Animal Prods.	7.34	0.35	-22.69
Total	25,425.6	3,131.3	-14,831.75

Source: SMART simulation results.

Table 7: Simulation E - Trade effect of India's aligning with other RCEP countries (USD million)

Country	Total trade effect	Trade creation effect	Trade diversion effect
Brazil	-24.76	0.00	-24.76
Russia	-73.08	0.00	-73.08
South Africa	-42.47	0.00	-42.47
China	9,562.72	8,251.55	1,311.17
India	--	--	--
Australia	962.57	669.29	293.29
Brunei Darussalam	0.27	0.08	0.19
Cambodia	0.76	0.69	0.08
Indonesia	2,271.82	2,164.00	107.83
Japan	3,237.68	2,778.83	458.84
Lao PDR	0.09	0.06	0.03
Malaysia	1,943.12	1,814.45	128.68
Myanmar	224.51	167.96	56.55
New Zealand	66.63	44.48	22.15
Philippines	77.14	65.13	12.01
Singapore	1,070.67	789.78	280.89
Republic of Korea	3,496.46	3,015.81	480.66
Thailand	1,969.85	1,772.62	197.23
Viet Nam	1,024.41	968.87	55.54
Trade, Welfare and Revenue Effects to the World			
Products	**Total Trade Effect**	**Welfare Effect**	**Change in Tariff Revenue Effect**
Wood	1,391.94	68.79	-235.33
Vegetable	1,233.54	534.84	-489.29
Trans.	5,371.97	507.23	-1,739.40
Metals	3,176.29	172.88	-2,729.22
Mach. & Elec. Equip.	5,416.05	308.53	-3,096.88
Fuels	211.65	8.86	-155.67
Food Prods.	2,922.58	1,238.10	-1,427.51
Chemicals	2,779.57	150.82	-2,021.70
Total	22,503.59	2,990.05	-11,895

Source: SMART simulation results.

Table 8: Simulation B - Trade effect of India's aligning with other BRICS countries (USD million)

Country	Total trade effect	Trade creation effect	Trade diversion effect
Brazil	321.73	240.15	81.58
Russia	1,193.77	871.91	321.87
South Africa	1,377.03	767.49	609.54
China	12,184.86	10,164.00	2,020.86
India	--	--	--
Australia	-82.29	0.00	-82.29
Brunei Darussalam	0.00	0.00	0.00
Cambodia	-0.26	0.00	-0.26
Indonesia	-82.98	0.00	-82.98
Japan	-187.69	0.00	-187.69
Lao PDR	-0.28	0.00	-0.28
Malaysia	-66.17	0.00	-66.17
Myanmar	-8.08	0.00	-8.08
New Zealand	-6.76	0.00	-6.76
Philippines	-5.36	0.00	-5.36
Singapore	-69.00	0.00	-69.00
Republic of Korea	-203.38	0.00	-203.38
Thailand	-96.02	0.00	-96.02
Viet Nam	-45.97	0.00	-45.97
Panel B: Trade, welfare and revenue effects to the world			
Products	**Total Trade Effect**	**Welfare Effect**	**Change in Tariff Revenue Effect**
Wood	642.24	38.23	-146.44
Vegetable	209.20	80.25	-122.90
Trans.	1331.68	152.34	-796.55
Text. & Cloth.	826.04	46.42	-105.05
Stones & Glass	708.61	40.50	-68.75
Minerals	404.13	23.22	-2,438.14
Metals	2,079.51	135.57	-1,826.80
Mach. & Elec. Equip.	3,599.76	215.50	-2,148.07
Hides & Skins	1.16	0.23	-4.42
Fuels	70.78	4.06	-106.45
Footwear	391.91	21.35	-36.85
Food Prods.	197.35	50.20	-520.20
Chemicals	1,579.08	90.01	-1,222.73
nimal Prods.	2.11	0.09	-1.30
Total	12,043.56	897.97	-9,544.65

Source: SMART Simulation Results.

