IV. AGRICULTURAL TRADE LIBERALIZATION IN THE ASIA-PACIFIC REGION WITH SPECIFIC REFERENCE TO PREFERENTIAL TRADE AGREEMENTS: SCENARIO AND IMPACT ANALYSIS

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Introduction

As in many other regions in the world, agriculture has been the most protected and distorted sector in the Asian and Pacific region. Many countries in the region are currently following a combined approach to agricultural trade reform. Those countries have been making some progress towards multilateral trade liberalization through the World Trade Organization (WTO) trade negotiations and regional trade liberalization through regional trade agreements (RTAs). As surveyed in chapters II and III, they have also been successful in concluding a large number of bilateral trade agreements (BTAs). Following the global trend, regional integration is gaining momentum in the Asia-Pacific region. Countries in Asia and the Pacific have also taken the initiative in forming a mega-RTA similar to the North American Free Trade Agreement (NAFTA) or the European Union in recent years (Scollay and Gilbert, 2001). As Chandra and Pratap (2005) noted, "the emerging dinosauric aspirations within the Asian region have also been discussed". They cited the "Expert Group Meeting on the Regional Agreements in Asia and the Pacific" held in Bangkok in January 2003 under the auspices of ESCAP as well as the International Conference on "Building New Asia: Towards an Asian Economic Community" held in New Delhi in March 2003 under the auspices of the Research and Information System for Non-Aligned Countries (RIS), as examples of this trend.

The ideas of regional cooperation among the Association of South East Asian Nations plus China, Japan and the Republic of Korea (ASEAN plus 3) and ASEAN plus SARRC (South Asian Association for Regional Cooperation) were highlighted at the ESCAP meeting. Chapters II and III of this book have provided detailed discussions on agricultural trade liberalization in the South-East Asian and South Asian regions separately. The main objective of this chapter is to attempt to evaluate the impact of agricultural trade reform in the Asia-Pacific region, focusing on RTAs and BTAs using some examples such as ASEAN, SAARC, ASEAN plus 3, ASEAN plus 3 plus India, and the Indo-Lanka Free Trade Agreement (FTA).

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The remainder of this chapter is organized as follows. Section A briefly summarizes the gains from the Doha agricultural trade reform with the focus on the Asia-Pacific region, using recent quantitative assessments. Section B briefly surveys the most popular technique, i.e., computable general equilibrium (CGE) modelling, used in evaluating the effects of RTAs. The global CGE model and the database used in this study are briefly outlined in section C. The effects of selected RTAs and BTAs are evaluated in section D. Limitations of the modelling technique used in this chapter are considered in section E while section F comprises concluding remarks and policy implications.

A. Effects of the Doha agricultural reform – a brief overview

As surveyed in another paper that is part of this study (Bandara, 2007), a number of studies have emerged on quantifying the possible effects of multilateral trade liberalization in agriculture on different regions in the world under the Doha Development Agenda (DDA). It is not intended to reproduce similar empirical studies in this chapter. Therefore, the results of previous studies are used to highlight the implications of multilateral trade liberalization for countries in the Asian and Pacific region. Table 1 provides a summary of the results of four main studies. Column one of the table shows the results of one policy simulation of the well-known World Bank study (Anderson and Martin, 2005a-2005g; Anderson and others, 2005). These results are relevant to agricultural trade liberalization (i.e., the welfare effects of tiered agricultural tariff cuts, elimination of export subsidies and cuts in actual domestic support, as of 2001, of 28 per cent in the United States, 18 per cent in the European Union and 16 per cent in Norway).

The most striking feature of these results is that countries in the Asia-Pacific region are the main winners of Doha agricultural trade liberalization. While the total global welfare gain from this policy scenario is some US$ 74.5 billion (2015), the total gain for the Asia-Pacific region is some US$ 32.6 billion (about 44 per cent of the total global gain). However, the big winners in the region are developed countries such as Australia, Japan, the Republic of Korea, Taiwan Province of China, New Zealand and Thailand. Only China as well as Hong Kong, China, Singapore and Viet Nam record small losses. Although many developing countries in South Asia and South-East Asia gain from agricultural trade liberalization, the gains are just moderate.

Hertel and Keeney (2005) also examined the effects of agricultural trade policy reforms under DDA, using their recently developed GTAP-AGR model. The results of that study are summarized in the second column of table 1. The results of Hertel and Keeney (2005) also indicate that agricultural trade reforms under DDA generate a substantial amount of global welfare (US$ 55.7 billion in 2001 value). Developing countries would gain around US$ 11.9 billion. Similar to the previous study, import market access for agricultural products has been the main source of welfare gains (93 per cent of total gains). The relative contribution of the abolition of export subsidies and domestic support has been minimal. According to the study, small countries such as Bangladesh, the Philippines and Viet Nam would lose while large countries such as China and India would gain from full agricultural trade liberalization under DDA.

Recently, Antimiani and others (2005) examined the effects of agricultural trade liberalization under alternative scenarios by incorporating the outcomes of interaction between the strategies of country groups in the negotiations. The main results of that examination are summarised in column three of table 1, with the focus on countries in the Asia-Pacific region. The gains from agricultural trade liberalization in the study are similar to those shown in the World Bank study. According to the Antimiani study, the total global welfare gain is some US$ 69.2 billion (2013) and the total Asia-Pacific gain is some US$ 31.6 billion (about 46 per cent). Once again, Japan, the Republic of Korea, Taiwan Province of China and Thailand are the biggest winners in the region while countries such as Bangladesh, China, Indonesia and Viet Nam would lose marginally from agricultural trade liberalization.

The above three studies are highly optimistic about agricultural trade liberalization. The last column of table 1 summarizes the results of another recent study carried out by a group of researchers who are also the main contributors in compiling of protection data systematically and the development of the MAcMap database (Bouet and others, 2004a and 2005). The researchers claimed that most of the global CGE studies on Doha agricultural trade liberalization were excessively optimistic due to several reasons (Bouet and others, 2004a). Their welfare results are shown in percentage change form rather than in absolute United States dollar terms compared with the other three studies. The welfare results of this study indicated that agricultural trade liberalization under DDA would lead to a very small percentage increase in global welfare (0.08 per cent). It is not clear how they calculated this change and it is therefore very difficult to compare the results with those of previous studies since they are in United States dollar terms. The results across countries and regions indicate that developing countries in the Asia-Pacific region would gain again from agricultural trade liberalization. However, agricultural trade liberalization results in welfare losses in country groups such as sub-Saharan Africa, the Mediterranean and the poorest countries of the world. In general, in contrast to many other CGE studies, this study suggests that the welfare gains from agricultural liberalization are just moderate.

All in all, the above quantitative assessments indicate that most countries in the Asia-Pacific region may experience welfare gains as a result of agricultural trade reform under DDA. However, some developing countries such as Bangladesh and Viet Nam may experience modest welfare losses and they are at risk. Section C of this chapter examines whether the countries in the region would gain further in undertaking agricultural trade reform within RTAs and BTAs on top of multilateral agricultural trade liberalization.

