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Chapter 1
Economic Effects of an ASEAN + 6 Free Trade Agreement : A CGE Model Simulation Analysis

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[Key Points]

- In addition to trade liberalization through reduction/elimination of tariffs, implementing trade and investment facilitation measures and technical assistance to developing countries yields greater economic impacts on countries within the region. Reducing cross-border service-link costs by various trade and investment facilitation measures could also help further develop the international production and distribution networks that have been formed in East Asia.
- Agricultural trade liberalization is also important. Regardless of whether gross domestic product (GDP), economic welfare, or trade, in most cases, positive economic effects are greater in scenarios of partial liberalization of trade in the agricultural sector than in scenarios of exclusion of that sector from trade liberalization, and are the greatest in scenarios of trade liberalization in all sectors including agriculture. Trade liberalization in the agricultural sector in addition to other sectors is important in terms of efficient resource allocation as well.
- Economic effects are likely to be greater for a free trade agreement (FTA) among the Association of Southeast Asian Nations (ASEAN) and six other countries (ASEAN+6 FTA) than a FTA among ASEAN plus only three countries (ASEAN+3 FTA). In addition, the relevance of the ASEAN+6 FTA and the incentive for each ASEAN+6 country to form that agreement heavily depend on how comprehensively the agreement incorporates elements other than trade liberalization.

〔Key Data〕

Economic Effects of an ASEAN+6 FTA: Real GDP Growth

(%)

	ASEAN+6				
	Sim1	Sim2	Sim3	Sim4	Sim5
Japan	0.03	0.06	0.05	0.54	0.54
China	0.22	0.20	0.14	1.77	4.84
South Korea	0.29	0.77	1.15	3.72	3.71
Indonesia	0.07	0.07	0.07	1.94	4.14
Malaysia	0.29	0.43	0.50	6.21	9.00
Philippines	0.14	0.19	0.25	4.18	6.52
Singapore	0.00	0.02	0.05	4.40	4.42
Thailand	0.55	0.70	0.74	4.78	7.32
Vietnam	1.31	1.86	2.25	7.33	9.92
Other Southeast Asian countries	0.05	0.09	0.10	0.92	2.95
Australia	0.14	0.15	0.16	1.35	1.35
New Zealand	0.06	0.08	0.10	1.87	1.87
India	-0.10	0.16	0.41	1.30	3.45

Source: Author's calculation, based on the simulation results

Note: Simulations are as follows:

Sim1: Full trade liberalization in the non-agriculture sector

Sim2: Full trade liberalization in the non-agriculture sector and 50%-trade liberazation in the agriculture sector

Sim3: Full trade liberalization in all sectors

Sim4: Full trade liberalization and various facilitation measures in all sectors

Sim5: Full trade liberalization, various facilitation measures, and technical cooperation to LDCs in all sectors

Introduction

In recent years efforts to conclude free trade agreements (FTAs) / economic partnership agreements (EPAs) have been gathering momentum in East Asia as well. FTAs/EPAs can have significant economic impacts on their member and non-member countries. In particular, the economic impacts are likely to be greater when FTAs/EPAs are more comprehensive ones involving not only trade liberalization but also liberalization of trade in services and investment, trade and investment facilitation measures such as simplified customs clearance and mutual recognition of standards, and technical assistance. This study employs a computable general equilibrium (CGE) model simulation analysis, the most widely utilized method to estimate economic effects of FTAs and economic integration, to assess the impact of economic partnership among the Association of Southeast Asian Nations (ASEAN) nations plus six countries (i.e., Australia, China, India, Japan, New Zealand, and South Korea) (ASEAN+6 FTA, hereinafter) on economies in the region. This study also attempts to discuss the significance of the ASEAN+6 framework and what is needed to form the ASEAN+6 FTA.

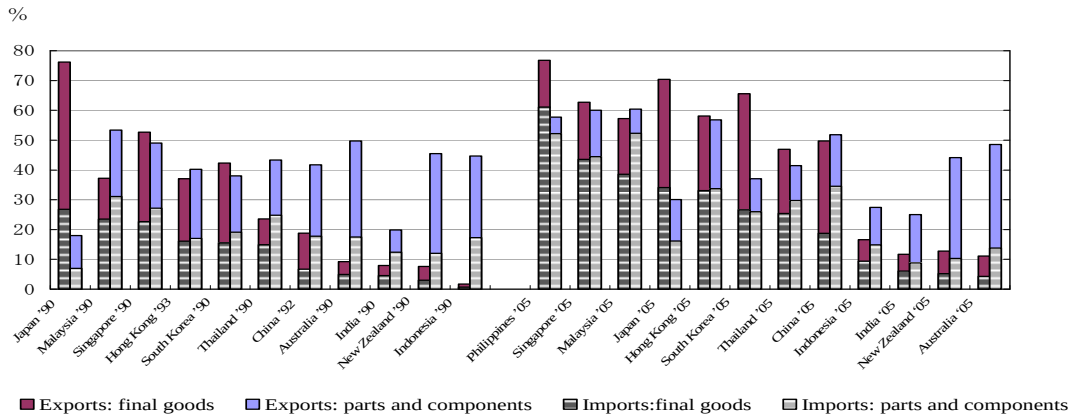
Before analyzing economic effects of an ASEAN+6 FTA, the next section provides overviews on changes in patterns of trade and international specialization in East Asia. The section 2 briefly introduces the basic features of CGE models and

attempts to capture the economic situation of the ASEAN+6 countries based on the database used in the analysis. The section 2 also explains the methodology to analyze the economic effects of the ASEAN+6 FTA using a CGE model. The results of the analysis are discussed in section 3, followed by conclusions in section 4.

1. Expansion of intraregional trade and development of international production and distribution networks in East Asia

While patterns of international specialization are dramatically changing around the world, international production and distribution networks in East Asia, in particular, have developed more rapidly and on a larger scale than elsewhere with aggressive utilization of foreign direct investment (FDI).1 The major players in East Asia's production networks are machinery industries including general machinery, electronic machinery, transport equipment, and precision machinery. Figure 1 shows machinery goods and machinery parts and components as a share of total exports to/imports from the world for ASEAN+6 countries. In East Asia except Australia, New Zealand, and India, machinery trade, particularly machinery parts and components trade sharply rose as a share of total exports/imports from the beginning of the 1990s to 2005. Over a period of almost 15 years, two-way trade in machinery parts and components had dramatically grown in East Asia.

Figure 1 Machinery Trade as a Percentage of Total Trade among Major ASEAN+6 Countries in Early 1990s and 2005



Source: Author's calculation, based on UN Comtrade data.
Note: Machinery trade is defined as HS 84-92; for definition of machine parts and components, see Ando and Kimura (2005).

[1] According to Ando and Kimura (2005), East Asian production networks are distinguished by the following characteristics. First, they already occupy a significant component of the economic activity of each East Asian country so that no one can discuss manufacturing activities and international trade patterns in East Asia by ignoring them any more. Second, they consist of a large number of countries at various income levels in the region, which is different from production networks between specific countries, such as those between developed and developing countries in geographic proximity to one another. Third, they involve not only intra-firm transactions but also arm's length transactions with various firm nationalities including local and multinational enterprises (MNEs).

The key point here is an expansion of back-and-forth transactions of machinery parts and components within the region. As Table 1 demonstrates, intraregional shares of machinery parts and components' exports rose from 40 percent in 1990 to more than 50 percent in 2005. In addition, machinery goods hold almost 60 percent of total intraregional exports in 2005 (40 percent in 1990), and of those intraregional machinery exports, 60 percent are parts and components (50 percent in 1990). In other words, machinery parts and components account for 35 percent of intraregional exports in all industries, which is 1.5 times that in 1990, 20 percent. Considering the fact that total trade in 2005 is more than four times that of 1990 (in nominal terms), these figures suggest that intraregional trade relationships in East Asia have been rapidly intensified through the explosive expansion of back-and-forth transactions of parts and components.2

Table 1 Increase in Intraregional Trade in East Asia: Exports

	1990	2005
(A)Machinery parts and components		
Intraregional exports (US $ million)	54,336	399,882
Intraregional share of parts and components' exports	40%	53%
Parts and components' share in intraregional machinery exports (A/B)	52%	61%
Machinery parts and components' share in total intraregional exports（A/C)	20%	35%
(B)Machinery goods (including parts and components)		
Intraregional exports (US $ million)	105,268	654,620
Intraregional share of machinery parts and components'	30%	44%
Machinery share in total intraregional exports（B/C)	39%	57%
(C)All products		
Intraregional exports (US $ million)	270,465	1,139,821
Intraregional share of exports	39%	45%

Source: Author's calculation, based on UN Comtrade data.