On the other hand, the results given in Table 7, the case of trade liberalization by India on combined specialized products of other RCEP countries, show mostly the same trend with less amount of trade and welfare effect. The low value of these effects is due to the less number of products taken in case of specialized product scenario. But, by looking at the total figures of trade and welfare effect, the difference seems to be very meager on the basis of which one may recommend the adoption of this type of policy in future rather than adopting full trade liberalization in all products in one go. Losses to non-member BRICS countries have also reduced in case of specialized scenario.

Further, the full trade liberalization with other BRICS countries (Simulation B) will provide maximum losses to Republic of Korea and Japan in terms of trade diversion and maximum benefits to China again followed by South Africa and Russia among the member countries in a post-simulation environment (see Table 8). In this scenario, the loss in tariff revenue is again greater than the welfare gain occur due to the decrease in prices.

On the other hand, the results of simulation F, assuming trade liberalization by India on combined specialized products of other BRICS members, also show the similar trend but low value of overall trade and welfare effect (see Table 9).

Overall, the comparative figures of SMART simulation results depicts that in terms of welfare effect, India would gain more in aligning with other RCEP countries than other BRICS countries under the policy of free trade area in goods trade only.

Table 9: Simulation F - Trade effect of India's aligning with other BRICS countries (USD million)

S.N.	Country	Total Trade Effect	Trade Creation Effect
Brazil	188.83	140.86	47.97
Russia	580.81	349.92	230.89
South Africa	1,286.39	708.91	577.48
China	2,761.22	2,332.74	428.49
India	--	--	--
Australia	-73.51	0.00	-73.51
Brunei Darussalam	0.00	0.00	0.00
Cambodia	-0.01	0.00	-0.01
Indonesia	-40.47	0.00	-40.47
Japan	-40.05	0.00	-40.05
Lao PDR	-0.28	0.00	-0.28
Malaysia	-18.40	0.00	-18.40
Myanmar	-7.80	0.00	-7.80
New Zealand	-5.95	0.00	-5.95
Philippines	-0.56	0.00	-0.56
Singapore	-11.04	0.00	-11.04
Republic of Korea	-52.76	0.00	-52.76
Thailand	-13.95	0.00	-13.95
Viet Nam	-7.90	0.00	-7.90
Trade, Welfare and Revenue Effects to the World			
Products	**Total Trade Effect**	**Welfare Effect**	**Change in Tariff Revenue Effect**
Wood	642.24	38.23	-146.44
Vegetable	209.20	80.25	-122.90
Minerals	404.13	23.22	-2,438.14
Metals	2,079.51	135.57	-1,826.80
Food Prods.	197.35	50.20	-520.20
Total	3,532.43	327.47	-5,054.48

Source: SMART Simulation Results

4.2 GTAP model: A general equilibrium tool

The main disadvantage of the partial equilibrium analysis is that it ignores the interaction effect between sectors. It also misses the existing constraints that apply to the various factors of production and their movement across sectors and very sensitive to some behavioral parameters such as elasticities. However, General Equilibrium modeling captures all these feedback effect of an economy and captures all indirect impacts on other market of any change in policy variable. For a trade policy change, such as tariff reduction/elimination,

has dual impact on the importer and exporter country. It has direct effects through the reduction in price of the imported product in the importer country and increase in exports from an exporter country. In addition to these, due to presence of linkage and feedback effects in an economy, it also affects the demand for its substitutes available in the home market and in foreign market with other supplier. Due to change in demand for substitute good, price will also be affected and hence affect the overall income of an economy through number of other linkage effects. Due to ignorance of these linkage and feedback effects in partial equilibrium analysis makes it simpler to understand because it focuses only on one market at a time. But in reality these linkages and feedback effects cannot be ignored and played a very important role in an economy. Hence, there arises a need to take all these effects together and study the effect of change in trade policy variable on all sectors of the economy rather than concentrating on one market at a time.

