# A GTAP Analysis of Regional Integration between South Asia and ASEAN[1]

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## Section 1: Introduction

The world at large has witnessed a proliferation of Preferential Trade Agreements (PTAs) which one started as an exception to GATT rules, but now appears to challenge the entire multilateral trading system. Provision for "Territorial Application – Frontier Traffic – Customs Union and Free-trade Areas" (Article XXIV of GATT) was built as an exception to one of the basic principles of the WTO i.e. Most Favoured Nation (MFN) Rule (Article I of GATT). The Asia and the Pacific countries are also not untouched with this phenomenon and several bilateral, plurilateral and inter-regional agreements have been signed and many more are being negotiated. Although, the outer structure of PTAs vary extensively, the core objective remains same i.e. reducing barriers to trade, especially tariffs, between member countries. PTAs may prove to be a cornerstone for larger economic and political endeavours to improve regional cooperation beyond the multilateral agenda. They can also stimulate inward foreign direct investment (Kimura and Ando, 2005) and growth through technological transfers. The process of proliferation can be intensified by strengthening the belief 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). The proliferation of PTAs appear to be motivated with a combination of commercial, socio-economic and political interests, which has thereby led to such agreements where common countries are participating but with different provisions. These agreements have become a real 'noodle bowl' in Asia and the Pacific and several concerns have been expressed on their structure and objectives. UNESCAP[3] has expressed its concerns on the subject and has also explored the possibilities of consolidation of these PTAs through a broader regionalism.

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3 APTIR 2011, 2012 and Growing Together: Economic Integration for an Inclusive and Sustainable Asia Pacific (2012)

In this region, while ASEAN is integrating through the process of ASEAN +1 process and then under the overall umbrella of RCEP, however it is not clear if all other agreements will be subsumed in RCEP or will still continue to be operational. On their side, South Asia is now reaching towards a full FTA as most of the members are going to reduce or eliminate their duties soon. From South Asia, India is engaged in ASEAN plus negotiations as well as in RCEP and has bilateral agreements with Japan and Republic of Korea. India is also a member of APTA. With the broader objectives of having a large regional block it is important that a 'mega FTA' is formed, but this should also take along with it the LDCs in the region which need greater support from major economies of Asia. In this context, the objective of this study is to examine the possible effects of regional integration between ASEAN and South Asia on various sectors as well as on macro-economic and trade indicators by using GTAP model and database. To analyses the likely impact of regional integration between ASEAN and South Asia, this study used simulation with a computable general equilibrium (CGE) model. In CGE, equilibrium is simultaneously obtained in more than one market.

## Section 2: Overview of ASEAN and SAARC

The ASEAN Heads of State and Government decided to establish an ASEAN Free Trade Area or AFTA in 1992. The objective of AFTA is to increase the ASEAN region's competitive advantage as a production base geared for the world market through the elimination of tariffs and non-tariff barriers among the ASEAN members. The Common Effective Preferential Tariff (CEPT) Agreement for AFTA prescribed that tariff rates are reduced to 0-5%. The ASEAN Free Trade Area (AFTA) has now been virtually established. ASEAN Member Countries have made significant progress in the lowering of intra-regional tariffs through the Common Effective Preferential Tariff (CEPT) Scheme for AFTA. More than 99 percent of the products in the CEPT Inclusion List (IL) of ASEAN-6, comprising Brunei Darussalam, Indonesia, Malaysia, the Philippines, Singapore and Thailand, have been brought down to the 0-5 percent tariff range. ASEAN's newer members, namely Cambodia, Laos, Myanmar and Viet Nam, are not far behind in the implementation of their CEPT commitments with almost 80 percent of their products having been moved into their respective CEPT ILS.

From 1 January 2010, all tariffs for products in the Common Effective Preferential Tariff (CEPT) Inclusion Lists of ASEAN-6 (Brunei Darussalam, Indonesia, Malaysia, Philippines, Singapore and Thailand), representing 99 percent of total tariff lines, have been eliminated for

intra-ASEAN trade. The average tariff is down to 0.9 percent in 2009 from 4.4 percent in 2000. Member Countries are working towards the total elimination of import duties on all products to achieve the ultimate objective of a free trade area. The AFTA Council has agreed that the target dates to achieve this objective will be in 2015 for the six original ASEAN Member Countries and 2018 for the newer Members. This move is expected to create an integrated market where there is free flow of goods within the region. Total elimination of import duties shall achieve a maximum impact in enhancing the ASEAN region's economic competitiveness vis-à-vis the rest of the world.

In South Asia, the idea of a "regional forum" was first proposed by Bangladesh in 1980. The SAPTA came into force in December 1995 after conclusion of First Round of negotiations in April 1995. Since then three more rounds were concluded and tariff concessions were exchanged on around 5000 products. SAPTA was envisaged primarily as the first step towards the transition to a South Asian Free Trade Area (SAFTA) leading subsequently towards a Customs Union, Common Market and Economic Union. The decision to convert SAARC into a Free Trade Area (FTA) was taken in the 9th SAARC Summit in May 1997 in Male. Finally, after extensive negotiations among member countries, the SAFTA Agreement was signed in January 2004 and was implemented with effect from January 01, 2006, though the tariff liberalisation started from July 01, 2006.

The two phases of Tariff Liberalisation Programme as envisaged in the SAFTA Agreement are summarized in the Tables below:

Table 1: Tariff Reduction Plan under SAFTA (First Phase)

| Countries | Existing Tariff Rates* | Tariff Rates Proposed under SAFTA | Time Schedule (from 1.1.2006) |
|---|---|---|---|
| Developing Countries | More than 20% | 20% (Maximum) | Within 2 Years |
| | Less than 20% | Annual reduction of 10% | Each of 2 Years |
| Least Developed | More than 30% | 30% (Maximum) | Within 2 Years |
| Countries | Less than 30% | Annual reduction of 5% | Each of 2 Years |
| *The tariff rates on the date of enforcement of SAFTA.* | | | |
| *NB: All tariff rates are applied tariff rates and not Bound Tariff Levels.* | | | |

Table 2: Tariff Reduction Plan under SAFTA (Second Phase)

| Countries | Existing Tariff Rates | Tariff Rates Proposed Under SAFTA | Time Schedule (from 1.1.2008) |
|---|---|---|---|
| India Pakistan | 20% or below | 0-5%* | Within 5 Years |
| Sri Lanka | 20% or below | 0-5%* | Within 6 Years |
| Least Developed Countries | 30% or below | 0-5%** | Within 8 Years |

*In equal annual instalments, but not less than 15% annually.*
*** In equal annual instalments, but not less than 10% annually.*
**Source: Ratna (2009) on the basis of data available at  SAARC Secretariat**

Therefore, while India and Pakistan have to bring their duties to 0-5% by 2013, Sri Lanka has to do it by 2014 and the LDCs by 2016. SAPTA was not able to achieve the desired results of enhancing the trade and investment linkages amongst the SAARC nations. Many believed that the failure of SAPTA to increase the intra-regional trade was a result of the limited product coverage and the limited extent of tariff concessions exchanged among member countries. And, accordingly, SAFTA, with the objective of bringing down the tariffs to zero, raised the hopes of millions of people for converting South Asia into a high trade region. Unfortunately, the large Sensitive List of SAFTA is one of the causes of hindering the intra-regional trade, despite the fact that efforts were taken to reduce the items from the Sensitive List. While India has reduced its list of items to only 25 for LDCs, SAARC Members are currently negotiating the pruning down of the list.

### Section 3: Intra-regional imports: ASEAN and SAARC

We have analyzed the intra-regional trade (imports) for ASEAN and SAARC as well as between SAARC and ASEAN as groups.  It would be evident from the figures below that while the intra-ASEAN imports increased from 11.9 % (in year 1996) to 22.8% (in year 2012) the intra-SAARC imports saw a much lesser share of 0.6%  (in year 1996) to 1.7% (in year 2012). Interestingly, the import share from ASEAN during the entire period was much higher than the intra-SAARC imports. Therefore, while the smaller economies of SAARC (mostly the LDCs) are dependent

for their trade within SAARC, for SAARC as a group (mostly driven by imports of India and Pakistan) imports share from ASEAN is more than intra-SAARC imports.

