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A GTAP Analysis of the Proposed BRICS Free Trade Agreement

Working Draft

Dr. Sachin Kumar Sharma
Dr. Murali Kallummal

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A GTAP Analysis of the Proposed BRICS Free Trade Agreement:¹

Dr. Sachin Kumar Sharma

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ABSTRACT

The negotiations for the BRICS FTA have made a significant progress with the four summit level meeting among proposed BRICS FTA. This study used the GTAP model on 57 tradable commodities and nine regions of the world to understand the likely impact of possible BRICS FTA. . In this study, 113 regions given in GTAP data base is mapped to nine regions namely Brazil, Russia, India, China, South Africa, ASEAN, USA, EU and Rest of the World by using GTAP database. This study updates the tariff protection for the nine regions and analyses the possible impacts on various indicators. A scenario of a full FTA between BRICS members is simulated using the GTAP model. Under this scenario, import protection within the BRICS member were removed but maintained between the Non-BRICS countries. Overall, the impact of proposed BRICS FTA would be positive for India as macroeconomics indicators (except trade balance) show positive change. However, at the disaggregate level, result vary across 57 sectors.

SECTION 1: INTRODUCTION

The world trading system witnessed a drastic change due to proliferation of RTA. Provision for Regional Trade Agreement (RTA) was built as exception to one of the basic principles of the WTO i.e. Most Favoured Nation Rule. The structure of RTAs varies widely, but all have one thing in common-the objective of reducing barriers to trade between member countries. The proliferation in RTAs around the globe reflects commercial, socio-economic and political interests. RTAs can be a cornerstone of larger economic and political efforts to increase regional cooperation beyond the multilateral agenda. They can also stimulate inward foreign direct investment (Kimura and Ando, 2005) and growth through technological transfers. Their proliferation can also be motivated by a growing sense that regional agreements elsewhere put the excluded countries at a disadvantage (Baldwin, 1993). Also the prevailing deadlock in the Doha round negotiations of the WTO resulted in the proliferation of RTAs (Tumbarello, 2007).

¹ We are grateful to Prof Abhijit Das and Sajal Mathur of the Centre for WTO Studies and Devender Pratap, Associate Fellow, National Council of Applied Economic Research (NCEAR) for their valuable comments and suggestions.

India has been a staunch supporter of multilateral trading system and always stood for open, equitable, predictable, non-discriminatory and rule-based trading system. India never used Regional Trade Agreements like FTAs or PTAs as a trade policy instrument for its economic engagement till 2000. India started pursuing engagement through RTAs in 2003. It was perhaps felt that if it did not do so, it will be locked-out of the markets of its important trading partners. India's increased engagement in RTAs, be they bilateral, regional or extra-regional in nature, is a break from the past when she undertook trade liberalisation mostly at the MFN level. India is seen to be seeking deeper forms of economic integration via comprehensive RTAs as a development strategy to exploit the potential of "efficiency-seeking" industrial restructuring and strengthen overall competitiveness. India began negotiating agreements with a view to moving, in some cases, towards Comprehensive Economic Cooperation Agreements (CECAs) covering FTA in Goods Services, Investment and other identified areas of economic cooperation. In addition, India also began actively engaging with regional block like EU, ASEAN, South Africa Customs Union (SACU) and MERCOSUR. Thus, India's RTAs increasingly include deeper and wider commitments in non-goods areas, which go beyond India's commitments under the WTO. While the widely acknowledged move towards regionalism driven by the "Look East" policy announced by the Indian government in 1992 played an important role in leading to the new RTA initiatives in East Asia, the dynamics of multilateral trade negotiations at the WTO and the proliferation of RTAs initiated by the ASEAN became important catalysts that accelerated India's trade policy shift involving RTAs with other regions. As more and more countries become members of multiple RTAs, the desire of the Indian government to avoid the perceived negative effects of discrimination and marginalisation (the domino effect suggested by Baldwin in 1993) has played an important role, as the country does not want to be excluded from a share in the benefits of belonging to the RTAs.

In this context, India has a dialogue with Brazil, Russia, China and South Africa for deeper economic cooperation. With Russia joining the WTO in 2011, all BRICS member countries are also the member of WTO. Growing engagement between these countries and their combined strength in global decision making process provides a favourable environment for a possible FTA. Already, four summit level meetings have been held during 2009-12. The Fourth BRICS Summit was hosted in New Delhi on 29 March 2012 under the overarching theme of "BRICS Partnership for Global Stability, Security and Prosperity." The Summit has imparted further

momentum to the BRICS process. The proposed FTA led liberalisation of trade between BRICS members will have implications in terms of overall welfare, macroeconomic and trade indicators. These implications can be further traced across sectors by using GTAP model. With this background, the objective of this study is to examine the effect of possible BRICS FTA on various sectors as well as on macro-economic and trade indicators by using GTAP model and database.

SECTION2: ECONOMIC PROFILE OF BRICS MEMBERS

This section gives an overview of economic and trade profiles of the BRICS members. To understand and analyse BRICS as a group, it is necessary to get a sense of how these five emerging giants spread across four continents are situated in the global context. The BRICS together account for 26 % of the world's GDP (PPP) in 2011 and over 40% of the global population. In terms of land mass, Russia is by far the largest in the grouping (it is also the largest country in the world). In terms of demographics, China closely followed by India, are the two most populous nations in the world. Together these two countries account for over one third of the world's population.

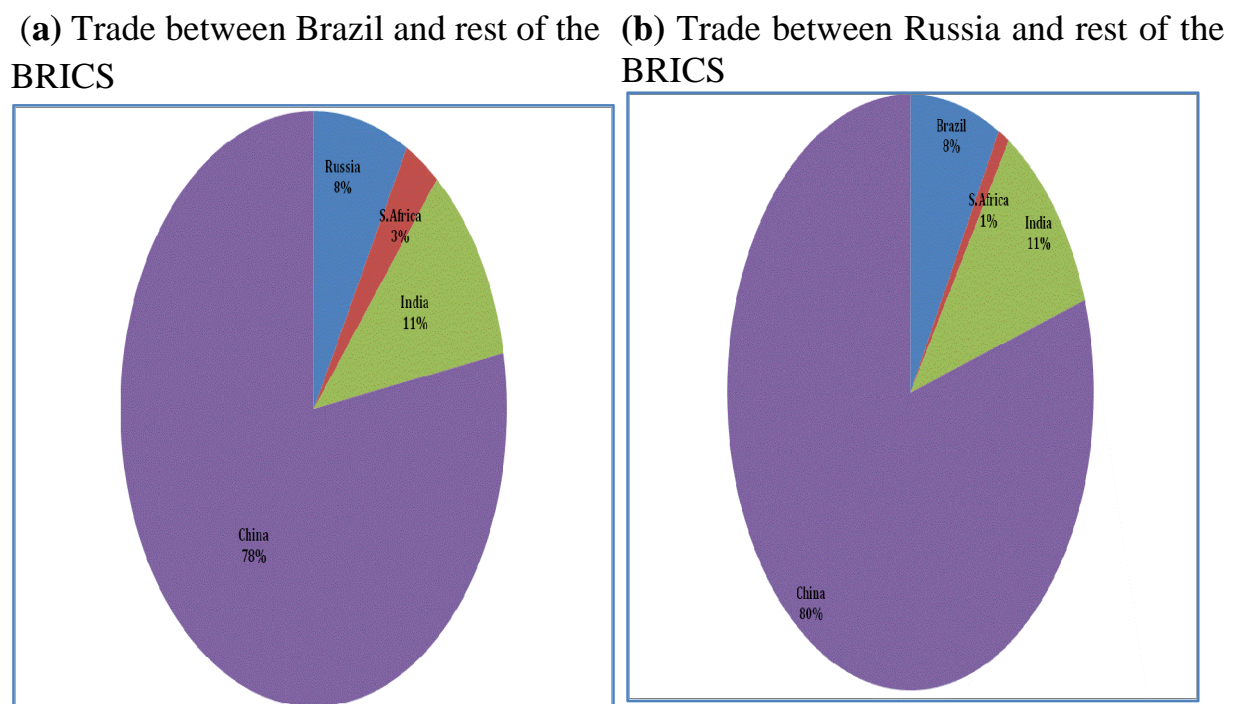
Over the past two decades, the rate of growth of per capita GDP in the BRICS has outpaced the global trend line. The investment and savings numbers are impressive. Across the BRICS members the gross saving and investment rates as a percentage of GDP averaged around 28.8 percentages. In terms of FDI flows, the BRICS as a group accounted for over US \$ 300 billion of FDI or over 20% of global FDI flows. China is a single biggest recipient of FDI followed by Brazil, Russia and India in that order. Total foreign exchange reserves of all the BRICS together amounts to US \$ 4,025.0 billion or about 37% of global foreign exchange reserves in 2010. China alone accounts for nearly 75 percentages with close to \$ 3 trillion of reserves. All the BRICS economies run a surplus on the capital account except India which had a small deficit in 2010. The situation in the current account is mixed with only China and Russia running a surplus. This is also reflected in the balance of trade numbers.

The BRICS as a grouping account for over 40% of the world's labour force. According to UN projections, by 2020, the working age population is expected to rise by 240 million in India and by 20 million in Brazil. China's demographic projections suggest that the labour force will peak by 2015 and decline thereafter. A growing population will only yield a demographic dividend if there is a matching increase in the available jobs. Improvements in total factor productivity are also critical for growth prospects. On the other hand the unemployment rate is over 20% in

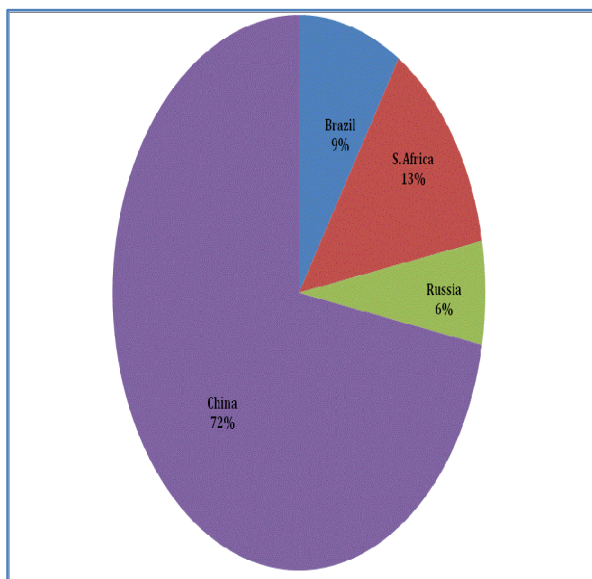
South Africa, over 8% in Brazil and Russia and just under 4.5% in India and China. With a large informal sector and a significant proportion of the work force still underemployed there is an ever growing need for skill and human resource development. More and better jobs require investment in education, health, and the soft skills to train the work force for jobs in the 21st century. The literacy rate in Brazil, China, Russia, and South Africa is 90% or above. In India, however, the literacy rate is just over 60%.

