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A CGE ANALYSIS OF THE ASEAN+3 FREE TRADE AGREEMENT UNDER DIFFERENT MARKET STRUCTURES

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Abstract

In this paper, we investigate the economic effects of possible free trade agreements among ASEAN+3 countries, and then compare the economic results of those FTAs. Our main findings are as follows. First, the trilateral FTA among Korea, China, and ASEAN (FTA_KCA) under the imperfectly competitive model, which would bring about a 1.02% increase in GDP for Korea, is the second-best choice for Korea. Second, according to the sectoral effects, we determined that the output of agricultural products would decrease when China joins the FTA. This is because China has a comparative advantage in the production and export of agricultural products.

Keywords: Free Trade Agreement; Imperfectly competitive model; Computable general equilibrium analysis
JEL Classification: F15, F17, O24

I. *Introduction*

Free trade agreements (FTA) have become increasingly popular as an alternative trade system, since the World Trade Organization (WTO) ultimately reached a conclusion about trade reform in 2001. Many countries are currently attempting to establish FTAs among different countries to expand their trade volumes.

However, until the late 1990s, the three Northeast Asian countries-Korea, China, and Japan-evidenced minimal interest in FTAs, despite the increasing membership in FTAs among

other countries of the world. After the 1997 financial crisis in East Asia, the attitude of the ASEAN plus three additional countries toward regionalism changed dramatically. Therefore, the ASEAN plus the other three countries began to show a great deal more interest in regional economic cooperation.

Importantly, Korea remained within the multilateral framework of the WTO in the late 1990s. However, after the financial crisis in 1997, Korea needs to establish a new trade policy to expand its exports. This is because the Korean GDP depends more heavily on merchandise trade than any other country. Therefore, in November 1998, the Korean government announced its trade policy strategy to launch FTA negotiations with Chile.

As a result of its aggressive efforts, Korea succeeded in establishing FTAs with Chile, Singapore, the European Free Trade Association[1] (EFTA), the Association of Southeast Asian Nations[2] (ASEAN: goods and services only), the United States, and the European Union (EU). At present, Korea is involved in multi-track FTA negotiations with Canada, India, Mexico, and the Gulf Cooperation Council[3] (GCC)

Many studies have been conducted thus far regarding the effects of the FTA on East Asian countries. Ko (2000), Lee, J.W. (2002), Abe (2003), Park (2004), Lee et al. (2005), and Yoon, et al. (2009) have all used the computable general equilibrium (CGE) model to evaluate the economic impacts of such an FTA. However, these prior models differ in certain aspects, including the type of CGE model, the baseyear of the database, and the scenarios used for the simulation. These studies generally incorporate the CGE model under a perfectly competitive market structure. In most cases, the CGE model was simulated using the GTAP Database version 5.0, except for in the studies of Lee et al. (2005), and Yoon et al. (2009), which were based on the GTAP 6.0. However, in this study we employ the GAP database, version 7, for which the baseyear is 2004.

Until now, computable general equilibrium analysis of trade policy has been generally predicated on perfect competition with constant returns to scale technology (CRTS). However, with the development of the new trade theory, CGE analysis has adopted an imperfectly competitive model with increasing returns to scale technology (IRTS). Taking into account the imperfect competition and economies of scale, such studies assess the effects of trade liberalization initiated by FTAs, and provide useful policy making information.

The links between trade policy and market structure have been the subject of intense scrutiny in recent years. Current interest in the policy community follows a long period during which many of the basic tenets of modern industrial organization theory were integrated into the core of mainstream trade theory. A number of empirical studies of trade policy have attempted to incorporate the theoretical insights gleaned from this literature into numerical assessments of trade policy. These include studies of regional integration in North America and Europe (Venables and Smith 1986, 1989; Cox and Harris 1985; Francois and Shiells 1994), studies of national trade policies (de Melo and Tarr 1992), studies of multilateral liberalization (Francois et al 1994; Haaland and Tollefson 1994), and sector-focused trade policy studies

[1] EFTA consists of four member countries: Iceland, Liechtenstein, Norway, and Switzerland.

[2] ASEAN was established in 1967 by the 5 member countries, Indonesia, Malaysia, Philippines, Singapore, and Thailand. Brunei joined in 1984, Vietnam in 1995, Laos and Myanmar in 1997, and Cambodia in 1999.

[3] GCC is a customs union whose member countries are Saudi Arabia, Kuwait, the United Arab Emirates, Bahrain, Oman, and Qatar.

(Dixit 1988; Baldwin and Krugman 1988). In particular, Francois & Roland-Holst (1997) and Willenbockel (2004) conducted studies that took into account the broad variety of models used; these studies attempted to show how the results from the simulations are affected by model structure and provide useful information for model selection. Although the two above-mentioned studies take various models into consideration, their analyses are rudimentary in both model and data construction, and they analyze only a single policy scenario. Owing to these shortcomings, it is difficult not only to derive general insights from their analyses but also to apply their results to a large-scale CGE analysis actually employed to evaluate trade policy.