Figure 1: ASEAN imports
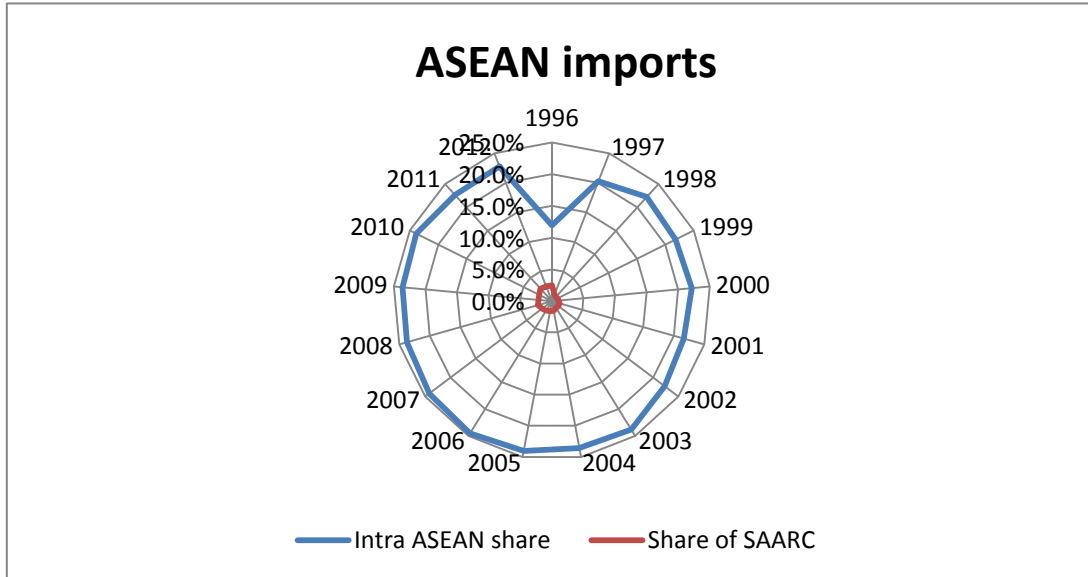


*(Source: Authors calculation from WITS accessed on 10 November 2013)*

Figure 2: SAARC import
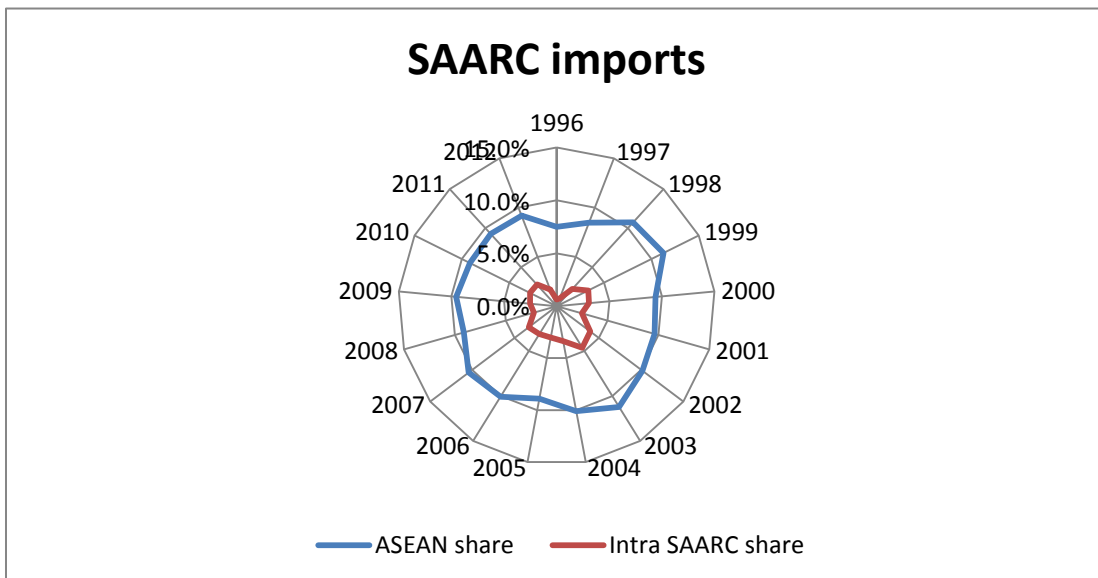


*(Source: Authors calculation from WITS accessed on 10 November 2013)*

SAFTA also has a mechanism to submit the preferential export data as well as preferential Certificate of Origins (CoO) issued for exports to the SAARC Secretariat which then compiles

this information. The maximum number of CoO has been issued by Bangladesh for exports under SAFTA. At the same time during the period 2006 -2012, exports under SAFTA were made by Bangladesh, India, Pakistan, Afghanistan and Sri Lanka.

Figure 3: Number of SAFTA Certificates of Origins Issued by the Member States
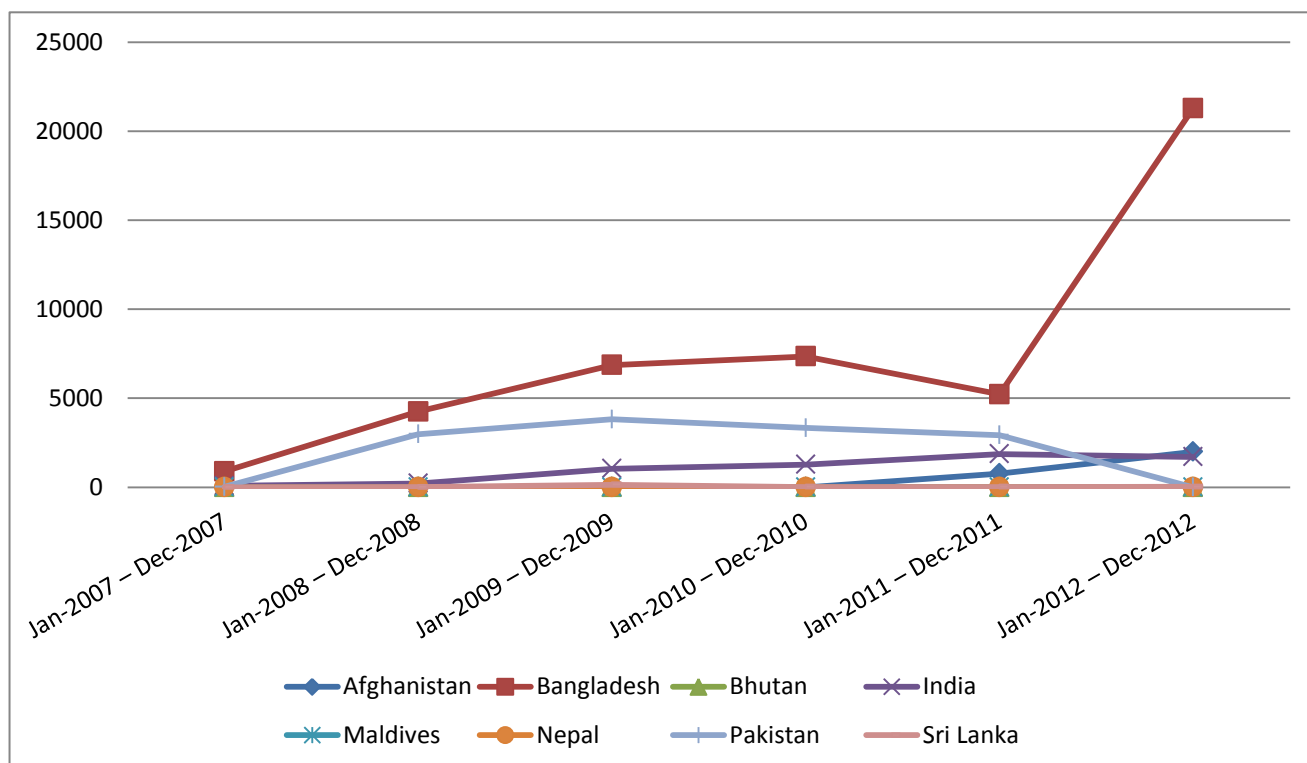


*(Source: Authors compilation on the basis of data available at SAARC Secretariat accessed on 10 November 2013)*

Though some exports have been made by Maldives, Bhutan and Nepal either they have not reported their exports or are not exporting at all under SAFTA. One possible explanation for the less exports under SAFTA by Sri Lanka could be due to more better preferences under its bilateral FTA with India and Pakistan. Similarly, for Bhutan and Nepal the low level of CoO issuance could be due to better preference for exports to India under their bilateral FTAs. Also being landlocked LDCs they may have severe limitations to exports to other larger markets in the region like Pakistan and Sri Lanka.