Note: See Figure 1 note for definitions. East Asia here comprises China, Hong Kong, Indonesia, Japan, Malaysia, the Philippines, Singapore, South Korea, and Thailand.

Underlying the growth of two-way trade in machinery parts and components within East Asia is the trend toward production fragmentation. Fragmentation refers to the process of breaking up production activities (processes) formerly carried out at a single location into a number of production blocs and relocating them to dispersed sites

[2] The East Asian countries have strengthened intraregional trade relationships by gradually involving more countries in the region and expanding transactions with them. For more detailed discussion on changes in patterns of East Asia's trade in the 1990s, see Ando (2006).

suitable for their particular activities. While fragmentation of production can lower production costs in each production site by utilizing location advantage, it newly incurs service-link costs connecting those production blocs. International fragmentation, in particular, imposes service-link costs across borders in addition to those generated by geographical distance. Therefore, reduction of these service-link costs is important for the development of international fragmentation and the growth of two-way trade in parts and components.

As Ando (2006) emphasizes, the drastic increase in two-way trade and formation of vertical international specialization occurs, mainly in machinery industries, in East Asia in the 1990s largely due to a rapid expansion of back-and-forth transactions among vertically fragmented production processes across borders as the fragmentation theory indicates, rather than that of intra-industry trade of quality-differentiated commodities as suggested by the theoretical model of vertical product differentiation. If cross-border service-link costs are further reduced, production fragmentation can more deeply develop, and international specialization within the region can be activated.

2. Analyzing Economic Effects of an ASEAN+6 FTA

Simulation analysis based on a CGE model is typically used to estimate the economic effects of FTAs and/or economic integration. In CGE models, assumptions are made on how producers, consumers and governments behave. For example, producers are assumed to maximize profits while consumers to maximize utility. As for government spending, many models assume that government collects revenues from various types of taxes including direct and indirect taxes and import tariffs and allocates its expenditure among different products according to pre-fixed sectoral shares.

Most CGE models assume perfect competition in product/service markets as well as in markets for the factors of production including labor and capital. The Armington assumption, in which products are differentiated according to their production sites, is applied to the structure of consumption and production in goods and services. Moreover, in virtually all the CGE models, factors of production, labor and capital, are assumed to be mobile among sectors within a country but not mobile across borders.3 Furthermore, since most models are static in the sense that no time dimension is explicitly considered, a comparative static simulation analysis is employed.

This section analyzes the economic effects of an ASEAN+6 FTA using a CGE model with the characteristics described. 4 The study employs the Global Trade

[3] Although this is an unrealistic assumption in our age of globalization, FDI and international movement of foreign labor have yet to be successfully incorporated in CGE models.

[4] For a discussion of previous studies estimating the effects of FTAs in East Asia, see Ando and Urata (2007).

Analysis Project (GTAP) model, the most pervasively utilized CGE model, and the GTAP 6 database ver.6 (the latest version) that corresponds to the global economy in the year 2001.5

2.1 Economic situation in 2001

The GTAP ver.6 database is composed of 87 regions and 57sectors.6 In our analysis, 87 regions are aggregated into 18 regions (Table A.1 in the Appendix), and 57 sectors are aggregated into 16 sectors (Table A.2).

Table 2 presents basic economic data available from the GTAP database for 18 countries/regions. From this table, we can observe that income levels considerably vary among the 13 ASEAN+6 economies. Moreover, while the ASEAN+3 (6 ASEAN countries plus China, Japan, and South Korea) countries account for about 90 percent of the total ASEAN+6 GDP, exports, and imports, just two countries, that is, China and India, account for 76 percent of the region's population.

Table 2 Basic Statistics of Economies

	GDP (US $ million)	(Share of ASEAN+6 total)	Per capita GDP (US $ million)	Population (millions)	(Share of ASEAN+6 total)	Exports (US $ million)	(Share of ASEAN+6 total)	Imports (US $ million)	(Share of ASEAN+6 total)	Average tariff (%)
Japan	4,177,570	(57.5%)	32,946	127	(4.2%)	478,422	(28.6%)	413,063	(29.6%)	4.1
China	1,159,031	(16.0%)	913	1,270	(41.9%)	388,381	(23.2%)	281,232	(20.2%)	11.6
South Korea	427,646	(5.9%)	8,988	48	(1.6%)	191,797	(11.5%)	162,579	(11.7%)	8.5
Indonesia	145,306	(2.0%)	681	213	(7.0%)	69,128	(4.1%)	45,415	(3.3%)	3.6
Malaysia	88,041	(1.2%)	3,720	24	(0.8%)	128,137	(7.7%)	76,683	(5.5%)	4.7
Philippines	71,437	(1.0%)	894	80	(2.6%)	38,836	(2.3%)	43,778	(3.1%)	2.8
Singapore	84,855	(1.2%)	25,482	3	(0.1%)	116,937	(7.0%)	124,467	(8.9%)	0.0
Thailand	114,681	(1.6%)	1,828	63	(2.1%)	81,251	(4.9%)	63,877	(4.6%)	8.8
Vietnam	32,723	(0.5%)	412	79	(2.6%)	15,784	(0.9%)	25,136	(1.8%)	10.3
Other Southeast Asia	79,053	(1.1%)	1,179	67	(2.2%)	8,700	(0.5%)	6,709	(0.5%)	9.0
Australia	357,365	(4.9%)	18,392	19	(0.6%)	73,934	(4.4%)	72,913	(5.2%)	4.3
New Zealand	50,569	(0.7%)	13,135	4	(0.1%)	19,024	(1.1%)	15,800	(1.1%)	1.7
India	477,342	(6.6%)	462	1,032	(34.1%)	63,232	(3.8%)	62,295	(4.5%)	21.8
Hong Kong	162,793		22,736	7		105,187		114,406		0.0
Taiwan	281,436		12,620	22		138,961		116,766		3.4
NAFTA	11,414,991		27,865	410		1,345,048		1,693,832		1.8
EU-15	7,929,525		21,075	376		2,603,932		2,571,408		0.8
Rest of world	4,224,237		1,846	2,288		1,277,982		1,254,312		6.4
ASEAN	616,096	(8.5%)	1,163	530	(17.5%)	458,772	(27.4%)	386,065	(27.7%)	4.0
ASEAN+3	6,380,343	(87.8%)	3,233	1,974	(65.2%)	1,517,372	(90.7%)	1,242,939	(89.2%)	6.3
ASEAN+6	7,265,620	(100.0%)	2,399	3,029	(100.0%)	1,673,561	(100.0%)	1,393,947	(100.0%)	6.9

Source: Author's calculation, based on GTAP database.

Note: Average tariffs are import-weighted average tariffs, obtained by using import values at domestic prices and import values at world prices.

5 As for the GTAP model, see Hertel (1997).

6 While the number of regions and sectors are 87 and 57 in the GTAP ver.6 database, the corresponding figures are 66 and 57 in the GTAP ver.5 database (with data for 1997). In addition, there are some modifications in the models; for instance, an elasticity of substitution between imported goods and domestic products are greater in the GTAP ver.6 database than in the GTAP ver.5 database.

Table 3 represents trade matrix among the ASEAN+6 economies (total = 100) in 2001. Patterns of trade among ASEAN+6 countries by exporters (or importers) are as follows: shares are roughly 25 percent for Japan, 20 percent for China, 10 percent for South Korea, 35 percent for the ASEAN countries, and 10 percent for the sum of Australia, New Zealand. Moreover, bilateral trade patterns show that trade among ASEAN+3 countries consists of 83 percent of trade among ASEAN+6 countries. Furthermore, trade among only three countries, China, Japan, and South Korea, are composed of 34 percent of trade among ASEAN+6 countries. These facts suggest that patterns and degrees of trade liberalization among these three countries in particular could have a significant impact not only on themselves but also on other members such as ASEAN countries.