In 1990, the BRICS as a group accounted for only 3% of global trade. This share had doubled by the turn of the century. In 2010, the BRICS as a group accounted for 15% of global exports and 14% of global imports of goods and services. The share of the BRICS in global trade has increased significantly over the last two decades. The double digit growth in merchandise trade has catapulted China to the top ranking in exports and it is the second largest importer of merchandise goods in 2010. Russia and India have also broken into the top 20 list of world merchandise exporters and importers. Brazil is in the top 20 from the merchandise export side. The merchandise trade balance is in surplus for China, Russia, and Brazil. India and South Africa have a merchandise trade deficit.

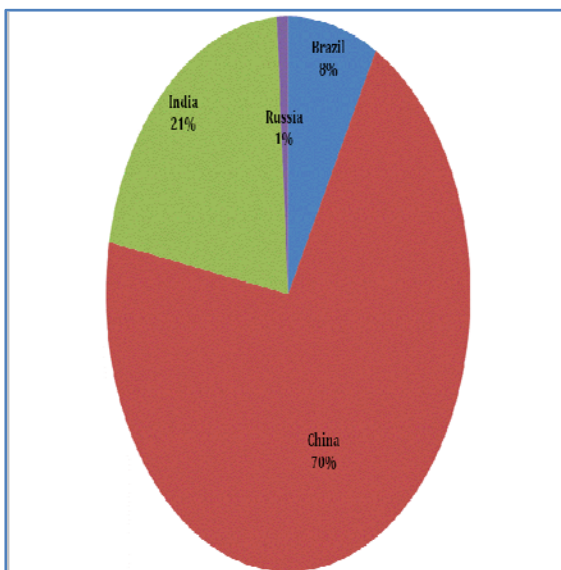
Figure 1: Intra-BRICS Trade (by destination)



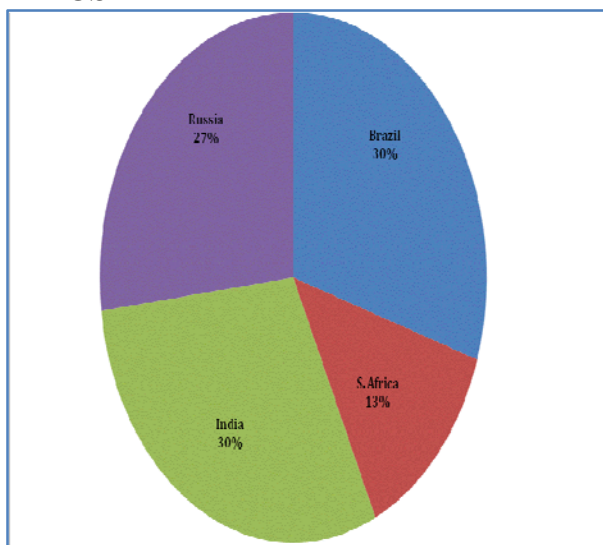
(c) Trade between India and rest of the BRICS



(e) Trade between South Africa and rest of the BRICS



(d) Trade between China and rest of the BRICS



Source: Based on UN Comtrade data

Without exception, China is the largest trade partner for each of the other BRICS with a trade share ranging between 70 to 80% in intra-BRICS trade. India has a share ranging between 10 to 30% in intra-BRICS trade. Brazil's trade share is in single digits except with China where its share is 30%. Russia too has a small slice of the intra-BRICS trade pie in all markets barring China where its share is 27%. South Africa's share is the smallest in each of the other BRICS markets.

SECTION 3: METHODOLOGY

The impact of possible BRICS FTA on different regions is estimated by using GTAP static model. This study is conducted with a multi country, general equilibrium closure. The model assumes perfect competition, constant return to scale and profit and utility maximising behaviour of firms and household respectively. Hertel (1997) provides detail information about the structure and overview of GTAP model. The data used in this study is the version 7 of the GTAP database. The reference year for this database is 2004.

3.1 Aggregation Strategy

The GTAP database is compiled for 113 regions across the world and for 57 tradable commodities of the world. In this study, 113 regions given in GTAP data base is mapped to nine regions namely Brazil, Russia, India, China, South Africa, ASEAN, USA, EU and Rest of the World by using GTAP database. ASEAN, USA and EU have been taken as a separate region due to the importance of these regions in world trade.

Table 1: Region aggregation in the GTAP Model

New Code	Region Description	Comprising old regions
INDIA	INDIA	India.
BRAZIL	BRAZIL	Brazil.
CHINA	CHINA	China.
RUSSIA	RUSSIA	Russian Federation.
SOUTH AFRICA	SOUTH AFRICA	South Africa.
ASEAN	ASEAN (except Brunei Darussalam)	Cambodia; Indonesia; Lao People's Democratic Republ; Myanmar; Malaysia; Philippines; Singapore; Thailand; Viet Nam.
USA	USA	United States of America.
EU_25	European Union 25	Austria; Belgium; Cyprus; Czech Republic; Denmark; Estonia; Finland; France; Germany; Greece; Hungary; Ireland; Italy; Latvia; Lithuania; Luxembourg; Malta; Netherlands; Poland; Portugal; Slovakia; Slovenia; Spain; Sweden; United Kingdom.

Rest of World	Rest of World	Australia; New Zealand; Rest of Oceania; Hong Kong; Japan; Korea; Taiwan; Rest of East Asia; Rest of Southeast Asia; Bangladesh; Pakistan; Sri Lanka; Rest of South Asia; Canada; Mexico; Rest of North America; Argentina; Bolivia; Chile; Colombia; Ecuador; Paraguay; Peru; Uruguay; Venezuela; Rest of South America; Costa Rica; Guatemala; Nicaragua; Panama; Rest of Central America; Caribbean; Switzerland; Norway; Rest of EFTA; Albania; Bulgaria; Belarus; Croatia; Romania; Ukraine; Rest of Eastern Europe; Rest of Europe; Kazakhstan; Kyrgyzstan; Rest of Former Soviet Union; Armenia; Azerbaijan; Georgia; Iran Islamic Republic of; Turkey; Rest of Western Asia; Egypt; Morocco; Tunisia; Rest of North Africa; Nigeria; Senegal; Rest of Western Africa; Central Africa; South Central Africa; Ethiopia; Madagascar; Malawi; Mauritius; Mozambique; Tanzania; Uganda; Zambia; Zimbabwe; Rest of Eastern Africa; Botswana; Rest of South African Customs .
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Source: GTAP 7 database

The analysis has been done for 57 sectors given in GTAP database. It will help in assessing the impact of possible BRICS-FTA at the disaggregated level (see table 1)

Table 2: Commodity Aggregation in the GTAP model

Agriculture (20 items)	Non-Agriculture (22 items)	Service (15 items)
Paddy, Rice	Forestry	Electricity
Wheat	Fishing	Gas Manufacturer Distribution
Cereal Grain nec	Coal	Water
Vegetable, Fruits	Oil	Construction
Oilseeds	Gas	Trade
Sugarcane, Sugar Beet	Mineral Nec	Transport Nec
Plant Based Fiber	Textiles	Sea Transport
Crop Nec	Wearing Apparel	Air Transport
Cattle,sheep, goat, horse	Leather Products	Communication
Animal Product Nec	Wood Products	Financial Services
Raw Milk	Paper Products, Publishing	Insurance
Wool, Silk-Worm Cocoons	Pertroleum, Coal Product	Business service
Meat: Cattle, Sheep, Goats,	Chemical Rubber Plastic	Recreation and other
Meat Products Nec	Mineral Products Nec	Public Adm/Defence/Health
Vegetable Oils And Fats	Ferrous Metal	Dwelling
Dairy Products	Metal Nec	
Processed Rice	Metal Products	
Sugar	Motor Vehicle Parts	
Food Product Nec	Transport Equip	
Beverages And Tobacco Products	Electronic Equipment	
	Machinery and Equipments	
	Manufacturers nec	

Source: GTAP data base

3.2 Experiment Design

Given the unstable economic environment, unemployment is a general phenomenon around the world. Therefore, to make this study more realistic, standard closure is altered by changing the assumption of full employment for skilled and unskilled labour. It is to be noted that the protection data supplied in GTAP is intended to represent a starting point for analysis. Data on protection is needed to adjust to make analysis more realistic and meaningful for the simulation. Protection data in GTAP is available for the reference year 2004. In GTAP database the protection level (See Appendix Tables 1 & 2 for India's protection levels) is different from Table 3 given below. Therefore, the protection information in GTAP database for the BRICS member is altered to better reflect the reality. The tariff data is extracted from WITS. The possible FTA among BRICS countries will require substantial reduction in tariff rate for the intra-BRICS trade and thereby will provide vast market for the member countries. For the year 2009, the tariff profile of member countries for the goods sector is given in table 1.

Table 3: Tariff profile of different regions across different sectors

	Sectors	India	Brazil	China	Russian Federation	South Africa	ASEAN	United States	European Union	ROW GTAP
1	Paddy, Rice	30	8	23	9	6	9	4	22	14
2	Wheat	26	5	11	6	5	8	4	10	11
3	Cereal Grain nec	26	5	11	6	5	8	4	10	11
4	Vegetable, Fruits	31	9	13	9	6	10	4	9	14
5	Oilseeds	26	5	11	6	5	8	4	10	11
6	Sugarcane, Sugar Beet	26	5	11	6	5	8	4	10	11
7	Plant Based Fiber	26	5	11	6	5	8	4	10	11
8	Crop Nec	31	8	13	8	5	9	3	8	13
9	Cattle, sheep, goat, horse	27	2	9	4	0	3	1	15	10
10	Animal Product Nec	24	7	12	6	5	6	1	10	14
11	Raw Milk	32	18	12	13	15	7	19	62	23
12	Wool, Silk-Worm	24	6	11	6	3	5	1	10	13
13	Forestry	20	5	8	11	4	4	1	2	7
14	Fishing	29	9	11	10	2	5	0	8	11
15	Coal	6	0	1	5	0	2	0	0	4
16	Oil	5	0	2	5	0	2	0	0	5
17	Gas	4	0	2	5	0	2	0	0	5
18	Mineral Nec	5	4	2	5	1	2	0	0	5
19	Meat: Cattle, Sheep, Goats, Horse	31	10	17	5	16	12	3	28	23
20	Meat Products Nec	29	10	16	5	15	11	3	26	21
21	Vegetable Oils And Fats	17	9	11	7	8	4	3	12	11
22	Dairy Products	16	9	11	7	8	4	3	10	11

23	Processed Rice	33	11	36	11	7	10	4	34	17
24	Sugar	41	16	35	5	1	20	11	46	16
25	Food Product Nec	32	12	18	11	10	8	5	18	15
26	Beverages And Tobacco Products	95	19	26	8	14	76	12	18	45
27	Textiles	12	23	10	10	18	7	8	7	12
28	Wearing Apparel	20	34	16	15	37	14	11	11	19
29	Leather Products	10	22	15	8	19	10	8	7	14
30	Wood Products	10	9	5	14	9	7	1	3	11
31	Paper Products, Publishing	8	11	5	11	4	5	0	0	9
32	Pertroleum, Coal Product	6	2	5	5	4	2	1	1	5
33	Chemical Rubber Plastic	9	8	7	7	3	3	3	4	6
34	Mineral Products Nec	9	10	12	14	6	7	3	3	11
35	Ferrous Metal	6	11	5	6	1	7	1	1	7
36	Metal Nec	6	8	5	11	2	2	3	3	6
37	Metal Products	10	16	11	12	8	9	3	3	11
38	Motor Vehicle Parts	24	25	14	9	12	17	4	6	11
39	Transport Equip	16	11	8	10	1	5	2	2	6
40	Electronic Equipment	5	14	5	7	2	3	1	2	8
41	Machinery and Equipments	8	14	9	7	3	3	2	2	7
42	Manufacturers nec	10	17	14	15	8	8	3	3	14

Source: WITS

The implication of reducing tariff across various sectors would vary among the BRICS members as these countries have comparative advantage in different commodities. Similarly the effect of possible BRICS FTA on welfare and macroeconomic indicators would be varied due to different socio-economic conditions prevailing in these countries. A scenario of a full FTA between BRICS members is simulated using the GTAP model. Under this scenario, import protection within the BRICS member were removed but maintained between the Non-BRICS countries. Although it is unlikely that an agreement would result in the complete removal of all import tariffs, this experiment provides an upper bound for the benefits of BRICS FTA that can be captured by the model.

