Economic Effects of FTA between ASEAN Plus Three : An Empirical Study Using GTAP model

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Introduction

The movement toward the conclusion of FTAs (Free Trade Agreements) in East Asia began to progress rapidly after 2000. Before the latter half of 1990's, Japan, China and South Korea rather hesitated to the conclusion of FTAs. AFTA of which ASEAN countries reached a mutual agreement in January, 1992 was an only exception. However, in the situation of the rapid expansion of FTAs in Europe and America and the deadlock in the negotiation of WTO, Japan and South Korea changed their trade policies drastically and moved to the conclusion of FTAs at and after the end of 1990's. China's movement toward the conclusion of an FTA with ASEAN in 2000 accelerated this movement.

In this economic situation in East Asia, ASEAN + 3 (China, Japan and South Korea) is playing a central role for the conclusion of FTAs. The first summit of ASEAN Plus Three (APT) was held in Kuala Lumpur in 1997. There are some criticisms from the countries and the regions which are not included in APT, such as the United States, Australia, India, and Russia. They insist that instead of APT, APEC[1] (Asia-Pacific Economic Cooperation) or EAS [2](East Asia Summit) should be used as the base of the free trade agreement. However, it must be realistic to think that the negotiation will be done focusing on APT for the trade agreement in the near future.

In this article, considering this situation, we will give the computer simulation analysis for the effects of the FTA between APT to the world economy by using the latest version of GTAP model (GTAP ver.6 Database). As we will explain in section 2, GTAP model is a CGE (Computable General Equilibrium) model which was developed at Purdue University in the United States. It is an econometric model accompanied with the data base of the world economy and it became a standard model for analyzing the effects of trade policies including tariff cuts to the world economy. The attempts to analyze the effects of FTAs in East Asia by using GTAP model has already been done by Tsutsumi-Kiyota (2002a, 2002b) and Kawasaki (2003).

Except for using the latest GTAP version, this analysis has no originality and is not complete at this point of time as I am not experienced in this model. However, I would like to use this article as a chance to do the empirical studies which use GTAP model as a joint research project of Asian Community Research Center with the cooperation of researchers from East Asian countries and regions. I would like

[1] In addition to APT, Chinese Taipei, Chinese Hong Kong, Mexico, Papua New Guinea, Australia, New Zealand, the United States, Canada, Peru, Chili and Russia are the members of APEC.
[2] India, Australia and New Zealand are the members of EAS.

young researchers in China to join our research project for the analysis of FTAs by using GTAP model and to develop it.

The composition of this paper is as follows. In the first section, the current situation of the conclusions of FTAs in East Asia will be surveyed. In section 2 we will explain about the costs and merits of GTAP model briefly. In section 3, after aggregating the world economy into eight regions and five sectors by using GTAP 6 Database, we will give a computer simulation for the effects of zero tariff rates on the values of imports, production level in each industry and GDP. In section 4, we will compare the results with the past studies. We will give some comments on the possibility of the development of our research in the final section.

1. Current situation of FTA conclusions in East Asia

ASEAN agreed on AFTA (ASEAN Free Trade Area) that was the Free Trade Agreement in the region in 1992. AFTA started in 2002. Though it was planed to reduce tariffs by 2008 at the beginning, the reduction was achieved in 2002 after two front loadings. However, AFTA has the following problems: (1) only six of ten ASEAN countries participate in AFTA, (2) The proportions of the intraregional trade in ASEAN is not so high, (3) it is not a tariff abolition but a tariff reduction, (4) there are many exceptional goods.

On the other hand, the movement toward the FTA conclusion was not actualized until the latter half of 1990's in Japan, South Korea and China. Japan tried to maintain the frame of multinational negotiations that centered on WTO. South Korea took a protectionism trade policy for the agricultural sectors and the immediate objective of China was to join WTO in 2001.

However, the Japanese government, mainly the Ministry of Economy, Trade and Industry (at that time, it was the Ministry of International Trade and Industry) did its policy shift to the conclusion of FTAs in the latter half of the 1990's due to the rapid expansion of FTAs[3] in Europe and America and the deadlock of the WTO negotiation caused by the confrontation between the developed versus developing countries. The Japanese government explained that FTAs were only complements to WTO. But in reality it decided to make trade negotiations by using FTAs mainly.