In this paper, we assess an alternative specification of market structure in applied trade models. Following a brief discourse on the concept of procompetitive effects of trade, we turn to an overview of conventions for specifying scale economies. Afterward, we establish a menu of specifications for market structure and conduct. These examples are drawn from quantitative assessments of the ASEAN+3 FTAs, under alternative specifications of market structure. The objective of this paper was to provide a comprehensive comparison of different market structure in a more realistic setting.

This paper is organized as follows. In the following section, we explore the process of ASEAN+3 FTAs and explain the economic structure and trade relations. Section III presents the models used for simulation and explains the benchmark data. We then explain the determination of parameters and the relevant policy scenarios. Section IV presents the results of the computations. Finally, concluding remarks are provided in Section V.

II. *ASEAN+3 FTAs and Trade Relations*

1. ASEAN+3 FTAs

Regionalism in East Asia has proliferated for three main reasons: (1) the failure of the Asia Pacific Economic Cooperation (APEC) group and the World Trade Organization (WTO) to achieve a substantial impact at both the continental and global levels; (2) the need of the East Asian economies to establish their own institutional identity in order to strengthen mutual cooperation following the adverse impacts on their economies from the 1997 Asian financial crisis; (3) the continued highly discriminatory nature of intra-regional trade in East Asia, which remains a major obstacle to expanding trade within the region.

The ASEAN+3 is a forum that functions as a coordinator of cooperation between the Association of Southeast Asian Nations and the three East Asian nations of China, Japan, and Korea. The first leaders' meeting was held in 1997 and the group's significance and importance was strengthened by the Asian financial crisis. The grouping was institutionalized by 1999.

Until now, ASEAN and East Asian countries signed a bilateral FTA. First, the ASEAN-China free trade area (ACFTA) was signed in 2002 with the intent of establishing a free trade area among the 11 nations by 2010. The free trade area went into effect on 1 January 2010. The ASEAN-China FTA is the world's largest free trade area in terms of population and the third-largest in terms of volume. The ASEAN-China investment agreement, signed on 15 August 2009, is the third of three main agreements concluded under the 2002 ASEAN-China framework agreement on comprehensive economic co-operation, the other two involving the trade in goods and the trade in services agreements.

TABLE 1. THE ECONOMIC INDICATORS OF ASEAN+3 COUNTRIES IN 2008

	Korea	China	Japan	ASEAN	World
Area (thousands of sq. km.)	99.3	9,598	377.9	4,436	134,095
Population (millions)	48.6	1,326	127.7	583.7	6,692
GDP (billions US$)	929	4,326	4,909	1,504	60,587
GDP per capita (US$)	21,530	2,940	38,210	2,577	8,613
GDP growt h(%)	2.2	9.0	−0.7	4.4	2.0
Merchandise trade (% of GDP)	92.3	59.2	31.5	113.7	52.8

Source: World Bank, World Development Indicators, 2009.

Second, ASEAN member states and Korea signed the framework agreement on comprehensive economic cooperation on 2005. The principal objective of the framework agreement is to establish an ASEAN-Korea free trade area (AKFTA) to strengthen and enhance economic, trade, and investment cooperation among ASEAN member states and Korea by progressively liberalizing and promoting trade in goods and services as well as creating a transparent, liberal, and facilitative investment regime. The agreement also aims to explore new areas and develop appropriate measures for closer economic cooperation and integration; facilitate more effective economic integration of the new ASEAN member states and bridge the development gaps; and, establish a cooperative framework to further strengthen economic relations among the countries.

Finally, ASEAN and Japan signed the ASEAN-Japan Comprehensive Economic Partnership (AJCEP) in April 2008. The AJCEP agreement is comprehensive in scope, covering trade in goods, trade in services, investment, and economic cooperation. The AJCEP would strengthen the economic ties between ASEAN and Japan and would create a larger and more efficient market with greater opportunities in this region. The agreement went into force on 1 December 2008. As of July 2009, Brunei Darussalam, Lao PDR, Malaysia, Myanmar, Singapore, Thailand, Viet Nam, and Japan have ratified the Agreement.

2. Trade Relations among ASEAN, Korea, China, and Japan

We conduct a review of selected economic indicators in Korea, China, Japan, and ASEAN. Table 1 provides some important information regarding the economies of the ASEAN plus three countries. The ASEAN + 3 regions had about 2.09 billion people in 2008, around 31.2 percent of the world's population, and possessed 19 percent of the world's GDP. According to these figures, we know that the ASEAN + 3 countries have the largest number of potential consumers and the greatest potential for economic growth in the world.

Table 2 shows the bilateral trade among Korea and certain selected countries. Trade between ASEAN and Korea continues to grow. Therefore, the total trade between ASEAN and Korea substantially increased from USD 71.8 billion in 2007 to USD 90.2 billion in 2008. This means that the ASEAN countries are very important trading partners of Korea. Considering their increasing intra-trade volume, the need for economic cooperation among them is obvious. Trade imbalance is another measure of the trade structure of the ASEAN + 3 countries. According to Table 2, Korea has run continuous trade deficits with Japan, whereas Korea has run continuous trade surpluses with China and ASEAN.

