EFFECTS OF FTA AMONG CHINA, JAPAN AND KOREA ON AGRICULTURE

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ABSTRACT

The effects of the Free Trade Agreement among China, Japan and Korea on Korean agriculture (CJK FTA) can be measured by Korean agricultural simulation model KREI-ASMO. Simulation results show that reductions in total agricultural income will occur at the range from 14 percent to 22 percent in 2014 depending on the coverage of the FTA. The impacts on agricultural income will be smaller when rice is excluded from the FTA. Also, Potential Bilateral Trade (PBT) indicated that the CJK FTA may result in significant increases in agricultural trade deficits against China and some decrease in trade surplus against Japan.

Ⅰ. Introduction

After the Uruguay Round was concluded, regional trade agreements (RTA) have been more widely established across the world. Although there was no single RTA until the beginning of the 21st century, the Northeast Asian region was no exception. Korea, Japan and China sought to sign a free

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trade agreement (FTA) with other countries. Especially, China and Japan have been competing to sign the FTA with ASEAN first. In the circumstances, the possibility and need for an FTA among China, Japan and Korea (CJK) has been discussed by some Northeast Asian economic leaders. Korea needs to figure out the effects of the CJK FTA on its agriculture since huge impacts are expected.

The partial equilibrium approach is one of suitable methodologies to measure the effects of external shock such as an FTA on specific sector. Though it is unable to present feedback effects associated with other sectors, it is capable of measuring the impact on a particular sector. The partial equilibrium model is used to measure what the general equilibrium model might ignore, such as the effects on production, consumption, price and income by agricultural product. In this study, Agricultural Simulation Model of Korea Rural Economic Institute (KREI-ASMO) was used to estimate the impact of tariff elimination on the agricultural sector by taking a look at changes in cultivation land area and quantities of production and consumptions as well as prices by commodity. The simulation result obtained using the KREI-ASMO is an outlook for the year 2014.

The KREI-ASMO model, however, is unsuitable to measure the impact of an FTA on agricultural exports and imports. This study will measure the trade diversion effects based on the concept of potential bilateral trade (PBT). PBT is a kind of comparative statics aiming to measure the changes in import and export by commodity between two countries. Therefore, it can hardly predict accurate the effects on trade between three countries. Yet, it may be used as maximum amount of the changes in agricultural trade among China, Japan, and Korea in order to supplement the results estimated by the KREI-ASMO model.

Ⅱ. KREI-ASMO Model-based Simulation

1. Structure of the Model

The Korea Rural Economic Institute (KREI) developed an agricultural simulation model called KREI-ASMO in 1995 to make mid/long-term prospect of the agricultural sector and has been applied ever since. This is a static policy simulation model aimed to forecast the agricultural demand, supply and other indicators. The KREI-ASMO is not designed to analyze trade policy. Yet, it can be utilized to analyze effects of various policies related to the Doha Development Agenda of World Trade Organization (WTO/DDA) negotiations and FTA negotiations. This model, based on the partial equilibrium analysis, is geared up for the agricultural sector of Korea and the international prices are to be introduced exogenously. This creates some limits when it comes to analyzing effects of FTA agreements. The KREI-ASMO is unable to measure the spill-over effects of FTA on domestic industries other than agriculture and on foreign countries.

The KREI-ASMO is made up of five high-level modules, such as the major macroeconomic variables forecasting module, the input price forecasting module, the cultivating sector forecasting module, the livestock forecasting module and the aggregate forecasting module. Every module is linked closely with each other. The major macroeconomic variable forecasting module was designed to forecast real GDP and GDP deflator. To this end, real economic growth rate, consumer inflation, foreign exchange rate, CPI, and producer price indicators are obtained from relevant organizations.

Twenty eight commodities adopted for the KREI-ASMO in total, and each commodity except for “other cultivated crops”, “other fruits” and “other livestock”, is applied with a separate supply and demand module. “Other cultivated crops,” “other fruits” and “other livestock” were introduced to forecast agricultural production amount, agricultural income and agricultural value added based on the aggregate module.

2. Data

Six statistical data are utilized in this simulation. They include macroeconomic variables, farming land area, supply & demand for agricultural products, yield per unit land size, producer's prices and consumer's prices. Most macroeconomic data, such as GDP, GDP deflator, CPI, and exchange rate, were provided by the Bank of Korea, while outlook of other institutes were also reflected. Other agricultural data, such as farming land area and the demand/supply of agricultural products were obtained from the Ministry of Agriculture and Forestry, the National Agricultural Products Quality Management Service, the National Agricultural Cooperatives Federation, etc.