Table 1. Gains from Doha agricultural trade liberalization

Country/region	Anderson and others, 2005 (US$ billion)	Hertel and Keeney, 2005	Antimiani and others, 2005 (US$ billion)	Bouet and others, 2004b (% change)
Asia-Pacific				
Australia and New Zealand	2.0	n.a.	2.0	n.a.
Singapore and Hong Kong, China	-0.1	n.a.	n.a.	0.05
Japan	18.9	n.a.	23.5	0.05
Republic of Korea and Taiwan Province of China	10.9	n.a.	3.1	n.a.
Bangladesh	0.0	-0.050	-0.1	n.a.
China	-0.5	0.560	-1.4	0.15
India	0.2	1.275	1.8	n.a.
Indonesia	0.1	0.085	-0.2	n.a.
Malaysia	n.a.	n.a.	1.3	n.a.
Philippines	n.a.	-0.085	-0.1	n.a.
Sri Lanka	n.a.	n.a.	0.2	n.a.
Thailand	0.9	n.a.	1.0	n.a.
Viet Nam	-0.1	-0.007	-0.2	n.a.
Rest of South Asia	0.2	n.a.	0.7	n.a.
Rest of East Asia	0.1	n.a.	n.a.	n.a.
High-income countries	65.6	41.6	n.a.	n.a.
European Union 25 plus EFTA	29.5	n.a.	8.8	0.14 and 0.11
United States of America	3.0	n.a.	3.0	0.05
Canada	1.4	n.a.	1.1	n.a.
Developing countries	9.0	11.9	n.a.	n.a.
East Asia and the Pacific	0.5	n.a.	n.a.	n.a.
South Asia	0.4	n.a.	n.a.	0.17
Europe and Central Asia	0.1	n.a.	n.a.	n.a.
Middle East and North Africa	-0.8	n.a.	n.a.	n.a.
Sub-Saharan Africa	0.3	n.a.	n.a.	n.a.
Latin America and Caribbean	8.1	n.a.	n.a.	n.a.
Transition economies	n.a.	2.2		
World total	74.5	55.7	69.2	0.08

B. Use of CGE models in evaluating RTAs

With the surge of RTAs around the world in recent years, a growing body of literature has been developed that focuses on the empirical assessment of the effects of those RTAs due to the increasing demand for such assessments. The ambiguity of the welfare effects of RTAs at theoretical level has also been a main reason for such increase in the demand for empirical assessments (Harrison and others, 2003; Robinson and Thierfelder, 2002). Some of the quantitative assessments have been carried out by policy analysts at the request of governments participating in RTAs (see, for example, Harrison and others, 2003). All these empirical studies can be classified by using two approaches. The first approach is to categorize them based on the time perspective they adopt: ex ante or ex post (DeRosa, 1998). While the ex ante evaluation estimate likely effects an RTA prior to its implementation or predicts future outcomes of an existing RTA, the ex post evaluation estimates such effects after the implementation of an RTA. Adams and others (2003) also followed this approach in reviewing empirical studies of RTAs. The second approach is to categorize them based on the methodology used in the studies, such as analytical, residual imputation and survey methods. Analytical studies involve using analytical models or methods for both ex ante and ex post evaluations while residual imputation can be employed only in the case of ex post situations. Survey methods depend on surveying various actors, sectors or industries in the economy. Of the three, analytical models have proven to be most popular among policy analysts.

A number of analytical techniques have been used by different analysts in recent years to evaluate the effects of various RTAs around the world. They range from single equation regressions to large-scale, multi-country global CGE models such as the currently popular GTAP model. Baldwin and Venables (1995) classified all analytical models under two groups: econometric models and CGE models. While econometric evaluations typically involve a large amount of historical or contemporary data, the estimation of parameters and hypothesis testing is done without a proper theoretical structure. Adams and others (2003) categorized the econometric evaluations (almost all of which are gravity models) as ex post evaluations, and CGE applications as ex ante evaluations. CGE applications are conducted based on a clear economy-wide theoretical structure, but rely mainly on estimates of key parameters outside the model (Baldwin and Venables, 1995; DeRosa, 1998). Both types of techniques have strengths and weaknesses (see Adams and others, 2003 and Neilsen, 2003 for detailed reviews).

Srinivasan and others (1993) surveyed several econometric studies from the 1960s and 1970s that attempted to evaluate the degree of trade diversion or trade creation as a result of the formation of RTAs in Europe and Latin America. However, none of those studies was able to present the welfare effects of RTAs because they lacked a proper microeconomic foundation. CGE models with a strong microeconomic foundation offer a systematic way of analysing welfare changes. Baldwin and Venables (1995) provided a systematic approach to welfare decomposition by grouping a number of possible mechanisms for welfare changes into seven components, as detailed below:

(a) In a setting of competitive world markets, an RTA may affect welfare through:

  (i) Trade volumes, and hence changes in tariff revenue or quota rents;

  (ii) Trade costs, and hence changes in import/export margins;

  (iii) The terms of trade, through the large-country effects;

(b) In a setting of imperfectly competitive markets, an RTA may affect welfare through:

  (i) Output effects, and hence changes in producer rents;

  (ii) Scale effects, and hence changes in production costs;

  (iii) Variety effects where consumers value diversity itself;

(c) In the long term, an RTA may affect welfare through accumulation effects that arise from changes in the rate of investment in those cases where the social rate of return diverges from the social discount rate.

In many recent CGE studies of RTAs, group (a) above has been taken into consideration, particularly after the introduction of the welfare decomposition method by Huff and Hertel (1996) into the GTAP framework. This has been one of the main strengths of using CGE models in analysing the effects of RTAs. There are CGE models that include the extensions of GTAP capable of capturing the welfare effects of groups (b) and (c) above. In addition to the ability of global CGE models to capture economy-wide as well as multiregional effects of RTAs, these models provide consistent and rigorously specified theoretical frameworks for performing a range of policy simulations. For this reason as well as other strengths, CGE modelling is currently the most popular technique in assessing RTAs.

As noted above, the increasing demand for quantitative assessments of PTAs such as the European Union, NAFTA and the ASEAN Free Trade Area (AFTA) has given rise to the extensive use of global modelling by policy analysts. Multiregional, multisector CGE models have been used as a tool for better understanding of the effects of an RTA. The trade literature show many CGE modelling applications deal with issues related to RTAs. These applications were surveyed by Flam (1992), Baldwin and Venables (1995), Francois and Sheills (1994), De Rosa (1998), and Robinson and Thierfelder (2002). Despite the criticism levelled at CGE evaluations of PTAs (Panagariya, 2000; Panagariya and Dattagupta, 1999), however, Baldwin and Venables (1995), De Rosa (1998), Robinson and Thierfelder (2002), Adams and others (2003) and Nielsen (2003) clearly recognized the contributions made by CGE models in evaluating PTAs. More recently, Harrison and others (2003) summarized the conclusions of many CGE studies they had undertaken to evaluate the effects of different RTAs, usually at the request of the client governments of the World Bank.

The evaluation of RTAs in the Asia-Pacific region by using CGE models has also been popular over the past decade or so. Many CGE studies have focusing on single RTAs as well as a number of RTAs and BTAs in the region. Some of the early CGE

studies of RTAs in the Asia-Pacific region were carried out by Lewis and others (1995), Brown and others (1996), and Ballard and Cheong (1997). Those studies examined the effects of possible RTA initiatives in the region. Following those early studies, there has been a surge of CGE studies of RTAs in recent years (for example, Robinson and Thierfelder, 2002, Nielsen, 2003, and Adams and others, 2003). Of all these studies, it is worth mentioning at least three studies that focused on a number of RTA initiatives similar to the ones considered in chapter III. The three studies are Ballard and Cheong (1997), Scollay and Gilbert (2001) and Ma and Wang (2002).

1. Ballard and Cheong, 1997

This study used perfectly competitive and imperfectly competitive versions of a global CGE model based on a GTAP database. It focused on the following policy scenarios under different combinations of model assumptions:

(a) The regional initiative of Asia-Pacific Economic Cooperation (APEC);

(b) A Pacific FTA with 11 member nations;

(c) An East-Asia FTA;

(d) Global liberalization.

Three main conclusions of this study were:

(a) “Every member of a proposed new free trade area would reap welfare gains”;

(b) “The imperfectly-competitive model simulates substantially larger welfare gains than does the perfectly-competitive model”;

(c) “Welfare gains will be larger when the proposed FTA is larger”.