TABLE 2. TRADE BALANCE IN KOREA (Unit: US$ billion)

	2007			2008		
	Export	Import	Trade Balance	Export	Import	Trade Balance
Total	371.5	356.8	14.7	422.0	435.3	−13.3
China	82.0	63.0	19.0	91.4	76.9	14.5
United States	45.8	37.2	8.6	46.4	38.4	8.0
Japan	26.4	56.3	−29.9	28.3	61.0	−32.7
EU	56.0	36.8	19.2	58.4	40.0	18.4
ASEAN	38.7	33.1	5.6	49.3	40.9	8.4

Source: Korea International Trade Association, KOTIS Data.

III. *Data and CGE Models*

1. CGE Model

In this section, we describe the structure of the model, which is a multisectoral, multiregional static general equilibrium model. We consider not only a model with CRTS technology and perfect competition (the perfectly competitive model) but also a model with IRTS technology and imperfect competition (the imperfectly competitive model). In the following section, we first explain the structure of the perfectly competitive mode along with a brief explanation of the model components.

(1) Perfectly Competitive Model

As the perfectly competitive model, we use the simplified version of the GTAP standard model. Firms produce goods under CRTS technology to maximize their profits using intermediate inputs and three primary factors (capital, labor, and land). All markets of goods and factors are assumed to be perfectly competitive, and thus all producers are price takers.

The production function is a two-stage CES function. The input structure is as follows. First, primary factors are aggregated into a primary factor composite through a CES function with an elasticity of σ_i, and then the primary factor composite and intermediate inputs are used to produce goods using a Leontief technology.

To represent the demand side, we assume a representative household for each region. Final demand is derived from the optimizing behavior of this representative household. The utility function for the household is a Cobb-Douglas function of consumption goods. The household income consists of factor income and tax revenues. The endowment of primary factors is assumed to be constant.

As with other CGE analysis, we employ the Armington assumption to explain cross-hauling in trade (Armington, 1969). The Armington assumption implies that domestically produced goods and imported goods are imperfect substitutes. Additionally, we assume that imports from different regions are imperfect substitutes as in the GTAP model. The aggregation of domestic and imported goods and the aggregation of imports from different regions are achieved through the CES functions.

(2) Imperfectly Competitive Models

However, the competitive regional CGE modeling presented above has two important limitations. First, it does not take into consideration the presence of imperfect competitive market structure, and second, it ignores production technologies characterized by increasing returns to scale (IRS). Herein, we present regional CGE modeling of increasing returns to scale and imperfect competition.

Imperfect market structures that characterize the product side of the production system have been the major focus of the majority of theoretical and empirical work in this regard. Monopolistic competition and oligopolistic competition, for example, have been extensively applied in trade models.

Under constant returns to scale, marginal costs are assumed to be constant and equal to average variable cost. However, under increasing returns to scale, average cost is a monotonically decreasing function.

$$AC=\frac{FC}{X}+MC \tag{1}$$

where FC is fixed costs and MC and AC are the marginal and average cost, respectively.

We assume that marginal costs are governed by the preferred constant returns to scale production function, but a subset of inputs are committed *a priori* to production, and these costs must be covered regardless of the output level. Thus, the increasing returns to scale take the form of unrealized economies of scale in production. There is no customary procedure for defining fixed costs. Fixed costs may involve the same mix of inputs as marginal costs or, alternatively, fixed costs may be assumed to involve a different set of inputs. However, the specification of the fixed costs has important ramifications with regard to the calibration procedure.

As a measure of unrealized scale economies, it is customary to employ the concept of the cost disadvantage ratio (CDR). The CDR provides an estimate of unrealized economies of scale (de Melo and Tarr, 1992). Depending on the value of this ratio, an industry may be facing economies /diseconomies of scale or it may be operating at the minimum efficient scale. The CDR is calculated as:

$$CDR=1-\frac{1}{S} \tag{2}$$

where $S=\frac{AC}{MC}$.

Thus, if $CDR>0$, there are economies of scale; if $CDR<0$, there are diseconomies of scale; and if, the firm is operating at the minimum efficient scale.

Before modeling market power, we require specification of the degree of product differentiation used in the model. Armington specifications also apply to sectors with IRS. In those sectors, goods are produced by identical firms, thereby implying that goods produced for domestic sales in these sectors are perfect substitutes.

The pricing hypotheses are considered for the IRS sectors. We assume that each firm behaves in the regional market as if it is facing a downward-sloping demand curve. The

equilibrium condition for each firm is given as follows:

$$\frac{PR-MC}{PR}=\frac{1+\theta}{N\times\varepsilon} \tag{3}$$

in which ϵ is the endogenous elasticity of aggregate sectoral demand, N is the number of firms, and θ is the representative firm's conjecture regarding the response of competitors to its output decision.

This alternative is the conjectural variation specification, wherein one may or may not have entry/exit assumptions. In long-run equilibrium, entry/exit ensures zero profits. If N represents the number of firms, then as $N\rightarrow\infty$ we expect $\theta\rightarrow 0$; thus, firms behave competitively. Why should the representative firm's conjecture vanish as the number of firms increase? Two explanations are given. First, collusion is difficult if more firms arrive to the market, and second, more firms imply greater availability of varieties. A conjectural formulation that accounts for both product variety and effects on the collusion of firms is given as follows:

$$\theta=\frac{\Delta Q_i}{\Delta Q_i}=N^{-1} \tag{4}$$

in which ΔQ_i is the change in aggregate output of other firms due to a change in the jth firm, and N is an arbitrary number normalized to unity in the calibration.