3. Simulation Scenarios

The market opening scenario to estimate the effects of the CJK FTA on Korean agriculture can be created by making different assumptions on the coverage of rice in the FTA. The baseline scenario assumes that rice is subject to Minimum Market Access (MMA) by 2014 with other products having status of developing country treatment in the ongoing WTO/DDA negotiations. Scenario 1 assumes gradual tariff reduction schedule for other products with rice excluded from the FTA, while Scenario 2 assumes drastic tariff elimination with rice included in the FTA. Three scenarios are conjured up for policy simulation. The details of the scenarios are as below.

3.1. Baseline Scenario

At the outset, MMA for rice was 4 percent of the annual average consumption during 1988 and 1990. It was assumed that MMA for rice will be raised up to 6.6 percent of the average consumption by 2014. All the imported rice will be sold at the market without designating their uses.[1] From 2005, public reserve

[1] In the 2004 rice negotiations, MMA was set at 7.96 percent. In order to measure the effects in case where rice is included as FTA target and in

system is to be introduced and expected public reserve will be 860,000 tons. Also, it was assumed that the rice to be provided as food aid to North Korea from 2005 to 2014 will be 200,000 tons.

For all other commodities, Korea was assumed to obtain the developing country status in the WTO/DDA negotiations. Thus, the tariff reduction rate for ten years will be 15 percent. In addition, high tariff products with over 200 percent as of 2005 will be subject to the ceiling binding of 200 percent in 2014.

3.2. Scenario 1

In Scenario 1, rice is excluded from the FTA. All other commodities are subject to tariff elimination under the FTA. For commodities with tariff rate below 100 percent as of 2005, tariffs will be eliminated immediately from 2006. If tariff rate is ranging from 100 percent to 200 percent, the tariff of such commodity will be removed progressively over ten years. If they are high-tariff commodities with over 200 percent tariff rate, the ceiling binding of 150 percent will be applied by 2014.

3.3. Scenario 2

In Scenario 2, rice is included in the FTA but tariffication of rice is still deferred. Rather, MMA for rice is assumed to increase up to 12 percent of the annual average consumption by 2014.

Other commodities are also subject to the FTA. If tariff rate is below 100 percent in 2005, the tariff for such commodities will be immediately lifted from 2006. For commodities with tariff rates between 100 percent and 200 percent, the tariff for such commodities will be removed progressively over five years. If it is 200 percent or above, the 100 percent ceiling binding will be applied to such commodities in 2014. Table 1 shows summaries of such three Scenarios:

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case where rice is excluded as FTA target, Scenario 1 and Scenario 2 assumed MMA at 6.6 percent and 12 percent respectively.

TABLE 1. Comparisons of Scenarios by Commodity Groups

Commodities by Tariff Rate(%)	Baseline Scenario	Scenario 1	Scenario 2	Remarks
Over 200	C/B of 200%	C/B of 150%	C/B 100%	in 2014
100～200	15% Reduction	Elimination for 10 years	Elimination for 5 Years	
Under 100	15% Reduction	Instant Elimination	Instant Elimination	
Rice in FTA	TRQ 6.6%	Excluded (TRQ 6.6%)	Included (TRQ 12%)	in 2014

Note: Maintaining SPS measurement for Apples, Pears, Tangerines and Peaches.

4. Results of Estimation

4.1. Changes in Agricultural Income

Presuming that the rice tariffication has been deferred at the cost of expanding MMA to 6.6 percent by 2014, total agricultural income is projected to be 13.4 trillion won in nominal price with the income from rice accounting for 5.05 trillion won under the Baseline Scenario, where the CJK FTA is not entered into force. Comparing to the agricultural income in 2003, it will drop by 43 billion won even without the CJK FTA.

Scenario 1 presumes that the CJK FTA is signed, but rice is excluded from the FTA. In this scenario, agricultural products except rice will be subject to tariff elimination over ten years. Among them, the ceiling binding of 150 percent will be applied to the commodities with high tariff over 200 percent in 2014. In this case, based on the nominal price, the total agricultural income of 2014 is projected to be 11.5 trillion won with rice income accounting for 4.6 trillion won. Compared with the Baseline Scenario in which the CJK FTA is not established, agricultural income is expected to reduce by 14.4 percent.

