

# **How Desirable is the South Asian Free Trade Area? A Quantitative Assessment**

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## **Abstract**

The proliferation of preferential trading agreements (PTAs) in different regions of the world has been a significant development over the last two decades or so. South Asian countries are slowly moving towards a South Asia Free Trade Area (SAFTA) in recent years.

The desirability of SAFTA has been questioned by some observers recently. Do necessary conditions exist for a successful PTA in South Asia? Will SAFTA create gains for its members or not? Is it better for South Asian countries to promote non-discriminatory trade liberalisation rather than promote SAFTA? Does SAFTA encourage unilateral trade liberalisation in the South Asian region? The main objective of this paper is to address some of the above questions, especially the desirability of SAFTA, using trade data and a global computable general equilibrium (CGE) model. From the existing empirical and theoretical studies, we have identified three viewpoints on the desirability (or viability) of SAFTA: pessimistic, optimistic, and moderate. Our discussion of the necessary conditions for forming a SAFTA, and the present political climate in South Asia seem to support the pessimistic view. Results from two policy scenarios (unilateral liberalisation and preferential liberalisation) confirm the pessimistic view by showing that unilateral liberalisation would benefit South Asia countries much more than preferential liberalisation. In fact, under preferential liberalisation, small countries in the region would gain little or even lose.

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## **How Desirable is the South Asian Free Trade Area? A Quantitative Assessment**

### **1. Introduction**

The proliferation of preferential trading agreements (PTAs) in different regions of the world has been a significant development over the last two decades or so. The South Asian region is no exception. Seven South Asian countries (Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka) formed the South Asian Association of Regional Cooperation - SAARC) in 1985 as a first step toward the regional cooperation. After a decade's existence, the South Asian Preferential Trading Agreement (SAPTA) was launched by the SAARC in 1995 as the second step and the end of year 2001 has been declared as the deadline to finalise a treaty for the South Asian Free Trade Association (SAFTA) as the final step of forming a South Asian free trade area. There is a large body of literature on PTAs in Europe, North America, South America and South East Asia. However, the literature on the South Asian regional grouping is still limited and much more qualitative. While there are many quantitative assessments on PTAs in other parts of the world, the number of quantitative studies on SAARC is limited. Even within a limited volume of literature on South Asian economic integration, there are some controversies over the desirability of SAFTA. The existing literature raises some questions. Do necessary conditions exist for a successful PTA in South Asia? Will SAPTA or SAFTA create gains for its members or not? Is it better for South Asian countries to promote non-discriminatory trade liberalisation rather than promote SAFTA? Does SAFTA (or SAPTA) encourage unilateral trade liberalisation in the South Asian region?

The main objective of this paper is to address some of the above questions using trade data and a global computable general equilibrium (CGE) model. The next section of the paper provides a very brief overview about South Asia and the progress of economic integration in this region. This will set the background for the study. Section 3 attempts to analyse whether the necessary conditions exist in the region for a successful PTA. A brief review of previous quantitative assessments of SAPTA is presented in Section 4 and the main analytical framework of this study is introduced in Section 5. The results of main policy scenarios are presented in Section 6. The alternative policy options for the region are also examined in this section. The final section presents concluding remarks.

### **2. An Overview of Evolution of Economic Integration in South Asia**

#### *South Asia at a Glance*

In recent years, South Asia has been the second fastest growing region in the world. Yet it remains as the region with the largest number of people living in poverty. Having more than 22 per cent of the world's population living on only 3.8 percent of the total land area of the world, it is home for more than half a billion poor people, or 40 per cent of world's poor. Its shares of world GNP and purchasing power are very small (around 2 per cent and 7 per cent, respectively). Its share in total world trade is even more small, only about one percent.

Although trade barriers are high, recent economic reforms have lowered some barriers on trade and investment, and have raised economic growth considerably (see Bandara and McGillivray, 1998 and Panagariya, 1999 for an overview of trade reforms in the region). With recent economic reforms, countries in the region are promoting economic integration for economic prosperity under the banner of SAARC.

#### *From SARC to SAFTA - Evolution*

To some observers, the establishment of the SAARC is not a new concept and, in fact, it is an attempt to restore the economic union that existed between India and Pakistan before their independence in 1947 (see Khan, 1999, p.490). In the early 1980s, Bangladesh has taken the initiatives to establish a regional co-operation, which led to the first South Asian foreign secretaries' meeting, held in April, 1981 in Colombo. At this meeting it was decided not to attempt to do too much too soon but to adapt a gradual confidence building approach by focusing only on non-contentious areas. Initially, five selected areas (agriculture, telecommunication, rural development, meteorology, and health and population) were selected for technical co-operation, while more complex issues were left out. With the progression of this technical co-operation, countries in the region identified the necessity for institutionalising the ad hoc arrangements of technical co-operation. As a result, the first foreign ministers meeting held in 1983 formally launched the Integrated Programs of Actions (IPA) through the adoption of South Asian Regional Cooperation (SARC). Since then the foreign ministers of seven member countries began to meet on a regular basis. These meetings and technical co-operations led to the establishment of the SAARC. Its Charter was adopted in 1985 and the first summit was held in the Bangladesh capital of Dhaka in December 1985. The main objectives of SAARC as stated in the charter are: "(a) to promote the welfare of the peoples of South Asia and to improve their quality of life; (b) to accelerate economic growth, social progress and cultural development in the region and to provide all individuals the opportunity to live in dignity and to realise their full potentials; (c) to promote and strengthen collective self-reliance among the countries of south Asia; (d) to contribute to mutual trust, understanding and appreciation of one another's problem; (e) to promote active and mutual assistance in the economic, social, cultural, technical and scientific fields; (f) to strengthen cooperation with other developing countries; (g) to strengthen cooperation among themselves in international forums on matters of common interests; and (h) to cooperate with international and regional organisations with similar aims and purposes." (<http://www.saarc-sec.org>). To facilitate activities within SAARC, a Secretariat was set up in the capital of Nepal, Kathamandu, with a Secretary-General and one director from each member country in 1986. From 1986 onwards, some complex issues such as promotion of people to people contacts. At present, the IPA covers (i) agriculture, (ii) communication, (iii) education, culture and sports, (iv) environment and meteorology, (v) health and population activities, (vi) prevention of drug trafficking and drug abuse, (vii) rural development, (viii) science and technology, (ix) tourism, (x) transport, and (xi) women development (<http://www.saarc-sec.org>).