2. Scollay and Gilbert, 2001

This is the most comprehensive CGE study of RTAs and BTAs in the Asia-Pacific region in terms of coverage. It used the standard GTAP model and database, and focused on a large number of RTAs and BTAs under four different headings:

(a) New bilateral and plurilateral subregional trade agreements (SRTAs) such as the trans-Pacific initiatives and intra-Western Pacific initiatives;

(b) Potential steps towards the formation of an East Asian trade bloc;

(c) APEC liberalization on a nondiscriminatory basis and preferential basis;

(d) The formation of the Asia-Pacific trade bloc and global contexts.

The main conclusions of this comprehensive study were:

(a) The effects of many proposed and new small RTAs and BTAs (known as SRTAs) were likely to be small;

(b) The recent proliferation of bilateral and plurilateral SRTAs could create trade conflicts and tension in the region;

(c) The welfare gains would be large in the case of SRTAs involving countries such as Japan and the United States.

3. Ma and Wang (2002)

This study used a recursive dynamic global CGE model and the GTAP database. It covered the four FTA scenarios in the region:

(a) ASEAN plus China;

(b) ASEAN plus Japan;

(c) ASEAN plus 3 (Japan, China and the Republic of Korea);

(d) ASEAN plus China, Japan, the Republic of Korea and the United States.

The main conclusions of the study were:

(a) ASEAN plus China is the main winner among the four scenarios;

(b) Japan gains from the ASEAN plus Japan FTA at the expense of China;

(c) All countries gain from the ASEAN plus three FTA and it offers substantially larger markets for its members.

While CGE models have been widely used to evaluate the effects of RTAs in the Asia-Pacific region, in general, less attention has been paid to RTAs in South Asia. However, a number of GTAP-based CGE studies have focused on South Asian RTAs (see Bandara, 2004 for a survey). For example, Pigato and others (1997) briefly assessed the effects of the South Asia Preferential Trading Arrangement (SAPTA) using the GTAP model; this can be considered as the first CGE study on SAPTA. This study found that SAPTA would create some welfare gains for its member countries, and that small countries would benefit more. However, unilateral trade liberalization would create larger gains for the region, and India would benefit from unilateral trade liberalization to a greater extent than the rest of South Asia.

Following the above study, Siriwardana (2001) used the GTAP model to investigate several trade liberalization options for Sri Lanka beyond preferential trade liberalization within SAARC. The study conducted a series of 12 policy experiments with the GTAP model, ranging from bilateral trade liberalization between Sri Lanka, other SAARC countries, ASEAN countries and other Asian countries. The results of this study indicated that bilateral trade liberalization with other SAARC countries would be beneficial to the Sri Lankan economy.

One of the most recent studies using GTAP to evaluate gains from a South Asian Free Trade Agreement (SAFTA) is that of Bandara and Yu (2003). This study investigated the question of "how desirable is the South Asian Free Trade Area?" To address this

question, a series of policy experiments were carried out with the GTAP model. Two opposite policy simulations were performed: (a) a unilateral trade liberalization scenario (South Asian countries liberalizing trade unilaterally); and (b) a preferential trade liberalization scenario (trade liberalization among trading partners in the region). The results of the two policy simulations demonstrated that the impact of preferential trade liberalization would be very small and that the impact of unilateral trade liberalization was significant for South Asia. Under preferential liberalization, small countries would lose or gain marginally while the biggest country in the region, India, would likely be the sole significant winner.

The results of other extra policy simulations (preferential trade liberalization between South Asia and ASEAN, the European Union and NAFTA) were also analysed in this study. While preferential trade between South Asia and ASEAN was expected to create adverse effects on South Asia, preferential trade between South Asia and European Union or NAFTA was expected to be beneficial to South Asia. More recently, Chandha and Pratap (2005) used a global CGE model based on the GTAP database to investigate a series of RTA scenarios involving South Asia.

The brief survey above indicates that a large number of attempts have been made to evaluate the effects of RTAs in the Asia-Pacific region in recent years. Many of these studies have attempted to evaluate the overall effects of different RTAs. Less attention has been paid to the agricultural trade liberalization under RTAs in this region. The purpose of this chapter is to undertake a similar quantitative study, but with the focus on agricultural trade liberalization. Similar to many previous studies, the standard GTAP model and its latest database (version 6) have been used for this purpose. Section C provides a brief description of the GTAP model and database used in this chapter.

C. GTAP model and database

The GTAP database has been used in all of these studies within CGE modelling frameworks. However, the models differ from study to study. It was decided to use the standard GTAP model and the database (version 6) in the present study. In this section the main features of the GTAP model and the database are briefly outlined.[1]

1. Overview of the GTAP model

As noted in the introduction, the GTAP model and the database have been widely used to explore the economic effects of global and regional trade liberalization around the world in recent years. Since the establishment of GTAP in 1992, many analysts have used either the standard GTAP model or the GTAP database to quantify the economic effects of RTAs around the world. In fact, this has been one of the most researched areas using GTAP. The structure of the “standard” GTAP model is well documented in chapter 2 of Hertel (1997). Although there are new extensions of this core model, only the standard GTAP model is used in this study together with the GTAP database. The core of GTAP is

[1] See the GTAP website at http://www.gtap.agecon.purdue.edu for more details.

its database that comprises a fully articulate record of transactions as well as export and import duties between different regions for a wide range of commodities. Since 1992, a number of versions of the GTAP database have been released. With each updated version, the quality of data has increased. The number of regions and commodities has also increased. Since the early versions, countries in the Asia-Pacific region have been well represented in GTAP. This present analysis uses the GTAP version 6 database as it represents a more disaggregated Asia-Pacific regional classification as well as improved quality of protection data.

There are some advantages of using the GTAP model to analyse the effects of agricultural trade liberalization on Asia and the Pacific. First, the GTAP model links different individual countries and regions with detailed specifications that describe the economic activities of firms, households and governments. Second, the model is based on the input-output structures of each region or country that link industries together in a value-added chain, starting from primary goods and moving into continuously higher stages of intermediate processing, to the final assembling of consumption goods for households and governments. Third, all individual regions or countries are linked through international trade flows to form a single global general equilibrium model in which prices and quantities supplied and demanded are determined simultaneously in all primary factor markets in domestic and international commodity markets. Finally, the GTAP model structure reflects the fact that all parts of the economy are connected in a network of direct and indirect linkages. This means that any changes in any part of the system will have repercussions throughout the global economy.

The standard GTAP model is a comparative static global general equilibrium model based on neo-classical economic theory. Neo-classical utility maximization and cost minimization assumptions are used to derive demand functions for household consumption and inputs. Each region contains a representative household that maximizes regional utility. The private household demand is specified as a Constant Difference Elasticity (CDE) demand system. In all markets (both output and factor markets), perfect competition is assumed while the constant returns scale technology is assumed in production. Firms are all assumed to maximize profits. Market clearing conditions are enforced for all the markets. The production of each commodity employs a composite of primary factors called value-added (a Constant Elasticity of Substitution [CES] of various primary factors) and an intermediate input composite (a CES composite of domestically produced goods and imported goods). The value-added component is combined with the composite intermediate input in a Leontief fashion to form the final product. Technical changes are incorporated into the value-added nest and the final output nest. Further, the production system has been incorporated into the GTAP model in order to distinguish production sectors by their intensities in factors of production. Five factors of production have been identified: (a) agricultural land; (b) other natural resources; (c) unskilled labour; (d) skilled labour; and (e) physical capital.

International trade is modelled as a nested Armington structure (Armington, 1969), which not only differentiates imported goods from domestically produced ones but also

differentiates imported products by regions. This structure is useful in tracking the existing trade pattern, especially the "cross hauling" of similar products. In the first net of this structure, imports of a given good are sourced by origins and then combined by a CES function as a composite at the border of the importing country. Once the composite product is imported into the region, it is considered a homogeneous product and cannot be distinguished by origin. This composite imported good is further divided into intermediate input, private consumption and government consumption. However, composite imported goods are differentiated from domestically produced goods when consumers/producers are making a decision on the optimal mix of domestic and imported goods.