According to Scenario 2, which assumes that rice is included in FTA and the MMA of rice will increase to 12

percent by 2014, tariff for other products will be lifted within five years and 100 percent ceiling binding will be applied. In this case, the total agricultural income in 2014 will be 10.4 trillion won in nominal price, which is lower than that of 2003 by some 2.9 trillion won. Compared with the Baseline Scenario, the total agricultural income is projected to be 22.2 percent lower. Rice income is also expected to drop by 25.6 percent to 3.8 trillion won.

FIGURE 1. Agricultural Income (Real) under CJK FTA by Scenario

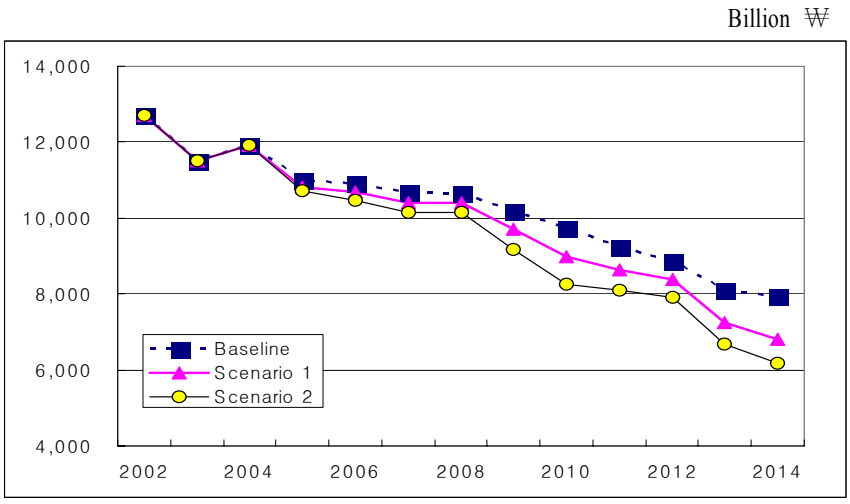

TABLE 2. Comparison of Agricultural Income in 2014 by Scenario

Billion won

Scenario	Total Agricultural Income		Income from Rice	Income from Other Items	Effects of FTA(Changes from Baseline Projection, %)		
	2003	2014			Total Income	Rice Income	Other Income
Baseline	13,368 (11,516)	13,411(7,942)	5,047(2,989)	8,364(4,953)			
Scenario 1		11,474(6,795)	4,620(2,736)	6,853(4,059)	-14.4%	-8.5%	-18.1%
Scenario 2		10,436(6,180)	3,751(2,222)	6,685(3,959)	-22.2%	-25.6%	-20.1%

Note: The numbers in ( ) are real incomes.

4.2. Effects on Productions and Prices of Major Commodities

In the above section, the effect of the CJK FTA on the total agricultural income, rice income and non-rice income were estimated. Since the KREI-ASMO is able to forecast on the agricultural sector, it is possible to predict production and consumption by commodity, cultivating land size, number of livestock heads raised, and producer's price.

This study measures the effects by scenario on main agricultural commodity, including rice, pork and Korean native beef, whose production values are substantial. The simulation estimates changes in production and consumption, producer's price and consumer's price by commodity. For the convenience of comparison, all the figures represented are based on the 2014 numbers.

4.2.1. Rice Production and Producer's Price

According to Baseline Scenario, rice production is expected to be 3.77 million tons in 2014, which is some 0.7 million tons lower than that of 2003 even without the CJK FTA. Producer's price index will be 131, 4.4 percent lower than the 2003 level.

Under Scenario 1 where rice is excluded from the FTA, the rice production is projected to be some 3.93 million tons, 160,000 tons or 4.5 percent higher than Baseline Scenario. The rice price index is 119, but since the rice price is relatively higher than other commodities, farmers tend to change their cultivation commodities to rice.

According to Scenario 2, where rice is included in the FTA and MMA increases to 12 percent in ten years, the rice production is expected to be 3.85 million tons or 80,000 tons higher than Baseline Scenario. Though rice price will drop 21.4 percent than in the Baseline Scenario, the production of rice will increase due to the relatively higher price of rice than other commodities.