Table 3 ASEAN+6 Trade Matrix

(%)

		Importers													
		Japan	China	South Korea	Indonesia	Malaysia	Philippines	Singapore	Thailand	Vietnam	Other Southeast Asia	Australia	New Zealand	India	Total
Exporters	Japan	0.0	8.6	4.8	1.2	2.1	1.6	2.7	2.2	0.4	0.1	1.4	0.2	0.4	25.7
	China	10.1	0.0	2.5	0.5	0.7	0.3	1.3	0.6	0.5	0.2	1.0	0.1	0.5	18.2
	South Korea	2.9	4.8	0.0	0.6	0.5	0.5	0.7	0.4	0.3	0.1	0.5	0.1	0.3	11.6
	Indonesia	2.2	0.8	0.6	0.0	0.4	0.1	0.9	0.2	0.1	0.0	0.3	0.0	0.3	5.9
	Malaysia	2.5	1.6	0.7	0.3	0.0	0.2	3.3	0.6	0.1	0.1	0.4	0.1	0.6	10.2
	Philippines	1.1	0.3	0.2	0.0	0.2	0.0	0.5	0.3	0.0	0.0	0.0	0.0	0.0	2.6
	Singapore	1.3	1.5	0.7	0.6	2.2	0.5	0.0	0.7	0.3	0.2	0.3	0.1	0.4	8.5
	Thailand	2.0	0.9	0.3	0.2	0.5	0.2	0.9	0.0	0.2	0.2	0.3	0.0	0.1	5.8
	Vietnam	0.5	0.2	0.1	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.1	0.0	0.0	1.2
	Other Southeast Asia	0.2	0.1	0.1	0.0	0.0	0.0	0.1	0.2	0.0	0.0	0.0	0.0	0.1	0.7
	Australia	2.2	0.9	0.8	0.3	0.3	0.1	0.3	0.2	0.1	0.0	0.0	0.5	0.3	6.0
	New Zealand	0.4	0.2	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	1.4
	India	0.5	0.4	0.2	0.1	0.2	0.1	0.2	0.1	0.1	0.0	0.1	0.0	0.0	2.0
	Total	25.8	20.0	11.2	3.8	7.2	3.7	11.0	5.6	2.0	0.8	4.9	1.2	2.9	100.0

Source: Author's calculation, based on GTAP database.
Note: Figures show ratios in total intra-regional exports among ASEAN+6 countries, based on export data at world prices.

Table 4(a) shows import-weighted average tariffs by sector for each country, calculated by using by-sector import values at domestic prices and world prices. Among ASEAN+6 countries, India, China, and Vietnam have particularly high average tariffs; 22 percent, 12 percent, and 10 percent for all commodities and 25 percent, 12 percent, and 15 percent for manufacturing goods, respectively. Moreover, agriculture, textiles and apparel, and transport equipment sectors tend to maintain high tariffs to protect the domestic producers in many countries. In other words, there is considerable room for trade liberalization in those countries/sectors. Table 4(b), on the other hand, provides bilateral import-weighted average tariffs, calculated by using bilateral import values at domestic prices and world prices. In scenarios of full trade liberalization in all sectors, all tariffs in Table 4(b) are removed. More specifically, when trade is fully liberalized among China, Japan, and South Korea with a significant amount of trade, tariffs are removed such as South Korea's tariffs of 22 percent on imports from China, China's tariffs of 14 percent on imports from Japanese, China's tariffs of 13 percent on imports from South Korea, and so on.

Table 4 Average Tariffs Among the ASEAN+6 Countries

Importer	Japan	China	South Korea	ASEAN								Australia	New Zealand	India
					Indonesia	Malaysia	Philippines	Singapore	Thailand	Vietnam	Other Southeast Asia			
(a) Average tariffs by sector														
Agriculture and food	30.2	37.6	81.7	13.9	5.0	17.1	9.5	0.4	29.4	36.6	20.4	2.8	2.0	50.2
Fishery and forestry	1.8	0.7	6.9	2.7	0.6	0.2	0.5	0.0	10.3	3.9	1.0	0.1	0.0	6.8
Mining	0.0	0.3	3.7	0.7	0.3	1.6	3.2	0.0	0.2	3.8	2.6	4.9	0.0	16.2
Texitle and apparel	9.0	20.5	10.0	11.1	8.6	12.3	6.5	0.0	18.5	31.3	10.1	17.0	6.0	26.6
Wood and paper	1.1	9.0	4.0	5.4	3.4	6.6	4.7	0.0	11.0	14.7	5.3	3.6	1.1	22.0
Mineral products	1.1	13.0	6.7	5.2	4.4	5.9	4.5	0.0	11.7	7.8	5.4	3.0	1.3	28.8
Iron and steel	0.5	7.5	3.8	5.6	5.9	8.5	3.9	0.0	9.3	5.1	3.5	3.6	1.4	33.6
General machinery	0.1	13.1	6.1	3.3	3.0	3.9	2.3	0.0	8.2	8.0	6.0	3.5	2.1	25.4
Electronic machinery	0.0	10.1	1.1	0.8	2.1	0.4	0.1	0.0	4.7	8.8	8.8	0.8	1.2	15.1
Transport equipment	0.0	20.5	3.9	14.6	9.6	31.7	11.5	0.0	24.0	46.9	25.0	12.9	3.5	27.4
Other manufacturing	5.3	13.9	8.5	6.1	6.5	6.8	6.1	0.0	7.1	20.2	13.7	5.2	3.8	33.8
Construction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Trade	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Transport and communication	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Public services	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other services	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Manufacturing, total	1.4	12.0	4.5	4.0	4.7	4.7	2.4	0.0	8.6	14.5	8.6	5.4	2.2	24.8
Total	4.1	11.6	8.5	4.0	3.6	4.7	2.8	0.0	8.8	10.3	9.0	4.3	1.7	21.8
(b)(Bilateral) average tariffs by trading partner														
Japan	-	13.6	5.1	5.5	5.3	7.8	2.3	0.0	11.2	11.3	9.7	8.8	4.6	23.6
China	5.2	-	21.6	6.7	6.6	6.7	5.9	0.0	11.1	19.9	7.9	8.4	5.1	25.1
South Korea	2.6	13.4	-	6.1	5.8	5.3	3.0	0.0	10.4	19.1	9.1	6.2	3.5	23.9
ASEAN	2.8	11.6	3.8	3.8	3.5	4.1	3.4	0.0	8.7	16.2	10.6	3.3	1.6	28.5
Indonesia	1.2	11.4	4.1	4.6	-	7.1	3.9	0.0	15.9	14.8	7.6	4.0	1.9	37.5
Malaysia	0.5	10.3	2.7	1.9	2.7	-	2.0	0.0	9.0	12.2	11.8	2.5	1.2	31.3
Philippines	1.0	10.1	3.3	3.2	4.3	3.8	-	0.0	7.9	13.3	10.3	2.9	1.5	23.9
Singapore	1.5	10.6	1.9	4.6	2.7	2.2	2.0	-	7.4	21.1	10.2	1.4	1.1	18.3
Thailand	8.8	16.7	8.7	5.4	6.3	9.5	4.4	0.0	-	12.3	10.9	4.5	2.1	24.4
Vietnam	4.7	12.7	9.6	7.2	4.5	5.0	14.9	0.0	17.6	-	0.0	5.8	4.8	22.6
Other Southeast Asia	0.9	7.2	3.6	1.5	3.8	1.1	3.0	0.0	1.9	2.7	2.1	5.4	0.7	26.3
Australia	15.1	10.8	5.9	3.8	3.8	3.4	4.1	0.0	7.9	8.0	5.4	-	0.2	26.5
New Zealand	8.4	11.9	7.7	5.3	3.9	1.8	3.9	0.0	12.5	13.1	5.3	4.5	-	15.0
India	2.0	7.5	10.6	4.9	4.3	3.9	6.2	0.0	12.2	8.3	3.1	5.6	3.0	-

Source: Author's calculation, based on GTAP database.
Note: See note for Table 2

2.2 Simulation methodology

Reduction or elimination of trade barriers within the region is of course important in establishing an ASEAN+6 FTA. Considering that intraregional trade has already grown dramatically in East Asia, and vertical international specialization has been formed as mentioned in section 1, however, an ASEAN+6 FTA including Australia, New Zealand, and India is expected to have a wider range of elements, comprehensively covering not only trade liberalization but also trade and investment facilitation measures such as simplification of customs clearance procedures and mutual recognition of standards as well as technical cooperation. Therefore, our analysis investigates the effects of measures to facilitate trade and investment within the region as well as technical assistance to developing countries in the region, in addition to the effects of elimination (or reduction) of trade barriers.