Duval (2008) examined the extent to which GMS economies have converged and become integrated, among themselves but also with other ASEAN countries. Although all GMS countries

have experienced rapid growth, no evidence was found that participation of CLMV in subregional cooperation and integration initiatives has led to a narrowing of the gap between the least and most developed GMS and ASEAN countries. He observed that while intra-GMS and intra-ASEAN trade both increased, trade of Cambodia and Lao PDR with other GMS or ASEAN countries remained small. If the various sub-regional and regional cooperation frameworks are to significantly reduce the development gap among members, activities more directly aimed at this objective may need to be emphasized. He strongly recommended for a re-think on institutional arrangements for regional cooperation at both the national and sub-regional/regional in order to facilitate participation of a more representative set of stakeholders in the prioritization of activities and to ensure synergies between the various initiatives can be captured.
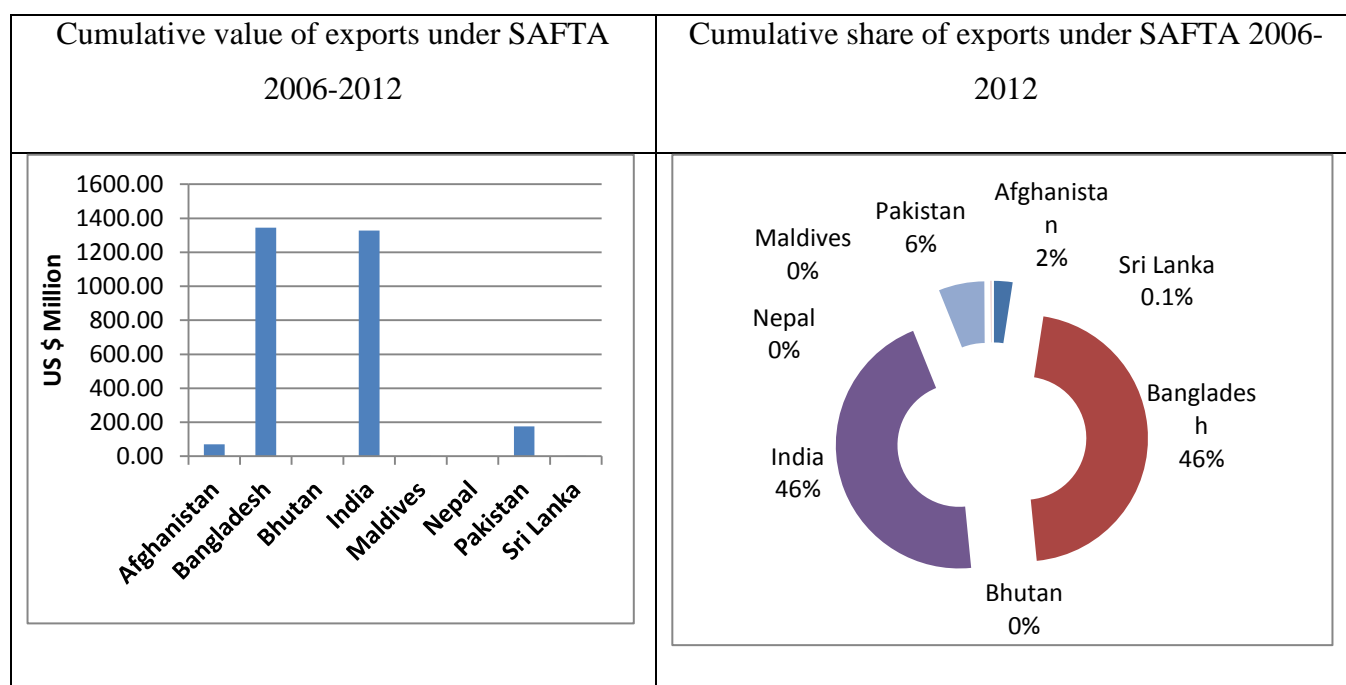
Figure 4: Value of exports under SAFTA (2006-2012)



*(Source: Authors compilation on the basis of data available at SAARC Secretariat accessed on 10 November 2013)*

Mikic (2009) has pointed out for making efforts to deepen integration in ASEAN not only to secure increased standard of living and prosperity, but for that to happen while narrowing the gaps that currently exist. She observed that regionalism can act as a stabilizing factor, politically, economically and financially and suggested that with respect to partnerships with the ROW, ASEAN needs to develop more coherent and collective external policy to deal with the ROW

and to assure its role as a core of any Asian-wide integrative frameworks. She pointed out that this can only be done by further strengthening the open regionalism approach while at the same time consolidating on BTAs.

Even in case of integration between SAARC and ASEAN, one of the important issues would be how to address the 'bilateralism' that exist within the regional grouping. As would be seen from the figure below, India has many bilateral FTA within SAARC as well as ASEAN despite now having FTA with ASEAN. How will these affect the bilateral or regional trade in a post FTA situation is difficult to assess. However, in the model that we have developed we looked at these 18 countries becoming 'one block'.

Figure 5: SAARC and ASEAN regional and bilateral engagement
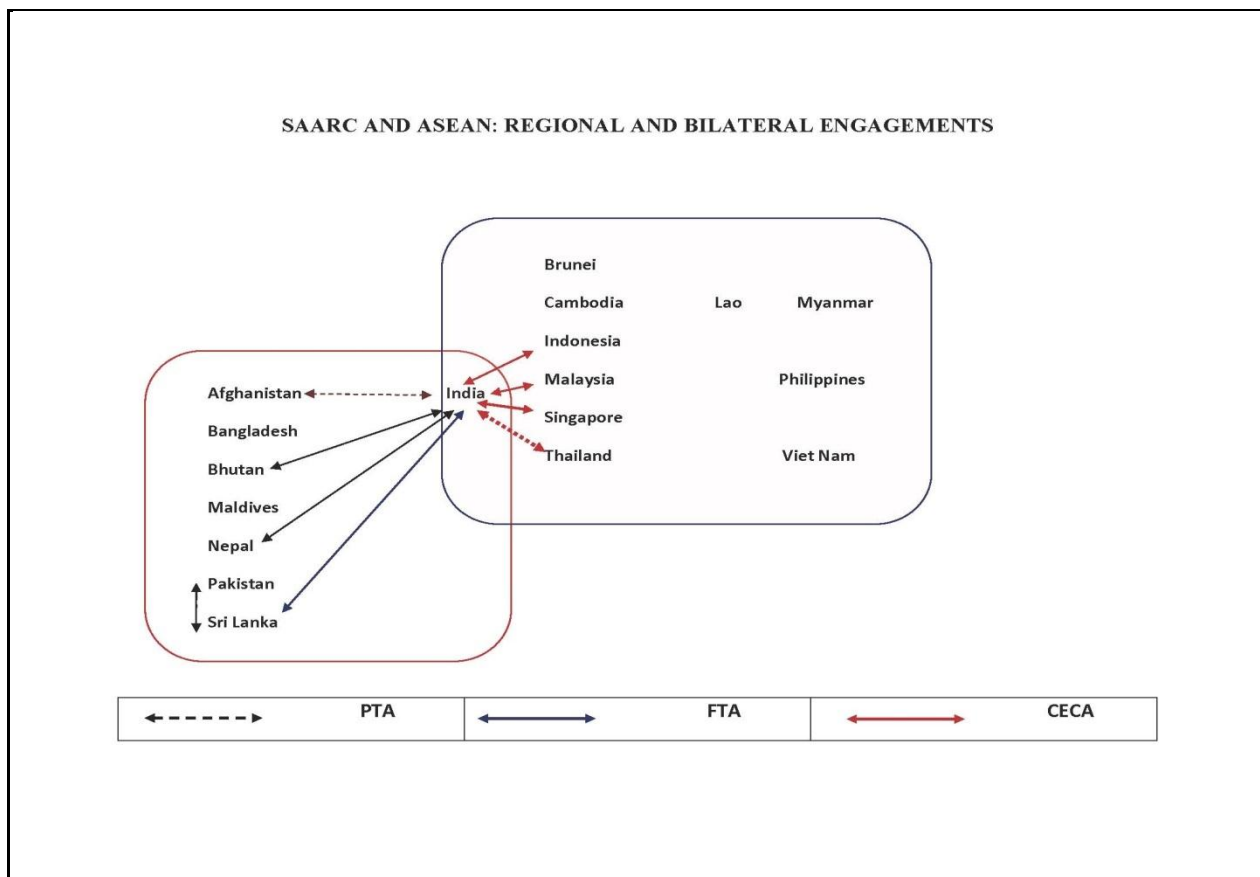


Source: Authors compilation

**Section 4: Methodology**

This study is conducted with a multi country, general equilibrium closure. WTO (2012) [4] stated that the purpose of the CGE simulations is to determine the effects of a change in trade policy on the endogenous variables of the model – prices, production, consumption, exports, imports and welfare. The simulation represents what the economy would look like if the policy change or shock had occurred. The difference in the values of the endogenous variables in the baseline and the simulation represents the effect of the policy change. So the model should be able to foretell the effect on trade and production patterns if the trade policy was changed. Furthermore, based on the change in welfare, the policy-maker would be able to judge whether the country benefited from the change in policy or not. Similarly, Gilbert (2013) mentioned that the idea behind CGE is to program a large scale mathematical system representing the global economy and to combine that theoretical system with a benchmark set of real world data representing the status quo. The equilibrium is then perturbed to generate insights into the direction and magnitude of the economic effects of policy intervention and/or other changes in the economic system. The impact of regional integration on different regions is estimated by using Global Trade Analysis Project (GTAP) static model. 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 8.1 (recent version available) of the GTAP database. The reference year for this database is 2007. GTAP 8.1 data base (134 regions) is better suited for this analysis, since the IO tables for China and few other countries were improved in this version and the tariff data issues were also addressed in it.

**4.1 Aggregation Strategy**

The GTAP database is compiled for 134 countries/territories across the world and for 57 tradable commodities of the world.  In this study, 134 countries/territories given in GTAP data base are mapped to 8 regions (table 3).