4.2.2. Pork

Simulation shows that pork production in 2014 is expected to be 993 thousand tons regardless of Scenarios, which is higher than that of 2003 by 210 thousand ton. Producer's price will rise to 2,058 won per kilogram, which is 25.2 percent higher than that of 2003 regardless of Scenario. That is, pork seems to be unrelated to the inclusion of rice in the CJK FTA. Pork production is expected to remain constant without any influence from the ceiling binding under the CJK FTA.

4.2.3. Beef

When the CJK FTA is not entered into force, the 2014 production of Korean native beef is estimated to be 187 thousand tons, which is higher than that of 2003 by 52 thousand tons. Consumer's price is estimated to be 35,340 won per kilogram, which is 12.9 percent higher than that of 2003. When the CJK FTA is introduced, the production of Korean native beef is forecast to decrease to 171 thousand tons, 8.6 percent lower than that of Baseline Scenario regardless of exclusion of rice from the FTA. Consumer's price is also projected to go down to 28,424 won per kilogram or lower by 19.6 percent from Baseline Scenario. Consumer's price of Korean native beef is found to be not influenced by the duration of tariff elimination or inclusion of rice in the CJK FTA.

TABLE 3. Productions and Prices of Major Commodities in 2014 by Scenario

Scenario	Rice			Pork			Beef		
	Production (1.000 MT)		Price ('95=100)	Production (1.000 MT)		Price (₩/kg)	Production (1.000 MT)		Price (₩/kg)
	2003	2014		2003	2014		2003	2014	
Baseline	4,451 (137)	3,771	131	783 (1,644)	993	2,058	135 (31,292)	187	35,340
Scenario 1		3,931	119		993	2,058		171	28,424
Scenario 2		3,853	103		993	2,058		171	28,424

Note: Numbers in ( ) refers to consumer prices (indicators) as of 2003.

The changes in production and producer's price of major commodities according to the coverage of the CJK FTA can be summed up as follows: First, production as well as prices of rice show sizable differences in 2014 when rice is included in the CJK FTA. But those of livestock products show no significant differences in production and prices between the two cases. Pork is found to show constant production and price whether or not the CJK FTA enters into force, while production of Korean native beef is expected to fall under the influence of the FTA regardless of the inclusion of rice in the FTA.

The agricultural forecast using the KREI-ASMO was designed to produce partial equilibrium forecast on domestic agriculture. So, it has some limitations in making overseas agricultural forecast. The model is unable to estimate international agricultural trade and trade balances. In particular, the CJK FTA and other external policies of similar nature have direct impact on international trade. But, it is impossible to properly measure the effects on domestic agriculture with the KREI-ASMO model alone. In order to overcome such shortcomings and to measure the effects of external policy changes on agricultural trade by commodity, the concept "PBT" can be introduced.

Ⅲ. Measuring Trade Diversion Effects via PBT

1. Concept of PBT

Potential Bilateral Trade (PBT) can be adopted to measure the effects of the CJK FTA on import and export of each agricultural commodity. PBT refers to the maximum trade amount when the trade barriers between countries are completely removed if the current production level and export/import capability are maintained.[2] Therefore, PBT means the increased export/import after signing an FTA and diverting the import from a third country to a contracting party. In other words, it means the trade

[2] See Eor et. al(2004) for more details on the PBT concept, page 61～62.

diversion effect of FTA.

PBT of product *i* can be calculated by subtracting the existing import of the importing country from either the global exports of the exporting country or the global imports of the importing country, whichever is smaller. Thus, following equation can be applied for the measurement.

$$PBT_i = \min(AX_i, BM_i) - ABM_i$$

Where, AX_i means the exporter A's global exports of product *i*; BM_i denotes the importer B's global imports of product *i* and ABM_i means the existing imports of B from A.

If the trade with third parties is substantial while the trade between FTA parties is small, PBT tends to expand. In addition, as the products are classified in too details, PBT tends to decrease, while it tends to increase as the commodities are roughly classified. Therefore, in order to correctly measure the PBT of FTA parties, it needs to classify the commodities properly and with same classification units.

2. Differences in Commodity Classification Method and Data Used

In the Harmonized Commodity Description and Coding System (HS), the first six-digit, called subheading, is the common classification criterion used around the world. The number over six-digit might have different meanings by country depending on its own classification method. In Korea, for example, 10-digit classification is adopted for imposing tariffs, while in Japan and China 9-digit and 8-digit classifications are used respectively. Therefore, there may be differences in trade statistics of China, Japan and Korea.