SECTION 4: SIMULATION RESULTS

This section shows the GTAP simulation results of the proposed BRICS FTA. It reports welfare, macro-economic, sectoral trade and employment effects of the proposed BRICS FTA.

4.1 WELFARE EFFECTS:

The net welfare gains from the proposed BRICS FTA are measured by equivalent variation (EV) in income. The EV measures the amount of income that would have to be given or taken away from an economy before trade liberalisation so as to leave the economy as well off as it would be after the policy has been changed. The welfare effects of the simulation for the concerned regions are given in table 3. In terms of absolute value, highest welfare gain is attained by China, Brazil, India and Russia whereas South Africa gained least in terms of welfare effect. It is revealed that Non-BRICS member experienced net welfare loss due to BRICS FTA. The decomposition of the welfare effects suggest that India's gain from the proposed FTA is primarily driven by endowment and allocation effects. BRICS members would experience gain in allocative efficiency as resources will divert from inefficient sectors to the more efficient sectors.

Table 4: Decomposition of Welfare Effect

(Million US \$)

Region	Allocation	Endowment	Terms of Trade	Investment and Saving	Welfare
INDIA	300	1332	-6	-24	1603
BRAZIL	409	703	770	-144	1739
CHINA	473	2617	1293	-79	4304
RUSSIA	119	869	593	-44	1537
SOUTH AFRICA	335	469	101	3	908
ASEAN	-64	-200	-209	49	-424
USA	-1172	-1934	-641	-174	-3920
EU_25	-3348	-2156	-1201	100	-6604
RoW	-1625	-2328	-704	313	-4346
Total	-4572	-627	-3	1	-5203

Source: Simulation Result

4.2 MACROECONOMIC EFFECTS:

Table 4 presents the impact on some macro-economic variables for the countries under the consideration. All the members of possible BRICS FTA would experience an increase in GDP and all the components of GDP from the base run. China and Brazil would be major beneficiaries in terms of GDP gain whereas South Africa and India would be least beneficiaries. Non-BRICS regions would experience fall in GDP as well as other component of GDP.

Table 5: Change in Macroeconomic indicators**(Million US \$)**

Region	Consumption	Investment	Government Expenditure	Export	Import	Total
INDIA	894	1090	204	3146	4092	1242
BRAZIL	3130	2786	1105	1965	3612	5374
CHINA	3558	3962	996	7284	7724	8075
RUSSIA	739	534	321	2772	2764	1603
SOUTH AFRICA	414	947	177	1705	2608	634
ASEAN	-496	-294	-84	-310	-404	-781
USA	-6661	-2125	-1471	-709	-1989	-8977
EU_25	-6967	-2977	-2544	-2153	-3661	-10980
RoW	-5176	-2674	-1505	-1725	-2772	-8307
Total	-10564	1247	-2802	11974	11973	-12118

Source: Simulation result

4.3 OUTPUT EFFECT:

The impact of proposed BRICS FTA on output varies across different sectors and different regions. To show the result at aggregate level, 57 sectors are mapped into three broad sectors (agriculture, non-agriculture and service) after the simulation. About the agriculture sector, India, China, South Africa, USA and EU_25 have negative change in agriculture output, whereas Brazil and Russia have positive growth in agriculture output. At the disaggregate level, India would experience negative growth in sugarcane, wool silk, vegetable oil, sugar and beverages. However, for non-agricultural sector, all the BRICS countries except Brazil has positive growth after simulation. In case of India, sectors like oil, paper, coal, transport equipments and electronic not performed well after the simulation. For service sector, BRICS members have experienced positive change in comparison to the base data. At the disaggregate level, all service sub-sectors indicated positive growth for India (disaggregate sector level see Appendix Table: 3).

Table 6: Change in Industrial Output

Sector	Unit	India	Brazil	China	Russia	South Africa	ASEAN	USA	EU_25	Rest of World
Total AGRI	US \$ million	-447.1	1895.8	-4.0	534.8	-58.0	-307.1	-178.9	-125.4	48.5
	% age	-0.169	1.014	-0.001	0.230	-0.105	-0.103	-0.016	-0.006	0.002
Total N.AGRI	US \$ million	2126.9	-2695.5	6094.2	2191.2	323.5	-37.8	-82.7	-3192.0	-2583.4
	% age	0.560	-0.749	0.252	0.569	0.199	-0.005	-0.002	-0.042	-0.034
Total Service	US \$ million	1806.4	1878.3	3738.5	1396.7	749.0	-198.3	-4634.4	-5680.0	-4462.3
	% age	0.367	0.317	0.214	0.259	0.289	-0.029	-0.031	-0.039	-0.033

Source: Simulation result

4.4 Employment Effect:

Overall, all the BRICS members have higher demand for skilled and unskilled labour, however for Non-BRICS members demand for labour is negative. It is noteworthy that Brazil has negative

demand for labour in non-agriculture sector. For India, demand for labour across all the broad sectors is positive. At disaggregate level, impact of proposed BRICS FTA is mixed across 57 sectors (disaggregate sector level see Appendix Tables: 4 & 5).

Table 7: Change in Demand for Labor

	India	Brazil	China	Russia	South Africa	ASEAN	USA	EU_25	Rest of World
	(Percentage)								
	Un-skilled								
Total Agri.	0.085	1.380	0.195	0.522	0.316	-0.143	-0.053	-0.009	-0.032
Total N.Aagri.	0.814	-0.504	0.414	0.770	0.072	-0.055	-0.007	-0.063	-0.059
T. Services	0.782	0.438	0.418	0.695	0.858	-0.070	-0.042	-0.069	-0.055
All Sectors	0.572	0.317	0.373	0.691	0.633	-0.077	-0.036	-0.064	-0.054
	Skilled								
Total Agri.	0.229	1.706	0.094	1.113	0.443	-0.341	-0.047	-0.035	-0.058
Total N.Aagri.	0.870	-0.508	0.456	0.911	0.430	-0.041	-0.009	-0.055	-0.050
T. Services	0.573	0.307	0.364	0.507	0.794	-0.064	-0.039	-0.067	-0.053
All Sectors	0.573	0.307	0.364	0.507	0.794	-0.064	-0.039	-0.067	-0.053

Source: Simulation result

4.5 IMPACT ON TRADE

At the aggregate level, all the BRICS members have shown positive sign for exports, whereas non-BRICS members have negative growth. At broad sub-sector level, India has positive growth for agriculture and non-agriculture sector; however, it is negative for service sector. In case of import, all the BRICS members have experienced positive growth across all the broad sub-sectors, whereas Non-BRICS regions have negative change after the simulation. At the disaggregate impact of proposed FTA on Export and Import is given in the Appendix Tables 6 and 7.

Table 5: Change in Exports

Sector	Unit	India	Brazil	China	Russia	South Africa	ASEAN	USA	EU_25	Rest of World
Total AGRI	US \$ million	226.6	1225.8	109.2	-346.4	76.4	-210.1	-125.4	152.8	318.2
	% age	1.642	3.049	0.334	-0.356	0.533	-0.268	-0.151	0.046	0.044
Total N.AGRI	US \$ million	3016.5	284.2	6434.1	1910.2	1570.8	-15.0	-316.8	-1824.3	-1822.8
	% age	21.865	0.707	19.656	1.964	10.963	-0.019	-0.381	-0.545	-0.252
Total Service	US \$ million	-75.2	-300.4	-562.1	-206.0	-54.0	131.1	173.3	832.3	617.5
	% age	-3.375	-7.337	-6.290	-1.292	-0.586	1.438	1.104	1.348	0.523