For General Equilibrium analysis, the study has utilized the GTAP model of world trade. It is a multi-region static computable general equilibrium model which includes the treatment of private household behavior using non-homothetic Constant Difference of Elasticities (CDE) functional form, international trade and transport activity and global savings/investment relationships[10]. Using CGE analysis, the study will present the disaggregated results on economy-wide variables for the given GTAP sectors in GTAP-8 database with data of 2007 reference year. A general equilibrium model is a complete picture of an economy describing the behavior of consumers and producers and their relationships with the help of mathematical equations. Any general equilibrium model which is computable by using the appropriate data is known as Computable General Equilibrium (CGE) model. In CGE model, an economy is assumed to be in equilibrium at the initial prices and all agents are satisfied with the reward they are getting and with their economic activities. Change in trade policy, such as changes in tariff rate, acts as a shock and create disequilibrium in the model which further causes reactions into the whole economic system. All of the mathematical equations will be resolved to get new equilibrium solution which again satisfy market clearing conditions.

[10] See Brockmeier, 1996, 2001; Hertel, 1997

Table 10: Total welfare effect of each member of two groupings (USD million)

Country/Region	Welfare Effect (EV)			
	Simulation C (Full with RCEP)	Simulation D (Full with BRICS)	Simulation G (Specialized with RCEP)	Simulation H (Specialized with BRICS)
India	1,627.05	-147.17	1,509.55	687.67
Brazil	-88.76	266.16	-90.73	185.52
China	2,291.03	3,144.63	1,813.09	746.52
Russia	-858.5	389.47	158.77	346.82
South Africa	-140.01	706.78	-137.27	667.35
Thailand	239.18	-37.44	187.09	-10.49
Australia	2,852.88	-177.71	746.08	-168.21
Viet Nam	25.36	-12.23	3.34	-3.61
New Zealand	-14.15	-2.86	-16.26	0.58
Japan	1,243.24	-113.63	1,254.9	-26.01
Singapore	465.07	-45.35	383.87	29.27
Philippines	-6.66	14.95	-20.78	7.36
Malaysia	412.73	-58.99	105.61	-26.46
Lao PDR	-1.46	0.18	-1.04	-0.02
Indonesia	1,978.48	-57.43	1,743.02	-48.82
Cambodia	-8.14	-1.06	-9.8	-0.4
Republic of Korea	5,496.71	-64.22	5,275.21	3.86
Rest of World	-3,829.34	-2,244.09	-2,523.32	-1,266.98
Total	**11,684.71**	**1,559.99**	**10,381.32**	**1,123.95**

Source: GTAP simulation results

In GTAP model, measurement of economic welfare depends upon household's own consumption expenditure, government consumption expenditure (government spending on public goods and services) and net national savings which will benefit his future consumption. Any distortion in the model has an effect on these variables and thus, affects economic welfare of a region. The estimation of GTAP model provides the regional equivalent variation (*EV*) measure in monetary terms which represent the welfare effect in this model (Huff and Hertel, 2000). From the household point of view, it measures the cost to the household of the same bundle of goods, before and after a given policy shock. In other words, it is the difference between the expenditure required to obtain the new level of utility at initial prices and the initial expenditure. In GTAP model, the regional household utility level depends upon per capita household consumption, per capita government expenditure, and

per capita savings. Any change in this aggregate utility level provides the welfare effect in this model. In other words, welfare change in the GTAP model is measured by change in aggregate utility due to any distortion specified over per capita private household consumption, per capita government expenditure and per capita savings and calculation of EV provides the value of the same percentage change in level of utility in terms of money value. Following Table 10 provides the simulation results on country's welfare measured through equivalent variation.

The results reveal that it would be beneficial for India to align with other RCEP member countries under the policy of free trade area in goods trade. The welfare effect becomes negative in case India joins BRICS FTA assuming free trade on all goods. But, with reciprocal specialized goods trade, India's welfare effect becomes positive which depicts that if India wants to join BRICS FTA in the near future then it must negotiate for the entry of its own specialized products into the markets of member countries. In reciprocity, it should allow the entry of their specialized products in to the domestic market.