To evaluate the significance of the ASEAN+6 framework, our study basically focuses on the impacts of an ASEAN+3 FTA and an ASEAN+6 FTA and compares their effects. Considering the fact that some FTAs between ASEAN and one of the countries in the "+6" group have been concluded or under negotiation, however, this study examines the impacts of six ASEAN+1 FTAs ((ASEAN+1)x6, hereafter) as well.

Regarding trade liberalization, the effects of elimination and/or reduction of trade barriers to both exports and imports are investigated. Given the fact that World Trade Organization (WTO) negotiations over agricultural trade liberalization have been stuck, this study attempts to discuss agriculture trade liberalization by examining scenarios not only of full trade liberalization in all sectors but also of partial trade liberalization in the agriculture sector (full trade liberalization in the non-agriculture sector and 50%-trade liberalization in the agriculture sector) as well as of exclusion of the agriculture sector from trade liberalization (full trade liberalization in only non-agriculture sectors).7

Implementation of various trade and investment facilitation measures is formulated in our simulation as an “import-augmenting technical change" to estimate that impacts. In the model, a positive “import-augmenting technical change” or an improvement in efficiency of importing products lowers the market price (domestic price) of imported products. Specifically, we investigate the effects of 10 percent exogenous change in this efficiency improvement. Note that five percent change in that efficiency improvement is applied to Singapore where importing efficiency is relatively high. Moreover, different rules of origins exist for each FTA in the case of (ASEAN+1 FTA)x6 unlike the case of ASEAN+6 FTA with only one rules of origins. Considering less efficiency resulting from lack of common rules of origins, the degree of efficiency improvement is reduced to the half in the case of (ASEAN+1)x6 FTA.

Technical assistance to developing countries is formulated in our simulation as an “output technical change” to analyze the effects. Specifically, we investigate the effects of one percent exogenous change in this output technical change. Developing countries are defined as China and all the ASEAN countries but Singapore in the case of the ASEAN+3 FTA, and China, India, and all ASEAN countries but Singapore in the case of the ASEAN+6.

The scenarios with a combination of trade liberalization, various facilitation measures, and technical assistance in our simulations are as follows:

Sim1: Full trade liberalization in non-agriculture sectors

Sim2: Full trade liberalization in non-agriculture sectors and 50%-trade liberalization in the agriculture sector

7 While WTO negotiations over agriculture trade liberalization have not made any progress, there have been cases in which market access in the agriculture sector has been improving under FTAs/EPAs. In the case of Japan, agriculture trade liberalization has improved to some degree with the conclusion of FTAs/EPAs. Note that an extremely complicated structure of tariffs as well as not a few number of commodities excluded from the liberalization list remain in agriculture trade liberalization under Japanese FTAs/EPAs. For features of and problems in the structure of tariffs under Japanese FTAs/EPAs for major commodities of agricultural imports, see Ando and Kimura (2008).

Sim3: Full trade liberalization in all sectors

Sim4: Full trade liberalization and various facilitation measures in all sectors

Sim5: Full trade liberalization, various facilitation measures, and technical assistance in all sectors

Based on the results of these simulations, we discuss the significance of the ASEAN+6 framework, focusing on the effects of trade liberalization, various facilitation measures, and technical assistance to developing countries in the region in the next section.

3. Results of the simulation analysis

Tables 5-7 display our estimates of the effects on GDP, economic welfare, and trade. These provide four interesting insights. First, trade and investment facilitation measures yield significant economic impacts. Sim 4 and Sim 5 formulated them as a positive "import-augmenting technical change" (technical improvement) and assumed 10 percent (or five percent) exogenous change in efficiency improvement to estimate their impacts. Compared their results with those of Sim 1 to Sim 3 (not including facilitation measures), the magnitude of the economic impacts is apparently larger.

Table 5 Economic Effects of FTAs in East Asia: Real GDP Growth

(%)

	ASEAN+3					(ASEAN+1)x6		ASEAN+6				
	Sim1	Sim2	Sim3	Sim4	Sim5	Sim3	Sim4	Sim1	Sim2	Sim3	Sim4	Sim5
Japan	0.03	0.03	0.01	0.44	0.44	-0.01	0.10	0.03	0.06	0.05	0.54	0.54
China	0.20	0.19	0.13	1.66	4.72	0.01	0.20	0.22	0.20	0.14	1.77	4.84
South Korea	0.26	0.76	1.13	3.56	3.55	-0.04	0.20	0.29	0.77	1.15	3.72	3.71
Indonesia	0.06	0.07	0.07	1.74	3.94	0.07	1.00	0.07	0.07	0.07	1.94	4.14
Malaysia	0.26	0.36	0.39	5.83	8.62	0.51	3.30	0.29	0.43	0.50	6.21	9.00
Philippines	0.13	0.17	0.21	3.94	6.28	0.20	2.20	0.14	0.19	0.25	4.18	6.52
Singapore	-0.01	0.01	0.06	4.22	4.24	0.10	2.30	0.00	0.02	0.05	4.40	4.42
Thailand	0.51	0.65	0.68	4.49	7.02	0.80	2.80	0.55	0.70	0.74	4.78	7.32
Vietnam	1.29	1.85	2.21	7.08	9.67	2.33	5.00	1.31	1.86	2.25	7.33	9.92
Other Southeast Asia	0.05	0.08	0.09	0.88	2.91	0.11	0.50	0.05	0.09	0.10	0.92	2.95
Australia	-0.03	-0.03	-0.03	-0.09	-0.09	0.01	0.20	0.14	0.15	0.16	1.35	1.35
New Zealand	-0.02	-0.03	-0.03	-0.06	-0.06	0.00	0.10	0.06	0.08	0.10	1.87	1.87
India	-0.04	-0.04	-0.04	-0.10	-0.10	0.31	0.50	-0.10	0.16	0.41	1.30	3.45
Hong Kong	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	-0.01
Taiwan	-0.05	-0.06	-0.06	-0.09	-0.08	-0.03	0.00	-0.06	-0.06	-0.07	-0.10	-0.10
NAFTA	0.00	0.00	0.00	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00	-0.01	-0.01
EU-15	-0.01	-0.01	0.00	-0.01	-0.01	0.00	0.00	-0.01	-0.01	-0.01	-0.01	-0.01
Rest of world	-0.02	-0.03	-0.03	-0.06	-0.06	-0.02	0.00	-0.03	-0.03	-0.03	-0.08	-0.08
ASEAN	0.23	0.32	0.36	3.60	5.67	0.41	2.14	0.25	0.34	0.39	3.83	5.89
ASEAN+3	0.09	0.13	0.14	1.18	1.93	0.04	0.30	0.10	0.16	0.17	1.30	2.05
ASEAN+6	0.08	0.11	0.12	1.02	1.68	0.05	0.31	0.09	0.16	0.19	1.30	2.11

Source: Author's calculation, based on the simulation results

Note: Simulations are as follows:

Sim1: Full trade liberalization in the non-agriculture sector

Sim2: Full trade liberalization in the non-agriculture sector and 50%-trade liberalization in the agriculture sector

Sim3: Full trade liberalization in all sectors

Sim4: Full trade liberalization and various facilitation measures in all sectors

(Less efficient falicitation due to lack of common rules of origins for (ASEAN+1)x3 and (ASEAN+1)x6)

Sim5: Full trade liberalization, various facilitation measures, and technical cooperation to LDCs in all sectors

(LDCs include ASEAN countries except Singapore, China, and India (only for ASEAN+6))