Until the 1990s economic integration was not much considered within SAARC and the first attempt towards moving to this direction was the commission of a study on Trade, Manufactures and Services by the SAARC Secretariat. The report of this study and recommendations were then endorsed by the Council of Ministers at its Ninth Session in Male in July 1991, where it was decided to set up a high level Committee on Economic Cooperation (CEC). The CEC at its meeting in New Delhi in November 1991 recommended a draft agreement on SAPTA. The Heads of State at the Colombo summit in December 1991 approved the establishment of the Inter-Governmental Group (IGG) to examine the institutional framework for South Asian Preferential Trading Arrangement (SAPTA). The Council of Ministers signed an agreement to form the SAPTA in April 1993. This agreement became operational in December 1995, marking the completion of a decade of SAARC existence. The SAPTA mainly focuses on preferential trade within the region and it has notified the WTO to operate as a PTA. At the Male summit in 1997, member countries agreed to work towards forming a South Asian Free Trade Area (SAFTA) by 2001. Despite this envisaged deadline of 2001, the team of experts has met only once by the end of 2000. The latest reports indicate that treaty text has to be finalised by the end of 2001 and the experts have identified a number of issues to be addressed before signing the SAFTA treaty. As scheduled before, SAARC failed to hold a summit in November 1999 because relations between the two key members, India and Pakistan, worsened in the wake of their “tit-for-tat” nuclear tests and the military takeover in Pakistan. The political bickering between India and Pakistan has severely hampered the progress of SAARC and SAPTA. According to the SAARC charter, all decisions are taken unanimously. Therefore, it is impossible to hold a summit without complete consensus among member countries. The Sri Lankan president has been the official head since July 1998 and there is no sign for a SAARC summit in the near future. With the worsening relationship between Indian and Pakistan, the formation of SAFTA before the end of 2001 is a distant dream.

#### *Progress of SAPTA*

After launching SAPTA in 1995, three rounds of preferential tariff reductions have been implemented, namely SAPTA-1 (concluded in 1995), SAPTA-2 (concluded in 1997) and SAPTA-3 (concluded in 1998), under the preferential trading agreement. The Consolidated National Schedules of Concessions (CNSC) of SAPTA have been published on the SAARC web page. The negotiations for the fourth round were initiated in 1999 and they have been postponed due to the inability of having a SAARC summit because of the political differences between India and Pakistan. Tariff reductions have been offered on the basis of two categories of members, namely the Least Developed Countries (LDCs) and non-LDC countries. The LDCs are Bangladesh, Bhutan, Nepal and Maldives while non-LDCs are India, Pakistan and Sri Lanka. The tariff concessions received by LDCs are higher than that of non-LDC members and many of the products under concession lists for the LDCs are different from those under non-LDC members' products lists. The coverage of SAPTA-1 was very modest as only about 6 per cent of traded goods (about 226 products at 6-digit HS level) were covered by SAPTA-1. The issue of non-tariff barriers was not taken into account in this

round and the proposed tariff cuts were also relatively small considering the higher tariff rates in the region. The product coverage and proposed tariff cuts were somewhat significant under SAPTA-2. Concessions were offered for all countries on around 1800 6-digit HS items. The important feature of this round is that it considered non-tariff measures as well. The SAPTA-3 was more significant. Under SAPTA-3 Concessions were granted for all countries on about 2700 6-digit HS items.

To evaluate the magnitude of preferential trade under SAPTA, Mukherji (2000) has estimated the extend of trade preference under all SAPTA rounds in terms of trade values and the percentages of preferential imports to total values of imports related to all member countries. Mukherji's estimates show that the region's total preferential imports amounted about US \$ 479.8 million, nearly half of which went to Pakistan. India's share of preferential trade out of total regional preferential imports was about 26 per cent while that for Sri Lanka was bout 16 per cent. Mukherji (2000) has also estimated percentages of each member country's total preferential imports in terms of its total regional imports. Pakistan has the highest coverage of preferential imports (about 40 per cent), followed by Nepal (35 per cent), India (30 per cent), Bhutan (17 per cent) and Sri Lanka (12 per cent).

### **3. Do Necessary Conditions Exist for a Successful PTA in South Asia?**

Some of important conditions highlighted in the PTA literature are (a) high pre-PTA tariffs; (b) high level of intra-regional trade; (c) the existence of trade complementarity; and (d) differences in economic structure based on competitiveness and (e) less political tensions among member countries. These conditions help to analysis the desirability of forming a PTA within a certain region.

#### *Geographical proximity*

Following the natural trading blocs argument, as suggested in Krugman (1991) and supported by others (Frankel and Wei, 1995 and Frankel, 1997), geographical proximity does promote trade. Regional trading arrangements should be initiated on the basis that it is natural for neighbours to engage in trade with each other. However, some economists such as Bhagwathi (1992, 1993) and Panagiriya (1995) have some reservations about this argument. In fact, the example they picked against the argument is the trade between India and Pakistan. In supporting the natural blocs concept, Frankel (1997) and others use their empirical work based on the gravity model to argue that the proximity is in general an important determinant of bilateral trade around the world. According to their work, however, only one case, i.e., South Asia, behaves against the natural blocs argument. Although India and Pakistan are neighbours, historically trade between two countries has been low. The estimates of Frankel and Wei (1995) indicate that trade between India and Pakistan is 70 per cent lower than two otherwise identical economies. Supporters of natural trading blocs argue that historical political differences have reduced trade between India and Pakistan and that this is a rare case. Considering quantitative and administrative restrictions and political process, Lahiri (1998) uses the case of trade between India and Pakistan as an example for "inverse

regionalism". In summary, despite the difference regarding their general attitude toward the natural trade argument, all these studies do recognize that the geographical proximity is not in favour of creating a SAFTA.

#### *High pre-PTA tariffs*

South Asian countries have long maintained high tariff rates and other protection measures despite their recent efforts to liberalise trade. In the three large countries in the region (Bangladesh, India and Pakistan), tariffs are still higher than Southeast Asian countries. Panagariya (1999) provides a comparison of tariff of the countries in this region with countries in the South East Asian region. It shows that high pre-PTA tariffs as a pre-condition for forming a PTA does indeed exist in South Asia.

#### *Level of intra-regional trade*

Despite difficulties of obtaining reliable data on South Asian intra-regional trade, mainly because of illegal across-border trade, available published trade data indicate that the level of intra-regional trade in South Asia is insignificant. Compared to the high level of intra-regional trade in other regions in the world, the low level of South Asian intra-regional trade is not an encouraging sign for the regional integration. While the share of intra-regional trade in South Asia's total trade has declined from 3.5 per cent to 2.4 between 1970 and 1990, it has shown moderate rise from 2.4 per cent in 1990 to 4.6 in 1999 (based on Direction of Trade Statistics of IMF). Still, the share of intra-regional trade in South Asia is the lowest compared with other PTAs around the world. The other important trend is India's growing trade surplus with other SAARC countries. India is the biggest country in the region and its exports to other SAARC countries (except Pakistan) have continuously increased. While the share of India's exports to the region in its total exports has increased from 3.9 per cent in 1970 to 5.5 per cent in 1999, its import share from the region has declined from 1.4 per cent to 0.9 per cent during the same period. This will also be a major concern for other member countries and certainly is not a good sign of promoting overall intra-regional trade in South Asia. Overall, very small South Asian intra-regional trade is not favourable for a PTA within the region.