On the other hand, with barriers to entry it is possible to have supernormal profits, because firms sell in the domestic regional market at a price $\overline{PR}>PR$. If we define an exogenous rate of profit (Ψ) per unit of regional sales, then the mark-up pricing equation is given by:

$$PX(\overline{PR}, PE)=AC(1+\Psi) \tag{5}$$

where PX is the weighted sum of the unit sales prices on the regional (PR) and export (PE) markets.

2. Benchmark Data

In this section, we describe the benchmark data for the simulation. As the benchmark data, we employ GTAP version 7, whose benchmark year is 2004. The original GTAP 7 data contain 114 regions and 57 sectors. We initially aggregate the original data into 8 regions and 16 sectors,[4] and then convert the data into a format that can be used in GAMS.

Although the main content of liberalization in the ASEAN+3 FTAs is the reduction of barriers to trade for goods, the reduction of barriers to services trade has become an important issue. However, we cannot analyze the effects of the reduction of services barriers using the GTAP 7 data, as services barriers are not included[5].

[4] Francois & Roland-Holst (1997) also use GTAP data. However, regions and sectors in that analysis are more highly aggregated than in the current paper. The data used for simulation in the study of Willenbockel (2004) are fictitious; they do not reflect actual data. Thus, we argue that our analysis is based on a more elaborate and realistic dataset than the previous studies.

[5] To analyze service barriers, it is necessary to create data for services barriers from other sources. The study of Brown *et al*. (2002) is also along these lines. Their study derives data for services barriers from data on gross margins

TABLE 3. REGION AND SECTOR LIST

Region	Description	Sector	Description
AUS	Australia	AFF	Agriculture, forestry and fishery
CHN	China	MIN	Mining
KOR	Korea	FBT	Food, Beverages and tobacco
ASE	ASEAN	TWA	Textiles, Wearing Apparel, and Leather products
USA	United States	WPP	Wood and Paper products
EUR	European Unions (25 countries)	CHM	Chemical products
JPN	Japan	MET	Metal products
ROW	Rest of the world	MVT	Motor vehicles and transport equipment
		ELE	Electronic equipment
		OME	Machinery and equipment nec
		OMF	Manufactures nec
		EGW	Electricity, Gas manufacture, and Water
		CNS	Construction
		TAT	Trade and transport
		OSP	Other private services
		OSG	Government services

3. Parameters and Calibration

Values of elasticity parameters are exogenously determined. We employ GTAP 7 values for the elasticity of substitution among primary factors (σ_i) and Armington elasticity (σ_i^A).In regard to the elasticity of substitution among imports from different regions (σ_i^M), we assume $\sigma_i^M=2\times\sigma_i^A$ in accordance with the GTAP model. In addition to the two elasticities mentioned above, the imperfectly competitive model includes the elasticity of substitution of varieties (σ_i^D and σ_i^F). For these two parameters, we assume $\sigma_i^D=\sigma_i^F=2\times\sigma_i^M$, following Harrison *et al.* (1996). The values of σ_i and σ_i^A are provided in Table 4[6].

The imperfectly competitive model includes parameters and variables that do not appear in the perfectly competitive model, such as fixed cost, the number of firms, markup rates, and the elasticity of substitution of varieties. Among these parameters, elasticity parameters are exogenously determined as explained above. To conduct the simulation, it is first necessary to determine the values of other parameters and variables. The approach used for the imperfectly competitive model is as follows. First, the fixed cost is calibrated, given exogenous CDR (Cost-Disadvantage Ratio). Second, markup rates and the number of firms are calibrated such that the zero profit condition is satisfied at the benchmark equilibrium. As the value of the exogenously given CDR, we assume 0.15 for all regions and sectors[7].

of multinational firms.

[6] With regard to these elasticity parameters, we conducted a sensitivity analysis. By changing the assumptions, quantitative results are modified significantly in some cases. However, it was confirmed that most of the qualitative results remain the same. Thus, we can conclude that the above results achieved robustness to some extent.

[7] Actually, it is desirable to assume different values for different regions and sectors. However, as we were unable to obtain good estimates of CDR for individual sectors, we assume the common value.