In addition, the study also reported the value of percentage change in GDP quantity index which shows the changes in real value of GDP in post-simulation environment. In GTAP model, the percentage change in quantity index can be easily calculated by subtracting percentage change in price index of GDP (*pgdp*) from percentage change in value index of GDP (*vgdp*). The increment in quantity index of GDP represents the shift in the economy's production possibility frontier. With the assumption of fixed endowments, the shifting will be due to the improved allocation of resource base. The results in Table 11 show that India will gain in terms of positive change in GDP quantity index. Again the results corresponding to India depict the same conclusion that aligning with RCEP improves more GDP than aligning with BRICS under the policy of trade liberalization in goods trade only.

Table 11: Percentage change in GDP quantity index

Country/Region	GDP Quantity Index (*qgdp*)			
	Simulation C (Full with RCEP)	**Simulation D (Full with BRICS)**	**Simulation G (Specialized with RCEP)**	**Simulation H (Specialized with BRICS)**
India	0.5	0.15	0.43	0.12
Brazil	0	0	0	0
China	0.02	0.02	0.02	0.01
Russia	-0.02	-0.03	0	-0.03
South Africa	-0.01	0	-0.01	0
Thailand	0	0	0.01	0
Australia	0.05	0	0.02	0
Viet Nam	-0.02	-0.01	-0.02	0
New Zealand	0	0	0	0
Japan	0	0	0	0
Singapore	0.01	0	0.01	0
Philippines	0	0	0	0
Malaysia	0.04	0	0.01	0
Lao PDR	0	0	0	0
Indonesia	0.02	0	0.02	0
Cambodia	-0.02	0	-0.02	0
Republic of Korea	0.44	0	0.44	0
Rest of World	0	0	0	0

Source: GTAP Simulation Results

India's Sectoral Analysis

Tables 12 to 15 present the changes in output, imports, exports, and trade balance of India under each simulation over 15 aggregated GTAP sectors. The results depict that the percentage change in sectoral output is higher in case of trade liberalization in specialized products than trade liberalization in all products. The simulation results also present an interesting result that on an aggregate, the percentage change in output of India is greater in case if India would be a part of BRICS FTA (either full or partially with specialized products).

Table 12: Percentage change in sectoral output

Sector	Percentage Change in Output (*qo*)			
	Simulation C (Full with RCEP)	**Simulation D (Full with BRICS)**	**Simulation G (Specialized with RCEP)**	**Simulation H (Specialized with BRICS)**
Vegetables	0.79	-1.63	0.84	-1.67
Animal Prods.	-0.33	0.26	-0.12	0.35
Food Prods.	-7.3	0.22	-7.7	0.06
Fuels	2.03	0.28	-0.81	0.61
Minerals	-0.83	-0.07	0.58	-0.29
Chemical & Plastic	0.48	0.47	-0.42	1.78
Hides & Skins	0.12	0.59	0.21	0.65
Wood	-1.41	-0.88	-1.42	-1.29
Text. & Cloth.	1.66	2.88	4.41	3.37
Footwear	6.02	6.74	7.82	5.75
Stone & Glass	-0.22	-0.45	0.79	0.27
Metals	-0.81	-1.39	-1.27	-1.95
Mach. & Elec. Equip.	0.77	0.39	0.22	1.18
Trans.	-0.83	1.69	-1.84	0.59
Other Services	0.32	0.16	0.29	0.12
Total*	**0.46**	**9.26**	**1.58**	**9.53**

Note: *: Total is just to compare the total change in two scenarios.

Source: GTAP Simulation Results.

Further, the sectoral results on changes in imports, exports, and changes in trade balance of India in a post-simulation environment have given in Tables 13 to 15.

The results reveal that in total, changes in India's imports will be greater than changes in its exports which further push our trade balance towards trade deficit. The joining of RCEP will also beneficial for Indian services sector which may expand by exporting more to the member countries and positively contribute to the trade balance. This benefit seems to be very low in case when India joins BRICS FTA including all the goods and become negative in case of BRICS FTA with specialized products. Hence, the trade effect from GTAP results also recommends the policy of joining RCEP in the near future.