Japan concluded the first EPA[4] (Economic Partnership Agreement) with Singapore in 2002 (it was signed on January 13, 2002 and came into effect on November 30). The exports from Japan to Singapore became 100 % duty-free by this agreement and the ratio of the non-dutiable goods to the imports of Japan from Singapore expanded from 84% to 94%. The main non-dutiable goods are plastics products and petroleum products. After JSEPA, Japan consequently concluded EPA with Mexico (which came into effect in April, 2005), with the Philippines (the mutual agreement in November, 2004), Thailand (the mutual agreement in September, 2005), and Malaysia (the agreement came into effect on July 13, 2006).

[3] WTO says that the number of the official notification of RTA to WTO is 211 in September, 2006.
[4] Instead of FTA, Japan concludes EPA as an RTA which is the comprehensive trade agreement including the agreements concerning of human movements and capital transfer in addition to the trade of goods.

For example, in the EPA with Malaysia, it is specified that all the fiber products are duty free, the tariffs for the iron and steel products, and the electronic products will be abolished within 5 to 10 years and passenger cars will be duty-free in 2010.

It is always said that the agricultural sector will be the bottleneck when Japan concludes an FTA with other countries or regions. For instance, in the EPA with Mexico, the tariff rates for pork, orange juice, chicken and beef were lowered but the quantitative restrictions of imports still exist for these goods. In EPA with the Philippines, although the tariff was abolished, the quota of imports is provided for sugar, pineapple and banana. In EPA with Thailand, Japan did not include rice and rice products in EPA and decided to give the technical assistance to the rice producers in Thailand for the compensation of it. How the Japanese government will make the adjustments in agricultural sectors will become the most important factor to conclude FTA[5].

South Korea also changed its policy to the conclusion of FTAs as Japan did in the latter half of the 1990's[6]. It made a proposal that it should conclude FTA with Japan in 1998. South Korea concluded its first FTA with Chile in 2003 (which came into effect in April, 2004) and after that, concluded an FTA with Singapore in March, 2006 and with EFTA (European Free Trade Association and Europe Free Trade Association) in September, 2006. It is negotiating with Mexico, Canada, India, the United States, and MERCOSUR now. As for the FTA with ASEAN, Korea formally signed “Framework Agreement on Korea-ASEAN Comprehensive Economic Cooperation” in December, 2005. However, because South Korea could not agree with Thailand on the import liberalization of rice, Thailand was excluded from this agreement.

China announced to conclude the free trade agreement with ASEAN in November, 2000 and signed "Framework Agreement on Comprehensive Economic Cooperation between ASEAN and China" in 2002. It is specified in that agreement that the free trade area will be established by 2010. Six countries of ASEAN were promised to abandon the credit of three billion dollars. The negotiations on trade with ASEAN ended in 2004 and the tariff reduction started in July, 2005. China showed a strong attitude toward concluding FTAs in East Asia, even if it made compromises with ASEAN. After that, China concluded an FTA with Chile in December, 2005 and with Pakistan in 2006.

We will briefly survey how the negotiations of FTAs have been proceeded between ASEAN, Japan, China, and South Korea. Japan proposed a conclusion of “ASEAN Comprehensive Economic Partnership Agreement of Japan” (AJCEP) to ASEAN in January, 2002, and in September agreed to conclude an agreement within ten years. In this mutual agreement, it is specified that Japan conclude an FTA with six countries by 2012 and with other ASEAN countries by 2017. Between Korea and ASEAN, the commodity trade negotiation was finished, and they agreed that the agreement came into effect in 2006, and the tariff would be abolished for the 90% of commodities by 2010. As we mentioned previously, commodities trade negotiations between China and ASEAN ended in 2004 and the tariff reduction started

[5] For the problems of Japanese Agriculture and FTA, see Taniguchi (2006). Taniguchi insists that Japanese Agriculture is not the bottle neck of the FTA negociations.
[6] For South Korea’s Strategy of FTAs, see Kou (2004).

in July, 2005. A conclusion of the agreement of investment services is scheduled in 2007. It is scheduled that the FTA with the original signatories will be achieved in 2010, and the FTA with the newly joining countries will be achieved in 2015. The negotiations are in progress between Japan, China, and South Korea now for aiming at the conclusion in 2008. The EPA negotiation between Japan and South Korea also started in December, 2003.