In order to carry out policy simulations with the model, it is necessary to close it by declaring some variables as exogenous since there are more variables than equations in the model. This is known as the "closure" of the model in CGE modelling literature. In the standard closure, regional savings are assumed to be homogeneous and contribute to a pool of savings, which is then allocated among regions for investment in response to change in regional expected rates of return. These changes are assumed to be equalized across regions, thus giving rise to capital mobility across regions. These assumptions allow greater changes in the balance of trade balance as a result of trade liberalization, and tend to dampen the terms of trade effects. Both labour and capital stocks are assumed to be mobile within a region and immobile across regions. However, land and natural resources are industry-specific. All factors of production are assumed constant and, hence, factor prices adjust to clear factor markets.

2. Main features of GTAP database, version 6

The standard GTAP model based on the GTAP version 6 database has been used to perform various simulations for this study. The GTAP version 6 database covers up to a maximum of 87 regions and countries, 57 industries and 5 primary factor endowments. It gives a "snapshot" of the world economy in 2001. The GTAP database distinguishes trade transactions between commodities and services based on their regions of origin and destination as well as agents such as intermediate users, households and governments that absorb the commodities in the importing country. Trade taxes have been recorded for every trade transaction. The database consists of regional input-output tables that take detailed account of the inter-industrial linkages within regions, detailed bilateral trade, transport and protection data that describe the interregional economic linkages and macroeconomic data. All these data sources are combined in a consistent manner. Often in a research application, the sectors and regions are aggregated to a smaller size that suits specific needs of the research. Although the scope of GTAP has far exceeded the boundary of "trade analysis", bilateral trade data and the protection instruments remain two key components in its database, the quality of which has improved continuously. The quality of the data and the solid structure of the model provide insurance of quality analysis on trade liberalization, as the correct representation of the initial trade structure and the protection situation determine whether the starting point is accurate.

According to Martin and Anderson (2005), the new version of the GTAP database (version 6) contains a number of additional features compared with the previous versions:

- New protection data are included for a recent year (2001) compared with the previous version (1997);
- Using systematically developed new protection data from the MAcMap database, this version has incorporated much detail on different items of protection such as bound and applied tariffs, non-reciprocal as well as reciprocal tariff preferences, and the ad valorem equivalents of specific tariffs for the first time;
- Also included are main trade policy reforms occurring outside the Doha negotiations such as the commitments associated with accession to WTO by such economies as China and Taiwan Province of China;
- The implementation of the last Uruguay Round commitments such as the abolition of quotas on trade in textiles and clothing at the end of 2004 and final agricultural tariff reductions in developing countries; and
- The incorporation of the European Union expansion from 15 to 25 members in April 2004. This new database contains all new member countries, so an EU 25 region can be aggregated.

In order to undertake any sensible policy simulation with the GTAP version 6 database, it is necessary to aggregate regions or countries (with maximum possible disaggregation of the Asia-Pacific region) and sectors (with maximum disaggregation of agricultural sectors) since it is difficult to use the full disaggregated version of the database (with 87 countries and regions, and 57 industries) in this study. As table 2 shows, the aggregated database of this study contains 24 regions, with many Asia-Pacific countries featured separately, and 26 sectors, keeping all agricultural sectors separately.

D. Effects of agricultural trade liberalization in Asia-Pacific RTAs and BTAs

This section provides estimates of potential welfare gains as a result of agricultural trade liberalization under different RTA and BTA initiatives. The main intention is not to attempt to quantify the effects of all RTAs and BTAs similar to Scollay and Gilbert (2001), due to time and resource constraints; instead, an attempt is made to evaluate the effects of agricultural liberalization related to selected RTAs and BTAs.

1. Experiments

The impact of RTAs within the Asia-Pacific region and the hypothetical gigantic Asia-Pacific RTA would be analysed through the use of the GTAP model by simulating possible agricultural trade liberalization (elimination of all import tariffs within member countries). Many CGE studies related to the Asia-Pacific region, including those surveyed in section B of this chapter, did not focus on:

Table 2. Aggregation of GTAP regions and industries

Number	Code	Description	Number	Code	Description
1	**AUS**	Australia	1	**PDR**	Paddy rice
2	**NZL**	New Zealand	2	**WHT**	Wheat
3	**XOC**	Rest of Oceania	3	**GRO**	Cereal grains nec
4	**CHN**	China	4	**V_F**	Vegetables, fruit, nuts
5	**HKG**	Hong Kong, China	5	**OSDs**	Oil seeds
6	**JPN**	Japan	6	**C_B**	Sugar cane, sugar beet
7	**KOR**	Republic of Korea	7	**PFB**	Plant-based fibres
8	**TWN**	Taiwan Province of China	8	**OCR**	Crops nec
9	**XEA**	Rest of East Asia	9	**CTL**	Bovine cattle, sheep and goats, horses
10	**IDN**	Indonesia	10	**OAP**	Animal products nec
11	**MYS**	Malaysia	11	**RMK**	Raw milk
12	**PHL**	Philippines	12	**WOL**	Wool, silkworm cocoons
13	**SGP**	Singapore	13	**FRS**	Forestry
14	**THA**	Thailand	14	**FSH**	Fishing
15	**VNM**	Viet Nam	15	**OIL**	Oil, coal, gas and minerals nec
16	**XSE**	Rest of South-East Asia	16	**CMT**	Bovine meat products
17	**BGD**	Bangladesh	17	**OMT**	Meat products nec
18	**IND**	India	18	**VOL**	Vegetable oils and fats
19	**LKA**	Sri Lanka	19	**MIL**	Dairy products
20	**XSA**	Rest of South Asia	20	**PCR**	Processed rice
21	**USA**	United States	21	**SGR**	Sugar
22	**CNA**	Canada	22	**OFD**	Food products nec
23	**EU**	EU 25	23	**B_T**	Beverages and tobacco products
24	**ROW**	Rest of the World	24	**TEX**	Textiles and wearing apparel
			25	**MNFCS**	Other manufacturing
			26	**SVCES**	All services

Note: nec = Not elsewhere classified.

(a) The effects of agricultural trade liberalization within RTAs;

(b) The link between multilateral agricultural trade liberalization under DDA and possible agricultural trade liberalization within RTAs.

Therefore, it was decided to focus on the above two aspects in this study. First, it was decided to run all simulations to focus on agricultural trade liberalization within RTAs. As reviewed in chapters II and III, many of the current and proposed RTAs and BTAs exclude a wide range of agricultural products. This study attempts to evaluate the effects

of agricultural trade liberalization if the members of RTAs and BTAs are also willing to extend preferences towards agricultural trade. Second, an attempt is made to establish the link between multilateral trade liberalization and agricultural trade liberalization within RTAs.

Although there are a number of approaches to establishing this link, the approach used in this chapter is the introduction of RTAs and BTAs as post-DDA scenarios. As the starting point, a basic simulation is run to capture the DDA trade liberalization reform. Similar to previous studies reviewed in section A, the proposed tariff cuts and elimination of subsidies for DDA trade liberalization are used in this simulation to create an updated database using the GTAP model and the adjusted database described in the previous section. This updated database takes into account the effects of multilateral trade liberalization. After creating this updated database, simulations related selected RTAs and BTAs were carried out to evaluate how countries' gains or losses from multilateral trade liberalization would alter with the agricultural trade reforms within RTAs and BTAs if the member countries agreed to extend preferences to cover agricultural products. A number of simulations were carried out using the selected scenarios listed below in relation to selected RTAs and BTAs in the region.

(a) Selected experiments related to RTAs

Experiment 1 – SAFTA: SAARC countries eliminating agricultural tariffs with one another while maintaining existing agricultural barriers on trade with other countries.

Experiment 2 – AFTA: ASEAN countries eliminating agricultural tariffs with one another while maintaining existing agricultural barriers on trade with other countries.

Experiment 3 – ASEAN plus 3: ASEAN plus 3 countries eliminating agricultural tariffs with one another while maintaining existing agricultural barriers on trade with other countries.