Table 3: Regional Aggregation

| No. | Region |
|-----|--------|
| 1 | ASEAN |
| 2 | SAARC |
| 3 | USA |

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[4] WTO (2012), "A Practical Guide to Trade Policy Analysis", published by United Nation and World Trade Organisation.

| 4 | China |
|---|---|
| 5 | RoK |
| 6 | Japan |
| 7 | EU_28 |
| 8 | RestofWorld |

Source: GTAP 8 database

The analysis is done for 18 sectors given in GTAP database. The 57 sectors of GTAP data base are mapped into 18 sectors (see table 4).

Table 4: Sector Aggregation

| No. | New Code | Sector Description | Comprising old sectors code |
|---|---|---|---|
| 1 | Paddy | paddy rice | pdr pcr |
| 2 | wheat | wheat | wht |
| 3 | plantfiber | Plant based fibre | pfb |
| 4 | oilseeds | oilseed | osd |
| 5 | sugar | sugar, sugarcane | c_b sgr |
| 6 | vegetable | Vegetable fruits | v_f |
| 7 | otherGrains | Grains and Crops | gro ocr |
| 8 | Dairy | milk and dairy | rmk mil |
| 9 | ProcFood | Processed Food | vol ofd b_t |
| 10 | Livestock | Livestock and Meat Products | ctl oap wol cmt omt |
| 11 | Fish | Fish | fsh |
| 12 | Extraction | Mining and Extraction | frs coa oil gas omn |
| 13 | TextWapp | Textiles and Clothing | tex wap |
| 14 | LightMnfc | Light Manufacturing | lea lum ppp fmp mvh otn omf |
| 15 | HeavyMnfc | Heavy Manufacturing | p_c crp nmm i_s nfm ele ome |
| 16 | transcomm | Transportation and Com. | trd otp wtp atp cmn |
| 17 | Util_cons | Utilities and Construction | ely gdt wtr cns |
| 18 | OtherService | other services | ofi isr obs ros osg dwe |

Source: GTAP 8 database

## 4.2 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 2007. In GTAP database the

protection level is different from current tariff in the above eight regions. Therefore, the protection information in GTAP database for eight regions is altered to better reflect the reality. The tariff data is extracted from World Integrated Trade Solution (WITS). The regional integration between ASEAN and SAARC will require substantial reduction in tariff rate between these two regions. For the year 2009, the tariff profile of eight broad regions for the goods sector is given in table 5.

Table 5: Sector-wise tariff for the year 2009

(Percentage)

| Product | ASEAN | SAARC | USA | China | Korea | Japan | EU_27 | RoW |
|---|---|---|---|---|---|---|---|---|
| Paddy | 26.88 | 22.50 | 11.20 | 65.00 | 5.00 | 0.00 | 7.70 | 10.59 |
| Wheat | 0.85 | 15.63 | 2.80 | 65.00 | 2.34 | 3.33 | 1.07 | 6.06 |
| Plantfibers | 1.75 | 8.00 | 0.00 | 5.67 | 1.50 | 0.00 | 0.00 | 4.65 |
| Oil seeds | 7.19 | 16.31 | 36.95 | 9.53 | 46.73 | 0.77 | 0.00 | 6.67 |
| sugar | 12.43 | 20.81 | 4.91 | 33.25 | 11.63 | 0.40 | 8.00 | 14.00 |
| Vegetables | 8.02 | 19.96 | 5.26 | 14.15 | 64.31 | 5.45 | 6.74 | 14.53 |
| Other grains | 5.39 | 15.99 | 3.73 | 9.39 | 69.60 | 1.51 | 2.41 | 8.36 |
| Dairy | 6.76 | 21.30 | 12.25 | 12.04 | 60.09 | 23.41 | 6.42 | 16.58 |
| procfood | 8.83 | 23.76 | 9.12 | 17.54 | 48.21 | 10.94 | 11.30 | 15.46 |
| livestock | 8.73 | 18.59 | 2.43 | 14.41 | 16.54 | 5.55 | 3.59 | 13.37 |
| Fishing | 4.61 | 15.69 | 0.13 | 10.89 | 17.54 | 4.30 | 7.90 | 10.95 |
| Extraction | 1.99 | 10.78 | 0.25 | 2.84 | 2.32 | 0.43 | 0.11 | 5.30 |
| Textile | 9.55 | 14.05 | 8.86 | 11.62 | 9.99 | 6.83 | 7.82 | 13.84 |
| lightmnfc | 7.75 | 16.32 | 2.42 | 10.36 | 5.52 | 1.99 | 2.67 | 10.61 |
| heavymnfc | 3.76 | 11.40 | 2.18 | 7.55 | 5.65 | 1.19 | 2.65 | 6.71 |

Source: World Integrated Trade Solution (WITS)

The implication of reducing tariff across various sectors would vary between ASEAN and SAARC, as these regions have comparative advantage in different commodities. Similarly the effect of this regional integration on welfare and macroeconomic indicators would be varied due to different socio-economic conditions prevailing in these regions. A scenario of a complete integration between ASEAN and SAARC is simulated using the GTAP model. Under this scenario, tariff between ASEAN and SAARC is removed but maintained for other regions.

**Section 5: Simulation Results**

This section shows the GTAP simulation results of regional integration between SAARC and ASEAN. It reports welfare, macro-economic, sectoral trade and employment effects of the ASEAN-SAARC regional integration.

**Welfare effects**

The net welfare gains from the proposed ASEAN-SAARC regional integration are measured by Equivalent Variation (EV) in income. The regional household's EV is equal to the difference between the expenditure required to obtain the new (post-simulation) level of utility at initial prices (*YEV)* and that available initially (*Y).*

$$EV = Y EV - Y$$

One particularly useful feature of GTAP is welfare decomposition (Huff and Hertel 2001). This subdivides the overall measure of welfare into components that have a reasonably intuitive interpretation. Endowment contributions to welfare arise from changes in the availability of primary factors, for example, increases in the stock of machinery, buildings and agricultural land. Technical efficiency contributions arise from changes in the use of available inputs in

Table 6: Decomposition of Welfare Effect

(Million US $)

| Region | Allocation | Endowment | Terms of Trade | Investment and Saving | Welfare |
|---|---|---|---|---|---|
| 1 ASEAN | 764 | 1785 | 4039 | -460 | 6128 |
| 2 SAARC | 925 | 6152 | -1585 | -563 | 4929 |
| 3 USA | -483 | -818 | -125 | -80 | -1506 |
| 4 CHINA | -326 | -684 | -567 | 278 | -1299 |
| 5 RoK | -146 | -253 | -141 | 40 | -499 |
| 6 Japan | -336 | -655 | -513 | 91 | -1413 |
| 7 EU_28 | -282 | -158 | -214 | 228 | -426 |
| 8 RestofWorld | -502 | -719 | -909 | 466 | -1664 |
| Total | -385 | 4651 | -14 | -1 | 4251 |

Source: GTAP simulation

production, for example, improvements in labour productivity. Allocative efficiency contributions arise when the allocation of resources changes relative to pre-existing distortions. The welfare effects of the simulation for the concerned regions are given in table. In terms of absolute value, highest welfare gain is attained by ASEAN and SAARC, whereas for other regions welfare effect is negative (table 6). The decomposition of the welfare effects suggest that ASEAN's gain from the regional integration is primarily driven by allocation, endowment and terms of trade effects. For SAARC region, the welfare increase due to allocation and endowment effect. Allocative efficacy gain is mainly because of tariff reduction. Endowment gains are from increased employment. SAARC loses terms of trade because it is going to get lower prices for its exports because of tariff reduction, while it is higher for ASEAN.

**Impact on GDP**

Regional integration between ASEAN and SAARC will lead to increase in GDP for ASEAN. All the components of GDP for ASEAN have shown positive increase (table 7). Remaining regions have experienced negative change in GDP. Domestic consumption falls because there is increased demand for export since prices in SAARC region go down due to huge tariff reduction compared to other region. Import increase because of huge tariff reduction, so import prices are much lower than domestic.

Table 7: Change in Macro Variable

(US million $)

| GDPEXP | 1 cons | 2 inv | 3 gov | 4 exp | 5 imp | Total |
|---|---|---|---|---|---|---|
| 1 ASEAN | 7034 | 3302 | 1245 | 10244 | -9883 | 11942 |
| 2 SAARC | -2662 | 656 | -279 | 10465 | -12414 | -4235 |
| 3 USA | -2090 | -761 | -479 | -239 | 796 | -2772 |
| 4 CHINA | -759 | -591 | -300 | -1286 | 1027 | -1908 |
| 5 RoK | -361 | -245 | -103 | -57 | 158 | -608 |
| 6 Japan | -1439 | -1205 | -464 | 463 | 428 | -2217 |
| 7 EU_28 | -696 | -199 | -251 | -1113 | 1142 | -1117 |
| 8 RestofWorld | -2211 | -1054 | -641 | -1776 | 2045 | -3635 |
| Total | -3182 | -96 | -1272 | 16702 | -16701 | -4550 |

Source: GTAP simulation

**Impact on overall trade balance**

Integration of SAARC and ASEAN will lead to increase in export and import form these regions. However, ASEAN will experience positive trade balance due to sharp increase in export in comparison to import. SAARC and China have negative trade balance after the simulation. All other regions have positive trade balance.