2. About the GTAP model

Global Trade Analysis Project (GTAP)[7] is a research project which was established by Professor Thomas W. Hertel of Purdue University in 1992. The aim of the project is that more researchers can access the econometric analysis of international trade problems at lower transaction cost and with less effort. It will offer a data base of the world economy and standard econometric model that everyone can freely get access.

The latest version of the data base is GTAP in Ver.6 which is based on the data set of the countries and the regions in 2001. This is a general equilibrium model in which households determine their demands for goods to maximize their utility functions, representative firms determine their demands for capital, intermediate goods and labor inputs to maximize their profit, and prices are determined in the market so as to equalize demand and supply of goods.

The features of this model are as follows[8].

- A representative consumer exists in each country or region and determines the consumption of goods, savings, and the government expenditure to maximize Cobb-Douglas utility function. The government is a virtual existence.
- A representative exists in each industry of each country or region and determines the inputs of factors of production (land, capital, skilled labor, and non-skilled labor) and intermediate goods (domestically produced goods and imported goods). Intermediate goods are separated from the factors of production in the production function, so the prices of intermediate products do not influence the factors of production. There are imported goods and domestic goods in intermediate goods and the parameter is given for the elasticity of substitutions.
- Prices of goods and production factors are determined so that demand and supply may be equilibrated in the market.

Although this GTAP model has such an advantage that everyone can easily use it, a lot of difficulties still exist. The biggest problem is that the model is static. Therefore, the transition between two equilibriums cannot be analyzed. Next, for there is no financial market in GTAP model, it cannot deal

[7] You can download the introductory model and the database from the website (http://www.gtap.org) freely.
[8] For the structure and the details of the GTAP model, see Hertel, Thomas W. and Marinos E. Tsigas (1997).

with foreign exchange rates, interest rates and inflation, and we can not analyze the effects of monetary policies. Moreover, there are problems that data set is somewhat old (the newest version is based on the data of 2001) and the data of the tariff rate is not correct for some goods. The problem of Armington approach was often pointed out by researchers. However, GTAP model made such a contribution that we can easily give access to the econometric analysis of international trade problems. Some of the problems which GTAP model has will be dissolved as we develop the model in the future.

3. Empirical analysis of FTA conclusion

In this section, we will analyze the effects of the tariff abolition between APT by using computer simulation[9]. For the computer simulation, we aggregate the world economy into eight regions as follows.

Table 1. 8-Region Aggregation

NAFTA	Canada, United States, Mexico
EU	Austria, Belgium, Denmark, Finland, Germany, United Kingdom, Greece, Ireland. Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden
China and Hong Kong	China, Hong Kong
Taiwan	Taiwan
Japan	Japan
Korea	Korea
AEAN	Indonesia, Malaysia, Philippines, Singapore, Thailand, Viet Nam, Brunei Darussalam, Cambodia, Lao People's Democratic Republic, Burma, (East)Timor Leste
ROW	All Other Regions

We can aggregate by using the GTAP software as follows.

・Start **GTAPAgg Database Aggregator**.
・Click the button of **View/Change Regional Aggregation**.
・Right -click on the box **ROW**.
Select **Insert before**
Input China and Hong Kong, Taiwan, Japan, Korea and ASEAN, consequently.
In the upper right frame, specify the new regions.

Next, we aggregate industries into five sectors as follows.

[9] There are the same kind of researches. See Young, Linda M. and Karen M. Huff (1997).

Table 2. Sector Aggregation

Aggregated Sector	Old Sector
Agriculture	Paddy rice, Wheat, Cereal grains nec, Vegetables, fruit, nuts, Oil seeds, Sugar cane, sugar beet, Plant-based fibers, Crops nec, Cattle, sheep, goats, horses, Animal products nec, Raw milk, Wool, silk-worm cocoons, Forestry, Fishing,
Food	Meat: cattle, sheep, goats, horse, Meat products nec, Vegetable oils and fats, Dairy products, Processed rice, Sugar, Food products nec, Beverages and tobacco products
Mining	Coal, Oil, Gas,
Manufacturing	Textiles, Wearing apparel, Leather products, Wood products, Paper products, publishing, Petroleum, coal products, Chemical, rubber, plastic prods, Mineral products nec, Ferrous metals, Metals nec, Metal products, Motor vehicles and parts, Transport equipment nec, Electronic equipment, Machinery and equipment nec, Manufactures nec
Service	Electricity, Gas manufacture, distribution, Water, Construction, Trade, Transport nec, Sea transport, Air transport, Communication, Financial services nec, Insurance, Business services nec, Recreation and other services, PubAdmin/ Defence /Health /Educat, Dwellings

We can aggregate sectors as follows.

