〈研究論文〉

A Study on Industrial Effects of Tariff Removal between Korea and Japan

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Ⅰ. Introduction

The talks for free trade agreement (FTA) between Korea and Japan began in 1998. By conducting research in industry, academia and government and collecting financial opinions, in October 2003 the first round of negotiation was held. The negotiation progressed rapidly until the 6th negotiation in November 2004, when the talks were discontinued.

The primary reason for the discontinued negotiation is insufficient economic effects for Korea from the Korea-Japan FTA. Most of the studies that have analyzed both countries' FTA future economic effects have concluded that Korea's size of imports from Japan will be larger than its exports to Japan. (Park 2002, Cheong 2004, Kim 2004, Yoo and Bae 2007, Yamazawa 2001, and Urata and Abe 2005). This is because the levied tariffs from Korea is relatively higher and Korea will increase imports of Japan's products since Japan's product price will decrease due to the tariff removal.

The Korean government has promoted the Korea-Japan FTA despite its continuous trade deficit with Japan and the negative economic effects. The Korean negotiation team that had these issues in mind, has requested Japan to invest in Korea, increase cooperation between corporations, remove non-tariff barriers, open agricultural market, etc. On the other hand, Japan has maintained its position that such issues should be solved not from a governmental but from a private perspective. The different opinions of both parties have caused disruption in the Korea-Japan FTA negotiation.

The lack of natural resources in Korea has a structure where the intermediary goods import increases when the amount of its export increases. According to the statistics by KOTIS, in 2008, 40.8% of Korea's imports from the world was imports for export, and 69.2% was imports of raw materials. Meanwhile, Japan is the third country where Korea imports raw materials, following China and Saudi Arabia. In 2008, Korea's import volume of raw materials from Japan was USD 28.9 billion, which was 47.4% of the total imports from Japan to Korea, and this was equivalent to 10.6% of Korea's total imports of raw materials.

Recently, Korea's economy has been stagnant due to the global economic downward trend. To overcome such problem, export will play a

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decisive role. During the foreign exchange crisis, export played a breakthrough role in weathering the crisis. Therefore, our interests should be placed on strengthening trade competitiveness.

Considering Korea's industrial structure that has large volume of raw materials' import for export, achieving efficient import is important. If importing with a lower price is possible, export products' price will become competitive. The fact that Korea's rate of dependence on imports from Japan is high indicates that Korea's import from Japan may serve as the key to control price competitiveness. This can be understood by improving the import efficiency in the Korea-Japan FTA.

This study began by recognizing the abovementioned issues. Most of the studies that analyzed the Korea-Japan FTA are based on the Computable General Equilibrium (CGE). The previous studies' results have shown that Korea's trade balance will worsen and the total industrial production will decrease, but in the long run, the inflow of foreign investment and increasing economic efficiency through further competition will improve future social welfare.[1)]

However, the previous studies have two focal problems. First, the analysis of the possible dynamic influence to the value-added structure in Korea's industries is weak. Even if such analysis has been carried out, it lacks the probability of exogenous assumption in relation to the increase in total factor productivity.[2)] Second, the previous studies remain in the boundary of macroeconomics and do not consider the industrial characteristics of both countries. This is similar to overlooking Korea's high rate of dependence on imports from Japan and high rate of vertical connection relationship between the two countries.

This study attempts to solve the issues faced by previous studies and analyze industrial effects of tariff removal between Korea and Japan. In order to consider the industrial structure of both countries, the international input-output table is used to estimate of tariffs and rate of decrease in price, and increase of production rate and scale of production increase from each industry.

The study is organized as follows. Section II organizes the economic effects of Korea-Japan FTA from the previous studies. Section III describes the sources and models utilized by this study, and Section IV provides the analysis results. Finally, Section V summarizes the study's results and implications.

Ⅱ. Previous Studies

The initial studies on the economic effects of Korea-Japan FTA were join research in industry, academia and government, which took place before 2000 by both countries.[3)] The economic effects studies focused on static effects through the removal of tariffs.[4)] The static effects do not consider the accumulation of capital although active capital movement and trade between the two countries exist through the FTA. The study mostly focuses on grasping the increase in efficiency of resource allocation for industries with competitive advantage in both countries' trade structure. When summarizing the results of this study, although Korea's trade balance's deficit with Japan increases, if foreign investment

flows into Korea, Korea's industrial structure and trade balance with the world improve.

After 2000, studies have been conducted by individual researchers through updated statistical data by re-estimating the economic effects and analyzing the dynamic effects. Major studies are as follows.