#### *(c) Trade Complementarity*

Trade complementarity is also another important pre-condition for a successful PTA. Despite some limitations, trade complementarity indices developed by Drysdale (1967, 1969) can be used to check the existence of trade complementarity in South Asia. If the calculated value of the complementarity index based on bilateral trade flows is greater than one, then there exists trade complementarity between two countries. Kemal, et. al. (2000) have estimated the complementarity indices for all five leading South Asian countries using time series trade data. They find that there is a lack of strong trade complementarity in the bilateral trade structures of South Asia. This point has also been supported by an early study of Aggarwal and Pandey (1992) and a recent study of Samaratunga (1999).

#### *(d) Differences in Economic Structures and Competitiveness*

The main issue related to South Asian economic integration is that countries in the region are producing and trading similar commodities. To identify different country's competitiveness among different commodity groups, the Export Revealed Comparative Advantage indices (XRCA) have been estimated by two recent studies for commodities at the tree-digit level using recent UN trade data (Samaratunga, 1999 and Kemal, et. al., 2000). These indices show the comparative advantage in terms of the share of a particular industry in a country's total exports relative to the industry's share in total world exports. The results of the above two studies indicate that countries in South Asia have an almost identical pattern of comparative advantage in a relatively narrow band of commodities and that these countries do not have comparative advantages in a wide range of capital goods and advanced manufactured products. The lack of trade complementarity in bilateral trade flows and the similarity of the pattern of comparative advantage in the region have been the main constraints for the growth of intra-regional trade (see Kemal, et. al., 2000).

#### *(e) Political Harmony in the Region*

Some analysts believe that the political tension between two large countries in the region (i.e., India and Pakistan) is a main constraint to the regional integration. Recent nuclear tests conducted by India and Pakistan, the border war and the political change in Pakistan are major obstacles for regional cooperation. SAARC failed to hold a previously scheduled summit in November 1999 because relations between India and Pakistan worsened in the wake of their "tit-for-tat" nuclear tests and the military takeover in Pakistan. The Sri Lankan president has been the official head since July 1998 and there is no sign for the next summit in the near future despite the deadline for SAFTA (end of 2001) is approaching very fast. Both India and Pakistan blame each other for the problems involved in SAARC.

The discussion in this section indicate that many generally accepted pre-conditions required to create a trade promoting successful PTA do not exist in the South Asian region.

### **4. Review of Selected Studies on the Impact of Regional Integration in South Asia**

As noted in the introduction, in comparison with quantitative assessments of PTAs in other parts of the world, the effects of South Asian economic integration have not been investigated extensively. While there are many qualitative studies on SAARC and SAPTA, quantitative studies on economic integration in South Asia are very limited with few exceptions. There are a number of reasons for this limitation. Firstly, many trade analysts have not paid much attention to this region until recently since it is not important in terms of trade, investment and growth. Secondly, finding data on trade and other variables related to countries in this region is very difficult. Thirdly, the volume and value of illegal trade is very high in the region and published data do not reflect the real picture of the trade structure in the region. Finally, non-tariff barriers on trade are very important in this region compared with many other regions in the world. However, the recognition and quantification of non-tariff barriers are difficult. Despite these constraints, there are several empirical and analytical studies that

have generated a debate over the desirability of SAFTA. This section attempts to synthesise some of these studies and provide a starting point for our study.

Some quantitative studies on the impact of a regional trading arrangement in South Asia have been undertaken even before the SAARC was formed in 1985. Jayaraman (1978) examined the effects of a hypothetical customs union of South Asia comprising of Bangladesh, India, Nepal, Pakistan and Sri Lanka. The results of this study suggested that gains from a South Asian PTA would be insignificant for small nations. A study of Rahman (1981) confirms some results of the study by Jayaraman and concluded that small countries like Nepal and Sri Lanka would lose welfare as a result of the custom union. In the 1990s, in order to examine the trade effects of regional integration in South Asia, Govindan (1994) has estimated price elasticities of demand for food imports for a number of South Asian countries within a partial equilibrium framework. The results of this study suggest that the South Asian PTA will lead to a welfare increase in the region through expansion of intra-regional trade. It further points out that economic integration can increase food security in the region. This study, however, has only focused on food security and agriculture and ignored the effects on manufactures and services trade. DeRosa and Govindan (1995 and 1996) have further extended Govindan's early work by employing the Armington system of bilateral trade demands. They have examined alternative approaches to trade liberalisation in South Asia within a partial equilibrium framework. These studies have focused on three policy approaches: (a) preferential trade liberalisation with the SAARC region, (b) preferential trade liberalisation between SAARC countries and APEC countries and (c) unilateral trade liberalisation by the SAARC countries. The last two approaches have been the main addition to the original study of Govindan (1994). Once again the results support SAPTA in terms of expansion of intra-regional food trade. However, the results suggest that welfare gains may increase significantly as a result of much broader trade liberalisation with other parts of the world.

Srinivasan (1994) and Srinivasan and Canonero (1993) have used the well-known gravity model to assess the impact of regional integration in South Asia. These studies also suggest that the unilateral trade liberalisation would yield much more gains for the region compared to gains from preferential trade liberalisation. They have found that small economies in the region gain much more from preferential trade liberalisation than larger economies do. The gravity model has also been used by Samaratunga (1999) to investigate the effects of SAARC-APEC trade links. The results of this study indicate that the potential for export expansion of SAARC region into APEC countries is limited within the 1991-1995 policy framework. Rajapakse and Arunatilake (1997) have used the same approach to investigate the implications of SAPTA for Sri Lanka and have found that Sri Lanka would gain from SAPTA. All of the above studies suffer from one major limitation: they are mainly based on the partial equilibrium approach and they focus mainly on trade flows. To the best of the authors' knowledge, only one simple quantitative assessment of SAPTA within a general equilibrium framework has been undertaken so far. Pigato, et al (1997) have briefly assessed the effects of SAPTA using the Global Trade Analysis Project (GTAP) model that is a global



CGE model (see Hertel 1997). This study has found that SAPTA would create some welfare gains for its member countries. However, unilateral trade liberalisation would create larger gains for the region. The summary of this study, however, states that the creation of SAFTA “would be highly desirable” and “economic gains would be significant, especially for the smaller countries” (p.2). This study also states that organisations like SAARC or SAPTA would reduce political and border tension in the region and would have a positive effect on South Asian regional integration.