Table 6 Economic Effects of FTAs in East Asia: Economic Welfare

	ASEAN+3					(ASEAN+1)x6		ASEAN+6				
	Sim1	Sim2	Sim3	Sim4	Sim5	Sim3	Sim4	Sim1	Sim2	Sim3	Sim4	Sim5
(a)Economic welfare effect (US $ million)												
Japan	8,244	7,938	6,436	29,554	29,336	-903	1,935	8,948	9,478	7,048	32,656	32,363
China	-1,256	-717	624	17,952	54,233	-1,457	-301	-569	-223	634	18,964	55,270
South Korea	3,663	5,695	5,945	18,819	18,719	-267	631	4,113	5,973	6,264	19,787	19,690
Indonesia	506	569	693	4,527	7,906	1,733	4,139	715	829	1,165	5,270	8,661
Malaysia	1,417	1,501	1,466	10,443	13,393	3,400	8,717	1,666	1,933	2,523	12,029	15,040
Philippines	64	116	139	3,367	5,054	422	2,334	93	125	122	3,457	5,142
Singapore	1,123	1,334	1,802	7,610	7,765	2,822	6,391	1,553	1,718	2,046	8,236	8,389
Thailand	1,246	1,932	2,851	8,815	11,872	3,878	7,421	1,408	2,010	2,645	8,829	11,888
Vietnam	373	581	633	2,723	3,488	942	2,243	446	617	645	2,813	3,578
Other Southeast Asia	3	3	-27	691	2,338	12	404	14	31	-1	729	2,379
Australia	-309	-490	-723	-1,684	-1,694	-152	359	1,181	2,195	4,832	11,669	11,682
New Zealand	-41	-89	-146	-230	-224	-10	82	134	217	267	1,655	1,669
India	-470	-487	-510	-1,049	-1,077	-602	-79	-2,021	-1,071	-885	2,744	13,124
Hong Kong	-254	-327	-460	-691	-487	-69	-40	-340	-404	-515	-798	-589
Taiwan	-1,496	-1,514	-1,522	-3,228	-3,250	-753	-1,290	-1,658	-1,711	-1,773	-3,637	-3,659
NAFTA	-3,365	-3,859	-4,526	-11,843	-12,476	-2,541	-5,016	-4,157	-4,916	-5,893	-14,282	-15,022
EU-15	-3,211	-3,199	-3,154	-7,263	-7,710	-2,267	-4,048	-4,123	-4,135	-4,112	-8,942	-9,502
Rest of world	-2,529	-2,776	-2,971	-9,606	-10,038	-1,721	-3,787	-3,750	-4,114	-4,311	-13,410	-13,933
ASEAN	4,732	6,037	7,557	38,174	51,816	13,209	31,648	5,895	7,263	9,145	41,364	55,078
ASEAN+3	15,383	18,953	20,562	104,500	154,104	10,581	33,913	18,386	22,491	23,091	112,771	162,401
ASEAN+6	14,563	17,887	19,183	101,536	151,110	9,818	34,276	17,681	23,831	27,305	128,839	188,875
(b)Economic welfare effect per capita (US $)												
Japan	65	63	51	233	231	-7	15	71	75	56	258	255
China	-1	-1	0	14	43	-1	0	0	0	0	15	44
South Korea	77	120	125	396	393	-6	13	86	126	132	416	414
Indonesia	2	3	3	21	37	8	19	3	4	5	25	41
Malaysia	60	63	62	441	566	144	368	70	82	107	508	635
Philippines	1	1	2	42	63	5	29	1	2	2	43	64
Singapore	337	401	541	2,285	2,332	847	1,919	466	516	614	2,473	2,519
Thailand	20	31	45	140	189	62	118	22	32	42	141	189
Vietnam	5	7	8	34	44	12	28	6	8	8	35	45
Other Southeast Asia	0	0	0	10	35	0	6	0	0	0	11	35
Australia	-16	-25	-37	-87	-87	-8	18	61	113	249	601	601
New Zealand	-11	-23	-38	-60	-58	-3	21	35	56	69	430	433
India	0	0	0	-1	-1	-1	0	-2	-1	-1	3	13
Hong Kong	-36	-46	-64	-97	-68	-10	-6	-48	-56	-72	-111	-82
Taiwan	-67	-68	-68	-145	-146	-34	-58	-74	-77	-80	-163	-164
NAFTA	-8	-9	-11	-29	-30	-6	-12	-10	-12	-14	-35	-37
EU-15	-9	-9	-8	-19	-20	-6	-11	-11	-11	-11	-24	-25
Rest of world	-1	-1	-1	-4	-4	-1	-2	-2	-2	-2	-6	-6
ASEAN	9	11	14	72	98	25	60	11	14	17	78	104
ASEAN+3	8	10	10	53	78	5	17	9	11	12	57	82
ASEAN+6	5	6	6	34	50	3	11	6	8	9	43	62

Source: See Table 5. Note: See Table 5.

Table 7 Economic Effects of FTAs in East Asia: Real Trade Growth

	ASEAN+3					(ASEAN+1)×6		ASEAN+6				
	Sim1	Sim2	Sim3	Sim4	Sim5	Sim3	Sim4	Sim1	Sim2	Sim3	Sim4	Sim5
(a) Exports (%)												
Japan	3.07	3.47	4.25	8.80	8.92	1.28	2.00	3.38	4.08	5.84	10.71	10.89
China	10.75	11.12	11.99	22.01	22.60	2.89	4.00	11.43	11.87	12.77	23.27	23.88
South Korea	4.22	4.73	8.70	13.98	13.98	0.71	1.00	4.45	5.07	8.90	14.25	14.25
Indonesia	2.76	2.89	3.11	7.73	8.49	4.01	7.00	3.07	3.23	3.45	8.58	9.36
Malaysia	1.87	1.98	2.14	5.35	6.61	2.73	4.80	2.07	2.15	2.25	5.64	6.90
Philippines	1.69	1.87	2.59	8.90	8.95	2.67	6.60	1.76	2.08	2.93	9.58	9.64
Singapore	1.05	0.84	0.40	6.64	6.64	1.20	5.20	1.17	0.92	0.40	6.55	6.54
Thailand	6.69	6.46	6.61	11.92	12.34	7.37	10.60	7.01	6.98	7.48	13.12	13.53
Vietnam	18.98	20.67	26.61	31.36	31.95	28.85	33.20	19.28	21.37	27.23	32.21	32.82
Other Southeast Asia	8.32	9.70	11.68	19.14	15.78	12.11	16.00	8.43	10.11	12.10	20.03	16.77
Australia	0.02	0.01	0.00	-0.19	-0.16	0.97	1.30	3.93	3.82	3.59	5.37	5.41
New Zealand	0.06	0.08	0.14	0.11	0.11	0.13	0.20	1.51	1.41	1.32	3.48	3.47
India	0.03	-0.02	-0.07	-0.21	-0.17	15.38	17.40	14.99	17.23	24.74	33.43	31.67
Hong Kong	-0.43	-0.45	-0.48	-1.00	-1.04	-0.18	-0.30	-0.43	-0.45	-0.50	-1.02	-1.05
Taiwan	-0.61	-0.60	-0.58	-2.24	-2.27	-0.27	-0.80	-0.65	-0.66	-0.65	-2.43	-2.46
NAFTA	0.14	0.10	0.06	-0.09	-0.04	0.04	0.00	0.14	0.10	0.08	-0.07	0.01
EU-15	0.04	0.03	0.03	-0.03	-0.02	-0.03	-0.10	0.04	0.03	0.02	-0.04	-0.03
Rest of world	0.05	0.04	0.02	0.09	0.10	-0.02	0.00	0.05	0.03	0.01	0.09	0.12
ASEAN	3.34	3.40	3.69	8.66	9.16	4.43	7.62	3.55	3.66	3.99	9.16	9.66
ASEAN+3	5.26	5.57	6.63	12.80	13.13	2.57	4.10	5.63	6.07	7.44	13.91	14.27
ASEAN+6	4.78	5.05	6.01	11.59	11.90	2.96	4.44	5.86	6.34	7.85	14.15	14.41
(b) Imports (%)												
Japan	6.17	6.61	7.44	17.66	17.70	1.04	2.20	6.61	7.30	8.90	19.42	19.44
China	16.08	16.56	17.75	31.36	32.22	4.25	5.50	17.11	17.68	18.86	33.12	33.97
South Korea	7.82	8.54	13.72	23.31	23.28	0.91	1.30	8.35	9.17	14.15	23.86	23.83
Indonesia	5.83	6.10	6.59	16.60	18.15	9.89	16.80	6.64	6.97	7.63	18.40	19.95
Malaysia	5.19	5.41	5.79	12.29	13.48	8.05	12.80	5.65	5.89	6.48	13.27	14.46
Philippines	2.59	2.85	3.51	17.01	19.42	5.06	13.60	2.77	3.08	3.75	17.50	19.89
Singapore	2.16	2.16	2.19	11.30	11.45	4.05	10.10	2.70	2.63	2.45	11.71	11.84
Thailand	13.77	14.18	15.66	28.56	30.37	18.74	27.20	14.52	15.06	16.64	29.98	31.76
Vietnam	17.41	18.82	22.36	33.03	35.28	25.87	34.10	17.97	19.43	22.73	33.67	35.91
Other Southeast Asia	11.69	13.45	15.84	27.22	30.67	16.82	23.40	11.65	13.77	15.97	27.50	31.01
Australia	-0.80	-1.17	-1.64	-3.61	-3.59	0.86	1.50	6.94	8.98	14.21	23.50	23.56
New Zealand	-0.37	-0.67	-1.03	-1.81	-1.76	0.08	0.40	3.08	3.50	3.65	11.70	11.77
India	-0.92	-0.96	-1.01	-2.14	-2.14	14.71	16.40	16.67	18.71	25.39	34.57	36.48
Hong Kong	-0.70	-0.79	-0.94	-1.73	-1.54	-0.26	-0.40	-0.82	-0.90	-1.05	-1.92	-1.73
Taiwan	-2.05	-2.04	-2.00	-5.65	-5.70	-0.97	-2.20	-2.26	-2.29	-2.33	-6.28	-6.34
NAFTA	-0.49	-0.55	-0.65	-1.71	-1.74	-0.34	-0.70	-0.63	-0.73	-0.87	-2.12	-2.16
EU-15	-0.29	-0.29	-0.30	-0.76	-0.78	-0.22	-0.40	-0.38	-0.40	-0.43	-0.98	-1.02
Rest of world	-0.43	-0.45	-0.48	-1.15	-1.18	-0.29	-0.50	-0.57	-0.63	-0.70	-1.59	-1.63
ASEAN	6.32	6.62	7.35	17.31	18.56	9.72	16.44	6.87	7.18	7.91	18.19	19.42
ASEAN+3	8.67	9.12	10.57	21.39	21.98	4.44	7.28	9.29	9.86	11.53	22.72	23.30
ASEAN+6	7.65	8.02	9.28	18.77	19.30	4.67	7.31	9.43	10.14	12.20	23.16	23.77