First, Park (2002) divided the capital accumulation effects from dynamic effects into fixed rate of savings and endogenous rate of savings.[5] By using this model and considering the effects of capital accumulation, Korea's GDP is estimated to grow up to 1%, and production of manufacturing industry up to 1.3%. Additionally, Korea's export to Japan is estimated to grow 14.78% and exports to other countries will also grow more than 2.7%. However, import from Japan is expected to grow up to 38% and therefore deficit in trade balance with Japan is expected to increase.

Cheong (2004) estimated the economic effects when removing both countries' tariffs and non-tariff barriers.[6] When tariffs and non-tariff barriers are lifted, GDP is expected to grow 3.91% and trade balance is estimated to improve by USD 2.2 billion. When putting Jung's studies together, the Korea-Japan FTA seems to be assisting Korea's economy of scale and easing of non-tariff barriers from mid-to long-term perspective.

According to Yoo and Bae (2007) when the Korea-Japan FTA is concluded, Korea's GDP, considering the effects of funds accumulation, will increase 0.66%. The production increase of manufacturing industry is estimated to be 1.16%, and textiles and clothing production is expected to be the highest with 3.57% of increase rate.

The common feature of studies conducted after the year 2000 is that the studies are based on the CGE model that utilizes GTAP[7]. However, it has a disadvantage of not being accurate enough for the GTAP data. When comparing the GTAP data to Korea's export and import statistics, the products' export and import are overestimated whereas the amount of service trade and import from Japan are underestimated.[8] The studies conducted after 2000 include Yamazawa (2001), Urata and Abe (2005), etc. but they also used the same data and model for their research.

On the other hand, Kim (2004) analyzed which type of FTA strategy is the most effective by studying the FTA policies being simultaneously promoted in Korea, and analyzing three types of FTA scenarios, which are the progressive FTA, Hub & Spoke model FTA, and wide FTAs.[9] In Kim's studies, when the Hub & Spoke model Korea-Japan FTA is concluded, it is estimated to have the largest economic effect with the increase of social welfare rate of 14.02%, and industrial production rate of 11.48%.[10] It is expected that industries with similar technological level will largely increase in production. Among the analyzed industries, in computers area, where Korea and Japan have the smallest disparity in technology, 18.16% increase in production is expected , and vessels , communication instruments, and home appliances are expected to increase largely in their production.

Ⅲ. Statistical Data and Model

1. Statistical Data

The basic statistical data used in this study is the 2000 Korea-Japan International Input-Output Table. The 2000 Korea-Japan International Input-Output Table has two distinctive features. First, the transaction between Korea and Japan's industries can be clearly grasped. Second, the interdependence relationship between the industries of the two countries can be known, and the effect of final industrial demand of Korea and Japan has on the two countries' industries can be deduced.

The 2000 Korea-Japan International Input-Output Table was prepared by combining and grouping the 2000 Korea Input-Output Table (77 categories) published by the Bank of Korea and the 2000 Japan Input-Output Table (73 categories) published by the Ministry of Internal Affairs and Communications from Japan. Since the basic statistics of these tables are prepared through non-competitive import models, all import tables can be used. The Korea-Japan trade statistics used the Trade Matrix for Asia-Pacific Region 2000 published by the Japan Center for Economic Research. The trade matrix was used because import statistics are generally more reliable than export statistics.

For the actual analysis, first, the common 23 endogenous categories were selected from Korea and Japan's input-output tables and trade matrix. In the actual analysis of categories division using the international input-output analysis, industries include intermediary and final goods. Specifically, products used for the industries' production activities are called intermediary goods, and being able to clearly observe the intermediary goods transaction between industries is a good advantage of the international input-output tables.

2. Model

The base model for the actual analysis is the equilibrium price model. Through this model, the ripple effect of each industry based on the change of products' price is quantitatively analyzed. In the international input-output tables, tariffs make up one part of expenditure and therefore it is placed on an input category. Hence, when tariffs are removed, production cost becomes smaller.

First, the basic input-output model is as follows.

$$\triangle X = (I - A)^{-1} \triangle F \tag{1}$$

Through equation (1), how much effect production activity of each industry, which is the endogenous part ($(I-A)^{-1}$), has on the final demand (F), and the total production change ($\triangle X$) scale that causes the final demand change ($\triangle F$) can be derived.