Figure 6: Overall Trade Balance (US Million $)
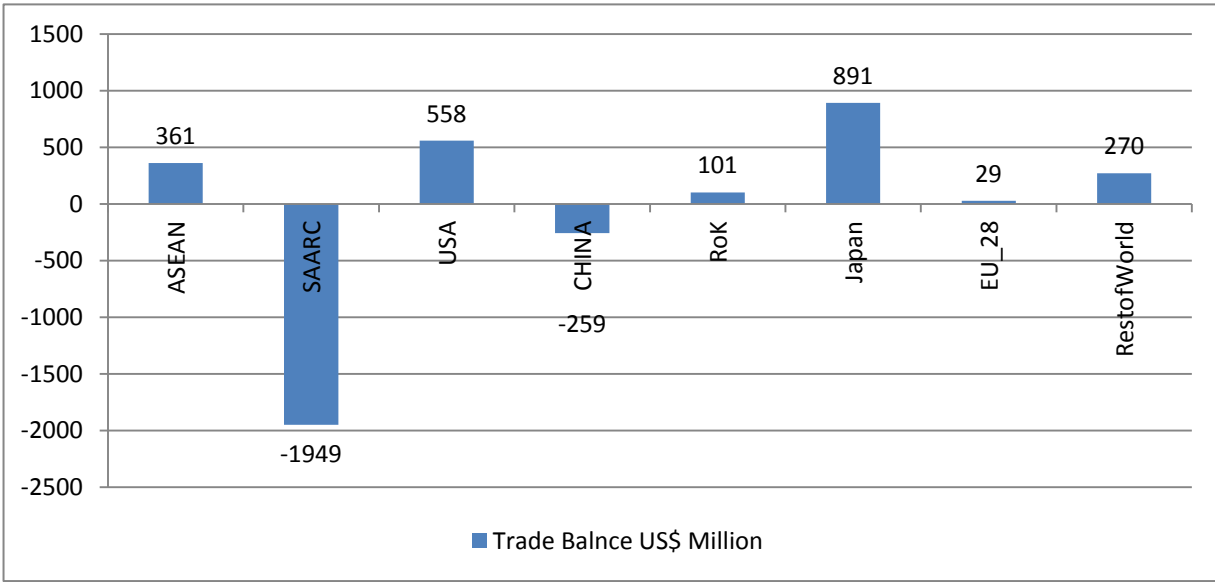
Source: Simulation result

Table 8: Sector-wise trade balance (US $ million)

| DTBALi | ASEAN | SAARC | USA | CHINA | RoK | Japan | EU_28 | Rest of World |
|---|---|---|---|---|---|---|---|---|
| Paddy | -238.0 | 171.0 | 9.1 | 5.6 | 0.2 | 7.2 | 2.6 | 33.1 |
| wheat | -50.7 | 78.5 | -2.2 | 4.3 | 0.6 | 0.6 | -8.4 | -21.0 |
| plantfiber | -6.1 | -9.2 | -2.7 | 5.3 | 0.9 | 0.2 | 0.5 | 8.4 |
| oilseeds | -131.2 | 108.6 | 6.3 | 7.2 | 0.8 | 0.4 | -3.1 | -2.3 |
| sugar | -66.5 | 61.1 | 0.5 | 0.3 | -0.1 | 0.2 | -2.3 | -5.5 |
| vegetable | 308.6 | -271.5 | -14.0 | 25.1 | 1.6 | 3.9 | -0.4 | -85.5 |
| otherGrains | -122.7 | 10.8 | 14.7 | 6.9 | 0.8 | 0.4 | 26.1 | 48.4 |
| Dairy | -35.4 | -4.2 | 4.0 | 0.7 | 0.2 | 2.2 | -2.5 | 30.3 |
| ProcFood | 2449.9 | -2531.0 | 10.8 | 32.3 | -12.9 | 29.2 | -63.8 | -298.1 |
| Livestock | -247.8 | 238.7 | -11.8 | 9.0 | 1.2 | 5.9 | 3.0 | -3.1 |
| Fish | -25.7 | 5.1 | -0.1 | 2.6 | 1.1 | 1.1 | 2.6 | 13.0 |
| Extraction | 1215.4 | -1841.5 | 10.3 | 101.5 | -40.5 | -191.8 | -40.7 | 5.3 |
| TextWapp | 8.4 | 1050.1 | -35.8 | -517.8 | -59.1 | -10.8 | -343.7 | -176.0 |
| LightMnfc | 453.9 | 383.6 | -356.5 | -78.3 | -65.0 | 65.3 | -526.7 | -5.6 |
| HeavyMnfc | 11.5 | -235.7 | 500.3 | -166.7 | 51.9 | 585.0 | -547.1 | -600.5 |
| transcomm | -1318.2 | 287.7 | 213.7 | 233.1 | 167.2 | 275.4 | 1170.2 | 833.7 |
| Util_cons | -194.3 | 25.9 | 10.8 | 10.3 | 6.1 | 25.7 | 46.2 | 69.2 |
| OtherService | -1649.9 | 522.2 | 200.1 | 59.4 | 45.6 | 91.0 | 315.5 | 416.1 |

Source: GTAP simulation

About sector-wise trade balance, result varies across all the regions (table 8). SAARC region will experience positive trade balance in 12 sectors out of 18 sectors. Textiles and Clothing, other

services (Financial services, Insurance, Business services, Recreation and other services, Defence/Health/Education), light manufacturing and livestock have shown highest positive trade balance for SAARC region. SAARC region will have highest negative trade balance in process food, extraction, vegetable and heavy industry. ASEAN will gain in 6 sectors out of 18 sectors in terms of positive trade balance. Highest positive trade balance sectors for ASEAN are process food, extraction, vegetable and light manufacturing. Other services, transport and communication, livestock are highest negative trade balance sector for ASEAN region. For other regions also, result varies across sectors.

Table 9: Change in Export

(Million US$)

| R001 | 1 ASEAN | 2 SAARC | 3 USA | 4 CHINA | 5 RoK | 6 Japan | 7 EU_28 | 8 Rest of World |
|---|---|---|---|---|---|---|---|---|
| 1 Paddy | -114 | 178 | 6 | 3 | 0 | 0 | 3 | 7 |
| 2 wheat | 0 | 8 | -2 | 4 | 0 | 0 | -8 | -33 |
| 3 plantfiber | 0 | 24 | -3 | 0 | 0 | 0 | 0 | 6 |
| 4 oilseeds | -4 | 92 | 7 | 0 | 0 | 0 | -3 | -8 |
| 5 sugar | 11 | 92 | 0 | 0 | 0 | 0 | -2 | -12 |
| 6 vegetable | 411 | 16 | -17 | 14 | 1 | 0 | -1 | -100 |
| 7 otherGrains | 11 | 116 | 8 | 5 | 0 | 0 | 14 | 29 |
| 8 Dairy | 36 | 23 | 4 | 0 | 0 | 0 | -4 | 20 |
| 9 ProcFood | 2975 | 300 | -21 | 7 | -17 | 4 | -76 | -368 |
| 10 Livestock | -79 | 244 | -14 | 2 | 0 | 0 | -5 | -17 |
| 11 Fish | -12 | 6 | 1 | 2 | 1 | 1 | 4 | 12 |
| 12 Extraction | 3089 | 446 | 33 | 50 | 0 | 0 | -435 | -424 |
| 13 TextWapp | 397 | 1662 | -42 | -551 | -75 | -34 | -357 | -236 |
| 14 LightMnfc | 1792 | 1950 | -504 | -141 | -95 | -60 | -692 | -308 |
| 15 HeavyMnfc | 3557 | 4521 | -48 | -899 | -39 | 265 | -950 | -1346 |
| 16 transcomm | -775 | 238 | 176 | 181 | 145 | 232 | 1115 | 708 |
| 17 Util_cons | -97 | 21 | 8 | 7 | 5 | 13 | 33 | 42 |
| 18 OtherService | -954 | 527 | 168 | 29 | 19 | 43 | 253 | 254 |
| Total | 10244 | 10465 | -239 | -1286 | -57 | 464 | -1113 | -1775 |

Source: GTAP simulation

For ASEAN region, there is a sharp increase in export of heavy manufacturing, extraction, process food, and light manufacturing, vegetable and textile sector. However, export of other services, transport and communication, paddy and utility services declined after the simulation. In case of import, all the sectors have shown positive sign after the simulation. Import of heavy

manufacturing, extraction, light manufacturing, other services, transport and process food sectors have highest positive change after the simulation (table 9 & 10).

In terms of export from SAARC, sectors like heavy manufacturing, light manufacturing, other services, and textile performed well after the regional integration between SAARC and ASEAN. It is important to note that export of all sectors was positive in SAARC region after the simulation. Import of heavy manufacturing, process food, extraction and light manufacturing increased sharply after the simulation.