Source: See Table 5. Note: See Table 5. Exports are based on FOB prices; imports are based on CIF prices.

As the results of Sim1 to Sim3 suggest, full/partial trade liberalization does yield a certain degree of economic effects. However, trade liberalization has already proceeded to a considerable degree except a few sectors in developed countries. Moreover, implied tariffs (actually imposed tariffs) might be lower due to the introduction of duty-drawback systems mainly to machinery industries including electronic machinery industry in East Asia's developing countries. Therefore, the economic effects through only trade liberalization are likely to be limited.

In East Asia, implementing not only trade liberalization but also various facilitation measures is important. An efficiency improvement in imports indicates reduction of service-link costs connecting fragmented production blocs across borders. If cross-border service-link costs are reduced by various facilitation measures, international production/distribution networks in East Asia can be further developed as discussed in section 1, with its extension to other countries such as India.

Second, technical assistance also brings significant economic impacts. Sim 5 formulated technical assistance to developing countries as an "output technical change" and investigated the effects of one percent exogenous improvement in this productivity change. Compared the results of Sim4 with those of Sim5, we can observe a pronounced economic impacts on developing countries as recipients of that assistance. A comprehensive FTA covering not only trade liberalization but also other elements such as facilitation measures and technical cooperation is likely to have much greater impacts.

Third, agricultural trade liberalization is important as well. Our analysis examined scenarios of full trade liberalization in non-agriculture sectors (Sim1), partial trade liberalization in the agriculture sector with full trade liberalization in non-agriculture sectors (Sim2), and full trade liberalization in all sectors including agriculture (Sim3 to Sim5). Regardless of whether GDP, economic welfare, or trade, positive economic effects are greater in scenarios of partial liberalization of trade in the agricultural sector than in scenarios of exclusion of that sector from trade liberalization, and are the greatest in scenarios of trade liberalization in all sectors including agriculture for ASEAN, ASEAN+3, and ASEAN+6 as a whole.

The effects on individual countries present a different picture to some extent in a few countries; economic effects are greater in scenarios of partial trade liberalization than in scenarios of full trade liberalization in the agriculture sector. For majority of the countries, however, economic effects are greater in scenarios of partial liberalization of trade in the agricultural sector than in scenarios of exclusion of that sector from trade liberalization, and are the greatest in scenarios of trade liberalization in all sectors including agriculture. In China and India, in particular, economic welfare significantly deteriorates when the agricultural sector is excluded from trade liberalization. Welfare decomposition in this scenario demonstrates a negative effect on terms of trade for China and a negative effect on both terms of trade and resource allocation for India. This indicates that significant deterioration of economic welfare in scenarios of trade liberalization only in non-agriculture sectors are induced by intensified inefficiency in resource allocation due to exclusion of the agriculture sector from trade liberalization, in addition to worsened terms of trade. All of them suggest the importance of agriculture trade liberalization for the regional economies.

Fourth, economic effects are likely to be greater for a free trade agreement (FTA) among a larger number of member countries. The ASEAN+6 FTA not only is beneficial to Australia, New Zealand, and India—which are non-members of an ASEAN+3 FTA—but also has greater impacts on the individual ASEAN+3 countries. In Sim3 with only trade liberalization, the effects on both GDP and economic welfare are slightly greater in the case of (ASEAN+1 FTA)x6 than in the case of ASEAN+6 FTA for ASEAN countries. This would be due to trade diversion from ASEAN countries to China by trade liberalization among China, Japan, and South Korea. As discussed in subsection 2.1, trade among China, Japan, and South Korea accounts for a large portion of trade among ASEAN+6 countries, and tariffs are relatively high. Thus, economic effects on ASEAN countries seem to be significantly influenced by whether trade among these three countries is liberalized or not.

In the case of (ASEAN+1 FTA)×6, different rules of origins exist for each FTA unlike ASEAN+6 FTA with only one rules of origins. As implied by the results of Sim 4 which takes into account inefficiency due to lack of common rules of origins in estimating effects of facilitation measures, the ASEAN+6 FTA is more beneficial for ASEAN countries as well. In addition, if technical assistance is also coved within the framework of an ASEAN+6 FTA, the incentive for ASEAN countries to form an ASEAN+6 FTA would become larger, rather than concluding multiple ASEAN+1 FTAs. Therefore, the ASEAN+6 FTA is expected to be more beneficial than the ASEAN+3 FTA, and the relevance of the ASEAN+6 FTA and the incentive for each ASEAN+6 country to form that agreement heavily depend on how comprehensively the agreement incorporates elements other than trade liberalization.

The effects of FDI are not considered in our simulations. With an increase in FDI contributing to expanding capital accumulation particularly in developing countries, however, the economic impacts of the ASEAN+6 FTA would be even greater than those indicated in our simulations (Ando and Urata (2007)).8 Moreover, further trade and investment facilitation would help lower cross-border service-link costs, resulting in accelerating FDI inflows. Implementing various facilitation measures in addition to trade liberalization should further stimulate FDI, which would be beneficial to countries in the region.

Table 8 shows by-sector impacts of the ASEAN+6 FTA with full trade liberalization, various facilitation measures, and technical assistance to developing

8 In the basic version of the standard GTAP model, a change in investment levels has no influence on the levels of capital stock that is one of factors of production. By allowing for capital accumulation in the model, however, the model can be modified so that capital stock increases when investment increases. Although the effects of FDI are not directly considered in their simulations, Ando and Urata (2007) conclude that the effects of FDI as an international capital movement would be large particularly for developing countries.

countries on production, exports, and imports (Sim5). In terms of imports, a substantial increase is observed in all sectors and countries except Japan's fishing and forestry and mining sectors. A large number of countries tend to experience a considerable increase in imports in sectors such as agriculture, textiles and apparel, and transport equipment, which are typically protected by high tariffs. In terms of exports, an overall uptrend is observed mainly for trade in goods. These results suggest that the conclusion of an ASEAN+6 FTA contributes to further strengthen trade linkages in many sectors. In terms of outputs, while production as a whole economy never shrinks as indicated by growth of real GDP, by-sector results reveal existence of some sectors in which production declines. This implies that the industrial structure of economies significantly changes, shifting toward a more efficient one, through trade liberalization, various facilitation measures, and technical assistance.