To estimate the price change through the change of tariffs expenditure, the following applied model was introduced.

$$\triangle P = [(I - A)^{-1}]^{T} \triangle H \tag{2}$$

H is the changing vector of tariffs expenditure, T is the transposed matrix that inverses the row and column. In other words, the price change ($\triangle P$) scale based on change of tariffs expenditure ($\triangle H$) can be known. When tariffs expenditure levied on each industry from both Korea and

Japan change, product price and product competitiveness are affected. As a result, the final demand of products from each country changes. Then, the changed final demand affects the production activity of the partner country through trade between the two countries.

To be able to estimate the effects on quantitative terms, the price elasticity of the final demand was assumed as -1. In other words, the industry's final demand equally react with the change of tariffs expenditure. This reflects the fact that the manufacturing industry, especially electric and electronic machines' price elasticity is bigger than the other industries. For example, when price rises (falls) 10%, demand decreases (increases) and therefore demand of consumption, investment, and export also decreases (increases) 10%.[11)]

However, the present assumption lacks theoretical support. It is rare for a company to uniformly experience change such as directly reducing expenditure, and increasing the demand by reducing the products' price when tariffs are removed. Even if this occurs, to accurately estimate this occurrence is difficult. Generally, companies' investment demand does not react to short-term price change. Government expenditure also tends to react to the long-term policy plans, and export is affected more by the income of the country that imports than the price change based on production costs.

Therefore, through the abovementioned assumptions, the analysis result may be overestimated. It is difficult for the short-term assumption to be realized, but the long-term aspect that affects the object-economy cannot be failed to be noticed. When considering the mid-to long-term price decrease through gradual increase in demand, the lack of theoretical support of the assumption may be improved.[12)]

To emphasize mid-to long-term aspects of the actual analysis model, additional assumptions were made in which tariffs would be completely removed. Tariffs usually change step by step instead of changing gradually. Especially, in FTA negotiations, tariffs decrease step by step in a certain period of time and at the final point of time tariff offers for complete removal is allowed. This study conducted the actual analysis by assuming the final point of time of complete removal.

The abovementioned equilibrium price model can be expressed as an identical equation. The input-output table is composed of the

Table 1. Physical-Value Flows with Two-Sector

	Sector 1	Sector 2	Final Demand	Total Output
Sector 1	p_1q_{11}	p_1q_{12}	f_1	x_1
Sector 2	p_2q_{21}	p_2q_{22}	f_2	x_2
Tariff	p_1v_1	p_1v_2		
Total Input	p_1q_1	p_1q_2		

Note: Tariffs for the 2 categories model is set as value added expense because labor and capital are utilized, but in this analysis, tariffs were used as an expense structure in place of value added.

multiplication of quantity and price, which are the two variables. In this analysis, is substituted for tariffs and set up as part of expenditure.

In Table 1, the sum of the column direction's relational expression is as follows.

$$\begin{aligned} p_1q_{11} + p_2q_{21} + p_1v_1 &= p_1q_1 \\ p_1q_{12} + p_2q_{22} + p_1v_2 &= p_2q_2 \end{aligned} \quad (3)$$

Through equation (3), for a specific industry to produce a product, the purchase amount of the primary and secondary industries are known. The purchased amount (price) means the cost (price) necessary for the product's production. When introducing the quantity standard's input coefficient, the following is derived.

$$\begin{aligned} p_1\frac{q_{11}}{q_1} + p_2\frac{q_{21}}{q_1} + p_1\frac{v_1}{q_1} &= p_1 \\ p_1\frac{q_{12}}{q_2} + p_2\frac{q_{22}}{q_2} + p_1\frac{v_2}{q_2} &= p_2 \end{aligned} \quad (4)$$

Equation (4) is the equilibrium expenditure equation of 1 unit's production quantity.

However, the existence of quantity table is rare in the case of input-output tables. The preparation of such tables also takes a tremendous amount of time. Therefore, first, the concept of dollar price unit was introduced to the input-output table of the actual basis amount, and then this was treated as the quantity. The sum of column's direction of the input-output table's basis amount is the equilibrium expenditure, and when expressed as an equation, it looks as follows.

$$\begin{aligned} Z_{11} + Z_{21} + v_1 &= x_1 \\ Z_{12} + Z_{22} + v_2 &= x_2 \end{aligned} \quad (5)$$

The tariff rate coefficient and input coefficient are calculated by dividing each middle input (Z) and tariff (v) by the total input (x_1). In other words, Z_{11} and Z_{21} are input coefficients, which are divided by x_1, and v_1 divided by x_1 is the tariff coefficient. When adding the input coefficient and tariff coefficient, it becomes 1. This can be expressed as the following.