Table 10: Change in Import

(Million US$)

| R002 | 1 ASEAN | 2 SAARC | 3 USA | 4 CHINA | 5 RoK | 6 Japan | 7 EU_28 | 8 RestofWorld |
|---|---|---|---|---|---|---|---|---|
| 1 Paddy | 124 | 7 | -3 | -3 | 0 | -7 | 0 | -27 |
| 2 wheat | 51 | -70 | 0 | 0 | -1 | -1 | 0 | -13 |
| 3 plantfiber | 6 | 33 | 0 | -5 | -1 | 0 | -1 | -2 |
| 4 oilseeds | 127 | -17 | 0 | -7 | -1 | 0 | 0 | -5 |
| 5 sugar | 78 | 30 | -1 | 0 | 0 | 0 | 0 | -7 |
| 6 vegetable | 102 | 288 | -3 | -11 | -1 | -4 | -1 | -15 |
| 7 otherGrains | 134 | 105 | -6 | -2 | -1 | -1 | -12 | -20 |
| 8 Dairy | 71 | 27 | 0 | -1 | 0 | -2 | -1 | -10 |
| 9 ProcFood | 526 | 2831 | -32 | -26 | -4 | -25 | -12 | -70 |
| 10 Livestock | 169 | 5 | -2 | -7 | -2 | -6 | -8 | -14 |
| 11 Fish | 14 | 1 | 1 | 0 | 0 | 0 | 1 | -1 |
| 12 Extraction | 1874 | 2288 | 23 | -52 | 40 | 192 | -395 | -442 |
| 13 TextWapp | 389 | 612 | -6 | -33 | -16 | -23 | -13 | -60 |
| 14 LightMnfc | 1339 | 1567 | -147 | -63 | -30 | -125 | -166 | -301 |
| 15 HeavyMnfc | 3545 | 4757 | -549 | -732 | -91 | -321 | -403 | -746 |
| 16 transcomm | 543 | -49 | -37 | -52 | -23 | -44 | -56 | -126 |
| 17 Util_cons | 97 | -5 | -3 | -3 | -1 | -13 | -14 | -28 |
| 18 OtherService | 696 | 4 | -32 | -31 | -27 | -49 | -62 | -162 |
| Total | 9883 | 12414 | -796 | -1027 | -158 | -428 | -1143 | -2046 |

Source: GTAP simulation

Except for six sectors, import prices (Pim) declined after the simulation for ASEAN region. Highest decline in import prices was observed in oilseeds, livestocks, sugar, and paddy. Import of all sectors (qim) especially oilseeds, paddy, live-stocks and grains has increased after the simulation. Export price index (pxw) of all the sectors increased especially fish, vegetable and oilseeds. There is positive change in aggregate export (qxw) of vegetables, process food, extraction, light & heavy manufacturing and textile sector in ASEAN region (table 11).

For SAARC region, import prices sharply decline for process food, vegetables and grains. The percentage change in aggregate import of processed food, grains, vegetables and textile increased steeply. Export price index of all the sectors declined after the integration of ASEAN and SAARC. All the sectors especially livestock, oilseed, sugar, wheat etc. have positive change in aggregate export after the regional integration of SAARC and ASEAN region.

Table 11: Percentage change in demand of export and import[5]

| Sector | pim | | pxw | | qim | | qxw | |
|---|---|---|---|---|---|---|---|---|
| | ASEAN | SAARC | ASEAN | SAARC | ASEAN | SAARC | ASEAN | SAARC |
| Paddy | -0.60 | -0.75 | 0.78 | -0.38 | 5.27 | 1.57 | -2.86 | 5.55 |
| wheat | -0.04 | -0.04 | 0.74 | -0.65 | 1.96 | -3.80 | -1.17 | 6.52 |
| plantfiber | -0.23 | -0.02 | 0.53 | -0.01 | 0.33 | 1.62 | -0.26 | 1.37 |
| oilseeds | -0.88 | -0.16 | 1.41 | -0.52 | 6.78 | -2.67 | -3.44 | 14.21 |
| sugar | -0.78 | -2.30 | 0.69 | -0.37 | 3.50 | 4.59 | -0.05 | 8.74 |
| vegetable | -0.15 | -4.18 | 1.52 | -0.49 | 2.99 | 6.65 | 8.40 | 1.44 |
| otherGrains | -0.34 | -3.16 | 1.07 | -0.32 | 3.51 | 7.06 | -0.84 | 4.21 |
| Dairy | -0.01 | -1.29 | 0.53 | -0.41 | 1.68 | 3.59 | 3.48 | 5.92 |
| ProcFood | -0.42 | -13.67 | 0.68 | -0.76 | 2.46 | 24.03 | 6.22 | 4.90 |
| Livestock | -0.85 | -0.53 | 0.74 | -0.47 | 4.81 | 0.57 | -4.09 | 19.56 |
| Fish | 0.52 | -0.99 | 1.69 | -0.11 | 1.71 | 1.24 | -2.60 | 2.55 |
| Extraction | 0.17 | -1.00 | 1.22 | -0.40 | 2.52 | 1.73 | 3.43 | 4.51 |
| TextWapp | -0.36 | -1.78 | 0.30 | -0.45 | 1.68 | 5.48 | 0.73 | 4.03 |
| LightMnfc | -0.13 | -1.67 | 0.43 | -0.56 | 1.62 | 3.61 | 1.57 | 6.42 |
| HeavyMnfc | 0.03 | -1.41 | 0.43 | -0.62 | 0.81 | 2.70 | 0.35 | 6.43 |
| transcomm | 0.01 | 0.03 | 0.55 | -0.37 | 1.09 | -0.30 | -1.33 | 1.22 |
| Util_cons | 0.02 | -0.03 | 0.50 | -0.50 | 1.44 | -0.29 | -2.25 | 2.35 |
| OtherService | 0.00 | 0.06 | 0.58 | -0.32 | 1.11 | -0.05 | -2.14 | 1.27 |

Source: GTAP simulation

**Bilateral Trade Balance:**

About bilateral export, SAARC export to all the other regions increased substantially. SAARC export to ASEAN increased by 5255 USD million after the simulation (see appendix table 1). However, SAARC witness positive change (USD 34673 million) in import from ASEAN after the regional integration. For other regions, SAARC import declined after the simulation (see

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[5] Pim indicate percentage change in market price of composite import i in region R: Pxw shows percentage change aggregate export price index of from region R; Qim indicate the percentage change aggregate import of i in region s, whereas; Qxw show percentage change in aggregate export of commodity i from region r.

appendix table 2). Except ASEAN, SAARC has positive trade balance with other region. It has huge negative trade balance (USD 29418 million) with ASEAN region (see table 13).

Table 13: Change in SAARC's Trade balance with regions

<div align="right">(Million US$)</div>

| Trade balance | 1 ASEAN | 2 SAARC | 3 USA | 4 CHINA | 5 RoK | 6 Japan | 7 EU_28 | 8 RestofWorld |
|---|---|---|---|---|---|---|---|---|
| 1 Paddy | 115 | 1 | 2 | 0 | 0 | 0 | 8 | 45 |
| 2 wheat | 5 | 0 | 6 | 0 | 0 | 0 | 2 | 65 |
| 3 plantfiber | 17 | -1 | -7 | -2 | 0 | 0 | 0 | -17 |
| 4 oilseeds | 81 | 0 | 1 | 1 | 2 | 0 | 3 | 21 |
| 5 sugar | 33 | 2 | 0 | 0 | 0 | 0 | 2 | 23 |
| 6 vegetable | -499 | 9 | 36 | 21 | 0 | 0 | 9 | 152 |
| 7 otherGrains | -82 | 2 | 7 | 7 | 0 | 2 | 15 | 59 |
| 8 Dairy | -41 | 0 | 5 | 1 | 0 | 0 | 8 | 22 |
| 9 ProcFood | -3564 | 31 | 78 | 42 | 27 | 16 | 215 | 625 |
| 10 Livestock | 196 | 0 | 3 | 1 | 0 | 0 | 6 | 33 |
| 11 Fish | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 12 Extraction | -10465 | 3 | 17 | 337 | 18 | 31 | 750 | 7467 |
| 13 TextWapp | -661 | 5 | 386 | 389 | 42 | 22 | 532 | 336 |
| 14 LightMnfc | -2813 | 3 | 823 | 315 | 132 | 227 | 901 | 797 |
| 15 HeavyMnfc | -11909 | 14 | 1073 | 2045 | 526 | 595 | 2685 | 4737 |
| 16 transcomm | 43 | 0 | 38 | 7 | 4 | 8 | 98 | 54 |
| 17 Util_cons | 3 | 0 | 1 | 1 | 0 | 5 | 7 | 9 |
| 18 OtherService | 120 | 0 | 109 | 19 | 7 | 5 | 181 | 83 |
| Total | -29418 | 70 | 2579 | 3185 | 759 | 909 | 5422 | 14509 |

Source: Simulation result

ASEAN export to all other regions except SAARC declined after the tariff reduction between ASEAN and SAARC. Export to SAARC increased by USD 31394 million after the simulation (see appendix table 3). Import from all other regions to ASEAN has positive change after the regional integration (see appendix table 4). Except SAARC, ASEAN has negative trade balance. With SAARC, it will have around USD 25833 millions positive trade balance. It is noteworthy that logically, ASEAN trade balance with SAARC (table 14) should be equal to SAARC trade balance with ASEAN (table 13). However, due to various reasons like reporting period, fob or cif prices etc. these two figures are not matching. The main point to be noted is that ASEAN with have positive trade balance with SAARC region.