In contrast to the above studies some observers have a much more negative view on SAFTA. They believe that SAFTA is largely ‘trade diverting’ and hence an efficiency reducing PTA. Recently, Panagariya (1999, p.373) has illustrated this point by using a simple two-dimensional trade diagram. He rejects the idea that forming SAFTA is beneficial for the region and argues that “it is in the region’s interest to push ahead with its non-discriminatory liberalisation rather than promote trade preferences” (p.373). Moderate observers believe that despite trade diversion and negative or small gains, SAPTA would help the countries in the region to engage in faster and deeper unilateral liberalisation, and to keep the momentum of the process of trade liberalisation (Srinivasan, 1998). Panagariya (1999) points out that this is a misguided argument and SAFTA is “likely to become a binding constraint on true, non-discriminatory liberalisation” (p.376). He uses examples of Mexico and Brazil joining the Southern American Common Market (MERCOSUR) and states that these two countries have virtually abandoned unilateral trade liberalisation and raised their tariffs. All the studies reviewed in this section have contributed valuable inputs to the debate on the desirability of SAFTA. Three different viewpoints on SAFTA can be summarized as follows:

- (a) **Optimistic View:** This group believes that the SAFTA would be “highly desirable” and economic gains would be significant, especially for small economies in the region. South Asian politicians and many bureaucrats hold this view. Some empirical studies also support this viewpoint (for example, Pigoto et al, 1997).
- (b) **Pessimistic View:** This group believes that the SAFTA is “highly undesirable” and it will lead to trade diversion and slow down of unilateral trade liberalisation (for example, Panagariya, 1999).
- (c) **Moderate or Intermediate View:** This group believes that potential gains from SAFTA, though less than those from unilateral liberalisation, are significant for small countries in the region and preferential trade liberalisation is good as part of a coordinated liberalisation in countries in the region, and it will lead to unilateral trade liberalisation (for example, Srinivansan and Canonero, 1993 and Srinivansan, 1998).

The above discussion indicates that the issue of desirability of SAFTA warrants further investigation. The rest of this paper is devoted to this purpose.

## 5. Methodology

The increasing demand for quantitative assessments of PTAs such as EU, NAFTA and AFTA has given rise to the extensive use of global modelling by policy analysts. Multi-regional computable general equilibrium (CGE) models have been used as a tool for better

understanding of the effects of a PTA. In the trade literature one can find that many CGE modelling applications deal with issues related to PTAs. These applications have been surveyed by Flam (1992), Baldwin and Venables (1994, 1995) and Bandara (1998). Baldwin and Venables (1995) have clearly recognised the contributions made by CGE models in evaluating PTAs.

These surveys indicate that global CGE models are more useful than econometric models and partial equilibrium models in analysing issues related to PTAs. Firstly, these models incorporate the necessary links between different agents in each country (or region). Secondly, these models are based on the input-output structures of each country (or region), which link industries together. Thirdly, all individual countries (or regions) are linked through international trade flows to form a general equilibrium model in which prices and quantities supplied and demanded are determined simultaneously in all primary factor markets and domestic and international commodity markets. Finally, a global CGE model structure reflects the fact that all parts of the world economy hinge together in a network of direct and indirect linkages. This means that any changes in any part of the system will have effects throughout the entire world.

At present the most widely used global CGE model is the GTAP model. This has been used by individual researchers and national and international organisations to quantify the effects of PTAs. There are numerous GTAP related CGE evaluations of PTAs (see Bandara, 1998). These quantitative assessments have provided valuable inputs into policy debate on PTAs. Even though the GTAP model has extensively been used to quantify the effects of many PTAs around the world, it has rarely been used to address issues of South Asia (with rare exceptions such as Pigato et al, 1997). One of the main reasons for this is the inadequate treatment of the member countries of SAARC in the GTAP database. South Asia (except India) was only an aggregated region in the GTAP database until 1998. Recently an attempt has been made to disaggregate South Asian in the GTAP database by incorporating Sri Lanka as a separate region for the purpose of analysing issues related to South Asia. This has been followed up by adding Bangladesh as separate region to GTAP-version 5 database. As a result, Bangladesh, India, Sri Lanka and the rest of South Asia are separate regions in the new database. This new version provides us with an opportunity to use the GTAP model in a sensible way to illustrate the quantification of the effects of regional integration in South Asia.

## **6. Policy Scenarios and Results**

We use the standard GTAP model in this study to illustrate (rather than to project) how it can be used to quantify the effects of SAPTA or SAFTA using a pre-release of the version 5 GTAP database, which has 1997 as its base year. The standard GTAP model, which is available from the GTAP website (<http://www.gtap.org>), is used here. However, in our policy scenarios, we are not attempting to model the effects of actual tariff concessions given by SAPTA members during SAPTA-1, SAPTA-2 and SAPTA-3. There are a number of reasons

for that. First, tariff concessions under SAPTA rounds are moderate. Secondly, the product items considered under these rounds are very narrowly defined (at 6-digit HS code level) and it is very difficult to aggregate them in a sensible way according to the GTAP commodity classification. Even without using actual tariff cuts, the GTAP model can be used to evaluate the possible effects of the SAFTA and shed some light on several issues related to the region. In particular, it can be used to provide some inputs to the debate of the desirability of SAFTA.

To begin with we perform two policy simulations with the pre-release version 5 database and its tariff levels in the base year (1997). For the first policy simulation (the unilateral trade liberalisation scenario) we assume that all four regions in South Asia (India, Sri Lanka, Bangladesh and the rest of South Asia) remove all import tariffs and export duties (or subsidies). For the second simulation, we assume that all tariffs and export duties (or subsidies) between the four trading partners in South Asia are removed while keeping the same variables against other regions outside South Asia remain constant (the preferential trade liberalisation scenario). The results presented in this section are intended to provide a benchmark for comparing the differential impact of unilateral and preferential trade liberalisation on South Asian countries.

In order to perform policy simulations we aggregate the version 5 database into 12 regions, keeping India, Sri Lanka, Bangladesh and the rest of South Asia as separate regions (see Appendix 1) and 17 industries (see Appendix 2). We identify some agricultural sectors separately and three manufacturing sectors separately: textiles, wearing apparels and other manufacturing. As shown in Table 2, the other manufacturing accounts for 41 per cent of India's total exports and the textile sector accounts for about 14 per cent. The wearing apparel has been the most dominating export product in Sri Lanka and Bangladesh (36 per cent and 42 per cent, respectively). In the rest of South Asia's (mainly Pakistan) the major export item is textiles (see Table 2). Table 3 indicates that the main trading partners of South Asia's main exporting goods are NAFTA and EU rather than South Asian countries themselves.

Some important results of two policy simulations are shown in Tables 4 - 8. Before focusing on the results we need to note some limitations of our study. We do not consider quantitative restrictions in this study and we are mainly focusing on import duties and export duties (or subsidies). Although the implementation of the Agreement on Textiles and Clothing (ATC) under the Uruguay Round is very important to South Asia's main export products, we are not focusing on it in details. However, we intend to extend our analysis to cover the ATC in the future. The results in this study under both scenarios are conservative and they underestimate welfare gains since the standard GTAP model does not capture the dynamic effects of both unilateral and preferential trade liberalisation. It also does not capture the economies of scale effects of trade liberalisation since the standard GTAP model is based on constant returns to scale assumption. This study also ignores the potential productivity gains from South Asia's

integration into the world economy as a result of trade liberalisation. All these limitations should be kept on our mind in interpreting our results.