・Click the button of **View/Change Sectoral Aggregation**.
・Right-click in **1 Food** and click the button of **Insert before**.
・Input the necessary sectors (Agriculture and Mining).
・Specify the old sectors into the new sectors.

Thus, click the button of **Save Aggregation Scheme to file** after aggregating regions and sectors. Then the zip file which is the archived database will be created (Create Aggregated Database). We have made an aggregation of regions and sectors, and a database.

The Abolition of tariff (Computer Simulation)

Now we can simulate the effects of the abolition of tariffs in APT. We can simulate it as follows.

・ Start **RUN GTAP Ver.5** software.
・ Click **Version/New** and we can read the file which contains aggregated database.
・ Set the **variable tms** and set **%targetrate** 0%.

For example, if we would like to set the tariff rate zero for the tradable goods between Japan and

ASEAN, we can set

Shock tms(TRAD_COMM,"ASEAN","JPN") = target% 0 from file tms.shk;

Shock tms(TRAD_COMM,"JPN","ASEAN") = target% 0 from file tms.shk;

・ Execute **Solve**.

We can choose the Johansen method, the Euler method, or the Gragg method for the approximation of the solution. Johansen is the fastest but if you prefer a more accurate solution, you had better use the multi-stepped methods such as the Euler or Gragg method.

・Click **Results** or **View/Updated Data/Updated Core Data**.

You can see the results of the simulation.

Value of Imports

Table 3. Total Value of Imports

	NAFTA	EU	CH_HK	TWN	JPN	KOR	ASEAN	ROW	Total
NAFTA	589232	309447	52776	25055	91526	37018	58723	227418	1391194
EU	362679	1401881	72990	16145	81697	27675	65673	594877	2623616
CH_HK	157454	104893	64995	8852	69485	20254	30959	73416	530309
TWN	43808	23446	26614		16018	3920	18078	16340	148223
JPN	146449	86344	67249	28490		29905	63226	68934	490596
KOR	46274	29194	36880	6993	17762		19303	38935	195342
ASEAN	102257	91073	45087	17198	59507	16522	88607	67800	488051
ROW	275541	546001	61573	17993	94129	41084	56749	415435	1508506
Total	1723693	2592279	428163	120727	430126	176378	401317	1503153	7375836

The left column of the table shows the exporting regions of goods, and the top row shows importing regions. For the following tables the relation between exporting and importing regions is the same.

Total value of imports of APT are $1513.5 billion and $758.8 billion of it is intra-regional trade (intra-regional import rate is 50.1%). China has the highest intra-regional import rate of 58.9% in APT and ASEAN, Korea and Japan has 54.2%, 47.2 % and 38.2%, respectively.

Table 4. Value of Imports for Agriculture

	NAFTA	EU	CH_HK	TWN	JPN	KOR	ASEAN	ROW	Total
NAFTA	17366	5738	5287	2034	9412	4956	2651	10535	57980
EU	2030	36907	926	80	779	147	272	10835	51976
CH_HK	823	1454	693	148	2097	3130	1129	1632	11106
TWN	81	33	61		374	48	66	33	696
JPN	79	69	134	36		137	47	1095	1596
KOR	64	38	81	31	562		38	55	869
ASEAN	1845	2059	2053	486	1892	514	2321	2706	13875
ROW	9929	30681	8178	613	5393	3360	3646	28315	90116
Total	32217	76978	17412	3428	20510	12292	10170	55206	228213

For agricultural products, Japan, China, South Korea, ASEAN import from NAFTA in the biggest ratio. The majority of it is import of grain such as wheat. In APT, China imports the largest value from ASEAN, and Japan and South Korea import the largest value from China. ASEAN imports most from ASEAN. It should be noted that China imports relatively big value of agricultural products from ASEAN and South Korea import only a small value from ASEAN.