Such discord makes it impossible to measure PBTs of the commodities with 10 classification digits. In this study, the PBT for China, Japan and Korea was measured based on six-digit classification(sub-heading of a product) under the HS classification system. As a result, there might be some commodities, which have

the same HS code but actually different products. This indicates that PBT may be over-estimated. PBT for HS-2 digit level of products(Chapter) can be obtained by summing up the measured PBT for HS-6 digit(sub-heading) across the two-digit classification.

The export/import statistics of agricultural products by commodity from 2000 to 2003 was adopted to measure PBT. Export and import of agricultural product, however, fluctuate radically year by year. To correct this trend, the average values during the four years of export/import statistics were introduced.

3. Results of Measurement

3.1. Agricultural Trade Changes between Korea and Japan

Agricultural trade statistics between Korea and Japan were collected from 2000 to 2003. Based on the HS-6 digit classification, PBT was measured. The PBT shows that if trade between the two countries is completely liberalized, Korea's agricultural export to Japan will rise by 579 million dollars. Korea is expected to increase the export of processed agricultural products, including food condiments including sauces(Chapter 21), tobacco(Chapter 24), processed grains(Chapter 19), drinks and beverages(Chapter 22). The export of meat(Chapter 2), seeds and fruits for oil extraction(Chapter 12) is also forecast to rise substantially. In addition, animal products(Chapter 5) and fresh agricultural products, including edible vegetables(Chapter 7) and edible fruits(Chapter 8) are projected to increase slightly.

On the contrary, Korea is expected to increase its import by 724 million dollars from Japan. In details, the import of tobacco(Chapter 24) and food condiments including sauces (Chapter 21) will show the biggest increase. Processed agricultural products, such as processed grains(Chapter 19), food processing residues(Chapter 23) and drinks and beverages(Chapter 22) are expected to show substantial import growth. However, import of fresh agricultural products is not projected to grow.

After signing the FTA, Korea’s agricultural import from Japan will surge much higher than its export to Japan. Since the

TABLE 4. Changes in Agricultural Export of Korea to Japan

Unit : US$ 1,000

Chapter and Description	2000	2001	2002	2003	Average ('00-'03)
01(Live animals: cattle, pigs, chicken, etc.)	347	575	561	568	513
02(Meat: beef, pork, chicken meat, etc.)	11,082	44,022	15,753	14,949	21,452
04(Dairy Products: cheese, butter, eggs, etc.)	1,079	548	292	141	515
05(Animal Products: animal hair, bone, etc.)	17,950	16,507	13,712	15,130	15,825
06(Live Plants, roots, seed germs, cut flowers)	9,367	9,693	11,536	16,785	11,845
07(Edible Vegetables)	5,306	10,338	7,350	7,767	7,690
08(Edible Fruits)	13,109	19,251	21,029	30,445	20,958
09(Coffee, Tea, Condiments, etc.)	3,786	6,703	9,511	7,258	6,815
10(Grains)	389	180	84	58	178
11(Grain Flour, Starch, Malts, etc.)	1,324	1,239	1,697	1,539	1,450
12(Seeds and Fruits for Oil Extraction)	20,019	19,660	25,500	27,549	23,182
13(Gum, Resin, Concentrated Essence, etc.)	14,197	13,478	15,785	16,393	14,963
14(Plant Fiber: Reeds, Rush, etc.)	75	113	87	58	83
15(Animal & Vegetable Fat & Oil; margarine)	6,014	5,573	5,659	12,486	7,433
16(Processed Food of Meat & Fish: sausages)	1,700	1,850	7,088	18,003	7,160
17(Sugar & Candies)	29,200	22,950	21,256	17,046	22,613
18(Cocoa & Processed Cocoa Products)	3,532	7,196	5,798	6,705	5,808
19(Processed Grain Products)	82,187	88,492	87,845	93,341	87,966
20(Processed Vegetables & Fruits)	11,281	13,010	17,316	17,464	14,768
21(Food Condiments including sauces, etc.)	75,552	90,762	117,442	136,447	105,051
22(Drinks and Beverages)	51,577	65,373	76,925	77,831	67,927
23(Food Processing Residues including Brans)	8,213	13,668	13,561	13,684	12,282
24(Tobacco & substitutes)	37,027	76,847	145,894	229,354	122,281
Total	404,312	528,029	621,681	761,001	578,756

Note: PBT was measured based on HS-6 digit(sub-heading).
Sources: Korea Trade Association(www.kita.net).