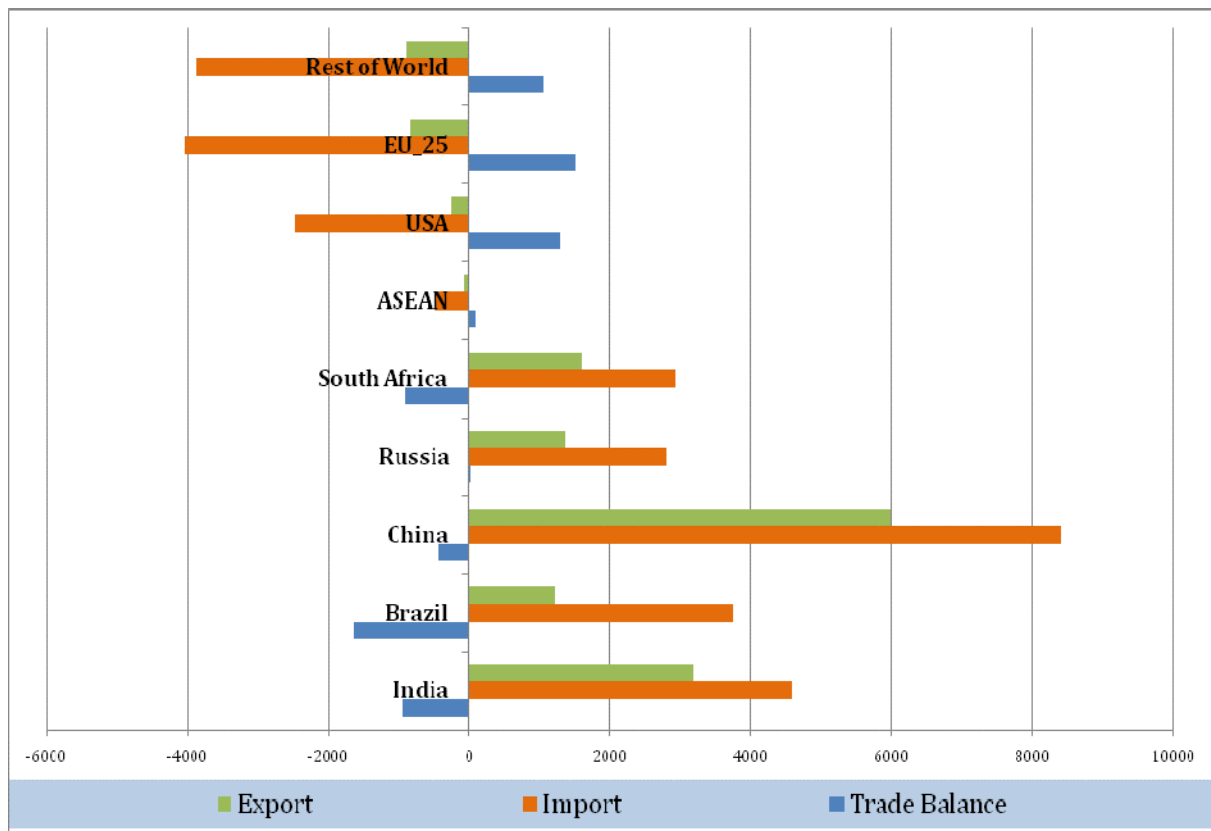
Source: Simulation Result

Table 6: Change in Imports

Sector	Unit	India	Brazil	China	Russia	South Africa	ASEAN	USA	EU_25	Rest of World
Total Agri	US \$ million	1369.0	129.0	1390.9	471.8	182.7	-153.5	-288.3	-658.4	1369.0
	% age	3.039	1.069	1.745	2.171	1.703	-0.215	-0.125	-0.113	3.039
Total N.Aagri	US \$ million	3113.6	3388.4	6561.9	2081.2	2695.1	-286.5	-2060.6	-2751.5	3113.6
	% age	2.913	5.122	1.209	2.386	5.624	-0.065	-0.151	-0.090	2.913
Total Ser.	US \$ million	90.9	224.3	453.7	235.8	44.4	-50.4	-143.8	-635.8	90.9
	% age	0.517	1.318	0.761	0.796	0.680	-0.065	-0.063	-0.075	0.517

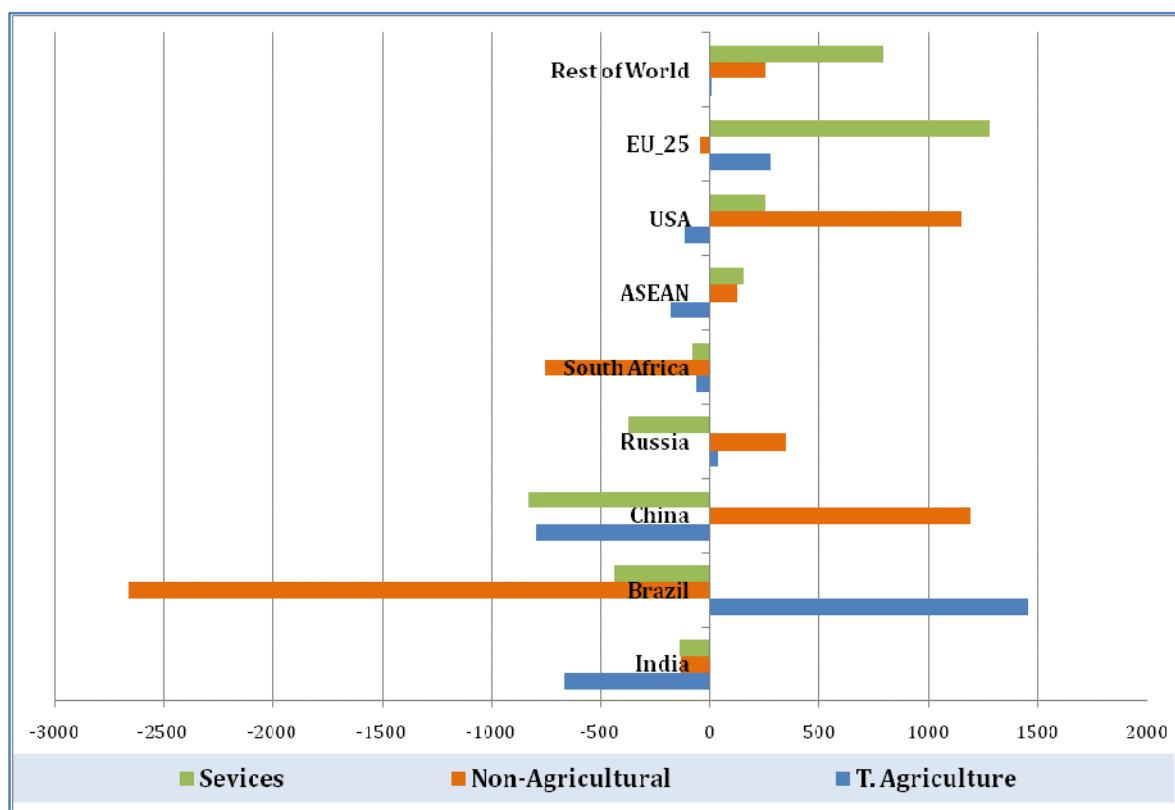
Source: Simulation Result

About the trade balance, all the BRICS members except Russia have negative trade balance due to higher positive change in import in comparison to change in exports after the simulation. Non-BRICS members have positive trade balance after the simulation.

Figure 2: Impact on Trade balance After Simulation

Source: Simulation Result

Figure 3: Impact on Trade balance After Simulation (Aggregate Sectors)



Source: Simulation Result

About broad sector-wise trade balance, India, China and South Africa have negative trade balance in agriculture sector. Brazil gained maximum in agriculture sector but experienced huge negative trade balance in non-agriculture sector. Trade balance across three broad sectors for India and South Africa is negative. At the disaggregate impact of proposed FTA on trade balance is given in the Appendix Table 8.

SECTION 5: CONCLUSION

This study used the GTAP model on 57 tradable commodities and nine regions of the world to understand the likely impact of possible BRICS FTA. The data in the GTAP model is available for 2004. This study updates the tariff protection for the nine regions and analyses the possible impacts on welfare, macro-economic variables, output, employment and trade indicators. In terms of absolute value, highest welfare gain is attained by China, Brazil, India and Russia whereas South Africa gained least in terms of welfare effect. It is revealed that Non-BRICS

member experienced net welfare loss due to BRICS FTA. All the members of possible BRICS FTA would experience an increase in GDP and all the components of GDP from the base run. China and Brazil would be major beneficiaries in terms of GDP gain whereas South Africa and India would be least beneficiaries. Non-BRICS regions would experience fall in GDP as well as other component of GDP. The impact on output varies across different sectors and different regions, for example, India, China, South Africa, USA and EU_25 has negative change in agriculture output, whereas Brazil and Russia has positive growth in agriculture output. At the disaggregate level, India would experience negative growth in sugarcane, wool silk, vegetable oil, sugar and beverages. All the BRICS members have higher demand for skilled and unskilled labour, however for Non-BRICS members demand for labour is negative. About the trade balance, all the BRICS members except Russia have negative trade balance. Non-BRICS members have positive trade balance after the simulation. Overall, the impact of proposed BRICS FTA would be positive for India as macroeconomics indicators (except trade balance) show positive change. However, at the disaggregate level, result vary across 57 sectors.

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Appendix Tables

Appendix Table 1: India's base Protection levels in GTAP database

rTMS	Brazil	China	Russia	South Africa	ASEAN	USA	EU-25	Rest of World	Total
Paddy, Rice	0	0	0	0	43	80	5	28	156
Wheat	0	0	0	0	0	0	0	0	0
Cereal Grain nec	0	0	0	0	0	50	5	19	74
Vegetable, Fruits	31	48	38	41	34	36	44	36	308
Oilseeds	0	30	30	0	30	30	16	51	187
Sugarcane, Sugar Beet	0	0	0	0	0	0	0	0	0
Plant Based Fiber	10	11	0	10	10	10	13	10	75
Crop Nec	56	34	0	53	63	42	27	37	310
Cattle,sheep, goat, horse	0	0	30	0	20	30	8	0	89
Animal Product Nec	6	29	20	4	10	12	3	1	85
Raw Milk	0	0	0	0	0	0	0	0	0
Wool, Silk-Worm	15	17	15	15	11	15	15	15	118
Forestry	5	25	23	5	5	11	11	6	92
Fishing	0	14	0	30	28	29	26	8	135
Coal	0	35	28	41	36	27	15	35	216
Oil	0	0	10	0	10	0	0	10	30
Gas	0	0	0	0	0	0	0	10	10
Mineral Nec	7	8	11	11	6	14	15	10	81
Meat: Cattle, Sheep, Goats, Horse	30	30	0	30	23	30	18	15	175
Meat Products Nec	38	40	0	30	27	70	39	24	268
Vegetable Oils And Fats	47	64	0	65	99	49	73	48	443
Dairy Products	0	30	0	34	40	39	37	30	210
Processed Rice	0	0	0	0	55	0	57	33	146
Sugar	100	0	0	100	29	99	50	36	414
Food Product Nec	32	35	0	35	40	44	39	33	257
Beverages And Tobacco Products	165	84	156	114	78	117	137	58	908
Textiles	20	18	15	16	15	15	16	15	130
Wearing Apparel	15	14	15	15	15	15	15	9	113
Leather Products	13	14	12	13	13	13	14	10	103
Wood Products	15	15	15	15	14	15	15	10	114
Paper Products, Publishing	11	14	15	7	12	13	14	13	99
Pertroleum, Coal Product	14	15	15	14	14	15	15	11	113
Chemical Rubber Plastic	15	15	14	15	16	15	15	13	117
Mineral Products Nec	15	14	15	15	15	15	15	15	118
Ferrous Metal	19	17	20	20	19	19	19	19	153
Metal Nec	15	15	15	15	15	15	15	15	120
Metal Products	15	15	15	15	14	15	15	15	119
Motor Vehicle Parts	59	16	15	16	18	17	31	22	193
Transport Equip	15	14	8	11	11	8	8	13	89
Electronic Equipment	5	3	10	8	2	2	4	2	37
Machinery and Equipments	15	14	15	15	13	13	14	14	114
Manufacturers nec	15	13	15	15	15	15	15	15	118