Moreover, the simulation results can be more robust if those are obtained by applying the dynamic GTAP model. With that option, one can also include the changes in foreign and domestic wealth which directly affects the level of available capital in the region. It can answer the important policy questions such as: long run impact of change in policy variables

on member countries and the time required to achieve that stage wherein each member country will eliminate all the tariffs on other member country's export, among others. One can further incorporate features of imperfect competition and scale economies.

Table 13: Percentage change in aggregate imports (qim)

Sector	Percentage Change in Aggregate Imports			
	Simulation C (Full with RCEP)	**Simulation D (Full with BRICS)**	**Simulation G (Specialized with RCEP)**	**Simulation H (Specialized with BRICS)**
Vegetables	19.75	86.81	19.34	88.05
Animal Prods.	43.74	7.6	-1.1	-4.78
Food Prods.	160.8	4.9	160.31	5.54
Fuels	2.8	1.09	6.84	-0.45
Minerals	4.02	0.63	-0.71	0.95
Chemical & Plastic	11.93	7.93	12.71	0.7
Hides & Skins	3.9	1.35	-0.16	-1.48
Wood	9.26	6.88	8.69	8.04
Text. & Cloth.	45.05	37.56	-2.55	-0.26
Footwear	23.23	18.41	1.21	1.71
Stone & Glass	20.05	16.69	-2.05	0.19
Metals	13.23	9.04	13.26	9.76
Mach. & Elec. Equip.	9.42	5.42	8.83	-0.47
Trans.	8.98	1.35	8.28	-0.23
Other Services	-0.96	-0.07	-1.36	0.43
Total*	**375.2**	**205.59**	**231.54**	**107.7**

Note: *: Total is just to compare the total change in two scenarios.

Source: GTAP Simulation Results.

Table 14: Percentage change in aggregate export (qxw)

Sector	Percentage Change in Aggregate Exports			
	Simulation C (Full with RCEP)	**Simulation D (Full with BRICS)**	**Simulation G (Specialized with RCEP)**	**Simulation H (Specialized with BRICS)**
Vegetables	97.38	12.7	98.37	11.41
Animal Prods.	18.51	13.58	20.47	11.72
Food Prods.	11.18	7.11	4.92	3.67
Fuels	13.34	1.95	3.34	1.69
Minerals	17.27	3.66	1.95	2.46
Chemical & Plastic	20.19	12.87	17.25	7.36
Hides & Skins	0.47	4.77	1.05	4.22
Wood	13.28	5.97	12.08	1.29
Text. & Cloth.	12.08	13.93	11.66	8.72
Footwear	16.36	16.48	14.61	10.57
Stone & Glass	7.92	3.75	6.52	2.14
Metals	18.83	8.27	18.66	6.28
Mach. & Elec. Equip.	18.1	9.8	15.59	2.78
Trans.	18.6	14.56	10.41	1.27
Other Services	2.19	0.6	2.77	-0.28
Total*	**285.7**	**130**	**239.65**	**75.3**

Note: *: Total is just to compare the total change in two scenarios

Source: GTAP Simulation Results

Table 15: Change in trade balance of India (USD million)

Sector	Change in Trade Balance (X-M)			
	Simulation C	**Simulation D**	**Simulation G**	**Simulation H**
Vegetables	4,703.92	-2,509.27	4,756.43	-2,609.5
Animal Prods.	93.65	107.28	227.9	124.14
Food Prods.	-8,542.63	-106.92	-9,087.19	-434.82
Fuels	1930.2	185.58	-133.87	345.35
Minerals	-2,587.91	-431.81	771.29	-839.69
Chemical & Plastic	288.33	103.56	-396.45	1,287.74
Hides & Skins	-3.66	3.21	1.25	5.65
Wood	-252.03	-234	-250.27	-342.97
Text. & Cloth.	868.32	1,529.59	2,462.51	1,887.3
Footwear	342.42	373.31	445.7	322.24
Stone & Glass	-149.49	-179.77	160.19	47.26
Metals	-1,427.48	-1,908.13	-1,435.62	-2,477.22
Mach. & Elec. Equip.	-567.23	-585.36	-1,040.47	967.12
Trans.	-295.07	597.9	-700.29	100.41
Other Services	1,671.95	370.78	2,164.65	-361.5
Total	**-3,926.71**	**-2,684.05**	**-2,054.24**	**-1,978.49**

Source: GTAP Simulation Results

5. Conclusion

The present study is an attempt to work out the relative benefits/losses of India aligning with RCEP and BRICS member countries under the conjecture of free trade area in good trade only. The study uses partial (SMART model) and general equilibrium (GTAP model) tools for this assessment. The main focus in the study is to compare the benefits/losses to Indian economy associated with both policy scenarios.