Table 5. Value of Imports for Food

	NAFTA	EU	CH_HK	TWN	JPN	KOR	ASEAN	ROW	Total
NAFTA	20521	4660	2097	620	12148	1738	1729	10543	54056
EU	11106	93495	1673	782	4913	1002	2205	29049	144225
CH_HK	1110	1228	1158	85	4722	1090	897	1739	12028
TWN	400	73	120		709	74	239	155	1771
JPN	447	159	565	526		291	450	311	2749
KOR	306	161	236	53	1170		163	374	2463
ASEAN	4703	4277	2566	463	5680	777	5636	8458	32559
ROW	12940	30351	3332	1153	9860	1809	5475	39879	104800
Total	51532	134404	11747	3682	39202	6781	16794	90507	354651

For food, China, Japan and Korea import the biggest value from ASEAN. It should be notable that China's import from ASEAN exceeds that from NAFTA.

Table 6. Value of Imports for Manufacturing Products

	NAFTA	EU	CH_HK	TWN	JPN	KOR	ASEAN	ROW	Total
NAFTA	505542	166156	35150	17664	49843	23208	40651	138547	976761
EU	240742	1045372	50552	12118	39330	15210	37173	455839	1896337
CH_HK	134255	70296	46164	6504	54201	12737	23070	55216	402443
TWN	38821	20210	25898		13279	3628	17521	14132	133488
JPN	140886	67372	64462	26264		28397	60340	58542	446264
KOR	41945	21470	36003	6738	14861		18178	34994	174190
ASEAN	83249	54781	36651	14747	39469	11131	74643	40683	355354
ROW	145626	296416	30852	7482	25496	11074	24028	237932	778906
Total	1331067	1742074	325731	91517	236478	105386	295605	1035886	5163743

China, South Korea, ASEAN import the biggest value of manufacturing products from Japan. Japan's import from China is bigger than NAFTA.

Tariff Rates

Table. 7, 8 and 9 express the calculations of the ratio of the amount of the tariff that occupies in the value of the imports for each region for agriculture, food and manufacture respectively.

Table 7. Tariff Rate for Agriculture

	1 NAFTA	2 EU	3 CH_HK	4 TWN	5 JPN	6 KOR	7 ASEAN	8 ROW
1 NAFTA	3.06	4.18	31.45	3.39	27.60	56.76	9.85	9.99
2 EU	2.17	0.00	8.21	7.50	3.59	10.88	9.93	12.72
3 CH_HK	2.19	12.38	0.14	8.11	10.49	70.19	6.47	10.66
4 TWN	1.23	3.03	4.92		2.94	6.25	6.06	9.09
5 JPN	1.27	2.90	5.97	5.56		11.68	6.38	0.18
6 KOR	1.56	10.53	8.64	6.45	4.80		7.89	12.73
7 ASEAN	2.49	3.40	8.23	12.35	3.75	15.95	12.88	12.71
8 ROW	2.14	6.49	28.70	4.89	15.39	49.82	5.62	8.17

The tariff rate of Japan for agriculture is not so high as being believed in general. It is noticeable that the tariff rate for the import of China from NAFTA is high, and that of Korea from NAFTA and China is high. The tariff rates of ASEAN for the agricultural import from other regions are constant, while the rate from ASEAN is higher than other rates.

Table 8. Tariff Rate for Food

	1 NAFTA	2 EU	3 CH_HK	4 TWN	5 JPN	6 KOR	7 ASEAN	8 ROW
1 NAFTA	5.08	12.85	8.77	15.97	28.42	22.09	13.19	18.92
2 EU	6.37	0.00	11.06	12.15	25.48	23.45	10.88	17.07
3 CH_HK	3.96	17.59	1.21	20.00	20.10	24.04	23.52	14.32
4 TWN	5.00	8.22	3.33		6.77	16.22	18.83	12.26
5 JPN	3.80	9.43	10.80	16.54		20.96	12.44	12.22
6 KOR	5.23	13.04	13.14	15.09	13.33		20.25	24.33
7 ASEAN	2.53	14.59	9.00	18.36	21.44	16.99	15.28	25.62
8 ROW	7.38	15.60	10.17	19.69	23.16	17.80	12.49	12.27

The tariff rates of Japan and South Korea for food are relatively higher than other regions. ASEAN's rates are in the range of 10% to 20% and higher than the tariff rates of China.