TABLE 4. ELASTICITY OF SUBSTITUTION IN PRIMARY FACTORS (σ_i) AND ARMINGTON ELASTICITY (σ_i^A)

Sector	σ_i	σ_i^A
AFF	0.23	2.42
MIN	0.20	5.75
FBT	1.12	2.49
TWA	1.26	3.78
WPP	1.26	3.10
CHM	1.26	2.92
MET	1.26	3.56
MVT	1.26	3.15
ELE	1.26	4.40
OME	1.26	4.05
OMF	1.26	3.75
EGW	1.26	2.80
CNS	1.40	1.90
TAT	1.68	1.90
OSP	1.26	1.90
OSG	1.26	1.90

TABLE 5. LIST OF SCENARIOS FOR FTAS IN ASEAN+3 COUNTRIES UNDER DIFFERENT MARKET STRUCTURE

Scenarios	Description
FTA_KCA	FTA among Korea, China, and ASEAN under perfect competition FTA among Korea, China, and ASEAN under imperfect competition
FTA_KJA	FTA among Korea, Japan, and ASEAN under perfect competition FTA among Korea, Japan, and ASEAN under imperfect competition
FTA_CJA	FTA among China, Japan, and ASEAN under perfect competition FTA among China, Japan, and ASEAN under imperfect competition
FTA_KCJA	FTA among Korea, China, Japan, and ASEAN under perfect competition FTA among Korea, China, Japan, and ASEAN under imperfect competition

4. Scenarios of ASEAN+3 FTAs

Free trade agreements can take various forms, and the extent and range of FTA can often vary widely. If we attempt to assess the effects of a particular FTA process, it is desirable to take into account, as fully as possible, the details of the FTA process; such details include, for example, which regions participate and which goods are liberalized, and to what extent. The list of FTA scenarios used in the simulation is shown in Table 5.

In the simulation, the existing tariffs in the participating regions are proportionally reduced by 100%. As explained above, we were unable to consider the effects of reduction of services barriers.

This study estimates the quantitative economic impacts of different free trade agreements in the ASEAN + 3 FTA under four scenarios under different market structures: (1) ASEAN-Korea-China, (2) ASEAN-Korea-Japan, (3) ASEAN-China-Japan and (4) EAFTA, i.e. an ASEAN, China, Japan and Korea FTA.

TABLE 6. SOCIAL WELFARE EFFECTS OF ASEAN+3 FTAs[8] (Unit: %)

	FTA_KCA		FTA_KJA		FTA_CJA		FTA_KCJA	
	PC	IMPC	PC	IMPC	PC	IMPC	PC	IMPC
Korea	1.568	1.691	0.154	0.030	−0.804	−0.914	0.977	0.964
China	0.037	0.041	−0.251	−0.285	0.065	0.070	0.174	0.142
Japan	−0.122	−0.129	0.126	0.099	0.284	0.246	0.271	0.226
ASEAN	0.682	0.776	0.046	−0.073	0.556	0.613	0.401	0.349
United States	−0.037	−0.034	−0.035	−0.034	−0.063	−0.060	−0.086	−0.081
EU	−0.037	−0.016	−0.023	−0.020	−0.056	−0.053	−0.018	−0.062

Note: PC denotes perfectly competitive model, and IMPC means imperfectly competitive model.

IV. *Results of the Simulation*

1. Macro Economic Effects

We will first discuss the effects of FTAs on macro-economic effects and, second, on sectoral effects. Firstly, we review the social welfare effects shown in Table 6. According to the simulation results, we know that once countries join an FTA, the social welfare of those countries tends to increase. The largest improvement in welfare was seen in Korea after it joined the FTA. In particular, the trilateral FTA among Korea, China, and the ASEAN (FTA_KCA), which would bring about a 1.69% increase in welfare for Korea, was the best for Korea. The IMPC model generates a large welfare increase and the model PC generates a small welfare increase. However, the welfare impacts of the perfectly competitive model are not necessarily smaller than those of the imperfectly competitive model.

Next, let us evaluate the GDP effects of the ASEAN+3 FTAs. Each scenario shows that the countries involved in the agreement experience GDP expansion. The largest improvement in GDP was seen in Korea after it joined the FTA. By way of contrast, the least benefit accrued to China after it joined the agreements. The trilateral FTA among Korea, China, and ASEAN (FTA_KCA), which would bring a 1.02% increase in GDP for Korea, is best for Korea. According to the real GDP figures, the largest expansion in Korea occured when China joined the agreement. This is because China is the largest importer among the ASEAN+3 countries. Compared to Korea, China is, relatively speaking, an agricultural exporter. Thus, Korea has a comparative advantage in the production and export of manufacturing products.

With an FTA among Korea, China, and the ASEAN, the ASEAN would benefit from the largest increase in GDP. At the same time, Japan would experience a greater increase in GDP from a trilateral FTA_CJA than from other FTAs. More importantly, Korea would benefit more from FTAs than would China, Japan, and the ASEAN countries. This is why Korea has recently been the most active in its FTA policy among the three countries.

The ASEAN+3 FTAs have a negative impact on the United States and the EU in regard to their GDP. This is because the form of FTA adopted by the ASEAN+3 members creates trade

[8] The table also includes the computations of equivalent variation EV, which is a measure of welfare. The effects on household welfare are estimated through the equivalent variation EV, one measure of welfare commonly used in literature.

TABLE 7. GDP EFFECTS OF ASEAN+3 FTAs[9]

(Unit: %)

	FTA_KCA		FTA_KJA		FTA_CJA		FTA_KCJA	
	PC	IMPC	PC	IMPC	PC	IMPC	PC	IMPC
Korea	0.999	1.017	0.098	0.018	−0.512	−0.550	0.623	0.580
China	0.019	0.020	−0.130	−0.137	0.034	0.037	0.093	0.075
Japan	−0.069	−0.071	0.071	0.055	0.160	0.136	0.153	0.125
ASEAN	0.465	0.493	0.031	−0.047	0.379	0.390	0.274	0.222
United States	−0.024	−0.021	−0.023	−0.022	−0.041	−0.038	−0.056	−0.052
EU	−0.069	−0.009	−0.012	−0.011	−0.032	−0.028	−0.039	−0.032

Note: PC denotes the perfectly competitive model, and IMPC means the imperfectly competitive model.