Overall, the comparative figures of SMART simulation results depicts that in terms of welfare effect, India would gain more in aligning with other RCEP countries than with other BRICS countries under the policy of free trade area in goods trade only. The general equilibrium analysis also reveals the same result. However, if India wants to join BRICS FTA in the near future then it must negotiate for the entry of its own specialized products into their markets and in reciprocity, it should allow the entry of their specialized products in to the domestic market. The results are in favor to make free trade area between RCEP countries which is more beneficial for India relative to make BRICS FTA.

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Appendix tables

Table A1: Aggregated product description

S.N.	Aggregated Product Name	HS 2007 2-Digit Code*	GTAP Product Code*
1.	Animal	01-05	9, 11-12, 19-20
2.	Vegetable	06-15	01-08
3.	Food Products	16-24	13-14, 21-26
4.	Minerals	25-26	15-18
5.	Fuels	27	32
6.	Chemicals	28-38	33
7.	Plastic and Rubber	39-40	
8.	Hides and Skins	41-43	10
9.	Wood	44-49	30-31
10.	Textiles and Clothing	50-63	27-28
11.	Footwear	64-67	29
12.	Stone and Glass	68-71	34
13.	Metals	72-83	35-37
14.	Machinery and Electronic Equipment.	84-85	40-42
15.	Miscellaneous	90-99	
16.	Transportation	86-89	38-39
17.	Services	Not Applicable	43-57

Note: *: For product description against HS and GTAP product codes, see HS2007 product classification at 2-digit level and GTAP product classification.

Source: Authors' Elaboration.

Table A2: Aggregated regions/countries (GTAP regions aggregation*)

<table>
<tr><th>Common Countries</th><th>Other BRICS Countries</th><th colspan="2">Other RCEP Countries</th></tr>
<tr><td rowspan="2">China</td><td rowspan="2">Brazil</td><td>Australia</td><td>Myanmar</td></tr>
<tr><td>Brunei Darussalam</td><td>New Zealand</td></tr>
<tr><td rowspan="3">India</td><td rowspan="2">Russia</td><td>Cambodia</td><td>Philippines</td></tr>
<tr><td>Indonesia</td><td>Singapore</td></tr>
<tr><td rowspan="3">South Africa</td><td>Japan</td><td>Republic of Korea</td></tr>
<tr><td>Lao PDR</td><td>Thailand</td></tr>
<tr><td>Malaysia</td><td>Viet Nam</td></tr>
<tr><td colspan="4">Rest of the World (ROW)</td></tr>
</table>

Note: *: The study uses GTAP-8 database which does not contain a separate primary region for Brunei and Myanmar. Hence, for GTAP analysis, the study aggregated the whole world into 18 countries/regions excluding Brunei and Myanmar from the above listed countries/regions.

Source: Authors' Elaboration.