TABLE 5. Changes in Agricultural Import of Korea from Japan

Unit : US$ 1,000

Chapter and Description	2000	2001	2002	2003	Average ('00-'03)
01(Live animals: cattle, pigs, chicken, etc.)	6,796	6,855	7,785	3,939	6,344
02(Meat: beef, pork, chicken meat, etc.)	6,181	6,210	3,623	-	4,004
04(Dairy Products: cheese, butter, eggs, etc.)	4,375	2,870	3,230	3,259	3,433
05(Animal Products: animal hair, bone, etc.)	480	774	434	1,223	728
06(Live Plants, roots, seed germs, cut flowers)	7,653	6,185	7,633	8,498	7,492
07(Edible Vegetables)	9,405	7,198	6,853	5,975	7,358
08(Edible Fruits)	1,456	1,505	2,050	1,221	1,558
09(Coffee, Tea, Condiments, etc.)	2,289	4,190	5,286	4,056	3,955
10(Grains)	2,203	26,609	345	401	7,390
11(Grain Flour, Starch, Malts, etc.)	3,124	4,441	4,133	5,652	4,338
12(Seeds and Fruits for Oil Extraction)	23,212	22,771	20,240	23,778	22,500
13(Gum, Resin, Concentrated Essence, etc.)	10,909	10,115	14,913	11,413	11,837
14(Plant Fiber: Reeds, Rush, etc.)	916	512	473	391	573
15(Animal & Vegetable Fat & Oil; margarine)	28,891	22,712	23,382	27,561	25,636
16(Processed Food of Meat & Fish: sausages)	7,282	4,253	3,224	3,911	4,667
17(Sugar & Candies)	36,171	36,503	39,147	46,882	39,676
18(Cocoa & Processed Cocoa Products)	19,534	19,151	23,565	29,288	22,885
19(Processed Grain Products)	89,720	103,162	103,198	104,709	100,197
20(Processed Vegetables & Fruits)	25,059	22,432	22,310	29,993	24,949
21(Food Condiments including sauces, etc.)	185,908	182,032	187,125	213,530	192,149
22(Drinks and Beverages)	69,673	57,611	64,700	63,627	63,903
23(Food Processing Residues including Brans)	59,208	53,645	52,105	41,565	51,631
24(Tobacco & substitutes)	97,255	153,729	178,859	35,721	116,391
Total	697,701	755,464	774,614	666,592	723,593

Note: PBT was measured based on HS-6 digit(sub-heading).
Sources: Korea Trade Association(www.kita.net).

level of current agricultural exports of Korea is much greater than that of Japan, there might be relatively little room for Korean export to grow further. Moreover, Japan's average concession tariff rate for agricultural products is 41.3 percent, much lower than that of Korea or 63.8 percent. In this context, if the tariff is eliminated after signing the FTA, Korea's import from Japan will grow faster than its export to Japan. The degree of price fall for Japan's agricultural products will be greater than that of Korea.

3.2. Agricultural Trade Changes between Korea and China

Korea's export of agricultural products to China is anticipated to expand by 457 million dollars. By commodity, processed agricultural products and processed foods including sauces(Chapter 21), sugar and candies(Chapter 17), seeds and fruits for oil extraction(Chapter 12), drinks and beverages(Chapter22) and processed grains(Chapter 19) will substantially increase. Besides, export of edible fruits(Chapter 8) appears to grow significantly.

Increase in Korean agricultural import from China is expected to record over 1.9 billion dollars. In details, grains (Chapter 10), food condiments including sauces(Chapter 21), tobacco(Chapter 24), meat(Chapter 2), food processing residues (Chapter 23) and seeds and fruits for oil extraction(Chapter 12) are expected to increase by more than 100 million dollars respectively. Also, import of a broad range of commodities including processed vegetables and fruits(Chapter 20), drinks and beverages(Chapter 22), processed grains(Chapter 19), sugar and candies(Chapter 17), processed food of meat and fish(Chapter 16) as well as fresh products including vegetables are forecast to grow.

The expected increase in the Chinese agricultural products import to a large degree is attributable to diversity of agricultural products and enormous export capability of China. China's concessional tariff rate for agricultural products is 37.9 percent which is lower than that of Korea. Therefore, agricultural import of Korea from China is expected to increase far more than the export of Korea to China.