Source: GTAP Database

Appendix Table 2: Level of Protection Faced by India in other Regions in GTAP database

rTMS	Brazil	China	Russia	South Africa	ASEAN	USA	EU-25	Rest of World	Total
Paddy, Rice	0	0	0	0	5	5	59	53	122
Wheat	0	0	0	0	2	3	7	5	16
Cereal Grain nec	0	0	0	3	0	1	20	13	38
Vegetable, Fruits	11	5	6	4	1	0	1	11	40
Oilseeds	5	5	5	9	4	24	0	55	107
Sugarcane, Sugar Beet	0	0	0	0	0	0	0	0	0
Plant Based Fiber	0	0	5	4	2	1	0	3	15
Crop Nec	13	8	5	8	12	2	2	12	62
Cattle,sheep, goat, horse	0	0	0	0	0	0	10	9	19
Animal Product Nec	2	9	6	1	3	1	5	3	30
Raw Milk	0	0	0	0	0	0	0	0	0
Wool, Silk-Worm	0	0	0	0	0	2	0	9	12
Forestry	8	12	8	1	4	0	1	14	47
Fishing	8	9	7	0	13	0	3	7	48
Coal	0	0	0	0	1	0	0	11	12
Oil	0	0	0	0	0	0	0	0	1
Gas	0	0	0	0	2	0	0	14	16
Mineral Nec	6	0	5	0	2	0	0	1	14
Meat: Cattle, Sheep, Goats, Horse	0	18	14	20	4	5	254	11	326
Meat Products Nec	17	0	0	0	11	2	18	11	59
Vegetable Oils And Fats	11	7	5	9	3	3	2	4	44
Dairy Products	0	9	8	9	2	7	20	18	74
Processed Rice	16	0	10	0	1	2	109	19	157
Sugar	0	0	0	12	13	6	34	28	93
Food Product Nec	11	12	13	4	15	2	7	8	71
Beverages And Tobacco Products	22	41	49	29	92	11	20	69	331
Textiles	16	7	15	21	10	7	7	10	94
Wearing Apparel	20	19	20	39	10	11	9	12	139
Leather Products	12	9	11	12	4	6	3	7	65
Wood Products	14	6	17	17	6	0	0	8	68
Paper Products, Publishing	13	7	11	5	5	0	0	11	51
Pertroleum, Coal Product	0	5	5	3	3	1	0	8	25
Chemical Rubber Plastic	8	9	10	3	3	2	1	7	43
Mineral Products Nec	12	11	15	5	8	1	1	11	64
Ferrous Metal	12	5	6	4	4	0	0	10	41
Metal Nec	10	8	5	2	3	0	2	4	33
Metal Products	18	10	11	10	7	0	0	12	68
Motor Vehicle Parts	17	15	7	19	23	0	4	15	100
Transport Equip	16	11	9	0	2	0	1	14	53
Electronic Equipment	14	2	8	6	2	0	1	8	41
Machinery and Equipments	13	7	7	3	3	0	0	7	42
Manufacturers nec	16	11	16	4	1	0	0	2	49

Source: GTAP Database

Appendix Table 3: Sector-wise Changes in Industrial Output

qo	India	Brazil	China	Russia	South Africa	ASEAN	USA	EU_25	Rest of World
Paddy	0.16	-0.07	0.16	-1.68	-1.13	-0.02	0.2	0.09	0
Wheat	0.13	-4.39	-0.02	-0.03	-0.41	0.12	0.29	0	0.09
Cereal grain	0.13	-0.19	0.14	0.43	-0.07	-0.03	0.03	0.02	0
Veg. Fruits	0.03	-0.46	0.18	0.47	0.3	0.03	0.04	0	-0.02
Oil seeds	0.07	5.04	-1.51	-0.21	-0.54	-0.43	-1.34	0.55	-0.41
Sugarcane	-1.65	2.94	0.39	-1.62	0.51	0.07	-0.01	-0.03	-0.05
Plant fiber	0.25	-0.1	1.47	-1.66	0.23	0.06	0.17	-0.03	-0.02
Crop n.e.c.	0.12	-0.75	0.25	6.02	-0.59	0.09	0.17	0.07	0.05
Cattle sheep	0.07	0.42	0.18	-0.3	-0.3	0.02	-0.02	0	-0.02
Animal product	0.39	0.68	0.15	-0.01	-2.02	0.02	0	-0.01	0.01
Raw milk	0.26	0.03	0.25	0.15	0.06	0	-0.02	-0.04	-0.03
Wool silk	-0.37	0.19	1.06	-1	17.71	0.01	0.42	0.13	0.29
Meat cattle	-0.42	0.4	-0.28	-0.3	-0.5	0.13	-0.03	0.13	0
Meat product	10.81	1.16	-0.16	-3.06	-3.85	0.09	-0.03	0.07	0.09
Veg edible oil	-0.68	3.78	-1.96	0.35	-0.57	-1.21	0.2	0.17	-0.1
dairy	0.24	-0.04	0.16	-0.01	0.1	0.02	-0.02	-0.04	-0.02
Processed rice	0.2	-0.14	0.1	-4.12	4.07	-0.04	-0.02	0.01	-0.01
Sugar	-4.42	6.02	-0.51	-1.61	1.23	0.09	-0.01	0	-0.06
Food pronec	0.3	0.26	-0.2	2.77	-0.07	-0.06	-0.03	-0.05	-0.06
beverages	-4.46	3.81	0.14	0.09	0.22	-0.08	-0.03	-0.05	-0.04
T. Agriculture	-0.169	1.014	-0.001	0.230	-0.105	-0.103	-0.016	-0.006	0.002
forestry	0.03	0.09	-0.35	3.06	0.62	-0.27	0.02	0.09	-0.01
fishing	0.19	-0.19	0.05	0.14	-0.01	-0.03	-0.01	-0.02	-0.02
coal	-0.13	-0.33	0.1	0.08	0.03	0.12	0.03	0.07	0.08
oil	-0.1	-0.3	-0.22	-0.07	-0.11	0.05	0.04	0.08	0.05
gas	0.44	-0.2	0.14	0.1	0.47	0.29	0.24	0.28	0.26
Mineral nec	0.79	-0.06	-0.14	0.04	0.23	0.02	0.01	0.05	-0.04
textiles	0.01	-4.71	2	-4.82	-8.62	-0.3	0	-0.2	-0.17
Wear apparel	2.58	-3.89	2.7	-12.06	-14.35	-0.07	0.04	-0.25	-0.1
Leather prod	4.3	6.42	0.8	-3.2	-12.18	-0.39	-0.25	-0.32	-0.74
Wood prod	0.34	-1.11	-0.13	-0.79	-0.37	0.22	0	0.01	0.03
paper	-0.32	-0.04	-0.13	1.28	0.21	-0.04	-0.02	-0.02	-0.03
Petro coal	0.32	-0.22	0.1	0.65	0.07	-0.06	-0.04	-0.05	-0.06
Chemical & rubber	0.79	-0.69	0.13	3.94	0.82	-0.1	-0.03	-0.05	-0.12
Minerprodn	0.62	0.31	0.33	-0.41	0.54	-0.04	0.01	-0.05	-0.02
Ferrous	0.34	-1.08	-0.08	0.86	1.18	0.09	0.07	0.04	0.02
Metal nec	1.28	-2.27	-0.41	0.2	7.37	0.05	0.12	0.08	-0.24
Metal produ	0.35	-0.81	0.28	0.82	0.24	-0.08	0.01	-0.04	-0.03
Motor vehic	0.64	1.23	-0.08	-0.04	1.39	-0.04	-0.02	-0.05	-0.04
Transport eq	-0.71	-1.1	0.41	12.89	1.61	-0.1	-0.04	-0.06	-0.08
Electro equi	-0.45	-2.04	-0.11	-0.14	0.29	0.12	-0.01	0.01	0.05
Machinery	0.76	-1.57	0.07	0.75	0.94	0.07	0.02	-0.01	0.04
Manufacturers	1.61	-1.21	-0.03	-1.39	1.72	-0.04	0.02	-0.05	-0.11
Non-Agricultural	0.560	-0.749	0.252	0.569	0.200	-0.005	-0.002	-0.042	-0.034
electricity	0.35	-0.29	0.16	0.49	0.91	-0.04	-0.02	-0.03	-0.05
Gas manufacture	0.25	-0.34	0.06	0.17	0.2	-0.01	-0.02	0	-0.03
water	0.24	-0.08	0.17	0.27	0.23	-0.03	-0.03	-0.04	-0.03
construction	0.79	1.68	0.39	0.36	2.35	-0.13	-0.05	-0.07	-0.06
trade	0.34	0.25	0.14	0.26	-0.53	-0.02	-0.03	-0.04	-0.03
Transport nes	0.35	0.16	0.07	0.18	0.01	0.04	-0.02	0	-0.01
sea	0.23	-0.72	0.11	-0.08	0.24	0.07	0.02	0.1	0.08
Air transport	0.32	-0.12	-0.09	-0.11	-0.19	0.03	-0.02	-0.02	0
communication	0.11	-0.06	0.2	0.09	0.09	0	-0.03	-0.03	-0.03
Financial ser	0.2	-0.08	0.17	0.38	0.09	-0.03	-0.03	-0.03	-0.03
insurance	0.16	0.12	-0.01	-0.06	0.09	0.02	-0.03	-0.02	-0.02
business	0.05	-0.06	0.19	0.07	0.31	0.02	-0.03	-0.03	-0.03
recreation	0.28	0.18	0.16	0.21	0.23	-0.03	-0.04	-0.04	-0.03
Pub admin	0.27	0.28	0.21	0.27	0.5	-0.06	-0.03	-0.05	-0.04
dwelling	0.25	0.11	0.21	0.23	0.21	-0.05	-0.02	-0.04	-0.02
Services	0.367	0.317	0.214	0.259	0.289	-0.029	-0.031	-0.039	-0.033