Table 9. Tariff Rate for Manufacturing Products

	1 NAFTA	2 EU	3 CH_HK	4 TWN	5 JPN	6 KOR	7 ASEAN	8 ROW
1 NAFTA	0.08	1.73	7.86	2.00	0.59	3.42	1.92	8.23
2 EU	2.63	0.00	10.01	5.83	1.80	5.50	4.52	5.74
3 CH_HK	4.36	3.46	2.30	3.87	3.72	6.18	6.09	13.60
4 TWN	2.73	2.02	9.38	-	0.59	2.56	5.27	8.46
5 JPN	2.15	3.36	10.46	3.91	-	4.85	5.32	9.44
6 KOR	3.26	3.72	10.53	2.64	1.78	-	5.88	11.23
7 ASEAN	3.06	2.61	8.54	1.67	0.83	2.87	2.77	10.19
8 ROW	3.74	0.66	7.09	3.21	0.86	4.54	3.13	6.46

For tariff rate of manufacturing goods, Japan is the lowest, South Korea and ASEAN form the second group and China is the lowest that is about 5%.

Effects of FTA between APT

Let's see the effects of FTA between APT.

Table 10. Changes of the Total Value of Imports

	NAFTA	EU	CH_HK	TWN	JPN	KOR	ASEAN	ROW	Total
NAFTA	4368	970	-6430	310	-2101	-5781	-3923	775	-11810
EU	727	-1227	-9945	152	427	-399	-3285	-97	-13647
CH_HK	-723	-1274	-3906	13	18823	15245	8786	-881	36081
TWN	1439	669	-4577		437	-127	-1487	488	-3158
JPN	-13361	-7561	29048	-2213		5058	8326	-6086	13213
KOR	-4923	-3180	15801	-608	3610		3303	-3982	10019
ASEAN	-4661	-5024	13723	-553	4826	1276	5091	-3909	10770
ROW	1052	973	-5638	141	-1008	-4804	-2856	1019	-11122
Total	-16080	-15652	28076	-2760	25013	10468	13955	-12671	30348

Table 10 shows the changes in the total value of imports. As we can easily see from table 10, all the values of imports of APT from APT increase while the imports of regions in APT from other regions decrease. It should be notable that China gains the biggest export values by FTA.

Table 11. Changes of Import Value for Agriculture

	NAFTA	EU	CH_HK	TWN	JPN	KOR	ASEAN	ROW	Total
NAFTA	-49	63	476	-24	-600	-4476	31	51	-4530
EU	-41	-221	66	-2	-62	-133	-1	-144	-538
CH_HK	-142	-237	-52	-26	464	9220	110	-266	9070
TWN	2	2	7	0	-17	-43	2	1	-46
JPN	-2	-2	44	-2	0	-119	15	-28	-94
KOR	108	74	279	56	963	0	99	104	1683
ASEAN	-273	-283	627	-75	-124	-446	1131	-388	169
ROW	-113	63	670	-11	-383	-3037	12	-102	-2903
Total	-511	-540	2117	-85	241	965	1398	-772	2812

The imports of South Korea from China increase for $9.2 billion for agriculture. Japan increases its import from South Korea for $0.96 billion and China increases the import from ASEAN for $0.63 billion. As for ASEAN, intra-region imports increase remarkably.

Table 12 Changes of Import for Food

	NAFTA	EU	CH_HK	TWN	JPN	KOR	ASEAN	ROW	Total
NAFTA	-99	-2	-95	-17	-2829	-857	-318	-45	-4262
EU	-121	-469	-84	-26	-1164	-496	-414	-273	-3047
CH_HK	-112	-119	-107	-10	3398	428	1067	-168	4378
TWN	11	2	-2		-148	-35	-38	4	-206

JPN	-19	-6	259	-35		78	155	-14	418
KOR	471	263	800	81	2905		686	582	5789
ASEAN	-464	-388	691	-54	4793	-17	2531	-793	6299
ROW	-68	0	-149	-32	-2292	-891	-1004	-147	-4584
Total	-401	-718	1314	-93	4663	-1791	2665	-851	4785

Imports of Japan from China, South Korea and ASEAN increase strikingly for food. Although Korea's import from China increases, the value is not too large. ASEAN will increase the imports from itself just like for agricultural products. China increases the import from South Korea and ASEAN.