In general, we can see from the welfare results of two simulations shown in Table 4 that the biggest gainer from both unilateral and preferential trade liberalisation would be India. While the rest of South Asia is expected to lose from the unilateral trade liberalisation, Bangladesh is expected to lose from the preferential trade liberalisation. Since India dominates regional trade and plays a bigger role in global trade than other South Asian countries, it is possible that India captures a large share of the absolute welfare gains following both types of trade liberalisation. Given the dominance of India in the South Asian market, India would be the biggest winner from the SAFTA, while small countries gain marginally. Bangladesh is even expected to lose. As we noted earlier, since South Asia's biggest trading partners are NAFTA and EU, they are expected to gain substantially from South Asia's unilateral trade liberalisation, compared to other regions in the world (except India). Regions like the ASEAN and the rest of Southeast Asia are expected to lose because these countries are main competitors in South Asian export markets. Under the preferential trade liberalisation, all the regions outside of South Asia lose due to the diverted trade and unfavourable terms of trade effect.

Analysing the real income effects of these two policy scenarios is a quite complex task. As illustrated by the welfare decomposition shown in Table 4, welfare gains from both policy scenarios are fundamentally determined by two main factors, i.e., the change in allocation efficiency as a result of resource reallocation, and the changes in a country's terms of trade (TOT).

First, we focus on the allocation efficiency. As we expect, all countries in the region are expected to have efficiency gains from the unilateral trade liberalisation and India is the biggest winner. The removal of all tariffs leads to an increased access to cheaper imported goods and an increase in gains in consumption. On the other hand, the improved resource utilisation, as a result of trade liberalisation also gives rise to welfare gains. It is not surprising to see that India as the biggest winner with its initial high tariff levels and bigger manufacturing sector. These gains are reflected under allocation efficiency in Table 4. The preferential trade liberalisation (scenario two) does not give rise to much efficiency gains in the region. In fact, small countries such as Sri Lanka and Bangladesh are expected to lose under resource utilisation.

Table 6 provides a decomposition of allocation efficiency effects by commodities. From this table, we can see that under the unilateral trade liberalisation, resource reallocations between manufactures, wearing apparels and textiles cause the bulk of the efficiency gains. India, in particular, gains \$3.235 billion from textiles. The negative effect on textile sector in Sri Lanka is the joint result of an output expansion and pre-existing domestic distortion. Overall, unilateral trade liberalisation improves welfare by moving resource from the manufacturing

sector to the more efficient clothing and textile sector in South Asian countries (see Table 7 for the declines in manufacturing output and rises in wearing apparels and textiles). Under the preferential liberalisation, however, the changes in efficiency are much smaller or even negative. In fact, only India shows modest gain in the manufacturing sector under preferential liberalisation.

Now we turn to the second important component of welfare gains (the TOT effect). For the two most important commodities in South Asia (WAP and TEX), Table 5 traces TOT effects from world price, export price and import price and demonstrates that all countries in the South Asian region would expect to lose as a result of TOT deterioration after unilateral trade liberalisation. How does this happen? This region initially has high tariff levels. When the countries in the region liberalise trade regime, imports into the region, especially other manufacturing goods from their main trading partners (EU and NAFTA), will increase. These countries need to export more of their own products such as wearing apparels and textiles to finance their increased import bills. This, in turn, depresses their export prices and passes South Asia's efficiency gains to other regions. Table 5 clearly demonstrates this point. Export prices of textiles and wearing apparels are expected to decline in all the countries in the region (see Table 5). According to the TOT effect, one region's gains are another's loss. Table 4 demonstrates this point. The negative TOT effect reduces welfare gains in this region compare to other regions. Under the preferential liberalisation, the world price effect is minimal as expected. However, India and rest of South Asia (Pakistan) enjoy some positive export price effects, mainly from increased export to the other South Asian countries in wearing apparels and textiles and favourable export price in these two sectors.

Table 7 shows the impact of both policy scenarios on industry output levels. Unilateral trade liberalisation gives rise to a decline in output levels of most industries other than wearing apparels and textiles in all countries in the region. On the other hand, wearing apparels and textiles expand at massive growth rates. This clearly shows the comparative advantage of wearing apparels and textiles in South Asia. Under preferential liberalisation, there are no major changes in output, confirming the relative similarity in production structure among these countries.

Table 8 shows changes of trade value at base price (1997) under both scenarios. The unilateral trade liberalisation leads to an increase in exports of South Asia's main products to NAFTA and EU, as expected. Changes in intra-South Asia trade are insignificant, except the moderate increase in manufacturing export from India to, and the import into India from the other countries in South Asia. The preferential trade liberalisation causes export from South Asia countries (except Bangladesh) to NAFTA and EU to drop. In this scenario, India steps in by increasing its export to the other South Asia countries, especially in manufacturing, and attracting more imports from the other South Asia countries. This, in some sense, creates some increases in intra-trade, but not significantly at all, compared to the expanded trade under unilateral trade liberalisation.

In general, while the impact of preferential trade liberalisation is very small, the impact of unilateral trade liberalisation is significant for South Asia. Under preferential liberalisation, small countries will lose or gain marginally, while the biggest country in the region, India will likely be the sole winner. These illustrative results contradict the findings of some of previous studies. According to some previous studies, small countries in the region would gain from preferential trade liberalisation more in comparison with India's gain. Some other previous studies have indicated some significant gains from SAFTA. However, our study demonstrates a different story. Our results are more close to the pessimistic view on SAFTA highlighted in the previous section, and in general confirm our discussion on the lack of the necessary conditions to form a desirable PTA in South Asia.

## **7. Concluding Remarks**

In this study we reviewed the background and the controversies related to the desirability of SAPTA. To illustrate whether the SAFTA is a desirable PTA, we analyze the necessary conditions for forming a PTA and later use the GTAP model as a tool to quantify the effects of SAPTA, in comparison with the effects of unilateral liberalisation. From previous empirical literature, we identify three different viewpoints on SAFTA (optimistic, pessimistic and moderate). Our results support the pessimistic viewpoint. As our results indicate, South Asian countries may gain much more benefits from unilateral trade liberalisation than from the current SAPTA or the proposed SAFTA.