Experiment 4 – ASEAN plus 3 plus India: ASEAN plus 3 countries and India eliminating agricultural tariffs with one another while maintaining existing agricultural barriers on trade with other countries.

Experiment 5 – Gigantic Asia-Pacific RTA: ESCAP member countries (excluding North American and South American countries) eliminating agricultural tariffs with one another while maintaining existing agricultural barriers on trade with other countries.

(b) Selected experiments related to BTAs

Experiment 6 – Indo-Lanka Trade Agreement: India and Sri Lanka eliminating agricultural tariffs with one another while maintaining existing agricultural barriers on trade with other countries.

Experiment 7 – Thailand-Japan Trade Agreement: Thailand and Japan eliminating agricultural tariffs with one another while maintaining existing agricultural barriers on trade with other countries.

It is important to note here that all the experiments mentioned above focused on the removal of all agricultural tariffs within RTAs and BTAs. This is not exactly what is happening in actual trade negotiations related to these agreements. As reviewed in chapters II and III, there are "sensitive" agricultural sectors such as sugar, tea and rice. Many member countries are reluctant to include these sectors in trade agreements. However, the incorporation of actual tariff cuts in these agreements and the exclusion of sensitive products was a very difficult and complex task in this study. For example, the GTAP commodity classification was not sufficient to accommodate some of the "sensitive" agricultural sectors in this region. Therefore, an attempt was made to evaluate the effects of full removal of agricultural tariffs within RTAs and BTAs to produce some benchmarks.

(c) Results of the experiments

In this section, the results of the different simulations related to the above experiments are discussed. Only the welfare results have been used to indicate "winners" and "losers". Analysing the welfare effects of trade liberalization under different scenarios is a complex task. Similar to any other GTAP application, the measure of change in welfare reported in this chapter is the equivalent variation in income, which can be defined as the money matrix equivalent of the utility change bought about by the price change. The standard GTAP model provides the results with a number of welfare decomposition components, in order to trace major factors that course welfare changes. There are two main factors or components among these components. The first important welfare component is the allocation efficiency. Countries are achieving efficiency gains when they remove trade distortion. This is the well-known allocation efficiency. The second important welfare component is the terms of trade (TOT) effect. In general, trade liberalization in agriculture will lead to a rise in food prices, particularly in the case of products that are highly protected in developed countries. This will lead to a TOT improvement in countries that are net exporters of protected commodities. On the other hand, net food importing countries expect to lose through TOT deterioration. This study focuses on these two factors when presenting results in this section.

It is important to caution readers about the welfare results of this study before carrying out the simulations and analysing the results. As summarised in section B, Baldwin and Venables (1995) grouped the possible mechanisms for welfare changes as a result of forming an RTA under three groups. In common with many CGE studies, the simulations carried out with the standard GTAP model in this study only identify the welfare mechanisms in the first group. Therefore, it is obvious that the results underestimate the welfare gains or loss. To capture other mechanisms, a dynamic CGE model based on imperfect competition is necessary. However, this study only uses the standard static GTAP model, based on the perfect competition assumption since dynamic and imperfect competitive variants of global CGE models are not freely available to users.

(i) Agricultural trade liberalization under SAFTA

Some of the main findings of the review of South Asian regional integration and agricultural trade liberalization in chapter II are that:

- South Asian economies remain the most protective region for agriculture;
- The South Asia interregional trade negotiations have given fewer preferences for agricultural trade;
- The number of agricultural products covered in these negotiations is very limited;
- The RTR and REST indices indicate potential for improving agricultural trade in the region;
- India can provide more opportunities to promote agricultural trade in the region.

The above findings indicate that agricultural trade liberalization is limited under the current preferential trading arrangements in South Asia. This allows a simulation to be run to examine the effects of full agricultural trade liberalization within the region if the member countries are willing to extend preferences toward agriculture with the implementation of multilateral trade liberalization under DDA. This will help in answering the question of "is it worthwhile for South Asian countries to move towards an FTA rather than focusing on multilateral trade liberalization?" This question has been raised by several experts in recent years in relation to SAFTA (Panagariya, 1999 and 2003). As stated at the beginning of this chapter, this simulation was run using the updated database after running the DDA simulation. The welfare results of this experiment are presented in table 3. The last column of table 3 shows the effects of multilateral trade liberalization for comparison purposes.

As table 3 shows, while major South Asian countries (India and the rest of South Asia including Pakistan) would benefit moderately from agricultural trade liberalization among the South Asian countries under SAFTA, small countries such as Bangladesh and Sri Lanka might experience moderate welfare losses. This is not surprising considering the relative share of South Asian trade in total world trade, as welfare results depend to a large extend on trade shares. As expected, India and Pakistan are winners. The results of revealed comparative advantage (RCA) calculations in chapter II indicated that India has RCA in a wide variety of agricultural goods and a higher potential to benefit from agricultural trade liberalization within the region. The results of our simulation support this finding. Bangladesh and Sri Lanka are likely to lose because they are net food importers. Bangladesh would be the biggest loser of welfare as a result of TOT effects. The low complementarity of trade within the region and low intraregional trade as indicated in chapter II have been reasons for marginal gains from agricultural trade liberalization in the region. South Asian countries, particularly India, would gain more under multilateral trade liberalization. These results are consistent with the previous study by Bandara and Yu (2003). The results show that the potential gains from agricultural trade liberalization

Table 3. Welfare effects of trade liberalization under SAFTA
(Equivalent variation in income, in 2001 US$ million)

Welfare	Allocative efficiency	Terms of trade effects	Total welfare changes under SAFTA	Total welfare changes under DDA agricultural scenario
1. Australia	0.2	-9.8	-9.6	452.30
2. New Zealand	-0.1	-1.2	-1.2	385.58
3. Rest of Oceania	0.0	0.0	0.0	69.93
4. China	4.9	2.9	6.8	-49.21
5. Hong Kong, China	0.0	1.7	2.0	-21.6
6. Japan	0.2	4.5	4.6	4 809.76
7. Republic of Korea	-1.8	1.8	-0.3	1 581.01
8. Taiwan Province of China	-0.1	1.7	1.5	9.78
9. Rest of East Asia	0.1	0.2	0.3	37.98
10. Indonesia	0.7	-12.0	-8.5	-10.68
11. Malaysia	-0.4	-4.0	-4.0	273.16
12. Philippines	0.3	0.0	0.2	-2.13
13. Singapore	0.1	0.2	0.3	10.22
14. Thailand	0.3	-4.1	-3.6	240.54
15. Viet Nam	0.3	-0.9	-0.7	3.12
16. Rest of South-East Asia	0.1	-2.6	-2.3	15.71
17. Bangladesh	3.2	-9.1	-8.2	-7.08
18. India	3.8	9.5	12.9	466.29
19. Sri Lanka	-3.9	3.1	-0.8	16.09
20. Rest of South Asia	-4.3	61.8	58.9	27.35
21. United States	-3.3	-10	-15.3	773.5
22. Canada	-0.4	-7.2	-7.1	429.22
23. European Union	7.7	-2.2	5.5	6 685.68
24. Rest of the world	2.5	-24.4	-21.3	357.90
Total	**10.2**	**-0.2**	**10.1**	**16 554.46**

Note: The sum of allocation efficiency and terms of trade does not equal the "total column" as total welfare also includes other components. See Huff and Hertel (1996) for welfare decomposition in the GTAP model.

would be moderate under SAFTA and it is therefore important for South Asian countries to pursue multilateral trade liberalization. This was emphasised by Panagariya (1999 and 2003) on a number of occasions using a simple analytical model.