Source: Simulation Result

Appendix Table 4: Demand for Unskilled Labour

qfe[UnSkLab**]	India	Brazil	China	Russia	South Africa	ASEAN	USA	EU_25	Rest of World
Paddy	0.22	0.14	0.23	-1.66	-1.03	-0.04	0.18	0.1	0
wheat	0.18	-4.31	0.04	0.08	-0.29	0.11	0.29	0.01	0.09
Cereal grain	0.19	0.03	0.21	0.56	0.06	-0.05	0.01	0.03	-0.01
Veg. fruits	0.08	-0.25	0.25	0.6	0.45	0.01	0.02	0.01	-0.03
oilseeds	0.12	5.43	-1.54	-0.11	-0.42	-0.5	-1.44	0.57	-0.43
sugarcane	-1.75	3.27	0.47	-1.6	0.66	0.05	-0.03	-0.03	-0.06
Plant fiber	0.32	0.12	1.61	-1.64	0.37	0.05	0.16	-0.03	-0.02
Crop nec	0.17	-0.55	0.32	6.49	-0.47	0.08	0.16	0.07	0.04
Cattle sheep	0.12	0.65	0.25	-0.2	-0.17	0	-0.05	0.01	-0.02
Animal product	0.47	0.93	0.21	0.1	-1.94	0	-0.03	0	0
Raw milk	0.33	0.25	0.33	0.27	0.19	-0.02	-0.04	-0.04	-0.04
Wool silk	-0.36	0.42	1.18	-0.94	18.41	-0.01	0.42	0.14	0.3
Meat cattle	0.01	0.79	-0.06	0.22	-0.06	0.09	-0.04	0.11	-0.02
Meat product	11.12	1.56	0.01	-2.63	-3.49	0.06	-0.03	0.04	0.07
Veg edible oil	-0.25	4.26	-1.78	0.82	0.08	-1.25	0.18	0.15	-0.13
dairy	0.62	0.42	0.35	0.44	0.55	-0.01	-0.03	-0.06	-0.05
Processed rice	0.36	0.27	0.36	-3.59	4.9	-0.08	-0.04	-0.02	-0.05
Sugar	-4.03	6.23	-0.31	-1.19	2.12	0.05	-0.02	-0.02	-0.08
Food pronec	0.68	0.64	-0.02	3.21	0.45	-0.1	-0.05	-0.07	-0.08
beverages	-4.05	4.16	0.4	0.54	0.97	-0.12	-0.05	-0.09	-0.07
T. Agriculture	0.085	1.380	0.195	0.522	0.316	-0.143	-0.053	-0.009	-0.032
forestry	0.09	0.17	-0.39	3.65	0.92	-0.31	0.02	0.1	-0.02
fishing	0.34	-0.24	0.1	0.34	0.1	-0.05	-0.02	-0.05	-0.04
coal	-0.12	-0.51	0.2	0.17	0.2	0.16	0.04	0.12	0.13
oil	-0.06	-0.45	-0.31	0.01	-0.05	0.06	0.06	0.11	0.07
gas	0.74	-0.28	0.83	0.29	1.07	0.41	0.37	0.4	0.41
Mineral nec	0.97	-0.04	-0.14	0.13	0.35	0.01	0.01	0.05	-0.05
textiles	0.21	-4.27	2.2	-4.76	-8.28	-0.34	-0.01	-0.22	-0.19
Wear apparel	2.77	-3.83	2.89	-11.67	-14.16	-0.11	0.03	-0.27	-0.12
Leather prod	4.78	6.73	1	-3.11	-11.74	-0.43	-0.26	-0.35	-0.76
Wood prod	0.6	-0.84	0.08	-0.63	0.04	0.18	0	-0.01	0
paper	0.09	0.12	0.07	1.85	0.76	-0.08	-0.03	-0.05	-0.05
Petro coal	0.91	0.22	0.33	1.33	1	-0.11	-0.06	-0.09	-0.1
Chemical & rubber	1.41	-0.23	0.36	4.32	1.61	-0.14	-0.05	-0.07	-0.15
Minerprodn	1.21	0.75	0.5	-0.14	1.19	-0.08	0	-0.08	-0.05
Ferrous	0.97	-0.55	0.11	1.37	1.9	0.04	0.06	0.02	0
Metal nec	1.81	-1.75	-0.21	0.76	8.53	0.01	0.11	0.06	-0.27
Metal produ	0.94	-0.62	0.47	1.01	0.66	-0.12	0	-0.06	-0.05
Motor vehic	1.05	1.75	0.14	0.27	2.1	-0.08	-0.03	-0.07	-0.07
Transport eq	-0.47	-0.81	0.55	12.94	2.04	-0.14	-0.04	-0.08	-0.1
Electro equi	0.06	-1.51	0.15	0.2	0.9	0.08	-0.02	-0.01	0.03
Machinery	1.37	-1.17	0.25	0.93	1.5	0.04	0.01	-0.03	0.02
Manufacturers	2.03	-0.89	0.24	-1.21	2.73	-0.08	0.01	-0.07	-0.13
Non-Agricultural	0.814	-0.504	0.414	0.770	0.072	-0.055	-0.007	-0.063	-0.059
electricity	0.89	0.05	0.46	0.98	1.75	-0.1	-0.05	-0.07	-0.09
Gas manufacture	0.66	0	0.27	0.41	0.98	-0.07	-0.05	-0.04	-0.06
water	0.64	0.25	0.37	0.47	0.9	-0.09	-0.04	-0.07	-0.07
construction	1	2.33	0.57	0.88	2.96	-0.16	-0.06	-0.1	-0.08
trade	1.04	0.43	0.36	1.24	0.34	-0.07	-0.04	-0.08	-0.06
Transport nes	0.75	0.32	0.36	0.78	0.95	-0.01	-0.03	-0.04	-0.04
sea	0.64	-0.56	0.43	0.54	1.23	0.01	0	0.06	0.05
Air transport	0.73	0.04	0.29	0.47	0.72	-0.03	-0.04	-0.06	-0.02
communication	0.73	0.42	0.52	0.47	1.04	-0.05	-0.05	-0.06	-0.06
Financial ser	0.78	0.05	0.47	0.64	0.85	-0.08	-0.04	-0.05	-0.06
insurance	0.73	0.29	0.25	0.45	0.85	-0.03	-0.03	-0.04	-0.04
business	0.34	0.32	0.42	0.63	1.16	-0.01	-0.03	-0.07	-0.06
recreation	0.57	0.19	0.3	0.56	0.53	-0.06	-0.05	-0.07	-0.06
Pub admin	0.4	0.28	0.31	0.4	0.71	-0.07	-0.04	-0.06	-0.05
dwelling	1	0.85	0.54	1.05	1.5	-0.12	-0.06	-0.1	-0.07
Services	0.782	0.438	0.418	0.695	0.858	-0.070	-0.042	-0.069	-0.055

Source: Simulation Result

Appendix Table 5: Demand for Skilled Labour

qfe[SkLab**]	India	Brazil	China	Russia	South Africa	ASEAN	USA	EU_25	Rest of World
Paddy	0.22	0.14	0.23	-1.66	-1.03	-0.04	0.18	0.1	0
wheat	0.18	-4.31	0.04	0.08	-0.29	0.11	0.29	0.01	0.09
Cereal grain	0.19	0.03	0.21	0.56	0.06	-0.05	0.01	0.03	-0.01
Veg. fruits	0.08	-0.25	0.25	0.6	0.45	0.01	0.02	0.01	-0.03
oilseeds	0.12	5.43	-1.54	-0.11	-0.42	-0.5	-1.44	0.57	-0.43
sugarcane	-1.75	3.27	0.47	-1.6	0.66	0.05	-0.03	-0.03	-0.06
Plant fiber	0.32	0.12	1.61	-1.64	0.37	0.05	0.16	-0.03	-0.02
Crop nec	0.17	-0.55	0.32	6.49	-0.47	0.08	0.16	0.07	0.04
Cattle sheep	0.12	0.65	0.25	-0.2	-0.17	0	-0.05	0.01	-0.02
Animal product	0.47	0.93	0.21	0.1	-1.94	0	-0.03	0	0
Raw milk	0.33	0.25	0.33	0.27	0.19	-0.02	-0.04	-0.04	-0.04
Wool silk	-0.36	0.42	1.18	-0.94	18.41	-0.01	0.42	0.14	0.3
Meat cattle	0.01	0.79	-0.06	0.22	-0.06	0.09	-0.04	0.11	-0.02
Meat product	11.12	1.56	0.01	-2.63	-3.49	0.06	-0.03	0.04	0.07
Veg edible oil	-0.25	4.26	-1.78	0.82	0.08	-1.25	0.18	0.15	-0.13
dariy	0.62	0.42	0.35	0.44	0.55	-0.01	-0.03	-0.06	-0.05
Processed rice	0.36	0.27	0.36	-3.59	4.9	-0.08	-0.04	-0.02	-0.05
Sugar	-4.03	6.23	-0.31	-1.19	2.12	0.05	-0.02	-0.02	-0.08
Food pronec	0.68	0.64	-0.02	3.21	0.45	-0.1	-0.05	-0.07	-0.08
beverages	-4.05	4.16	0.4	0.54	0.97	-0.12	-0.05	-0.09	-0.07
T. Agriculture	0.229	1.706	0.094	1.113	0.443	-0.341	-0.047	-0.035	-0.058
forestry	0.09	0.17	-0.39	3.65	0.92	-0.31	0.02	0.1	-0.02
fishing	0.34	-0.24	0.1	0.34	0.1	-0.05	-0.02	-0.05	-0.04
coal	-0.12	-0.51	0.2	0.17	0.2	0.16	0.04	0.12	0.13
oil	-0.06	-0.45	-0.31	0.01	-0.05	0.06	0.06	0.11	0.07
gas	0.74	-0.28	0.83	0.29	1.07	0.41	0.37	0.4	0.41
Mineral nec	0.97	-0.04	-0.14	0.13	0.35	0.01	0.01	0.05	-0.05
textiles	0.21	-4.27	2.2	-4.76	-8.28	-0.34	-0.01	-0.22	-0.19
Wear apparel	2.77	-3.83	2.89	-11.67	-14.16	-0.11	0.03	-0.27	-0.12
Leather prod	4.78	6.73	1	-3.11	-11.74	-0.43	-0.26	-0.35	-0.76
Wood prod	0.6	-0.84	0.08	-0.63	0.04	0.18	0	-0.01	0
paper	0.09	0.12	0.07	1.85	0.76	-0.08	-0.03	-0.05	-0.05
Petro coal	0.91	0.22	0.33	1.33	1	-0.11	-0.06	-0.09	-0.1
Chemical & rubber	1.41	-0.23	0.36	4.32	1.61	-0.14	-0.05	-0.07	-0.15
Minerprodn	1.21	0.75	0.5	-0.14	1.19	-0.08	0	-0.08	-0.05
Ferrous	0.97	-0.55	0.11	1.37	1.9	0.04	0.06	0.02	0
Metal nec	1.81	-1.75	-0.21	0.76	8.53	0.01	0.11	0.06	-0.27
Metal produ	0.94	-0.62	0.47	1.01	0.66	-0.12	0	-0.06	-0.05
Motor vechic	1.05	1.75	0.14	0.27	2.1	-0.08	-0.03	-0.07	-0.07
Transport eq	-0.47	-0.81	0.55	12.94	2.04	-0.14	-0.04	-0.08	-0.1
Electro equi	0.06	-1.51	0.15	0.2	0.9	0.08	-0.02	-0.01	0.03
Machinery	1.37	-1.17	0.25	0.93	1.5	0.04	0.01	-0.03	0.02
Manufacturers	2.03	-0.89	0.24	-1.21	2.73	-0.08	0.01	-0.07	-0.13
Non-Agricultural	0.870	-0.508	0.456	0.911	0.430	-0.041	-0.009	-0.055	-0.050
electricity	0.89	0.05	0.46	0.98	1.75	-0.1	-0.05	-0.07	-0.09
Gas manufacture	0.66	0	0.27	0.41	0.98	-0.07	-0.05	-0.04	-0.06
water	0.64	0.25	0.37	0.47	0.9	-0.09	-0.04	-0.07	-0.07
construction	1.00	2.33	0.57	0.88	2.96	-0.16	-0.06	-0.1	-0.08
trade	1.04	0.43	0.36	1.24	0.34	-0.07	-0.04	-0.08	-0.06
Transport nes	0.75	0.32	0.36	0.78	0.95	-0.01	-0.03	-0.04	-0.04
sea	0.64	-0.56	0.43	0.54	1.23	0.01	0	0.06	0.05
Air transport	0.73	0.04	0.29	0.47	0.72	-0.03	-0.04	-0.06	-0.02
communication	0.73	0.42	0.52	0.47	1.04	-0.05	-0.05	-0.06	-0.06
Financial ser	0.78	0.05	0.47	0.64	0.85	-0.08	-0.04	-0.05	-0.06
insurance	0.73	0.29	0.25	0.45	0.85	-0.03	-0.03	-0.04	-0.04
business	0.34	0.32	0.42	0.63	1.16	-0.01	-0.03	-0.07	-0.06
recreation	0.57	0.19	0.3	0.56	0.53	-0.06	-0.05	-0.07	-0.06
Pub admin	0.4	0.28	0.31	0.4	0.71	-0.07	-0.04	-0.06	-0.05
dwelling	1.00	0.85	0.54	1.05	1.50	-0.12	-0.06	-0.10	-0.07
Services	0.573	0.307	0.364	0.507	0.794	-0.064	-0.039	-0.067	-0.053