Even the observers who hold the moderate view (i.e., despite the moderate gains from SAFTA, it is better for South Asian countries to form a PTA from a political perspective to sell trade liberalisation as part of a coordinated liberalisation) have been disturbed by the recent disappointment performance of SAARC. Since 1999 the member countries could not meet at a SAARC summit because of the Indo-Pakistan conflict. The experience of last 15 years demonstrates that it is very difficult to achieve a meaningful regional cooperation in economic and social matters in the SAARC region without proper resolutions of political conflicts between member countries, particularly between India and Pakistan. The recent political events have stopped the progress of SAARC and SAPTA. It seems that the formation of SAFTA before the end of 2001 is a distance dream. Small members of the association are extremely frustrated with the present situation. In this environment, some member countries in the region have chosen another option, i.e., entering into bilateral trade agreements. For example, Sri Lanka signed a bilateral trade agreement with India in 1998 and it is effective now. At present, it is also negotiating with Pakistan to sign another bilateral trade agreement with Pakistan. These developments reflect more pessimistic future about SAFTA. Therefore, it is better for policy makers in the region to put more effort to liberalise their own trade regimes, rather than wasting energy on forming SAFTA with a lot of economic and political constraints.

**Table 1: Distribution of Intra-regional Trade in South Asia (% of total trade in the respective countries)**

| Country        | 1970 | 1975 | 1980 | 1985 | 1990 | 1994 | 1995 | 1999 |
|----------------|------|------|------|------|------|------|------|------|
| <b>Exports</b> |      |      |      |      |      |      |      |      |
| Bangladesh     | n.a  | 2.4  | 9.1  | 7.7  | 3.6  | 2.3  | 2.6  | 2.2  |
| India          | 3.9  | 3.7  | 3.5  | 2.9  | 2.7  | 3.9  | 5.0  | 5.5  |
| Nepal          | 61.9 | 81.1 | 38.1 | 38.5 | 6.9  | 4.6  | 8.7  | 27.7 |
| Pakistan       | 1.5  | 6.8  | 6.3  | 5.3  | 4.0  | 3.2  | 3.3  | 3.3  |
| Sri Lanka      | 3.2  | 9.0  | 6.8  | 3.7  | 3.1  | 2.3  | 2.7  | 2.6  |
| South Asia     | 3.7  | 5.1  | 4.8  | 4.0  | 3.1  | 3.5  | 4.4  | 4.9  |
| <b>Imports</b> |      |      |      |      |      |      |      |      |
| Bangladesh     | n.a  | 7.9  | 3.7  | 1.3  | 7.0  | 13.3 | 17.7 | 14.7 |
| India          | 1.4  | 0.9  | 1.0  | 0.7  | 0.4  | 0.5  | 0.6  | 0.9  |
| Nepal          | 73.6 | 62.0 | 48.0 | 32.5 | 11.5 | 19.2 | 9.9  | 33.4 |
| Pakistan       | 0.5  | 2.8  | 2.1  | 1.7  | 1.6  | 1.6  | 1.3  | 1.8  |
| Sri Lanka      | 12.4 | 6.9  | 6.3  | 6.3  | 6.6  | 9.0  | 10.3 | 13.8 |
| South Asia     | 3.3  | 3.2  | 2.3  | 1.7  | 1.8  | 3.1  | 3.6  | 4.3  |
| <b>Trade</b>   |      |      |      |      |      |      |      |      |
| Bangladesh     | n.a  | 6.9  | 4.9  | 3.0  | 5.9  | 9.3  | 10.1 | 8.5  |
| India          | 2.7  | 2.0  | 1.9  | 1.5  | 1.4  | 2.1  | 2.8  | 3.2  |
| Nepal          | 70.3 | 67.0 | 45.7 | 34.4 | 10.0 | 13.8 | 9.3  | 30.6 |
| Pakistan       | 0.9  | 4.1  | 3.5  | 2.9  | 2.6  | 2.3  | 2.3  | 2.6  |
| Sri Lanka      | 8.1  | 7.8  | 6.5  | 5.2  | 5.1  | 6.3  | 6.5  | 8.2  |
| South Asia     | 3.5  | 3.9  | 3.2  | 2.6  | 2.4  | 3.3  | 4    | 4.6  |

Source: Computed from Direction of Trade Statistics Yearbook (various issues), IMF.

**Table2: Shares of export by commodities in South Asia in 1997**

|     | IND   | LKA   | BGD   | RAS   |
|-----|-------|-------|-------|-------|
| omf | 41.1% | 24.9% | 11.2% | 9.5%  |
| wap | 9.4%  | 36.0% | 46.6% | 14.5% |
| Tex | 14.0% | 9.6%  | 18.8% | 41.8% |
| Ocr | 3.6%  | 5.2%  | 2.3%  | 1.1%  |

Source: GTAP database Version 5.

Note: See the appendix tables for abbreviations in Tables 2-8..

**Table 3: Bilateral export shares by commodities and destination in 1997**

|     |     | NAFTA | IND  | LKA  | BGD  | RAS   | EU    |
|-----|-----|-------|------|------|------|-------|-------|
| wap | IND | 35.3% | 0.0% | 0.1% | 0.0% | 0.0%  | 45.0% |
|     | LKA | 66.3% | 0.0% | 0.0% | 0.0% | 0.0%  | 30.7% |
|     | BGD | 53.2% | 0.0% | 0.0% | 0.0% | 0.0%  | 43.6% |
|     | RAS | 43.1% | 0.0% | 0.0% | 0.0% | 0.0%  | 45.6% |
| tex | IND | 17.9% | 0.0% | 1.2% | 4.7% | 0.3%  | 36.2% |
|     | LKA | 39.7% | 0.4% | 0.0% | 0.1% | 0.2%  | 46.9% |
|     | BGD | 17.6% | 0.8% | 0.2% | 0.0% | 0.2%  | 62.3% |
|     | RAS | 19.0% | 0.6% | 0.7% | 1.2% | 0.1%  | 29.3% |
| omf | IND | 27.1% | 0.0% | 1.2% | 1.8% | 0.8%  | 26.5% |
|     | LKA | 28.5% | 1.7% | 0.0% | 0.8% | 0.9%  | 37.1% |
|     | BGD | 28.1% | 2.7% | 0.0% | 0.0% | 0.1%  | 29.6% |
|     | RAS | 15.3% | 6.1% | 0.7% | 1.6% | 0.1%  | 40.5% |
| ocr | IND | 14.6% | 0.0% | 0.6% | 1.4% | 1.6%  | 29.2% |
|     | LKA | 15.7% | 1.7% | 0.0% | 0.0% | 4.8%  | 35.3% |
|     | BGD | 0.6%  | 0.3% | 0.0% | 0.0% | 31.8% | 4.9%  |
|     | RAS | 3.7%  | 6.8% | 2.7% | 6.6% | 0.5%  | 13.1% |

Source: GTAP database Version 5.