Table 13. Changes of Import for Manufacturing Products

	NAFTA	EU	CH_HK	TWN	JPN	KOR	ASEAN	ROW	Total
NAFTA	4497	535	-6947	425	565	-993	-4302	754	-5467
EU	1027	-652	-10157	237	284	-715	-4082	526	-13532
CH_HK	-95	-411	-3659	97	14785	5314	7294	-184	23142
TWN	1295	567	-4604		487	-68	-1471	425	-3368
JPN	-13062	-6561	28805	-2060		5070	8164	-5546	14808
KOR	-5059	-2686	14776	-723	-168		2581	-4272	4448
ASEAN	-3038	-2276	12638	-321	733	1101	1467	-1584	8720
ROW	1197	810	-6106	175	277	-482	-2552	1179	-5502
Total	-13238	-10675	24746	-2170	16965	9225	7098	-8704	23248

For manufacturing goods, China increases the imports from Japan, Korea and ASEAN for $28.8 billion, $14.8 billion and $12.6 billion respectively. Japan increases the import from China for $14.8 billion and decreases oppositely its imports from ASEAN and Korea for $700 million and $200 million respectively. On the other hand, the total imports from Japan increases only for $14.8 billion due to the reductions of the import of NAFTA, EU, and ROW. Therefore, an increase of the value of the import is bigger than an increase in exports for industrial goods. Korea increases the import from China and Japan for $5.1 billion and for $5.3 billion respectively. ASEAN increases the import from Japan and China for $7.3 billion and $8.2 billion.

Changes of GDP and Production Level of Each Sector

Table 14. Changes of Nominal GDP

	Consumption	Investment	Government Expenditure	Export	Import	Total
1 NAFTA	-40456	-17864	-9036	-6753	15626	-58481
2 EU	-20426	-12325	-7207	-9501	15216	-34243
3 CH_HK	2524	3221	322	42628	-45439	3256
4 TWN	-2891	-1156	-627	-2577	2659	-4592
5 JPN	32658	22489	11063	25628	-32118	59720
6 KOR	1533	9607	1463	15034	-20555	7082

7 ASEAN	5751	6903	1028	19663	-23918	9427
8 ROW	-19134	-9953	-4912	-7002	11408	-29592
Total	-40438	924	-7908	77120	-77120	-47424

Table 15. Changes of Nominal GDP

	Consumption	Investment	Government Expenditure	Export	Import	Total
1 NAFTA	-0.52%	-0.79%	-0.52%	-0.50%	-0.92%	-0.51%
2 EU	-0.44%	-0.76%	-0.44%	-0.36%	-0.59%	-0.43%
3 CH_HK	0.42%	0.71%	0.19%	8.64%	11.48%	0.25%
4 TWN	-1.68%	-2.24%	-1.75%	-1.85%	-2.28%	-1.63%
5 JPN	1.40%	2.12%	1.54%	5.36%	7.78%	1.43%
6 KOR	0.62%	8.74%	3.46%	7.84%	12.64%	1.66%
7 ASEAN	1.65%	5.10%	1.71%	4.29%	6.20%	1.53%
8 ROW	-0.60%	-0.94%	-0.60%	-0.49%	-0.81%	-0.58%
Total	-0.21%	0.01%	-0.15%	1.08%	1.08%	-0.15%

Table 14 and 15 shows the change of nominal GDP by value and %. In nominal GDP Korea gain the highest growth rate and ASEAN is the second, Japan, third and China is the fourth.

Table 16. Changes of Real GDP

NAFTA	EU	CH_HK	TWN	JPN	KOR	ASEAN	ROW
-0.003	-0.008	0.075	-0.032	-0.004	1.403	0.170	-0.026

However, as Table 16 shows, the real GDP of Japan decreases. This is because the inflation rate of Japan is higher than other regions.