TABLE 8. CHANGE IN MERCHANDISE TRADE UNDER THE IMPERFECTLY COMPETITIVE MODEL

(Unit: %)

	FTA_KCA		FTA_KJA		FTA_CJA		FTA_KCJA	
	exports	imports	exports	imports	exports	imports	exports	imports
Korea	7.126	10.179	3.000	3.029	−1.007	−2.147	7.795	9.979
China	5.929	7.030	−0.382	−0.843	6.403	7.928	9.005	10.099
Japan	−0.644	−1.202	1.803	2.218	3.421	4.531	3.472	4.461
ASEAN	1.195	2.303	1.037	1.491	1.294	2.618	1.533	2.523
United States	−0.224	−0.388	−0.149	−0.326	−0.257	−0.578	−0.396	−0.787
EU	−0.037	−0.048	−0.025	−0.063	−0.045	−0.136	−0.063	−0.153

TABLE 9. CHANGE IN TRADE BALANCE

(Unit: US$ billion)

	FTA_KCA		FTA_KJA		FTA_CJA		FTA_KCJA	
	PC	IMPC	PC	IMPC	PC	IMPC	PC	IMPC
Korea	−5.95	−9.32	−1.00	−1.71	2.33	2.56	−4.25	−8.16
China	−4.85	−4.2	1.84	2.01	−0.09	−3.77	−6.73	−7.70
Japan	2.89	3.38	−3.53	−4.29	−7.83	−9.60	−7.46	−9.13
ASEAN	−3.9	−6.15	−0.30	−2.95	−3.54	−7.24	−2.16	−5.86
United States	2.05	2.16	1.97	2.15	3.45	3.87	4.68	4.88
EU	1.56	0.5	1.06	1.16	2.92	2.66	3.38	2.74

Note: PC denotes the perfectly competitive model, and IMPC means the imperfectly competitive model.

diversion effects. However, the ASEAN + 3 FTAs have a minimal GDP effect on the United States and the EU.

According to these results, we found that member countries can increase their GDP by establishing any form of FTA. This means that once a country signs an FTA with one or more other countries, it will benefit economically from that FTA. However, the amount of change in GDP depends on the form of FTA employed for the simulation.

As can be seen in Tables 8 and 9, Korea would see a much larger increase in merchandise exports and imports from any form of FTA, while it would experience a reduction in its

[9] In this model, we assume about the labor market: labor supply is fixed and a uniform, flexible, market-clearing wage balances labor supply and demand. However, in the case of endogenous labor supply model, the change of labor supply affects GDP change.

TABLE 10. CHANGE IN SECTORAL OUTPUT IN KOREA FROM FTA SCENARIOS UNDER THE IMPERFECTLY COMPETITIVE MODEL (Unit: %, US$ million)

	FTA_KCA		FTA_KJA		FTA_CJA		FTA_KCJA−0	
	%	US$ m	%	US$ m	%	US$ m	%	US$ m
AFF	−21.995	−6,250	−0.274	−80	0.365	100	−20.783	−5,900
MIN	−12.809	−770	−7.954	−480	3.908	240	−11.258	−680
FBT	8.636	3,030	−0.339	−120	0.058	20	9.554	3,350
TWA	29.546	6,830	8.897	2,060	−5.766	−1,330	29.7	6,860
WPP	0.212	40	−1.027	−170	0.73	120	0.68	120
CHM	2.751	2,160	0.256	200	−0.732	−580	2.552	2,010
MET	−2.439	−1,210	−0.608	−300	1.847	910	−2.088	−1,030
MVT	0.63	220	1.227	440	1.041	370	−0.278	−100
ELE	−1.178	−490	1.241	510	0.046	20	0.49	200
OME	−2.847	−1,950	−1.801	−1,230	1.172	800	−3.198	−2,190
OMF	−1.708	−240	−2.323	−320	1.312	180	−2.53	−350
EGW	1.929	550	0.185	50	−0.277	−80	1.872	540
CNS	0.082	50	−0.008	−4	−0.015	−9	0.07	40
TAT	0.982	960	−0.087	−90	0.004	4	0.954	930
OSP	0.548	1,050	−0.122	−230	−0.159	−300	0.38	730
OSG	0.345	270	−0.044	−40	−0.211	−170	0.159	130

merchandise trade balance because its imports would surpass its exports. China and Japan would experience a reduction in its trade balance by joining FTAs. Meanwhile, the United States and the EU would get an increase in trade balance from any form of FTA.

According to the trade balance figures, the ASEAN+3 FTAs stimulate capital inflows for each of the members, particularly Korea, because the trade balance results show negative changes after ASEAN+3 FTAs.