**Table 4: Welfare changes: Equivalent Variation (\$million)**

| Regions | Exp1                  |                |         | Exp2                  |                |        |
|---------|-----------------------|----------------|---------|-----------------------|----------------|--------|
|         | Allocation efficiency | Terms of trade | total   | Allocation efficiency | Terms of trade | total  |
| AUS     | 1.2                   | 97.7           | 148     | -1.3                  | -4.8           | -12.2  |
| NAFTA   | 1531.8                | 1763.5         | 2498.6  | -4.5                  | -33.7          | -114.6 |
| JPN     | 30.8                  | 45.3           | 403.3   | -6.7                  | -55.6          | -157.2 |
| REA     | -890.8                | -285.3         | -1179.1 | -3                    | -61.7          | -137.4 |
| ASE     | -164.9                | 248.3          | 210.4   | -0.2                  | -35.4          | -55.6  |
| IND     | 4519.1                | -2375.6        | 2320.5  | 81                    | 323.4          | 756.2  |
| LKA     | 150                   | -108.8         | 83      | -4.9                  | 8              | 4.1    |
| BGD     | 542.5                 | -520           | 172.9   | -5.9                  | -28            | -41.2  |
| RAS     | 1333.7                | -1003.8        | -512.7  | 2.3                   | 39.1           | 52.4   |
| EU      | 205.2                 | 751.3          | 1091.5  | -22.6                 | -95.4          | -169.8 |
| EIT     | -113.4                | -305.1         | -488.1  | -4.2                  | -12.3          | -24.3  |
| ROW     | 529.7                 | 1719.3         | 2925.8  | -36.4                 | -44.7          | -109.2 |

Note: Tables 4-8 report the results from the two experiments.

**Table 5: Decomposition of terms of trade effect (\$million)**

|         |       | Exp1   |         |         | Exp2   |         |         |
|---------|-------|--------|---------|---------|--------|---------|---------|
| sectors |       | pworld | pexport | pimport | pworld | pexport | pimport |
| WAP     | 6 IND | -307.9 | -2358.7 | -2.9    | 0.1    | 27.7    | 0       |
|         | 7 LKA | -51.9  | -109.8  | -1.3    | 0      | -7.4    | -0.1    |
|         | 8 BGD | -96.7  | -368.2  | -0.8    | 0      | -17.9   | 0       |
|         | 9 RAS | -61.2  | -210.8  | -1.4    | 0      | 4.7     | 0       |
| TEX     | 6 IND | -26.9  | -191.8  | -4.2    | 1.5    | 43.1    | 0.1     |
|         | 7 LKA | 1.8    | -25.7   | -5.9    | -0.1   | 0.8     | -0.6    |
|         | 8 BGD | 1.6    | -99.6   | -14.9   | 0      | -4.5    | -1.8    |
|         | 9 RAS | -24.9  | -498.5  | -2.4    | 1.2    | 12.7    | -0.1    |

**Table 6: Decomposition of allocation efficiency effect by commodities (\$million)**

| EXP1 |       |        | EXP2  |       |       |       |
|------|-------|--------|-------|-------|-------|-------|
|      | omf   | wap    | Tex   | omf   | wap   | tex   |
| IND  | 558.9 | 3235   | 410.2 | 132.1 | -52   | -10.4 |
| LKA  | 99.4  | -100.3 | 74.6  | -1.8  | -10.1 | -8.1  |
| BGD  | 133.4 | 156.7  | 174.1 | -19.3 | 12.7  | -15.4 |
| RAS  | 685.1 | 142.8  | 229   | -3.7  | -5.1  | -1.8  |



**Table 7: Percentage changes in regional output**

| Sim 1: Unilateral Trade Liberalisation |       |       |       |       | Sim2: Preferential Trade Liberalisation |      |      |      |  |
|----------------------------------------|-------|-------|-------|-------|-----------------------------------------|------|------|------|--|
|                                        | IND   | LKA   | BGD   | RAS   | IND                                     | LKA  | BGD  | RAS  |  |
| ser                                    | 0.6   | -1.6  | -0.9  | 1.8   | 0                                       | -0.1 | 0    | 0    |  |
| omf                                    | -11.2 | -5.9  | -21.5 | -21.5 | 0                                       | 1.2  | -1.1 | 0.9  |  |
| wap                                    | 206.7 | 45.5  | 111.3 | 68    | -2                                      | 3.8  | 5.1  | -1.7 |  |
| tex                                    | 12.1  | -3    | 19.5  | 22.9  | -0.1                                    | -1   | 1.8  | 0.7  |  |
| b_t                                    | -8.6  | -83   | -6.5  | -4.4  | -0.1                                    | 3.4  | -0.1 | 0.6  |  |
| ofd                                    | -10.5 | -10.3 | -5.2  | -3.8  | -0.7                                    | -1.2 | -1.9 | 1.7  |  |
| mil                                    | -0.5  | 3.9   | -16.6 | -1.1  | 0.1                                     | 0.9  | -2.2 | 0.1  |  |
| vol                                    | -4.3  | -5.6  | -21.6 | -13   | 0.1                                     | 44.6 | -0.9 | -0.8 |  |
| min                                    | -10.1 | -31   | -18.2 | -4.9  | -0.3                                    | -0.7 | -0.5 | -0.2 |  |
| f_f                                    | -3    | -2.4  | -1.2  | -2.9  | 0                                       | -0.1 | 0.1  | -0.4 |  |
| wol                                    | -19.1 | 49    | 1     | -9.2  | -0.8                                    | 2.8  | -0.1 | 0    |  |
| ctl                                    | -0.9  | -1    | -2.9  | -3.4  | 0                                       | 0.2  | -0.2 | 0.1  |  |
| ocr                                    | -1.4  | 1.6   | 2.3   | -3.4  | 0.1                                     | 6.5  | 2    | -1.7 |  |
| sgr                                    | -0.3  | -25.9 | -6.4  | -3.2  | 0.6                                     | -2.3 | -2.2 | -1.6 |  |
| veg                                    | -3.1  | -2.8  | -1.3  | -1.2  | 0                                       | -0.2 | -0.1 | 0.5  |  |
| gro                                    | -0.2  | -32   | -9.5  | 0.6   | 0                                       | -1.1 | -1.6 | 0    |  |
| ric                                    | -0.6  | -8.1  | -0.7  | 1.2   | 0.1                                     | -5.5 | -0.4 | 0.4  |  |