Table 8 Economic Effects of FTAs in East Asia by Sector: ASEAN+6, Simulation 5

(%)

	Japan	China	South Korea	Indonesia	Malaysia	Philippines	Singapore	Thailand	Vietnam	Other Southeast Asia	Australia	New Zealand	India
(a) Outputs													
Agriculture and food	-5.6	4.7	-16.8	4.1	25.1	-3.9	46.6	1.0	-10.9	0.9	21.4	0.6	-2.6
Fishery and forestry	-2.5	1.1	-5.5	1.9	1.0	2.1	-1.2	0.1	2.6	3.2	0.5	-0.2	1.6
Mining	-5.2	-0.3	-18.3	-0.3	-1.1	-22.6	-1.2	-7.4	-0.3	4.6	-2.7	0.0	-2.2
Textile and apparel	-0.5	-1.8	24.6	-9.3	21.1	-20.5	-18.4	-23.9	107.3	-5.7	-35.8	-15.5	7.3
Wood and paper	-1.7	-4.6	1.4	0.5	1.7	-10.7	-2.2	-15.5	11.0	5.7	-6.5	5.6	-0.4
Mineral products	1.0	-3.3	5.0	2.0	-1.6	-2.4	5.0	9.1	14.0	1.6	-6.9	-0.1	4.8
Iron and steel	3.1	-3.9	-3.9	1.7	11.2	-9.5	9.9	3.5	-29.1	-4.8	-17.9	-0.7	-1.9
General machinery	3.9	-3.7	-9.3	35.2	21.4	17.9	16.0	23.0	23.2	-10.2	-25.0	-2.9	2.1
Electronic machinery	-5.9	24.1	1.7	-4.3	0.3	20.9	17.2	27.2	-11.5	-5.6	-20.9	-23.4	-4.2
Transport equipment	0.8	-6.9	-8.4	-6.9	-3.3	25.4	-27.4	3.7	-22.4	-3.0	-21.0	-10.0	-1.8
Other manufacturing	-3.6	-3.8	37.6	-20.9	7.3	-31.9	-9.4	-21.3	20.3	0.0	-19.4	1.8	12.1
Construction	0.3	-0.4	2.8	1.4	-3.9	2.9	-1.2	2.3	-2.1	1.6	1.2	1.0	2.4
Trade	1.9	7.0	10.2	12.1	24.5	27.2	12.6	40.8	23.2	5.1	10.2	7.5	7.1
Transport and communicatio	-0.3	-0.9	-2.5	-1.4	-5.9	-5.2	-7.9	-8.5	5.6	1.6	-3.8	-3.8	2.9
Public services	0.1	2.9	0.4	2.0	4.5	3.5	5.6	1.0	-4.5	1.9	0.6	1.1	0.2
Other services	0.0	-0.1	0.2	-0.4	-9.0	1.1	-10.0	-2.3	-3.8	1.6	-0.6	-0.3	1.6
(b) Exports													
Agriculture and food	31.8	117.5	200.5	33.9	59.2	-20.9	82.4	25.1	18.7	64.8	60.8	3.2	34.5
Fishery and forestry	40.0	10.0	42.5	4.5	-6.6	-36.9	-1.2	-8.6	-38.1	12.1	-10.2	-6.4	6.5
Mining	194.4	104.1	102.0	5.4	13.9	-3.5	9.0	16.0	-6.1	7.8	8.1	52.1	195.5
Textile and apparel	124.1	27.8	51.3	-2.2	33.5	-15.8	-16.7	-26.9	147.1	2.0	-3.0	4.8	24.7
Wood and paper	37.0	-0.4	36.7	3.3	8.3	-15.4	0.8	-15.3	54.0	66.1	3.3	23.4	12.2
Mineral products	19.8	14.4	33.2	26.3	12.1	28.6	9.5	37.6	124.9	295.4	3.0	14.9	55.4
Iron and steel	32.8	16.1	20.8	18.9	44.2	-24.0	26.6	25.6	-25.3	39.7	-18.3	17.0	38.1
General machinery	14.8	15.0	7.5	60.0	38.3	23.5	20.4	36.1	64.0	34.4	-19.8	9.5	47.6
Electronic machinery	0.3	53.0	7.9	2.3	1.1	22.0	17.9	35.3	23.9	194.4	-2.4	-24.1	75.7
Transport equipment	2.7	22.4	-10.4	25.6	56.1	81.2	-33.4	44.9	95.0	39.5	-12.7	-1.7	23.9
Other manufacturing	11.7	-1.1	79.5	-21.0	26.2	-39.1	-5.3	-27.3	28.4	9.9	-20.6	22.1	26.5
Construction	-3.2	-5.5	-9.9	-20.4	-23.9	-40.9	-27.6	-41.6	-38.0	0.2	-29.7	-15.4	8.3
Trade	-6.2	1.8	-16.7	-6.6	2.7	-25.9	-26.2	-19.5	-20.6	-1.1	-25.7	-10.9	5.5
Transport and communicatio	-1.3	-5.2	-6.7	-11.4	-8.9	-21.5	-13.5	-27.4	2.4	-0.3	-26.5	-9.8	7.9
Public services	-12.5	-10.0	-27.7	-24.5	-22.5	-43.9	-31.5	-42.2	-43.7	-7.0	-33.7	-19.8	-3.8
Other services	-10.0	-8.1	-25.6	-21.5	-18.3	-41.6	-31.6	-39.9	-57.2	-2.3	-32.7	-19.4	5.0
(c) Imports													
Agriculture and food	40.3	43.1	97.2	30.3	40.4	52.5	20.0	70.2	101.9	49.1	44.3	14.2	146.5
Fishery and forestry	-1.1	9.8	0.8	18.8	18.3	12.0	9.0	10.7	52.7	12.4	23.2	7.0	12.2
Mining	-0.6	18.4	2.6	53.3	44.1	0.2	3.5	10.7	239.2	104.4	44.7	12.9	20.8
Textile and apparel	50.7	78.2	59.8	34.9	29.9	6.0	4.0	71.3	87.2	33.3	42.0	18.9	104.8
Wood and paper	13.6	24.6	27.2	20.9	16.1	12.1	10.8	26.2	54.3	20.8	31.0	19.5	31.5
Mineral products	13.5	35.8	22.8	12.2	16.6	9.5	7.4	24.0	18.5	18.5	18.8	7.4	32.8
Iron and steel	19.2	24.9	21.5	19.9	16.2	44.5	12.5	17.4	19.6	21.3	32.1	13.3	50.1
General machinery	21.4	41.0	31.8	14.9	17.2	18.2	11.8	29.6	22.5	14.3	16.2	9.0	38.1
Electronic machinery	28.7	28.2	11.8	18.4	4.9	13.4	12.0	27.8	32.3	66.1	7.9	16.9	37.2
Transport equipment	16.1	50.6	24.0	21.1	26.4	27.4	11.8	54.0	15.7	94.7	26.1	7.6	67.7
Other manufacturing	27.7	69.3	31.0	31.6	31.4	33.5	15.7	37.4	51.3	41.0	32.9	21.3	16.5
Construction	7.2	8.2	13.3	20.0	29.2	41.7	26.5	47.6	34.3	5.0	25.3	15.0	4.4
Trade	10.4	13.3	24.6	27.0	57.1	62.0	8.8	25.4	48.9	2.2	24.5	13.7	8.1
Transport and communicatio	7.3	8.5	8.6	14.2	13.2	25.1	9.0	29.3	10.8	6.9	20.5	7.8	0.9
Public services	7.9	11.9	24.1	21.6	22.7	44.7	8.0	38.3	37.4	8.9	28.3	15.9	4.6
Other services	8.3	7.9	17.2	15.5	3.3	42.0	15.3	34.6	44.0	7.0	27.0	14.7	2.4

Source: Author's calculation, based on the simulation results

4. Conclusion

This study examined economic impacts of an ASEAN+6 FTA by using a simulation analysis based on a GTAP CGE model to assess the significance of an ASEAN+6 framework, focusing on the effects of trade liberalization (elimination and reduction of trade barriers for both exports and imports), trade and investment facilitation measures, and technical assistance to developing countries in the region. Our results of five scenarios, including those with only trade liberalization and those with facilitation measures and technical assistance in addition to trade liberalization, demonstrate that facilitation measures and technical assistance in the framework of the ASEAN+6 FTA are likely to have significant economic impacts on its members.