(ii) Agricultural trade liberalization under AFTA

Once again, before analysing the quantitative results of this experiment, it is also important to note some findings of the descriptive analysis of agricultural trade between ASEAN countries in chapter III:

- The average share of intra-ASEAN agricultural exports (imports) in total ASEAN exports (imports) between 1993 and 2003 was low at 1.6 (1.4) per cent, while that of extra-ASEAN was slightly higher at 6 (5) per cent;
- In general, there is product similarity in agricultural trade or trade competitiveness rather than trade complementarity;
- The tariffs on a large proportion of intra-ASEAN agricultural trade are much lower compared to the most favoured nation (MFN) tariffs on extra-ASEAN agricultural trade.

Table 4 shows the potential welfare gains of agricultural under AFTA. The gains from agricultural trade liberalization are not large. These results are not surprising and, in fact, are consistent with the findings in chapter III. Even individual country welfare results related to ASEAN members are consistent with the descriptive analysis in chapter III. Agricultural trade liberalization within the ASEAN region results in welfare gains for member countries except the Philippines. However, the gains are not large. Members such as Thailand and Viet Nam perform well. As shown in chapter III, both Thailand and Viet Nam have a comparative advantage in a wide variety of agricultural products. The results suggest that the Philippines could suffer a very small loss as a result of agricultural trade liberalization within ASEAN. The welfare loss as a result of TOT deterioration is much bigger for the Philippines than for other countries. Agricultural trade liberalization within ASEAN member countries could result in welfare loses in non-partner countries, including small Asia-Pacific and South Asian countries, because of the well-known trade diversion effect.

(iii) Trade liberalization under ASEAN plus three countries

The results of the previous experiment demonstrate that agricultural trade liberalization within the ASEAN region would not result in substantial welfare gains for member countries. In this experiment, an attempt is made to show how ASEAN countries would benefit from an RTA of ASEAN plus three big economies in the region (China, the Republic of Korea and Japan). As noted in chapter III:

(a) Inter-ASEAN agricultural trade is higher than intra-ASEAN agricultural trade;

Table 4. Welfare effects of agricultural trade liberalization under AFTA
(Equivalent variation in income, in 2001 US$ million)

Welfare	Allocative efficiency	Terms of trade effects	Total welfare changes
1. Australia	0.6	-2.0	-0.7
2. New Zealand	-0.4	-7.7	-7.4
3. Rest of Oceania	-1.3	-4.2	-6.5
4. China	-9.4	-33.2	-31.8
5. Hong Kong, China	-0.1	-11.7	-12.2
6. Japan	-20.9	-10.6	-23.1
7. Republic of Korea	-5.6	-6.9	-10.7
8. Taiwan Province of China	-0.3	-5.5	-4.8
9. Rest of East Asia	-1.4	-1.3	-3.5
10. Indonesia	17.3	6.1	19.2
11. Malaysia	64.7	-7.4	20.8
12. Philippines	51.2	-50.5	-6.4
13. Singapore	8.8	87.0	101.1
14. Thailand	-14.7	109.3	90.7
15. Viet Nam	0.7	26.0	20.6
16. Rest of South-East Asia	-3.6	-9.7	-9.1
17. Bangladesh	-0.1	-1.3	-1.6
18. India	-0.6	-6.7	-6.2
19. Sri Lanka	-0.2	-0.1	-0.3
20. Rest of South Asia	-0.7	-1.5	-2.1
21. United States	9.7	-20.4	-8.4
22. Canada	2.0	2.5	6.4
23. European Union	2.1	-14.6	0.1
24. Rest of the world	-10.2	-35.6	-36.8
Total	**87.5**	**-0.1**	**87.4**

Note: The sum of allocation efficiency and terms of trade does not equal the "total column" as total welfare also includes other components. See Huff and Hertel (1996) for welfare decomposition in the GTAP model.

(b) Agricultural trade between ASEAN member countries, Japan and the Republic of Korea is more complementary than competitive, and there is a large degree of trade complementarity;

(c) Protection of the agricultural sector in Japan and the Republic of Korea is higher than in ASEAN member countries.

This experiment simulated the effects of agricultural trade liberalization within an enlarged AFTA covering ASEAN member countries plus China, the Republic of Korea and Japan. This simulation was run on the updated database after running the AFTA simulation

to examine the marginal benefits of adding the big three economies to ASEAN. Table 5 shows the welfare effects that emerged from this simulation. In this case, all participating countries in the RTA would benefit and the welfare gains would be much higher than those of AFTA. Japan would be the biggest winner from agricultural trade liberalization in an ASEAN plus 3 RTA (more than US$ 13 billion). The Republic of Korea would be the second biggest winner from this RTA. In fact, these countries would gain more than multilateral trade liberalization since full liberalization of agricultural trade within ASEAN plus 3 is assumed, rather than the reduction of tariffs by certain percentages under multilateral trade liberalization.

Table 5. Welfare effects of trade liberalization under ASEAN plus 3
(Equivalent variation in income, in 2001 US$ million)

Welfare	Allocative efficiency	Terms of trade effects	Total welfare changes
1. Australia	8.0	-166.6	-155
2. New Zealand	-1.7	-47.4	-44.1
3. Rest of Oceania	-3.3	-6.7	-12.2
4. China	-1 049.6	2 721.3	1 382.0
5. Hong Kong, China	-0.2	-139.5	-133.8
6. Japan	13 768.5	-601.9	1 3418.2
7. Republic of Korea	6 186.2	-3 328.2	2824.1
8. Taiwan Province of China	2.7	77.6	80.6
9. Rest of East Asia	5.9	107.2	138.7
10. Indonesia	17.1	23.0	15.7
11. Malaysia	0.0	68.4	25.0
12. Philippines	11.1	-86.2	-86.1
13. Singapore	65.9	603.9	704.6
14. Thailand	-169.6	785.4	578.2
15. Viet Nam	-111.3	84.0	-17.9
16. Rest of South-East Asia	-205.9	-4.7	-203.8
17. Bangladesh	-6.2	-2.6	-6.5
18. India	17.8	-24.0	-2.9
19. Sri Lanka	0.2	-2.5	-2.2
20. Rest of South Asia	7.9	-1.5	7.0
21. United States	160.4	-311.4	-112.8
22. Canada	9.1	-39.7	-24.7
23. European Union	95.4	424.8	554.4
24. Rest of the world	-19.0	-169.6	-172.4
Total	**18 789.8**	**-37.0**	**18 754.2**

Note: The sum of allocation efficiency and terms of trade does not equal the "total column" as total welfare also includes other components. See Huff and Hertel (1996) for welfare decomposition in the GTAP model.

These results once again confirm one of the main conclusions of the previous comprehensive CGE study by Scollay and Gilbert (2001) on RTAs and BTAs in the Asia-Pacific region. According to them, the welfare gains from RTAs would be much larger in the case of RTAs and BTAs involving developed countries such as Japan. However, our results demonstrate that while developed and large developing countries would gain from an ASEAN plus 3, small countries such as the Philippines and Viet Nam would be at risk of moderate welfare losses. This could be due to competition from a country such as China. For example, Viet Nam was found to be a main winner under the AFTA scenario. However, the results of this simulation show that Viet Nam could experience a welfare loss from an ASEAN plus 3. This might be due to competition from China in agricultural trade.

Excluded countries, such as those in South Asia, are likely to suffer under this scenario due to possible trade diversion effects.

(iv) Trade liberalization under ASEAN plus 3 plus India

In this experiment India was added to the ASEAN plus 3 RTA. Once again, the updated database was used to eliminate tariffs between ASEAN plus 3 plus India in order to evaluate the marginal effect of adding India to ASEAN plus 3. Table 6 presents the welfare gains under this scenario. Again, all participating countries would gain under this RTA. The results suggest that India would gain much more in participating in an ASEAN plus 3 plus India RTA than in a South Asian RTA. Our results are consistent with recent efforts by India in joining an ASEAN RTA. The marginal benefits of adding India to ASEAN plus 3 would not be as large as adding Japan, the Republic of Korea and China to ASEAN. However, all member countries would benefit from adding India to ASEAN plus 3.