**Table 8: Changes of bilateral export at base price (\$ Millions)**

| Exp 1: Unilateral Trade Liberalisation |       |       |      |       |       |        | Exp 2: Preferential Trade Liberalisation |       |       |       |       |        |
|----------------------------------------|-------|-------|------|-------|-------|--------|------------------------------------------|-------|-------|-------|-------|--------|
| IND (exporter)                         |       |       |      |       |       |        |                                          |       |       |       |       |        |
|                                        | NAFTA | IND   | LKA  | BGD   | RAS   | EU     | NAFTA                                    | IND   | LKA   | BGD   | RAS   | EU     |
| Omf                                    | 193.3 | 0     | 67.4 | 91.5  | -35.7 | 211.1  | -158.3                                   | 0     | 283.9 | 427.6 | 475.4 | -155.6 |
| Wap                                    | 13943 | 0     | 0.7  | -0.6  | 0.1   | 2600.8 | -54.2                                    | 0     | 25.4  | 1.1   | 6.2   | -87.3  |
| Tex                                    | 217.1 | 0     | -2.6 | -47.9 | 0.6   | 804.2  | -28.5                                    | 0     | 81.4  | 126.3 | 20.5  | -56.2  |
| LKA (exporter)                         |       |       |      |       |       |        |                                          |       |       |       |       |        |
|                                        | NAFTA | IND   | LKA  | BGD   | RAS   | EU     | NAFTA                                    | IND   | LKA   | BGD   | RAS   | EU     |
| Omf                                    | 56.5  | 22.9  | 0    | 2.6   | -6.5  | 74.2   | -8.2                                     | 97.4  | 0     | 14.3  | 9.6   | -10.8  |
| Wap                                    | 444.8 | 2.2   | 0    | 0     | 0     | 312.2  | 39.1                                     | 3.8   | 0     | 0     | 0     | 18.9   |
| Tex                                    | 89.5  | 2.4   | 0    | 0.6   | -0.4  | 5.9    | -1.3                                     | 4.5   | 0     | 1.5   | 0.3   | -1.6   |
| BGD (exporter)                         |       |       |      |       |       |        |                                          |       |       |       |       |        |
|                                        | NAFTA | IND   | LKA  | BGD   | RAS   | EU     | NAFTA                                    | IND   | LKA   | BGD   | RAS   | EU     |
| Omf                                    | -13.8 | 13.2  | 0    | 0     | 0.1   | -14    | 2.4                                      | 68.8  | 0.1   | 0     | 5.5   | 2.6    |
| Wap                                    | 1319  | 0.1   | 0.1  | 0     | 1.2   | 1598.7 | 68.5                                     | 0.1   | 0.4   | 0     | 4.8   | 57.7   |
| Tex                                    | 131.8 | 16.9  | 1.1  | 0     | 7.4   | 231    | 2.5                                      | 24.6  | 3.5   | 0     | 15.5  | 9.9    |
| RAS (exporter)                         |       |       |      |       |       |        |                                          |       |       |       |       |        |
|                                        | NAFTA | IND   | LKA  | BGD   | RAS   | EU     | NAFTA                                    | IND   | LKA   | BGD   | RAS   | EU     |
| Omf                                    | 115.8 | 195.4 | 3.5  | 19.4  | -0.7  | 309.9  | -2.2                                     | 328.3 | 4.1   | 23.4  | 0     | -5.8   |
| Wap                                    | 626.7 | 0.5   | 0.7  | -0.1  | -0.1  | 1008.5 | -16.3                                    | 0.6   | 2.6   | 0.6   | 0     | -16.8  |
| Tex                                    | 848.2 | 65.9  | 12   | 7.7   | -1    | 739.1  | -8.7                                     | 77.5  | 38.1  | 25.9  | -0.2  | -14.3  |

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## Appendix 1. Regional Aggregation of the GTAP database

| Code  | Aggregated region       | Comprising old regions                                                |
|-------|-------------------------|-----------------------------------------------------------------------|
| AUS   | Australia               | Australia.                                                            |
| NAFTA | North American FTA      | Canada; United States; Mexico.                                        |
| JPN   | Jpn                     | Japan.                                                                |
| REA   | Rest of East Asia       | China; Hong Kong; Korea; Taiwan.                                      |
| ASE   | Asean-6                 | Indonesia; Malaysia; Philippines; Singapore; Thailand; Vietnam.       |
| IND   | India                   | India.                                                                |
| LKA   | Sri Lanka               | Sri Lanka.                                                            |
| BGD   | BGD                     | Bangladesh.                                                           |
| RAS   | Rest of South Asia      | Rest of South Asia.                                                   |
| EU    | European Union          | EU 15                                                                 |
| EIT   | Economies in Transition | Hungary; Poland; Rest of Central European Assoc; Former Soviet Union. |
| ROW   | Rest of the world       | Rest of World                                                         |

## Appendix 2. Commodity Aggregation of the GTAP database

| code | Aggregated sector                   | Comprising old sectors                                                                                                                                                                                                                                                                                            |
|------|-------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ser  | service                             | Electricity; Gas manufacture, distribution; Water; Construction; Trade; Transport nec; Sea transport; Air transport; Communication; Financial services nec; Insurance; Business services nec; Recreation and other services; PubAdmin/Defence/Health/Educat; Dwellings.                                           |
| omf  | Manufacturing                       | Leather products; Wood products; Paper products, publishing; Petroleum, coal products; Chemical, rubber, plastic prods; Mineral products nec; Ferrous metals; Metals nec; Metal products; Motor vehicles and parts; Transport equipment nec; Electronic equipment; Machinery and equipment nec; Manufactures nec. |
| wap  | Wearing apparel.                    | Wearing apparel.                                                                                                                                                                                                                                                                                                  |
| tex  | Textiles.                           | Textiles.                                                                                                                                                                                                                                                                                                         |
| b_t  | Beverages and tobacco products.     | Beverages and tobacco products.                                                                                                                                                                                                                                                                                   |
| ofd  | Food products nec.                  | Food products nec.                                                                                                                                                                                                                                                                                                |
| mil  | Raw milk; Dairy products.           | Raw milk; Dairy products.                                                                                                                                                                                                                                                                                         |
| vol  | Oil seeds; Vegetable oils and fats. | Oil seeds; Vegetable oils and fats.                                                                                                                                                                                                                                                                               |
| min  | Coal; Oil; Gas; Minerals nec.       | Coal; Oil; Gas; Minerals nec.                                                                                                                                                                                                                                                                                     |
| f_f  | Forestry; Fishing.                  | Forestry; Fishing.                                                                                                                                                                                                                                                                                                |
| wol  | Wool, silk-worm cocoons.            | Wool, silk-worm cocoons.                                                                                                                                                                                                                                                                                          |
| ctl  | ctl                                 | Cattle, sheep, goats, horses; Animal products nec; Meat: cattle, sheep, goats, horse; Meat products nec.                                                                                                                                                                                                          |
| ocr  | ocr                                 | Plant-based fibers; Crops nec.                                                                                                                                                                                                                                                                                    |
| sgr  | sgr                                 | Sugar cane, sugar beet; Sugar.                                                                                                                                                                                                                                                                                    |
| veg  | veg                                 | Vegetables, fruit, nuts.                                                                                                                                                                                                                                                                                          |
| gro  | cereals                             | Wheat; Cereal grains nec.                                                                                                                                                                                                                                                                                         |
| ric  | rice                                | Paddy rice; Processed rice.                                                                                                                                                                                                                                                                                       |