2. Sectoral Output and Trade Effects

Following the analysis described in the previous section, the present section will examine the sectoral effects of an ASEAN + 3 FTA on output, export and import volume, and trade balance. As the consequence of an FTA_KCA, the outputs of textile products, chemical and petroleum refinery products, and food and beverage products would increase in Korea, whereas the output of agriculture, forestry, and fishery products would be reduced by USD 6,250 million under the imperfectly competitive model.

According to the sectoral output figures, we determined that the outputs of agricultural products in Korea would decrease rapidly when China joins the FTA. This is because China has a comparative advantage in the production and export of agricultural products.

Table 11 shows the trade effects of an ASEAN+3 FTA. The exports of most industries in Korea would increase as the result of an FTA, especially one involving textile products, chemical and petroleum refinery products, or food and beverage products in Korea. As a result of the FTA, the largest improvement in trade balance is textile products in Korea, whereas trade balance in agricultural products would be reduced by USD 9,970 million.

TABLE 11. CHANGE IN SECTORAL EXPORTS AND IMPORTS IN KOREA FROM FTA SCENARIOS UNDER THE IMPERFECTLY COMPETITIVE MODEL

(Unit: US$ million)

	FTA_KCA			FTA_KJA			FTA_CJA			FTA_KCJA		
	Exports	Imports	Trade Balance	Exports	Imports	Trade Balance	Exports	Imports	Trade Balance	Exports	Imports	Trade Balance
AFF	390	10,520	−10, 130	60	240	−180	3	−270	273	460	10,430	−9, 970
MIN	−10	1,400	−1, 410	−7	580	−587	6	−370	376	−10	1,270	−1, 280
FBT	850	−1, 860	2,710	230	460	−230	−20	−320	300	1,080	−2, 030	3,110
TWA	5,140	1,470	3,670	1,570	390	1,180	−1, 010	−330	−680	5,080	1,310	3,770
WPP	180	370	−190	30	150	−120	2	−120	122	200	320	−120
CHM	1,240	1,210	30	570	910	−340	−520	−510	−10	1,350	1,470	−120
MET	160	700	−540	170	270	−100	70	−230	300	210	600	−390
MVT	460	460	0	450	230	220	130	−150	280	300	480	−180
ELE	−100	360	−460	500	170	330	−90	−170	80	400	330	70
OME	140	1,410	−1, 270	60	1,260	−1, 200	50	−460	510	120	1,850	−1, 730
OMF	210	550	−340	50	360	−310	1	−160	161	200	630	−430
EGW	0	8	−8	0	1	−1	0	−1	1	0	6	−6
CNS	−2	3	−5	0	0	−1	1	−1	2	−1	2	−3
TAT	50	310	−260	−20	110	−130	100	−290	390	110	110	0
OSP	−90	800	−890	−40	170	−210	50	−340	390	−80	620	−700
OSG	−50	160	−210	−10	30	−40	20	−50	70	−50	130	−180

V. *Summary and Concluding Remarks*

With the development of the new trade theory, the use of the imperfectly competitive model has increased in CGE analyses. Thus, under the current situation, a variety of imperfectly competitive models are employed in different studies of the effects of trade liberalization.

In this study, we compare the perfectly competitive model and the imperfectly competitive model in a unified framework, taking into consideration the various FTA scenarios, using a static regional general equilibrium model with 16 sectors and 8 regions. As the benchmark dataset, we use GTAP version 7 data, with a benchmark year of 2004. This study estimates the quantitative economic impacts of different free trade agreements in ASEAN+3 under different market structures: (1) ASEAN -Korea-China, (2) ASEAN-Korea-Japan, (3) ASEAN-China-Japan and (4) EAFTA, i.e. an ASEAN, China, Japan and Korea FTA. Our main findings are summarized as follows.

First, the largest improvement in welfare was observed in Korea after it joined the FTA. In particular, the trilateral FTA among Korea, China, and ASEAN (FTA_KCA), which would bring about a 1.69% increase in welfare for Korea, is best for Korea.

Second, the trilateral FTA among Korea, China, and the ASEAN (FTA_KCA) countries under the imperfectly competitive model, which would bring about a 1.02% increase in GDP for Korea, is the second-best choice for Korea. Under the ASEAN+3 FTAs, Korea would enjoy the greatest benefits in terms of GDP growth. This is consistent with traditional trade theory, which predicts that a small open economy would benefit more profoundly from trade liberalization.

Third, Korea would see a much larger increase in merchandise exports and imports from any form of FTA, while it would experience a reduction in its merchandise trade balance because its imports would exceed its exports.

Fourth, according to the sectoral effects, we determined that the output of agricultural products in Korea would decrease rapidly when China joins the FTA. This is because China has a comparative advantage in the production and export of agricultural products. As a result of the FTA, the largest improvement in the trade balance was seen in regard to textile products in Korea, whereas the trade balance in agricultural products would decrease by USD 9,970 million.

According to our analysis above, we would like to describe the policy implications of our analysis. First, we demonstrated that differences in the models lead to differences in the effects of FTAs. Differences in the models can be viewed as differences in the economic structures of the regions being analyzed. This implies that differences in results by model depend strongly on which region is analyzed.