Source: Simulation Result

Appendix Table 6: Sector-wise Changes in Exports

qxw	India	Brazil	China	Russia	South Africa	ASEAN	USA	EU_25	Rest of World
Paddy	-0.81	-6.59	-3.99	-0.71	-1.43	0.94	0.48	0.21	1.66
Wheat	-0.86	-6.02	-2.86	-3.1	-1.14	0.47	0.39	0.06	0.3
Cereal grain	-0.43	-2.76	-0.95	-1.17	-0.48	0.18	0.13	0.1	0.12
Veg. Fruits	0.36	-2.76	1.28	13.74	0.66	0.12	0.16	0.01	-0.06
Oil seeds	2.65	7.22	0.47	2.37	-0.21	0.3	-3.22	1.16	-1.43
Sugarcane	5.13	-3.85	-0.54	2.65	2.77	-0.25	0.21	-0.2	-0.36
Plant fiber	10.58	3.9	2.61	0.08	1.09	0.4	0.53	0.05	0.11
Crop n.e.c.	4.38	-3.94	1.68	9.75	0.6	0.21	0.37	0.14	0.05
Cattle sheep	-0.49	-4.96	-1.56	-0.83	-0.4	0.18	0.22	0	0.01
Animal product	-0.26	-1.91	-0.26	1.62	0.68	0.13	0.22	0.03	0.09
Raw milk	9.71	1.86	6.14	7.49	11.11	0.12	-0.07	-0.34	-0.31
Wool silk	10.46	1.58	6.65	13.52	32.12	1.22	0.69	0.17	1.34
Meat cattle	-1.41	0.18	4.66	7.6	1.72	0.28	-0.34	0.36	-0.12
Meat product	15.85	1.93	-0.11	0.43	1.48	0.74	-0.19	0.17	-0.29
Veg edible oil	2.96	8.27	1.74	-0.59	2.24	-1.8	0.78	0.38	-0.45
dariy	-0.86	-5.54	-0.14	-1.33	-0.71	0.14	0.16	-0.01	0.08
Processed rice	0.72	-1.43	0.44	0.28	4.92	-0.12	-0.04	0	-0.09
Sugar	4.9	10.52	-0.76	1.93	5.89	0.3	0.42	0.13	-0.76
Food pronec	2.51	-0.33	0.37	14.75	0.65	-0.15	-0.23	-0.07	-0.25
beverages	2.14	35.55	0	-0.28	0.02	-0.42	-0.02	-0.07	-0.06
T. Agriculture	1.642	3.049	0.334	-0.356	0.533	-0.268	-0.151	0.046	0.044
forestry	0.9	-0.84	2.26	7.14	9.22	-2.2	0.26	0.38	-0.6
fishing	-1.18	-0.95	-0.61	-1.27	0.09	0.1	0.04	0	0.04
coal	1.25	0.02	-0.36	-0.42	-0.58	0.19	0.7	0.3	0.1
oil	-0.69	1.13	0.91	-0.7	-0.18	0.02	0.16	0.09	0.08
gas	-22.01	2.27	0.38	-2.7	-22.03	0.55	1.32	0.41	0.56
Mineral nec	1.02	0.06	0.33	-0.02	0.19	0.05	0.02	0.14	0.02
textiles	4.7	4.6	3.35	4.63	9.85	-0.71	-0.21	-0.39	-0.4
Wear apparel	3.33	3.58	3.63	3.92	8.41	-0.13	0	-1.16	-0.39
Leather prod	8.5	14.17	2.03	11.44	11.12	-0.56	-1.51	-0.8	-2.03
Wood prod	-0.03	-2.63	-0.3	-0.92	-0.42	0.27	0.08	0.05	0.1
paper	1.76	0.05	-0.26	5.06	2.4	-0.09	0.02	0.02	-0.07
Petro coal	0.66	-0.85	1.16	0.84	0.12	-0.15	-0.01	-0.07	-0.12
Chemical & rubber	6.53	-0.32	1.89	8.59	4.4	-0.17	-0.12	-0.05	-0.29
Minerprodn	0.9	-1.7	1.14	-0.64	-0.25	-0.01	0.1	-0.08	-0.01
Ferrous	2.56	-0.92	-0.18	0.95	1.57	0.05	0.15	0.08	-0.01
Metal nec	11.19	-2.02	0.98	0.64	7.6	0.03	0.13	0.11	-0.53
Metal produ	3.38	-1.67	0.89	9.99	0.95	-0.2	0.05	-0.1	-0.09
Motor vechic	2.82	2.62	-0.12	-0.29	3.68	-0.06	0.02	-0.05	-0.06
Transport eq	3.91	-2.55	1.99	22.17	2.29	-0.25	-0.13	-0.1	-0.16
Electro equi	5.16	1.64	0	5.75	-0.02	0.12	-0.19	0	0.07
Machinery	6.14	-1.42	0.57	6.23	1.16	0.08	0.07	0	0.07
Manufacturers	3.31	-2.19	0.58	0.89	15.62	-0.1	-0.22	-0.15	-0.45
Non-Agricultural	21.865	0.707	19.656	1.964	10.963	-0.019	-0.381	-0.545	-0.252
electricity	0.46	-3.35	-0.89	-1.92	-0.46	0.13	0.31	0.15	0.07
Gas manufacture	-1.36	-3.82	-0.69	-0.84	-1.58	0.34	0.37	0.25	0.2
water	-1.32	-3.56	-2.08	-1.04	-1.52	0.29	0.12	0.12	0.12
construction	-0.35	-3.35	-0.86	-0.98	-0.51	0.1	0.14	0.05	0.12
trade	-1.14	-2.64	-1.16	-1.65	-0.88	0.2	0.11	0.12	0.17
Transport nes	-0.39	-1.54	-1.18	-0.57	-0.71	0.22	0.12	0.19	0.18
sea	-0.07	-0.95	-0.26	-0.45	-0.28	0.13	0.16	0.12	0.13
Air transport	-0.4	-1.43	-0.58	-0.67	-0.46	0.08	0.03	0	0.05
communication	-1.43	-3.35	-1.64	-0.96	-0.99	0.15	0.07	0.04	0.03
Financial ser	-1.56	-2.84	-1.81	-0.79	-1.53	0.13	0.04	0.03	0.04
insurance	-1.42	-2.77	-1.4	-1.26	-1.51	0.14	0.08	0.06	0.05
business	-0.22	-3.3	-1.3	-1.36	-1.34	0.1	0.03	0.07	0.02
recreation	-0.22	-2.4	-1.13	-0.79	-0.31	0.08	0.02	0.04	0.02
Pub admin	-0.31	-2.45	-1.2	-0.41	0.07	0.07	0.06	0.02	0.02
dwelling	0.14	0.11	0.6	0.14	0.21	-0.04	-0.02	-0.04	-0.03
Services	-3.375	-7.337	-6.290	-1.292	-0.586	1.438	1.104	1.348	0.523