Table 17. Changes of Production Level

	NAFTA	EU	CH_HK	TWN	JPN	KOR	ASEAN	ROW
Agriculture	-0.563	-0.203	2.527	-0.213	-2.209	-17.100	0.370	-0.207
Food	-0.371	-0.311	2.045	-0.802	-2.286	29.978	4.282	-0.480
Mining	0.152	0.096	-0.519	1.801	-2.499	-8.634	-1.486	0.151
Manufacturing	0.166	-0.115	-1.400	-0.036	0.342	-0.553	0.670	0.112
Service	-0.014	0.049	-0.031	0.023	0.036	0.479	-0.636	0.025

Table.10 shows the rates of the increase for the production level of each sector. China increases production level of agriculture and decreases mining and manufacturing products. Japan increases only the production of manufacturing goods, South Korea increases only the production of food and ASEAN decreases mining and service.

4. Analysis

It is believed that an FTA increases trade in the region where it was concluded, and decreases imports from other regions. Our simulation for the FTA between APT also shows the same results. For example, while China's imports of manufacturing goods from NAFTA decreases for $6.9 billion and imports from EU decreases $10.2 billion, imports from every APT regions increase. China's imports from Japan, South Korea and ASEAN increase for $28.8 billion, $14.8 billion and $12.6 billion respectively. Such a tendency is seen about other sectors.

As for the trade balance, China, Japan, South Korea, and ASEAN all have deteriorated. It is because (1) the import increases as GDP of APT increase and (2) exports into regions other than APT decrease as GDP of these regions do not increase.

For nominal GDP in each region, it increases in APT, and decreases in other regions. It is the same as many economists have pointed out. However, Japan decreases slightly for its real GDP. This is because the price level rises especially in Japan. Korea gains the highest GDP growth rate of 1.4%. As for ASEAN, the influence of the FTA is remarkable. On the other hand, nominal and real GDP decrease in regions other than APT. However, the rates of reduction are not too big.

For the real production level, China and ASEAN increase the production of agriculture and food, and South Korea decreases agriculture, and increase food strikingly. This is because South Korea takes the aegis policy in agricultural sector now.

Thus, FTA between APT does not seem to cause too much influence about GDP although some regions and some sectors suffer big influences. Let us compare these results with the previous researches. In Kawasaki (2003), the effects of FTA of ASEAN with Japan and China to real GDP are as follows.

Japan +0.79%　China +3.68%　Singapore +5.66%　Indonesia +4.08%　Malaysia +10.79%
Thailand +27.16% Philippines +4.67%

Tsutsumi-Kiyota (2002) estimated the effects of the FTA between Japan, China, South Korea, Singapore and the ASEAN 5 into real GDP and the results are as follows.

Japan +1.02%　China +27.69%　South Korea +9.05% Singapore +16.85% Indonesia +13.36%
Malaysia +18.52%　Thailand +18.44%

The effects when an FTA is concluded are smaller than the results of our simulation. We can think that the differences of these results are due to the efforts of liberalization of trade for several years by each country and region.

Therefore, the crucial point is whether we can conclude an FTA by abolishing tariff and import quota as much as possible while considering the influence of sensitive fields (mainly agricultural and food sectors). We need more detailed sector aggregation for this respect.

Conclusions

In this article, we analyze the effects of the FTA between APT by doing computer simulation. In this simulation, the effects do not become too big though a drastic policy of 0 tariff rate between APT is assumed. Moreover, the effects have become smaller than the simulations of the past studies. We can assume that this is due to the trade liberalization policy of each country and region for the past several years, although there is a possibility that the characteristic of the GTAP model influences, too.

There remains several problems for further studies.

(1) The number of sectors, 5 is too small and we can not analyze the effect into each industry. Especially, a more detailed analysis is necessary for agriculture and food.
(2) As we aggregate ASEAN countries to one region, it is not clear what influence reaches into each country of ASEAN.
(3) We assume the extreme case of 0 tariff rate.
(4) As we use the GTAP mode, we should have the problems which the GTAP model has. It is necessary to develop GTAP model into the model which assume the capital transfer, the financial market, and the dynamic situation.

I would like to overcome these problems in a joint research with researchers in East Asia in the future.

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