(v) Trade liberalization under a gigantic Asia-Pacific RTA

Under this scenario it is assumed that all countries in the Asia-Pacific region, with the exception of the United States, are participating in a gigantic Asia-Pacific RTA similar to the European Union and NAFTA. The database, updated after running the DDA agricultural scenario, was also used in this experiment. The welfare results, shown in table 7, are very interesting. Overall, many countries in the region could gain more from the gigantic RTA than by participating in small RTAs. The total gains are higher than even the total welfare gains from the DDA agricultural scenario because full liberalization of agriculture was assumed in this experiment. However, the results suggest that two small South Asian countries (Bangladesh and Sri Lanka) and the Philippines could suffer welfare losses as a result of agricultural trade liberalization under a gigantic Asia-Pacific RTA. This is because of the competition from other developing countries in the regions.

The Indo-Lanka FTA has been one of the most popular BTAs in the South Asian region and an example for small BTAs. The results of agricultural trade liberalization between India and Sri Lanka are shown in table 8.

Table 6. Welfare effects of trade liberalization under ASEAN plus 3 plus India
(Equivalent variation in income, in 2001 US$ million)

Welfare	Allocative efficiency	Terms of trade effects	Total welfare changes
1. Australia	9.5	-214.5	-199.7
2. New Zealand	-2.0	-50.7	-47.1
3. Rest of Oceania	-3.3	-6.4	-11.8
4. China	-1 010.7	2 635.0	1 353.7
5. Hong Kong, China	-0.2	-138.8	-132.2
6. Japan	13 495.6	-644.6	13 121.4
7. Republic of Korea	6 293.5	-3 303.3	2 954.1
8. Taiwan Province of China	3.6	77.5	81.6
9. Rest of East Asia	5.5	107.7	138.7
10. Indonesia	-10.0	201.7	111.1
11. Malaysia	125.5	262.4	295.5
12. Philippines	61.5	-33.5	21.0
13. Singapore	62.5	560.1	658.0
14. Thailand	-34.3	859.0	783.7
15. Viet Nam	2.4	47.1	56.3
16. Rest of South-East Asia	-7.4	59.7	50.7
17. Bangladesh	-6.7	-4.6	-8.9
18. India	408.4	-118.4	296
19. Sri Lanka	0.0	-3.7	-3.5
20. Rest of South Asia	7.9	-22.3	-14.1
21. United States	197.5	-423.9	-166.7
22. Canada	13.5	-77.8	-53.3
23. European Union	123.8	440.3	624.3
24. Rest of the world	-8.4	-245.3	-216.9
Total	**19 727.7**	**-37.0**	**19 692.2**

Note: The sum of allocation efficiency and terms of trade does not equal the "total column" as total welfare also includes other components. See Huff and Hertel (1996) for welfare decomposition in the GTAP model.

(vi) Indo-Lanka Free Trade Agreement

As pointed out in Scollay and Gilbert (2001), our results suggest that forming a BTA between small developing countries would not result in big welfare gains for the participating countries. In fact, some small countries may lose from these BTAs. Sri Lanka tends to lose from agricultural trade liberalization under the Indo-Lanka FTA. This is the reason why Sri Lanka is reluctant to open its market to agricultural exports from India. As shown in chapter II, India has a comparative advantage in a wide variety of agricultural commodities and has become a major food supplier to Sri Lanka. Therefore, agricultural trade liberalization under the Indo-Lanka FTA will lead to further benefits for India. Other countries in the

Table 7. Welfare effects of trade liberalization within the ESCAP region
(Equivalent variation in income, in 2001 US$ million)

Welfare	Allocative efficiency	Terms of trade effects	Total welfare changes
1. Australia	28.4	1 642.1	1 666.4
2. New Zealand	20.7	151.4	154.6
3. Rest of Oceania	43.9	44.9	108.6
4. China	-928.1	2 235.6	1 089.6
5. Hong Kong, China	-1.0	-89.6	-82.1
6. Japan	14 399.8	-1 171.9	13 529.6
7. Republic of Korea	6 334.5	-3 294.3	3 011.2
8. Taiwan Province of China	57.1	-19.3	45.8
9. Rest of East Asia	5.3	125.7	161.3
10. Indonesia	-14.9	157.5	72
11. Malaysia	124.8	284.3	313.6
12. Philippines	67.8	-56.5	2.0
13. Singapore	53.8	474.1	558.3
14. Thailand	-2.3	572.6	547.8
15. Viet Nam	22.1	36.1	59.0
16. Rest of South-East Asia	-6.8	50.9	43.9
17. Bangladesh	17.4	-33.9	-21.0
18. India	563.3	-328.5	242.2
19. Sri Lanka	-2.4	-4.3	-6.5
20. Rest of South Asia	52.0	11.5	64.4
21. United States	222.3	-681.2	-535.8
22. Canada	-1.3	-127.9	-108.1
23. European Union	75.0	302.4	444.8
24. Rest of the world	-27.2	-331.4	-305.6
Total	**21 104.2**	**-49.6**	**21 055.9**

Note: The sum of allocation efficiency and terms of trade does not equal the "total column" as total welfare also includes other components. See Huff and Hertel (1996) for welfare decomposition in the GTAP model.

South Asian region may moderately suffer as a result of this agreement due to the trade diversion effect.

(vii) Agricultural trade liberalization under a Japan-Thailand FTA

In contrast to the Indo-Lanka FTA, the proposed FTA between Japan and Thailand is a very interesting case. This is between a developed and a rapidly developing country in the region. There is a trade complementarity between Japan and Thailand. However, Japan's agricultural sector is highly protected compared to Thailand. As reviewed in chapter III, Thailand is the biggest exporter of agricultural and fisheries products to Japan

Table 8. Welfare effects of trade liberalization under the Indo-Lanka Trade Agreement

(Equivalent variation in income, in 2001 US$ million)

Welfare	Allocative efficiency	Terms of trade effects	Total welfare changes
1. Australia	0.0	-1.1	-1.2
2. New Zealand	0.0	-0.2	-0.2
3. Rest of Oceania	0.0	0.0	0.0
4. China	0.3	-0.1	0.2
5. Hong Kong, China	0.0	0.1	0.1
6. Japan	0.3	0.8	1.2
7. Republic of Korea	0.0	0.3	0.3
8. Taiwan Province of China	0.0	0.1	0.1
9. Rest of East Asia	0.0	0.0	0.0
10. Indonesia	0.0	-1.2	-1.0
11. Malaysia	-0.1	-0.2	-0.3
12. Philippines	0.0	0.0	0.0
13. Singapore	0.0	-0.2	-0.2
14. Thailand	0.1	-1.4	-1.3
15. Viet Nam	0.0	-0.2	-0.2
16. Rest of South-East Asia	0.0	-0.1	-0.1
17. Bangladesh	0.0	-0.1	-0.2
18. India	-2.7	8.3	5.5
19. Sri Lanka	-5.0	-0.4	-5.4
20. Rest of South Asia	0.2	-1.2	-1.1
21. United States	0.2	-0.2	-0.1
22. Canada	0.0	-0.1	-0.1
23. European Union	0.3	0.1	0.4
24. Rest of the world	-0.6	-2.9	-3.4
Total	**-6.9**	**0.0**	**-6.9**

Note: The sum of allocation efficiency and terms of trade does not equal the "total column" as total welfare also includes other components. See Huff and Hertel (1996) for welfare decomposition in the GTAP model.

and nearly half of its current exports to Japan face market access restrictions. Japan has already agreed to cut tariffs on more than 500 agricultural products from Thailand. However, they have excluded rice and sugar from the preference list. This experiment was carried out to show how Thailand would benefit if Japan removed all barriers to Thai agricultural exports, even after multilateral trade reform under DDA.