TABLE 6. Changes in Agricultural Export of Korea to China

Unit: US$ 1,000

Chapter and Description	2000	2001	2002	2003	Average ('00-'03)
01(Live animals: cattle, pigs, chicken, etc.)	1,874	1,438	516	452	1,070
02(Meat: beef, pork, chicken meat, etc.)	18,172	13,541	18,331	16,454	16,625
04(Dairy Products: cheese, butter, eggs, etc.)	3,455	2,141	2,652	2,722	2,743
05(Animal Products: animal hair, bone, etc.)	11,239	9,132	6,741	7,830	8,736
06(Live Plants, roots, seed germs, cut flowers)	6,752	6,455	7,399	8,266	7,218
07(Edible Vegetables)	2,432	3,323	3,008	2,587	2,838
08(Edible Fruits)	14,890	18,842	29,844	20,756	21,083
09(Coffee, Tea, Condiments, etc.)	2,847	4,454	4,150	5,100	4,138
10(Grains)	704	114	173	116	277
11(Grain Flour, Starch, Malts, etc.)	9,570	7,901	5,745	5,147	7,091
12(Seeds and Fruits for Oil Extraction)	55,421	52,629	35,333	30,809	43,548
13(Gum, Resin, Concentrated Essence, etc.)	11,722	11,121	11,320	19,290	13,363
14(Plant Fiber: Reeds, Rush, etc.)	889	870	605	478	711
15(Animal & Vegetable Fat & Oil; margarine)	8,254	9,550	14,303	14,377	11,621
16(Processed Food of Meat & Fish: sausages)	2,678	1,839	1,331	2,861	2,177
17(Sugar & Candies)	43,907	66,296	38,333	36,807	46,336
18(Cocoa & Processed Cocoa Products)	8,685	12,017	11,152	12,626	11,120
19(Processed Grain Products)	19,768	28,247	42,518	46,476	34,252
20(Processed Vegetables & Fruits)	9,190	9,637	9,689	10,184	9,675
21(Food Condiments including sauces, etc.)	84,143	115,903	115,163	159,726	118,734
22(Drinks and Beverages)	29,824	35,723	39,081	43,068	36,924
23(Food Processing Residues including Brans)	9,849	14,466	16,475	16,909	14,425
24(Tobacco & substitutes)	51,305	45,593	32,595	39,466	42,240
Total	407,570	471,232	446,457	502,507	456,943

Note: PBT was measured based on HS-6 digit(sub-heading).
Sources: Korea Trade Association(www.kita.net).

TABLE 7. Changes in Agricultural Import of Korea from China

Unit : US$ 1,000

Chapter and Description	2000	2001	2002	2003	Average ('00-'03)
01(Live animals: cattle, pigs, chicken, etc.)	7,784	9,701	4,137	7,226	7,212
02(Meat: beef, pork, chicken meat, etc.)	147,781	245,544	299,958	290,700	245,996
04(Dairy Products: cheese, butter, eggs, etc.)	4,946	10,128	7,537	9,319	7,983
05(Animal Products: animal hair, bone, etc.)	28,064	27,999	41,405	46,468	35,984
06(Live Plants, roots, seed germs, cut flowers)	11,546	11,214	15,409	19,291	14,365
07(Edible Vegetables)	18,495	16,603	18,941	37,887	22,982
08(Edible Fruits)	14,105	18,599	27,654	45,712	26,518
09(Coffee, Tea, Condiments, etc.)	12,209	15,981	22,191	26,201	19,146
10(Grains)	275,570	335,677	355,735	287,662	313,661
11(Grain Flour, Starch, Malts, etc.)	6,939	7,456	7,880	7,536	7,453
12(Seeds and Fruits for Oil Extraction)	131,409	138,531	116,828	145,360	133,032
13(Gum, Resin, Concentrated Essence, etc.)	23,787	33,861	38,756	22,281	29,671
14(Plant Fiber: Reeds, Rush, etc.)	10,755	9,325	8,888	9,306	9,569
15(Animal & Vegetable Fat & Oil; margarine)	25,251	21,914	26,796	33,690	26,913
16(Processed Food of Meat & Fish: sausages)	18,784	27,729	26,857	28,994	25,591
17(Sugar & Candies)	37,723	49,502	57,400	59,207	50,958
18(Cocoa & Processed Cocoa Products)	12,348	12,272	26,793	39,538	22,738
19(Processed Grain Products)	50,869	50,311	58,472	64,729	56,095
20(Processed Vegetables & Fruits)	79,710	81,713	85,882	115,905	90,803
21(Food Condiments including sauces, etc.)	230,584	262,590	316,322	324,678	283,544
22(Drinks and Beverages)	51,197	65,480	77,020	73,886	66,896
23(Food Processing Residues including Brans)	84,480	144,211	239,296	222,299	172,572
24(Tobacco & substitutes)	197,327	238,831	291,546	204,984	233,172
Total	1,481,663	1,835,172	2,171,703	2,122,859	1,902,849

Note: PBT was measured based on HS-6 digit(sub-heading).
Sources: Korea Trade Association(www.kita.net).