Appendix Table A3: Specialized Products on the Basis of Table 4

ISO Code →	Other BRICS Countries			Common Countries		Other RCEP Countries								Combined List	
Product*	BRA	RUS	ZAF	CHN	IND	AUS	BRN	IDN	JAP	MYS	NZL	SGP	KOR	THA	Other RCEP	Other BRICS
Animal	✓				✓	✓					✓					
Vegetable	✓		✓		✓	✓		✓		✓	✓				✓	✓
Food Prods.	✓		✓					✓			✓	✓		✓	✓	✓
Minerals	✓		✓			✓										✓
Fuels		✓			✓	✓	✓	✓		✓		✓			✓	
Chemicals					✓							✓				
Plastic & Rubber.								✓	✓	✓		✓	✓	✓	✓	
Hides & Skins	✓			✓	✓						✓	✓				
Wood	✓	✓	✓					✓		✓	✓	✓			✓	✓
Text. & Cloth.				✓	✓			✓								
Footwear				✓	✓			✓								
Stones & Glass			✓		✓	✓						✓		✓		
Metals	✓	✓	✓	✓	✓				✓			✓	✓		✓	✓
Mach. & Elec. Equip.				✓					✓	✓		✓	✓	✓	✓	
Trans.			✓						✓			✓	✓	✓	✓	
Misc.				✓					✓			✓				

Note: *: For detailed product classification, see Appendix Table A1. *Source:* Trade Outcome Indicators in WITS.

Table 4A: Product-wise initial bilateral tariff rates of India imposed on other BRICS countries

Product	Brazil	Russia	China	South Africa
Vegetables	84.62	99.68	35.31	32.87
Animal Prods.	74.76	12.73	23.17	14.73
Food Prods.	49.34	60.62	36.67	83.29
Fuels	15	15	14.98	15
Minerals	6.49	10.61	15.21	20.14
Chemical & Plastic	15.51	12.2	14.27	14.54
Hides & Skins	16.34	0	26.67	3.94
Wood	12.75	14.16	14.86	6.7
Text. & Cloth.	16.76	15.09	17	15.38
Footwear	10.55	12.92	14.88	13.24
Stone & Glass	14.99	15	13.95	15
Metals	19.57	18.59	16.39	15.34
Mach. & Elec. Equip.	14.17	14.27	7.77	12.51
Trans.	12.67	14.95	15.42	14.67

Source: GTAP 8 Database

Table 4B: Product-wise initial bilateral tariff rates of India imposed on other RCEP countries

Product	Australia	Cambodia	Japan	Indonesia	Republic of Korea	Lao PDR
Vegetables	35.12	26.23	11.65	52.68	12.47	49.92
Animal Prods.	15.28	0	30.26	6.99	29.39	0
Food Prods.	39.69	56.35	29.93	98.83	33.19	7.18
Fuels	15	0	15	14.89	15	0
Minerals	21.1	0	12.91	12.55	5.82	0
Chemical & Plastic	10.75	0	14.47	19.27	14.29	15
Hides & Skins	11.67	0	8.22	0.09	0.99	0
Wood	14.96	0	14.98	9.6	14.99	0
Text. & Cloth.	17.11	15	15.02	15	15.03	0
Footwear	12.26	0	14.2	10.46	10.81	0
Stone & Glass	15	0	15	14.81	14.94	0
Metals	15.06	0	18.18	16.66	17.04	0
Mach. & Elec. Equip.	11.37	10.94	13.23	11.84	10.13	4.06
Trans.	17.13	0	29.95	14.36	16.54	0
Product	**Malaysia**	**New Zealand**	**Philippines**	**Singapore**	**Thailand**	**Viet Nam**
Vegetables	56.28	40.15	10.12	39.9	28.31	66.91
Animal Prods.	29.9	15.72	0	30.53	45.53	0
Food Prods.	44.69	24.67	34.83	45.21	72.16	36.97
Fuels	11.78	0	14.71	14.8	14.98	0
Minerals	10.01	14.99	10.43	8.2	8.77	10.83
Chemical & Plastic	15.56	15.21	16.89	14.74	14.72	15.34
Hides & Skins	14.21	0.67	0	12.9	22.16	0
Wood	14.9	13.67	15	14.91	12.48	12.5
Text. & Cloth.	15	15.53	15	15.15	15.02	15.02
Footwear	14.48	11.05	12.28	13.6	13.63	14.5
Stone & Glass	14.96	15	15	14.99	14.92	14.96
Metals	17.6	16	18.6	16.07	15.79	17.32
Mach. & Elec. Equip.	4.05	13.33	2.11	8.07	8.96	14.66
Trans.	15.89	16.81	15.07	14.18	15.51	15.04

Source: GTAP 8 Database

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