Source: Simulation Result

Appendix Table 7: Sector-wise Changes in Imports

qim	India	Brazil	China	Russia	South Africa	ASEAN	USA	EU_25	Rest of World
Paddy	54.73	6.7	48	8.76	0.14	-1.51	-0.63	-0.09	-0.22
Wheat	9.9	0.72	1.32	2.41	0.23	-0.15	-0.12	-0.07	-0.12
Cereal grain	0.76	1.97	0.81	0.66	0.41	-0.27	-0.07	-0.1	-0.08
Veg. Fruits	2.79	3.39	2.14	1.37	0.42	-0.36	-0.14	-0.04	-0.09
Oil seeds	4.37	7.78	2.13	6.49	0.18	-1.11	-1.04	-0.45	-0.24
Sugarcane	5.93	12.61	7.63	2.11	3.83	0.03	-0.04	0.1	0.01
Plant fiber	5.08	1.87	3.04	-0.04	0.39	-0.24	-0.25	-0.15	-0.18
Crop n.e.c.	17.67	5.73	5.66	0.96	1.41	-0.5	-0.45	-0.3	-0.34
Cattle sheep	1.93	3.22	0.97	0.36	-0.07	-0.15	-0.13	0.04	-0.06
Animal product	6.99	2.68	0.84	0.69	1.46	-0.17	-0.24	-0.07	-0.18
Raw milk	29.51	18.12	8.12	2.68	10.26	-0.38	-0.37	-0.16	-0.22
Wool silk	11.75	1.97	4.35	6.43	-2.3	-0.54	-0.14	-0.09	-0.54
Meat cattle	19.29	5.06	3.81	4.2	10.91	-0.76	-0.13	-0.47	-0.43
Meat product	4.81	6.15	23.71	4.74	45.2	-1.09	-0.55	-0.24	-0.52
Veg edible oil	2.91	5.35	2.58	1.61	2.23	-0.76	-0.39	-0.32	-0.19
dariy	1.91	4.06	0.85	1.12	1.68	-0.1	-0.15	-0.05	-0.08
Processed rice	22.54	2.84	1.58	2.26	0.72	-0.11	-0.05	-0.05	-0.07
Sugar	91.02	6.47	0.75	4.66	0.96	-0.17	-0.2	-0.1	-0.5
Food pronec	5.84	2.76	6.79	2.3	3.08	-0.12	-0.13	-0.08	-0.09
beverages	67.46	1.89	0.84	0.45	0.94	-0.08	-0.06	-0.06	-0.07
T. Agriculture	3.039	1.069	1.745	2.171	1.703	-0.215	-0.125	-0.113	-0.150
forestry	2	4	7.12	5.53	2.49	-0.07	-0.06	-0.44	-0.52
fishing	4.44	1.16	0.87	1.42	0.37	-0.12	-0.05	-0.05	-0.14
coal	1.62	-0.41	1.51	1.07	1.2	-0.08	-0.34	-0.14	-0.12
oil	0.43	0.55	0.52	1.81	0.07	-0.13	-0.08	-0.07	-0.12
gas	15.9	-0.56	11.86	2.89	14.59	0.14	-0.28	-0.14	-0.11
Mineral nec	0.82	-0.62	0.58	0.54	1.63	-0.07	-0.05	-0.06	-0.11
textiles	23.22	24.89	3.01	1.04	16.65	-0.31	-0.14	-0.16	-0.2
Wear apparel	16.57	115.25	1.21	9.51	109.37	-0.34	-0.15	-0.18	-0.3
Leather prod	11.11	50.89	9.64	4.63	43.3	-0.34	-0.14	-0.16	-0.17
Wood prod	3.1	4.07	1.97	2.01	4.66	-0.13	-0.21	-0.09	-0.13
paper	3.18	2.58	1.76	1.7	1.1	-0.09	-0.14	-0.08	-0.12
Petro coal	1.42	1.21	0.98	1.72	2.68	-0.04	-0.12	-0.06	-0.07
Chemical & rubber	4.15	2.47	1.34	2.03	1.49	-0.12	-0.12	-0.07	-0.08
Minerprodn	2.15	6.45	1.2	3.67	4.97	-0.15	-0.24	-0.1	-0.16
Ferrous	3.7	7.42	1.99	1.96	2.18	-0.07	-0.25	-0.07	-0.15
Metal nec	2.13	3.21	1.75	5.34	4.91	-0.02	-0.22	-0.1	-0.22
Metal produ	11.26	10.52	1.47	3.59	5.98	-0.12	-0.26	-0.1	-0.12
Motor vechic	4.65	2.54	1.25	0.62	2.24	-0.09	-0.07	-0.07	-0.07
Transport eq	5.6	4.29	2.24	1.71	1.42	-0.13	-0.22	-0.09	-0.07
Electro equi	2.71	5.14	0.37	1.72	2.33	0.04	-0.17	-0.1	-0.1
Machinery	2.7	5.68	0.96	1.29	2.68	-0.06	-0.18	-0.09	-0.08
Manufacturers	4.26	34.05	10.98	8.59	8.15	-0.16	-0.24	-0.21	-0.16
Non-Agricultural	2.913	5.122	1.209	2.386	5.624	-0.065	-0.151	-0.090	-0.112
electricity	1.600	1.120	1.620	1.890	1.940	-0.100	-0.190	-0.100	-0.060
Gas manufacture	0.600	1.450	0.390	1.010	0.840	-0.290	-0.350	-0.250	-0.280
water	1.140	1.540	1.250	0.810	0.010	-0.170	-0.130	-0.130	-0.110
construction	1.010	3.510	0.550	0.880	2.720	-0.150	-0.090	-0.110	-0.090
trade	0.990	1.570	0.720	1.090	0.680	-0.140	-0.070	-0.120	-0.090
Transport nes	0.460	0.940	0.790	0.810	0.540	-0.030	-0.080	-0.060	-0.060
sea	0.340	0.400	0.730	0.570	0.370	-0.010	-0.110	-0.020	0.030
Air transport	0.360	0.650	0.530	0.620	0.250	-0.050	-0.050	-0.060	-0.060
communication	0.210	0.680	1.040	0.590	0.600	-0.110	-0.080	-0.070	-0.060
Financial ser	0.910	1.420	1.110	0.790	0.660	-0.100	-0.060	-0.050	-0.050
insurance	0.590	1.400	0.740	0.640	0.900	-0.040	-0.050	-0.060	-0.050
business	0.400	1.810	0.860	0.850	1.010	-0.030	-0.050	-0.080	-0.050
recreation	0.460	0.970	0.800	0.630	0.390	-0.080	-0.060	-0.070	-0.050
Pub admin	0.320	1.260	0.850	0.510	0.520	-0.070	-0.060	-0.080	-0.050
dwelling	0.140	0.110	0.600	0.140	0.210	-0.040	-0.020	-0.040	-0.030
Services	0.517	1.318	0.761	0.796	0.680	-0.065	-0.063	-0.075	-0.052

Source: Simulation Result

Appendix Table 8: Trade balance in Million US \$

	India	Brazil	China	Russia	South Africa	ASEAN	USA	EU_25	Rest of World
Paddy	-1.2	-6.2	-7.7	-0.2	0.0	2.9	3.2	0.7	8.6
wheat	-3.6	-23.8	-20.4	-22.0	-0.8	2.9	22.1	5.7	39.7
Cereal grain	-0.6	-15.9	-4.3	-2.3	-0.9	1.2	4.6	4.9	14.5
Veg. fruits	-31.3	-23.5	25.8	-22.1	15.7	5.9	18.9	11.0	-8.3
oilseeds	8.4	460.1	-191.2	-3.7	-0.1	17.5	-246.7	25.0	-84.4
sugarcane	0.4	0.0	-0.2	0.0	0.1	0.0	0.0	-0.1	-0.1
Plant fiber	13.0	17.5	-74.6	0.2	0.5	3.8	18.7	2.0	12.5
Crop nec	-0.6	-114.7	4.8	-12.8	-3.7	10.9	29.6	56.4	31.9
Cattle sheep	-0.1	-0.9	-1.6	-0.1	0.0	0.5	1.9	-1.1	1.4
Animal product	-5.2	-4.4	-12.6	0.3	-0.3	1.7	5.5	4.4	10.8
Raw milk	-0.1	-0.2	-0.7	1.4	-0.1	0.0	0.1	-0.2	-0.3
Wool silk	-22.8	0.2	-38.3	0.3	31.3	0.1	0.2	0.7	25.9
Meat cattle	-7.3	32.7	-26.1	-62.9	-11.1	3.8	0.9	59.2	13.6
Meat product	1.0	130.4	-71.9	-102.0	-84.2	12.2	-4.2	61.6	56.7
Veg edible oil	-80.7	385.1	-114.1	-12.1	-9.8	-213.8	26.3	61.1	-36.1
dariy	-1.7	-10.8	-4.1	-16.2	-2.5	3.7	5.7	8.0	18.3
Processed rice	8.6	-4.1	1.6	-3.9	-1.0	-8.0	-0.8	0.5	6.1
Sugar	-299.8	346.4	-2.0	-64.1	15.5	4.6	2.1	8.5	-23.8
Food pronec	38.9	-9.2	-257.6	364.7	-13.7	-24.2	-12.9	-11.4	-84.2
beverages	-283.8	292.6	-2.2	-7.2	-0.5	-6.8	7.0	-20.0	0.2
T. Agriculture	-668.6	1451.2	-797.0	35.4	-65.8	-180.9	-117.8	276.9	3.0
forestry	-10.7	-0.5	-194.7	203.3	7.5	-33.5	3.6	24.0	-10.8
fishing	-1.3	-0.9	-5.1	-2.2	0.3	0.9	1.5	4.1	4.3
coal	-29.0	3.2	-7.2	-12.2	-9.1	13.5	20.3	3.4	16.5
oil	-119.7	-6.1	-177.6	-284.0	-7.3	27.2	31.3	-55.1	597.5
gas	-0.5	0.7	0.5	-419.6	0.0	81.5	7.3	-91.6	425.5
Mineral nec	1.5	61.0	-114.3	2.0	3.0	0.9	-0.4	30.5	7.2
textiles	-162.5	-332.4	1087.9	-24.4	-210.9	-70.2	17.7	-183.1	-230.8
Wear apparel	175.6	-323.2	1984.7	-506.4	-860.9	-19.1	76.6	-464.4	-157.8
Leather prod	162.8	318.9	298.7	-54.8	-237.6	-51.8	-9.4	-216.7	-256.9
Wood prod	-10.0	-87.0	-96.3	-61.0	-32.0	34.5	96.7	87.6	89.3
paper	-49.0	-1.7	-200.9	90.4	18.8	-2.4	29.9	74.8	25.4
Petro coal	-10.2	-58.5	-42.1	171.7	-8.2	-16.6	13.3	-12.6	-47.6
Chemical & rubber	163.3	-422.4	-304.9	984.8	121.6	-58.0	-52.9	-37.4	-563.7
Minerprodn	-4.8	-60.2	109.1	-86.4	-38.0	3.3	39.7	-7.6	42.3
Ferrous	-36.0	-75.3	-395.1	144.8	87.7	4.9	54.8	126.1	66.7
Metal nec	-67.7	-118.2	-232.0	58.8	668.8	1.1	63.1	117.6	-494.5
Metal produ	-52.5	-135.0	159.0	10.2	-52.3	-3.3	73.1	-21.2	13.5
Motor vehic	-14.1	191.1	-211.3	-57.1	-41.7	9.7	172.1	-11.8	-44.8
Transport eq	-151.8	-247.4	86.7	428.7	-16.5	3.1	-27.7	-25.6	-53.2
Electro equi	-148.2	-415.9	-140.4	-114.2	-96.9	127.6	73.0	277.4	430.0
Machinery	-72.3	-766.7	-388.8	27.8	-164.2	72.1	405.9	313.2	532.4
Manufacturers	302.5	-180.4	-30.4	-153.5	114.3	-5.1	56.5	23.3	-137.0
Non-Agricultural	-134.5	-2656.9	1185.6	346.6	-753.9	120.2	1146.1	-45.0	253.6
electricity	-1.18	-19.51	-4.74	-17.89	-9.88	0.18	5.79	35.75	11.46
Gas manufacture	0	-0.31	-0.95	-16.61	-0.01	2.04	2.05	6.48	7.32
water	-0.15	-0.62	-2.09	-0.67	-0.59	0.32	0.58	1.91	1.31
construction	-8.44	-1.77	-17.17	-38.6	-0.85	4.74	5.73	31.35	25.01
trade	-11.45	-35.12	-315.42	-38.21	-15.03	30.66	27.91	173.03	183.55
Transport nes	-9.48	-19.89	-124.74	-60.73	-13.29	34.19	59.27	263.43	195.39
sea	-6.87	-19.17	-0.88	-11.13	-1.54	18.05	16.1	143.05	106.48
Air transport	-2.05	-16.08	-30.11	-26.56	-6.18	9.87	18.87	34.93	51.12
communication	-12.72	-8.7	-20.93	-9.23	-3.36	4.49	8.42	30.21	11.82
Financial ser	-24.03	-19.4	-19.35	-12.42	-6.11	6.04	7.43	49.7	18.1
insurance	-10.71	-16.76	-37.59	-8.82	-7.67	4.96	22.86	31.87	21.85
business	-47.14	-231.11	-134.65	-101.24	-11.35	26.1	35.48	374.56	89.06
recreation	-2.82	-12.42	-50.97	-15.29	-4.97	7.41	3.35	51.25	24.44
Pub admin	-5	-39.01	-69.66	-16.07	-3.27	5.29	37.55	47.19	42.96
dwelling	0	0	0	0	0	0	0	0	0
Services	-142.04	-439.87	-829.25	-373.47	-84.1	154.34	251.39	1274.71	789.87

Source: Simulation Result