Table 14: Change in ASEAN's trade balance with other regions

(Million US$)

| VIWS | 1 ASEAN | 2 SAARC | 3 USA | 4 CHINA | 5 RoK | 6 Japan | 7 EU_28 | 8 RestofWorld |
|---|---|---|---|---|---|---|---|---|
| 1 Paddy | 5 | -136 | -5 | -3 | -1 | -11 | -10 | -77 |
| 2 wheat | 0 | -5 | -14 | -5 | 0 | 0 | 0 | -26 |
| 3 plantfiber | 0 | -19 | 5 | 0 | 0 | 0 | 0 | 7 |
| 4 oilseeds | 1 | -91 | -17 | -2 | 0 | -1 | -1 | -19 |
| 5 sugar | 4 | -54 | -3 | -1 | -1 | -4 | -1 | -7 |
| 6 vegetable | 3 | 441 | -19 | -47 | -4 | -9 | -16 | -39 |
| 7 otherGrains | 3 | 58 | -34 | -13 | -3 | -14 | -62 | -58 |
| 8 Dairy | 1 | 37 | -9 | -1 | 0 | -3 | -14 | -46 |
| 9 ProcFood | 10 | 3045 | -117 | -76 | -17 | -75 | -110 | -209 |
| 10 Livestock | 2 | -212 | 4 | 1 | -1 | -21 | -27 | 6 |
| 11 Fish | 0 | -5 | -3 | -2 | -2 | -4 | -3 | -8 |
| 12 Extraction | 97 | 8758 | -228 | -699 | -771 | -1897 | -239 | -3807 |
| 13 TextWapp | 6 | 533 | -324 | 54 | 16 | -28 | -149 | -99 |
| 14 LightMnfc | 19 | 2519 | -350 | -166 | -86 | -335 | -563 | -585 |
| 15 HeavyMnfc | 86 | 11132 | -2080 | -2576 | -622 | -1565 | -1814 | -2550 |
| 16 transcomm | 0 | -43 | -153 | -86 | -46 | -97 | -601 | -422 |
| 17 Util_cons | 0 | -3 | -13 | -10 | -8 | -26 | -77 | -58 |
| 18 OtherService | 0 | -120 | -247 | -62 | -55 | -70 | -670 | -425 |
| Total | 236 | 25833 | -3607 | -3692 | -1600 | -4161 | -4355 | -8421 |

Source: Simulation result

**Demand of Industrial Output**

In ASEAN region, process food, vegetables, oilseed, fish, utility services sectors has highest growth after the simulation. However, plant fibre, wheat, paddy, livestock, sugar sectors not performed well. For SAARC region, out of 18 sectors, 14 sectors have shown positive growth in output (table 15). Textile, plant fibre, light and heavy manufacturing sectors have highest positive growth whereas, process food, oilseed, wheat and vegetable sectors have experienced negative growth. After the simulation, there is increase in demand for unskilled and skilled labour after the simulation.

Table 15: Industrial output (Percentage)

| qo | ASEAN | SAARC | USA | CHINA | RoK | Japan | EU_28 | Rest of World |
|---|---|---|---|---|---|---|---|---|
| Land | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| UnSkLab | 0.43 | 0.95 | -0.01 | -0.04 | -0.06 | -0.04 | 0.00 | -0.02 |
| SkLab | 0.29 | 1.06 | -0.01 | -0.05 | -0.06 | -0.04 | 0.00 | -0.02 |
| Capital | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| NatRes | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Paddy | -0.57 | 0.49 | 0.20 | -0.01 | 0.00 | 0.04 | 0.11 | 0.11 |
| wheat | -1.54 | -1.32 | -0.01 | 0.00 | 0.10 | 0.00 | -0.03 | -0.06 |
| plantfiber | -1.26 | 1.51 | -0.05 | -0.18 | -0.01 | -0.46 | -0.04 | 0.00 |
| oilseeds | 1.02 | -0.57 | 0.02 | 0.01 | -0.13 | 0.03 | -0.02 | -0.03 |
| sugar | -0.34 | 0.12 | 0.00 | 0.00 | -0.04 | 0.06 | -0.02 | -0.02 |
| vegetable | 1.22 | -0.48 | -0.02 | 0.00 | 0.05 | 0.03 | 0.00 | -0.04 |
| otherGrains | -0.01 | 0.20 | 0.03 | 0.01 | -0.02 | 0.02 | 0.02 | 0.02 |
| Dairy | 0.08 | 0.30 | -0.01 | -0.02 | -0.03 | -0.02 | 0.00 | 0.00 |
| ProcFood | 2.11 | -2.57 | -0.01 | 0.00 | -0.06 | -0.01 | -0.01 | -0.05 |
| Livestock | -0.37 | 0.89 | -0.02 | -0.03 | -0.03 | 0.00 | 0.00 | -0.01 |
| Fish | 0.52 | 0.12 | 0.03 | -0.01 | 0.00 | 0.01 | 0.01 | 0.01 |
| Extraction | 0.35 | -0.16 | 0.00 | 0.02 | 0.13 | 0.20 | -0.06 | 0.00 |
| TextWapp | 0.01 | 1.61 | -0.06 | -0.20 | -0.27 | -0.11 | -0.13 | -0.10 |
| LightMnfc | 0.44 | 0.98 | -0.04 | -0.03 | -0.07 | -0.02 | -0.02 | -0.02 |
| HeavyMnfc | 0.00 | 0.85 | 0.01 | -0.01 | -0.03 | 0.02 | -0.01 | -0.03 |
| transcomm | -0.05 | 0.55 | -0.01 | 0.00 | 0.01 | -0.02 | 0.02 | 0.01 |
| Util_cons | 0.45 | 0.68 | -0.02 | -0.03 | -0.06 | -0.08 | 0.00 | -0.02 |
| OtherService | -0.06 | 0.55 | -0.01 | -0.03 | -0.04 | -0.03 | 0.00 | -0.01 |
| CGDS | 0.74 | 0.79 | -0.02 | -0.04 | -0.08 | -0.11 | 0.00 | -0.02 |

Source: GTAP simulation

**SECTION 6: Limitation and Conclusion**

This study used the GTAP static model on 18 tradable commodities and 8 regions of the world to understand the likely impact of SAARC and ASEAN regional integration. This study updates the tariff protection for the eight regions and analyses the likely impact on welfare, macro-economic variables, and output, employment and trade indicators.

 Under this study, a hypothetical scenario of a complete regional integration between SAARC and ASEAN is estimated by complete elimination of import tariff between these two regions but maintained for other regions. Although it is unlikely that an agreement would result in the complete removal of tariffs on all products listed in national tariff lines, this experiment provides the maximilistic situation of tariff liberalisation  for   the complete integration of ASEAN and SAARC and thus the model expresses the upper-most level of benefit that can be achieved in the process.   However, eliminating tariffs on all products in SAARC and ASEAN  can not be a real situation as  in all the PTAs in Asia-Pacific (as well as ASEAN FTA and SAFTA) there exists each PTA partner's sensitive or exclusion list covering products on which tariffs are not

liberalised. This study does not adequately capture the service trade reforms and thus the result may underestimate the potential effect of liberalisation where services sector is to be included. It is to be noted that GTAP model has both static and dynamic version. However, in this paper, static GTAP model is used. Gilbert (2013) mentioned that the static model has disadvantage relative to dynamic techniques of not describing the time path, i.e. attention in the analysis is concentrated on the end outcome rather than the transition. Data aggregation is an issue, since the result may be different if one does detailed sectoral and country-level analysis. For the model in general: market structure (perfect competition, uniformity of functions across sectors and regions, etc) is too simplistic in the standard GTAP model. Studies that do incorporate imperfect competition tend to generate welfare estimates that are roughly double those of competitive models (Gilbert, 2013). This study gives only conservative outcome as it only considered only merchandise trade liberalisation.

In terms of absolute value, highest welfare gain is attained by ASEAN and SAARC, whereas for other regions welfare effect is negative. Regional integration between ASEAN and SAARAC has led to increase in GDP for ASEAN. Remaining regions have experienced negative change in GDP. ASEAN will experience positive trade balance due to sharp increase in export in comparison to import. SAARC and China have negative trade balance after the simulation. All other regions have positive trade balance. In ASEAN region, process food, vegetables, oilseed, fish, utility services sectors has highest output growth after the simulation. For SAARC region, out of 18 sectors, 14 sectors have shown positive growth in output. About bilateral trade balance, ASEAN region will have huge positive trade balance with SAARC region. After the simulation, there is an increase in demand for unskilled and skilled labour in SAARC and ASEAN region.