The second finding is that the economic impacts of the perfectly competitive model are not necessarily smaller than those of the imperfectly competitive model. As the imperfectly competitive model includes factors that do not exist in the perfectly competitive model, it is frequently noted that the imperfectly competitive model will generate a larger welfare impact than the perfectly competitive model.

Third, the results from the model simulations demonstrated that the regional agreement (ASEAN+3 FTA) would yield higher economic gains and a greater economic impact on the East Asian economies as a whole. Based on economic grounds, the inclusion of more member countries would definitely lead to more desirable outcomes.

The ideal regional economic integration, however, might be deterred as the result of a variety of obstacles. First, Japan and Korea protect their agricultural sectors assiduously, while the ASEAN and China wish to pursue the existing ASEAN-China free trade agreement, in which agricultural sectors are included, via member enlargement. Second, Japan's recent FTA strategy is more likely to initiate bilateral agreements on interested product coverage, as opposed to comprehensive product coverage.

REFERENCES

Abe, K. (2003), "Economic Effects of a Possible FTA among China, Japan and, Korea," in Y. S. Kim. and C.K. Lee (Eds.), *Northeast Asian Economic Integration: Prospects for a Northeast Asian FTA*, Korea Institute for International Economic Policy, Conference Proceedings 03-05.

Armington, P.S. (1969), *A Theory of Demand for Products Distinguished by Place of Production*, IMF Staff Papers 16.

Baldwin, R.E. and P. Krugman (1988), "Industrial Policy and International Competition in Wide-Bodied Jet Aircraft," in R.E. Baldwin, ed., *Trade Policy Issues and Empirical Analysis*. Chicago: University of Chicago Press.

Baldwin, R.E. and A.J. Venables (1995), "Regional Economic Integration", in G. M. Grossman and K. Rogoff eds., *Handbook of International Economics* 3, Amsterdam: North-Holland, Chap. 31, pp.1597-1645.

Cox, D. and R. Harris (1985), "Trade Liberalization and Industrial Organization: Some Estimates for Canada," *Journal of Political Economy* 93, pp.115-145.

Dixit, A. (1988), "Optimal Trade Policy and Industrial Policies for the U.S. Automobile Industry," in R.C. Feenstra, ed., *Empirical Methods for International Trade*, MIT Press: Cambridge.

Francois, J.F. and C.R. Shiells (1994), *Modelling Trade Policy: AGE Models of North American Free Trade*, Cambridge University Press.

Francois, J.F. and D.W. Roland-Holst (1997), "Scale Economies and Imperfect Competition," in J.F. Francois and K.A. Reinert eds., *Applied Methods for Trade Policy Analysis: A Handbook,* New York: Cambridge University Press, Chap. 11, pp.331-363.

Haaland, J. and T.C. Tollefsen (1994), "The Uruguay Round and Trade in Manufactures and Services. General Equilibrium Simulations of Production, Trade and welfare Effects of Liberalization," CEPR discussion paper 1008.

Harrison, G.W., T.F. Rutherford, and D.G. Tarr (1996), "Quantifying the Uruguay Round," in W. Martin and A.L.Winters eds., *The Uruguay Round and the Developing Economies*, New York: Cambridge University Press, Chap. 7, pp.215-284.

Ko, J.W. (2000), "Analysis of Economic Effects of a Free Trade Agreement among Korea, China, and Japan," *International Area Studies Review* 4(2), pp.177-209.

Lee, C.J. et al. (2005), "Rationale for a China-Japan-Korea FTA and Its Impact on the Korean Economy," Korea Institute for International Economic Policy, NRCS Joint Research Series on FTA Issues 05-04.

Lee, J.W. (2002), "Economic Impacts in Northeast Asia: The Perspective of a China-Japan-Korea FTA," *Journal of Korea Trade* 6(2), pp.155-188.

de Melo, J. and D. Tarr (1992), *A General Equilibrium Analysis of US Foreign Trade Policy*, Cambridge, MA: MIT Press.

Park, I.W. (2004), "A CGE Analysis of a Korea-China-Japan Free Trade Area," *Economic Papers* 6(2), pp. 151-186.

Piermartini, R. and R. Teh (2005), Demystifying Modelling Methods for Trade Policy. WTO Discussion Paper No. 10.

Smith, M.A.M. and A.J. Venables (1988), "Completing the Internal Market in the European Community," *European Economic Review* 32, pp.1501-1525.

Venables, A. and A. Smith (1986), "Trade and Industrial Policy Under Imperfect Competition," *Economic Policy* 1, pp.622-672.

Venables, A. and A. Smith (1989), "Completing the Internal Market in the European Community: Some Industry Simulations," *European Economic Review* 32 (7), pp.1501-1525.

Willenbockel, D. (2004), "Specification Choice and Robustness in CGE Trade policy Analysis with Imperfect Competition," *Economic Modelling* 21, pp.1065-1099.

Yoon, Y.M. et al. (2009), "A CGE Analysis of Free Trade Agreements among China, Japan, and Korea," *Journal of Korea Trade* 13(1), pp.45-64.

Global Trade Analysis Project (GTAP) Database 7.0

World Bank, World Development Indicators 2009.