3.3. Changes in Agricultural Trade Balance of Korea

The potential changes in agricultural import and export against China and Japan were measured by using the agricultural trade statistics from 2000 to 2003 based on the assumption that the CJK FTA was signed. It was found that Korea's agricultural export to Japan will rise by 580 million dollars, while its import from Japan will rise by 720 million dollars. Therefore, Korea's agricultural trade surplus against Japan is expected to decrease by 140 million dollars.

Korea's agricultural exports to China is projected to rise by 460 million dollars while its import from China is expected to rise by 1.9 billion dollars. As a result, the agricultural trade deficits of Korea against China is measured to expand by more than 1.4 billion dollars.

As stated above, PBT is a tool to measure the effects of trade liberalization in consideration of external factors, such as an FTA. It is able to predict changes in trade by commodity and in trade balances, which are difficult to be predicted by domestic agricultural simulation model. However, PBT can be viewed to measure only trade diversion effects, since it estimates changes in trade under the assumption that the partner of FTA will divert the external trade to its partner. PBT is unable to measure the trade creation effects, where new products begin to be imported or exported after trade liberalization.

In addition, in case of the products whose trade gets limited because of the quantity regulations, animal/plant quarantine and other non-tariff barriers, their trade is likely to increase significantly after trade liberalization. But increase in trade measured by PBT for such products tends to be under-estimated. For instance, the PBT for Korean rice import may be lower than the actual increase in import after complete trade liberalization. On the other hands, PBT for livestock products and spice vegetables, whose imports from China are limited due to quarantine problems may be greater than actual changes, after FTA unless the Sanitary and Phyto-sanitory(SPS) problems are resolved.

Another shortfall of PBT is that it considers an FTA as an opportunity to divert existing trade completely. However, the differences in specifications and quality of agricultural products prevent its import from being entirely diverted to FTA parties. Usually, PBT represents the maximum level of increases in import or export after FTA.

Ⅳ. Concluding Remarks

Establishing the FTA with China and Japan will bring a great opportunity as well as a challenge to Korean agriculture. After the FTA is signed, Korean farmers will face full competition from the two countries without any protective regulations on agricultural trade, such as tariff and non-tariff barriers. The FTA's biggest challenge to Korean agriculture seems to be the possibility of surging import from China, since it has been known to maintain comparative advantage for almost all agricultural products.

China, Japan and Korea are the core countries in Northeast Asia, and are sharing some common characteristics such as small-scale farming and the composition of agricultural products, so that they are mutually competitive. At the same time, however, due to the different factor endowment ratios, they have complementary relations, too. It might imply the possibility of intra-industry trade in agricultural sector.

The effects of the CJK FTA on Korean agriculture can be expressed in terms of reductions in total agricultural income. Our simulation shows that the agricultural income reduction rate will range from 14 percent to 22 percent by 2014 by scenarios which have different FTA conditions. It shows that agricultural income will decrease slightly when rice is excluded from the FTA. On the contrary, agricultural income may fall further if rice is included in the FTA. This result conveys us an important policy implication that rice should be excluded from the CJK FTA in order to prevent agricultural income from rapid reduction.

Measured potential bilateral trade(PBT) also tells us that the CJK FTA may expand agricultural trade among the member

countries. Korean agricultural import from Japan is expected to increase by 240 percent or 720 million dollars, while export will increase by 90 percent or 580 million dollars. On the other hand, Korean agricultural import from China is expected to increase by 92 percent or 1.9 billion dollars while export to China is estimated to rise by 180 percent or 460 million dollars. As a result, Korean agricultural trade balance against Japan and China are expected to grow worse by more than 1.5 billion dollars in total.

The effects of the CJK FTA on production and prices of other commodities are different according to their relations with rice. Pork seems to have almost no impact from the FTA, while beef production is expected to fall because of the CJK FTA.

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