Trade liberalization such as elimination/reduction of tariffs is of course important. Implementing trade and investment facilitation measures and technical assistance in addition to trade liberalization, however, are even more beneficial to the member countries. Furthermore, if cross-border service-link costs are reduced by various facilitation measures, international production/distribution networks in East Asia can be further developed.

As for trade liberalization, we investigated not only scenarios of full trade liberalization in all sectors including agriculture but also those of full trade liberalization in only non-agriculture sectors and those of partial trade liberalization in the agriculture sector with full trade liberalization in non-agriculture sectors. Our results clearly demonstrated that positive economic effects are greater in scenarios of partial liberalization of trade in the agricultural sector than in scenarios of exclusion of that sector from trade liberalization, and are the greatest in scenarios of trade liberalization in all sectors including agriculture. In some countries, exclusion of the agriculture sector from trade liberalization worsened terms of trade and intensified inefficiency in resource allocation, ending up with a deterioration of economic welfare. It is thus important for ASEAN+6 countries to improve market access in the agriculture sector in addition to other sectors.

The study also demonstrated that economic effects of FTAs with a larger number of members are likely to be greater. The ASEAN+6 FTA not only is beneficial to Australia, New Zealand, and India—non-members of an ASEAN+3 FTA—but also has greater impacts on the individual ASEAN+3 countries than the ASEAN+3 FTA. Compared the results of (ASEAN+1 FTA) x 6 with those of the ASEAN+6 FTA, (ASEAN+1 FTA)x6 are slightly more beneficial to ASEAN countries than the ASEAN+6 FTA when only trade liberalization is focused on. The ASEAN+6 FTA, however, is more beneficial for ASEAN countries as well when facilitation measures are considered. Furthermore, the incentive for ASEAN countries to form an ASEAN+6 FTA

would become even larger when the ASEAN+6 FTA covers technical assistance. Given all the above, how comprehensively the agreement incorporates elements other than trade liberalization heavily influence the possibility of the establishment of an ASEAN+6 FTA.

The effects of FDI were not considered in our simulations. With an increase in FDI contributing to expanding capital accumulation particularly in developing countries, however, economic impacts of the ASEAN+6 FTA would be even greater than those indicated in our simulations. Moreover, further trade and investment facilitation would help lower cross-border service-link costs, resulting in accelerating FDI inflows. For the establishment of an ASEAN+6 FTA, a high quality of trade liberalization including that in the agricultural sector is essential. Furthermore, it is indispensable for an agreement to be comprehensive, covering not only intraregional trade liberalization but also other elements such as trade and investment facilitation measures and technical assistance.

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Table A.1 Aggregated Countries/Regions

18 countries/regions	87countries/regions （GTAP ver.6 database）					
Australia	1 aus	Australia				
New Zealand	2 nzl	New Zealand				
China	4 chn	China				
Hong Kong	5 hkg	Hong Kong				
Japan	6 jpn	Japan				
South Korea	7 kor	Korea				
Taiwan	8 twn	Taiwan				
Indonesia （ASEAN）	10 idn	Indonesia				
Malaysia (ASEAN)	11 mys	Malaysia				
Philippines (ASEAN)	12 phl	Philippines				
Singapore (ASEAN)	13 sgp	Singapore				
Thailand(ASEAN)	14 tha	Thailand				
Vietnam (ASEAN)	15 vnm	Vietnam				
Other Southeast Asia (ASEAN)	16 xse	Rest of Southeast Asia (Brunei, Cambodia, Laos, Burma, (East)Timor Leste)				
India	18 ind					
NAFTA	21 can	Canada	22 usa	USA	23 mex	Mexico
EU-15	37 aut	Austria	42 deu	Germany	47 lux	Luxemburg
	38 bel	Belgium	43 gbr	U.K.	48 nld	Netherland
	39 dnk	Denmark	44 grc	Greece	49 prt	Portugal
	40 fin	Finland	45 irl	Ireland	50 esp	Spain
	41 fra	France	46 ita	Italy	51 swe	Sweden
Rest of world	9 xea	Rest of East Asia (Macau, Mongolia, Democratic Korea)				
	3 xoc	Rest of Oceania	52 che	Switzerland	71 tur	Turkey
	17 bgd	Bangladesh	53 xef	Rest of EFTA	72 xme	Rest of Middle East
	19 lka	Ski Lanka	54 xer	Rest of Europe	73 mar	Morocco
	20 xsa	Rest of South Asia	55 alb	Albania	74 tun	Tunisia
	24 xna	Rest of North America	56 bgr	Bulgaria	75 xnf	Rest of North Africa
	25 col	Colombia	57 hrv	Croatia	76 bwa	Botwana
	26 per	Peru	58 cyp	Cyprus	77 zaf	South Africa
	27 ven	Venezuela	59 cze	Czech	78 xsc	Rest of SACU
	28 xap	Rest of Andean Pact	60 hun	Hungary	79 mwi	Malawi
	29 arg	Argentina	62 pol	Poland	80 moz	Mozambique
	30 bra	Brazil	63 rom	Romania	81 tza	Tanzania
	31 chl	Chile	64 svk	Slovakia	82 zmb	Zambia
	32 ury	Uruguay	65 svn	Slovenia	83 zwe	Zimbabwe
	33 xsm	Rest of South America	66 est	Estonia	84 xsd	Rest of SADC
	34 xca	Central America	67 lva	Latovia	85 mdg	Madagascor
	35 xfa	Rest of FTAA	68 ltu	Lithuania	86 uga	Uganda
	36 xcb	Rest of the Caribbean	69 rus	Russia	87 xss	Rest of Sub-Saharan Africa
			70 xsu	Rest of FSU		

Table A.2 Aggregated Sectors

16 sectors	57 sectors (GTAP ver.6 database)			
Agriculture and food	1 pdr	Paddy Rice	11 rmk	Raw milk
	2 wht	Wheat	12 wol	Wool
	3 gro	Other grains	19 cmt	Meat: cattle, sheep, goats, horse
	4 v_f	Vegetables, fruits, nuts	20 omt	Other meat
	5 osd	Oil seeds	21 vol	Vegetable oils
	6 c_b	Sugar cane and sugar beet	22 mil	Milk: dairy products
	7 pfb	Plant fibres	23 pcr	Processed rice
	8 ocr	Other crops	24 sgr	Sugar
	9 ctl	Cattle, sheep, goats, horses	25 ofd	Other food
	10 oap	Other animal products	26 b_t	Beverages and tobacco
Fishery and forestry	13 frs	Forestry	14 fsh	Fishing
Mining	15 coa	Coal	17 gas	Gas
	16 oil	Oil	18 omn	Other mining
Texitle and apparel	27 tex	Textiles	28 wap	Wearing apparel
Wood and paper	30 lum	Wood products	31 ppp	Paper products
Mineral products	32 p_c	Petroleum and coke	34 nmn	Non-metallic minerals
	33 crp	Chemical rubber products		
Iron and steel	35 i_s	Iron and steel	37 fmp	Metal products
	36 nfm	Non-ferrous metals		
General machinery	41 ome	Other machinery and equipment		
Electronic machinery	40 ele	Electronic equipment		
Transport equipment	38 mvh	Motor vehicles	39 otn	Other transport equipment
Other manufacturing	29 lea	Leather	42 omf	Other manufacturing
Construction	46 cns	Construction		
Trade	47 trd	Trade		
Transport and communication	48 otp	Other transport	50 atp	Air transport
	49 wtp	Water transport	51 cmn	Communications
Public services	56 osg	Public administration, defense, education, health		
Other services	43 ely	Electricity	53 isr	Insurance
	44 gdt	Gas distribution	54 obs	Other business services
	45 wtr	Water	55 ros	Recreation and other services
	52 ofi	Other financial intermediation	57 dwe	Dwellings

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