Table 9 presents the results of this experiment. The results indicate that both countries would gain from agricultural trade liberalization under this FTA, unlike the case of the Indo-Lanka FTA. Thailand is the biggest winner in this case because it is assumed

that Japan is ready to remove its high trade barriers to Thai agricultural exports. As Thailand is a net agricultural exporter to Japan, it would enjoy a huge welfare gain through TOT. Japan would also benefit from this FTA, as shown in table 9. These gains are through allocation efficiency. However, the results also show that there is a trade diversion problem because of discriminatory trade. Some other countries in the region, such as Malaysia, Indonesia, the Philippines and the rest of South-East Asia, might lose due to the Thai-Japan FTA.

Table 9. Welfare effects of trade liberalization under Japan-Thailand Trade Agreement

(Equivalent variation in income, in 2001 US$ million)

Welfare	Allocative efficiency	Terms of trade effects	Total welfare changes
1. Australia	5.6	-22.0	-17.3
2. New Zealand	0.9	5.7	7.4
3. Rest of Oceania	-1.8	-5.1	-9.2
4. China	-25.0	-68.5	-52.5
5. Hong Kong, China	0.6	-67.8	-72.2
6. Japan	5 805.2	-3 440.1	2 545.2
7. Republic of Korea	-16.3	-3.5	-6.4
8. Taiwan Province of China	-4.1	-2.7	6.3
9. Rest of East Asia	2.7	57.0	70.9
10. Indonesia	-17.7	-32.4	-41.9
11. Malaysia	-17.1	-75.9	-60.9
12. Philippines	-21.1	5.9	-16.0
13. Singapore	-5.0	-55.9	-66.1
14. Thailand	-109.2	3 672.5	3 477.4
15. Viet Nam	1.0	35.2	40.2
16. Rest of South-East Asia	-4.7	-17.4	-22.7
17. Bangladesh	-2.2	-3.0	-5.8
18. India	-25.9	50.5	22.1
19. Sri Lanka	0.0	1.3	1.2
20. Rest of South Asia	-6.1	22.4	16.4
21. United States	9.7	236	58.7
22. Canada	0.9	-27.0	-18.0
23. European Union	-172.7	-24.3	-219.1
24. Rest of the world	-251.8	-283.8	-534.0
Total	**5 145.7**	**-43**	**5 103.6**

Note: The sum of allocation efficiency and terms of trade does not equal the “total column” as total welfare also includes other components. See Huff and Hertel (1996) for welfare decomposition in the GTAP model.

E. Limitations of the above quantitative analysis

The main tool used in the quantitative analysis in this chapter was the standard GTAP model based on the version 6 database, which has become the most popular global CGE model in the world. As noted in section B, the CGE modelling technique has also become the most popular analytical technique for evaluating the effects of RTAs. However, these models have been criticized on various grounds such as problems in interpreting the results, questions regarding the general equilibrium theory itself, poor performance of these models, the assumptions used in these models and weak econometric foundations (Dhar, 2006; Kehoe, 2002; Panagariya, 2000; Panagariya and Duttagupta, 2001; Ackerman, 1999; McKitrick, 1998; and Jorgenson, 1984). This section briefly outlines some of the limitations highlighted in the literature in order to show that the results presented in the previous section are subject to limitations.

First, Dhar (2006) noted the limitations of the theoretical framework of the general equilibrium model, citing Ackerman (1999). According to these critics, CGE models are based on the assumptions of neo-classical microeconomics. They question the idealistic behaviour of producers and consumers of equilibrium models as well as the existence of equilibrium. In addition, they criticize some assumptions such as perfect competition and market clearing prices.

Second, CGE models have been criticized on the basis of their sizes using standard labelling of “black boxes”. This is the same old argument used by opponents of CGE modelling, who claim it is difficult to understand what is driving the results because these models are large and complex. The critics add that the modellers are unable to interpret the results due to the complexities of these big models. In recent years, CGE modellers have been able to respond to this criticism by making their models more transparent and by developing methods to explain where the results come from. Welfare decomposition is a good example.

Third, the critics (Panagariya 2000; Panagariya and Duttagupta, 2001) argue that the CGE models generate benefits for a country from its own preferential trade liberalization due to erroneous reasons, such as:

(a) CGE models are based on internally inconsistent assumptions (wrong models);

(b) The gains are generated by choosing questionable values of some key parameters (wrong parameters).

With regard to the first point, critics argue that the CGE models covered by the survey of Robinson and Thierfelder (2002) are fundamentally flawed because they combine the Armington assumption (i.e., goods are differentiated by the country of origin) and fixed terms of trade. Further, they argue that the product differentiation associated with the Armington assumption is incompatible with fixed terms of trade. Using the partial equilibrium analysis, they argue that the introduction of terms of trade changes (flexibility) leads to a deterioration of welfare in member countries. On the second point, they believe that

CGE models generate benefits from RTAs because modellers are using the wrong model with the wrong parameter values. According to them, if a theoretically correct conventional model is selected, the CGE models are unlikely to generate benefits for a PTA member from its own preferential trade liberalization.

In their study, Panagariya and Duttagupta (2001) developed a partial equilibrium model and a stylized CGE model. Then, they argued, the results obtained from the stylized model based on the Armington assumption and their "correct" closure were consistent with their partial equilibrium story, i.e., a member of a PTA hurts itself and benefits the recipient of the preference.

Finally, the base year of databases and the level of aggregation of the sectors of CGE models have also been subjected to criticism.

The CGE modellers should take these limitations seriously and attempt to respond to their critics in a convincing way. In fact, they have already responded to these criticisms and attempted to improve the modelling techniques and the quality of results (Bandara and Yu, 2002; Hertel and others, 2003).

Although CGE models have been subjected to various criticisms such as those discussed above, they are the most popular analytical technique available to policy analysts of RTAs because of their ability to capture region-wide and country-wide effects. They have also allowed policy analysts to conduct a range of policy simulations, such as this study, within a consistent and rigorously specified theoretical framework. To date, the critics have not been able to produce an alternative empirical analytical technique to evaluate RTAs. This has been the main reason for the emergence of hundreds of CGE applications in analysing RTAs in recent years.

F. Conclusions

In this chapter, we have discussed the results of the simulations related to agricultural trade liberalization within selected RTAs and BTAs. The modelling was carried out using the standard GTAP model, which is a static model based on the assumption of perfect competition and its version 6 database. The starting point was the agricultural trade liberalization under DDA. The standard GTAP model was used to create an updated database with the DDA agricultural reform. The DDA agricultural reform simulation was carried out in a similar manner to those in previous studies. The different policy simulations were carried out based on the updated database except for the ASEAN plus 3 and ASEAN plus 3 plus India experiments. (The updated database from the ASEAN experiment was used for the ASEAN plus 3 and the updated database from ASEAN plus 3 was used for the ASEAN plus 3 plus India experiment, in order to observe the marginal benefits of adding members to an existing PTA). The main findings of this chapter can be summarized as follows.

The simulation results given in this chapter show that the welfare effects of agricultural trade liberalization on member countries within small RTAs such as SAFTA, the Indo-Lanka FTA and even AFTA are negligible. These results, however, suggest that the welfare gains will be larger when the proposed RTA is larger. At the same time, however, non-member countries will experience widespread negative welfare effects as a result of these large RTAs. In general, countries that are excluded from a particular RTA are much more likely to suffer welfare losses than are the included countries in the region. A gigantic RTA for the Asia-Pacific region is more suitable than overlapping small RTAs and BTAs, as discussed in the recent forums mentioned in the introduction. Japan may gain much higher welfare benefits when it participates in an ASEAN RTA and it may suffer when it does not participate in an ASEAN RTA. Some South Asian countries may suffer from a gigantic Asia-Pacific RTA. One point that stands out from many of our simulations is that Bangladesh and the Philippines are at risk of losing from agricultural trade liberalization in RTAs. This can be observed in the quantitative studies related to DDA agricultural trade liberalization surveyed in section A of this chapter.

It should be noted that the simulation results presented in this chapter are subject to the limitations highlighted otherwise in this publication.

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