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## Appendix Table 1: Change in SAARC's export to other regions

(Million US$)

| VXWD | 1 ASEAN | 2 SAARC | 3 USA | 4 CHINA | 5 RoK | 6 Japan | 7 EU_28 | 8 Rest of World |
|---|---|---|---|---|---|---|---|---|
| 1 Paddy | 128 | -5 | 2 | 0 | 0 | 0 | 8 | 45 |
| 2 wheat | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| 3 plantfiber | 18 | 8 | 0 | -1 | 0 | 0 | 0 | 0 |
| 4 oilseeds | 85 | -1 | 1 | 1 | 2 | 0 | 2 | 3 |
| 5 sugar | 100 | -18 | 0 | 0 | 0 | 0 | 2 | 7 |
| 6 vegetable | 36 | -34 | 3 | 1 | 0 | 0 | 4 | 6 |
| 7 otherGrains | 115 | -28 | 4 | 0 | 0 | 1 | 9 | 15 |
| 8 Dairy | 18 | -2 | 2 | 0 | 0 | 0 | 2 | 3 |
| 9 ProcFood | 465 | -277 | 18 | 7 | 5 | 13 | 35 | 36 |
| 10 Livestock | 219 | -1 | 1 | 0 | 0 | 0 | 3 | 22 |
| 11 Fish | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12 Extraction | 34 | -17 | 6 | 321 | 17 | 29 | 30 | 27 |
| 13 TextWapp | 594 | -70 | 371 | 22 | 9 | 11 | 482 | 243 |
| 14 LightMnfc | 1065 | -50 | 234 | 25 | 15 | 24 | 279 | 359 |
| 15 HeavyMnfc | 2293 | -247 | 343 | 133 | 115 | 90 | 580 | 1214 |
| 16 transcomm | 19 | 1 | 34 | 6 | 4 | 7 | 86 | 47 |
| 17 Util_cons | 2 | 2 | 1 | 1 | 0 | 5 | 5 | 7 |
| 18 OtherService | 54 | 3 | 124 | 21 | 8 | 7 | 211 | 100 |
| Total | 5255 | -737 | 1143 | 535 | 175 | 187 | 1734 | 2136 |

Source: Simulation result

## Appendix Table 2: Change in SAARC's import from other regions

(Million US$)

| VIWS | 1 ASEAN | 2 SAARC | 3 USA | 4 CHINA | 5 RoK | 6 Japan | 7 EU_28 | 8 RestofWorld |
|---|---|---|---|---|---|---|---|---|
| 1 Paddy | 13 | -6 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 wheat | 0 | 0 | -6 | 0 | 0 | 0 | -2 | -62 |
| 3 plantfiber | 1 | 9 | 6 | 0 | 0 | 0 | 0 | 17 |
| 4 oilseeds | 4 | -1 | 0 | 0 | 0 | 0 | -2 | -18 |
| 5 sugar | 67 | -20 | 0 | 0 | 0 | 0 | 0 | -16 |
| 6 vegetable | 535 | -43 | -33 | -20 | 0 | 0 | -6 | -146 |
| 7 otherGrains | 197 | -31 | -3 | -7 | 0 | -1 | -6 | -43 |
| 8 Dairy | 59 | -3 | -3 | -1 | 0 | 0 | -6 | -19 |
| 9 ProcFood | 4029 | -307 | -60 | -36 | -22 | -3 | -181 | -589 |
| 10 Livestock | 23 | 0 | -2 | -1 | 0 | 0 | -3 | -12 |
| 11 Fish | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12 Extraction | 10500 | -20 | -12 | -17 | -1 | -2 | -721 | -7440 |
| 13 TextWapp | 1255 | -75 | -15 | -367 | -33 | -11 | -50 | -93 |
| 14 LightMnfc | 3878 | -53 | -589 | -289 | -117 | -202 | -623 | -438 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 15 HeavyMnfc | 14202 | -261 | -730 | -1911 | -411 | -505 | -2105 | -3523 |
| 16 transcomm | -24 | 1 | -5 | -1 | 0 | -1 | -12 | -7 |
| 17 Util_cons | -1 | 2 | -1 | 0 | 0 | -1 | -2 | -2 |
| 18 OtherService | -66 | 3 | 15 | 2 | 1 | 3 | 30 | 17 |
| Total | 34673 | -806 | -1437 | -2649 | -584 | -722 | -3688 | -12373 |

Source: Simulation result

Appendix Table 3: Change in ASEAN's export to other regions

(Million US$)

| VXWD | 1 ASEAN | 2 SAARC | 3 USA | 4 CHINA | 5 RoK | 6 Japan | 7 EU_28 | 8 RestofWorld |
|---|---|---|---|---|---|---|---|---|
| 1 Paddy | -20 | 12 | -5 | -2 | -1 | -11 | -10 | -77 |
| 2 wheat | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 plantfiber | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 oilseeds | -2 | 3 | 0 | -1 | 0 | -1 | -1 | -2 |
| 5 sugar | -26 | 60 | -3 | -1 | -1 | -4 | -1 | -13 |
| 6 vegetable | -3 | 490 | -11 | -12 | -4 | -9 | -15 | -25 |
| 7 otherGrains | -23 | 183 | -31 | -4 | -3 | -14 | -59 | -39 |
| 8 Dairy | -6 | 55 | -1 | 0 | 0 | -3 | -1 | -9 |
| 9 ProcFood | -63 | 3553 | -106 | -61 | -14 | -72 | -91 | -170 |
| 10 Livestock | -24 | 21 | -4 | -1 | -1 | -21 | -32 | -17 |
| 11 Fish | 3 | 1 | -3 | -1 | -1 | -4 | -3 | -5 |
| 12 Extraction | -805 | 8798 | -218 | -664 | -770 | -1893 | -221 | -1138 |
| 13 TextWapp | -77 | 1172 | -329 | -18 | -14 | -40 | -162 | -135 |
| 14 LightMnfc | -226 | 3610 | -277 | -79 | -48 | -213 | -458 | -516 |
| 15 HeavyMnfc | -1625 | 13525 | -1721 | -1968 | -375 | -976 | -1382 | -1922 |
| 16 transcomm | -8 | -24 | -98 | -60 | -39 | -56 | -385 | -233 |
| 17 Util_cons | -1 | -1 | -5 | -3 | -2 | -15 | -40 | -30 |
| 18 OtherService | -10 | -66 | -111 | -45 | -42 | -43 | -384 | -252 |
| Total | -2918 | 31394 | -2922 | -2921 | -1314 | -3374 | -3245 | -4585 |

Source: Simulation result

Appendix Table 4: Change in ASEAN's Import from other regions

| VIWS | 1 ASEAN | 2 SAARC | 3 USA | 4 CHINA | 5 RoK | 6 Japan | 7 EU_28 | 8 RestofWorld |
|---|---|---|---|---|---|---|---|---|
| 1 Paddy | -25 | 148 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 wheat | 0 | 6 | 14 | 5 | 0 | 0 | 0 | 26 |
| 3 plantfiber | 0 | 19 | -5 | 0 | 0 | 0 | 0 | -7 |
| 4 oilseeds | -3 | 95 | 17 | 1 | 0 | 0 | 0 | 16 |
| 5 sugar | -30 | 114 | 0 | 0 | 0 | 0 | 0 | -6 |
| 6 vegetable | -6 | 50 | 8 | 34 | 0 | 0 | 1 | 14 |
| 7 otherGrains | -26 | 125 | 3 | 9 | 0 | 0 | 3 | 20 |
| 8 Dairy | -7 | 18 | 8 | 1 | 0 | 0 | 13 | 37 |
| 9 ProcFood | -73 | 508 | 11 | 15 | 2 | 4 | 19 | 39 |
| 10 Livestock | -26 | 234 | -7 | -2 | 0 | 0 | -5 | -24 |
| 11 Fish | 3 | 6 | 0 | 1 | 0 | 1 | 0 | 3 |
| 12 Extraction | -902 | 40 | 9 | 35 | 1 | 4 | 18 | 2669 |
| 13 TextWapp | -83 | 639 | -4 | -71 | -30 | -12 | -13 | -37 |
| 14 LightMnfc | -246 | 1092 | 73 | 87 | 38 | 122 | 105 | 68 |
| 15 HeavyMnfc | -1711 | 2393 | 359 | 608 | 248 | 589 | 432 | 628 |
| 16 transcomm | -8 | 19 | 55 | 26 | 7 | 41 | 215 | 189 |
| 17 Util_cons | -1 | 2 | 9 | 7 | 6 | 11 | 37 | 28 |
| 18 OtherService | -10 | 54 | 136 | 17 | 13 | 28 | 286 | 172 |
| Total | -3154 | 5560 | 686 | 772 | 286 | 787 | 1110 | 3836 |

Source: Simulation result