$$\begin{aligned} \frac{Z_{11}}{x_1} + \frac{Z_{21}}{x_1} + \frac{v_1}{x_1} &= 1 \\ \frac{Z_{12}}{x_2} + \frac{Z_{22}}{x_2} + \frac{v_2}{x_2} &= 1 \end{aligned} \quad (6)$$

When using the coefficient to equation (6), the following can be derived.

$$\begin{aligned} a_{11} + a_{21} + \overline{v_1} &= 1 \\ a_{12} + a_{22} + \overline{v_2} &= 1 \ (\overline{v} \text{ is tariff}) \end{aligned} \quad (7)$$

The following can be derived when using the unit vector and expressed as a matrix equation.

$$\begin{bmatrix} a_{11} & a_{21} \\ a_{12} & a_{22} \end{bmatrix} \begin{bmatrix} 1 \\ 1 \end{bmatrix} + \begin{bmatrix} \overline{v_1} \\ v_1 \end{bmatrix} = \begin{bmatrix} 1 \\ 1 \end{bmatrix} \quad (8)$$

This is the necessary cost for producing 1 unit of product, middle input, and tariff. The following is when the unit vector is expressed as the basis price.

$$\begin{aligned} p_1a_{11} + p_2a_{21} + \overline{v_1} &= p_1 \\ p_1a_{12} + p_2a_{22} + \overline{v_2} &= p_2 \end{aligned} \quad (9)$$

The following is when the above is expressed as a matrix equation.

$$\begin{bmatrix} a_{11} & a_{21} \\ a_{12} & a_{22} \end{bmatrix} \begin{bmatrix} p_1 \\ p_2 \end{bmatrix} + \begin{bmatrix} \overline{v_1} \\ v_1 \end{bmatrix} = \begin{bmatrix} p_1 \\ p_2 \end{bmatrix} \quad (10)$$

The following is when the above is simplified.

$$A' p + \bar{v} = p$$
$$p = (I - A')^{-1} \bar{v} \qquad \triangle p = (I - A')^{-1} \triangle \bar{v} \tag{11}$$

The identical equation so far is the equilibrium price model of Leontief multiplier.

In equation (11), the price that is possible for estimation is the 'domestic products' price and import price is not included. In the object-economy, price change based on tariffs removal applies to both domestic products and imported products. Therefore, by considering the effects of imported products' price change, the equilibrium price model can be rebuilt when domestic products (d) and intermediary goods (m) are separated from the price vector (p) and input coefficient matrix (A). This equilibrium expenditure equation is as follows.

$$p^d = A^d p^d + A^m p^m + \bar{v} \tag{12}$$

In equation (12), since imported intermediary goods become an exogenous variable together with tariffs, when this is expressed from the domestic price's perspective, the following equilibrium price model can be derived.

$$p^d = [A^m p^m + \bar{v}] [I - A^d]^{-1} \tag{13}$$

Through equation (13), the effects of imported intermediary goods price change based on tariffs removal to the Korean industries' import from and export to Japan can be analyzed.

Through the above analysis model, tariff costs, price, production were estimated. Tariff costs affect price, and through this price change, the amount of products from each country's industry change as well. As the amount of products from each country's industry change, the intermediary goods trade between the two countries, which is necessary for production, also changes.

Ⅳ. Results

1. Change of Tariffs and Rate of Decrease in Price

The sum total of tariffs is the necessary expenditure for production. If tariffs are removed by concluding an FTA, companies' expenditure decreases as much as the tariffs. It cannot be verified how much the decrease in expenditure is because tariff removal affects the decrease in price. However, when the international input-output analysis expenditure decreases, it is assumed that the price decreases as well. Therefore, this is spread to other industries resulting in decreasing the overall expenditure and finally leading to decrease in price.

When concluding the Korea-Japan FTA, the changes of tariff rate for Korea is 1.792%, and for Japan 0.049%.[13] In the current stage, the higher the tariff of an industry or country, the bigger is the change of tariff rates. In Korea, the change of tariff rate was the largest in the order of vessels and transportation machineries, electric machines, and precision instruments. Also, since Japan's current average tariff is mostly 0%, there is not much change of tariff rate. However, changes of tariff rate of textiles and foodstuffs were relatively large.

The rate of decrease in price is when price falls due to the decrease in tariff rate. The result of estimating the decrease in price rate for Korea was 3.1%, which was 0.1% higher than that of Japan. Having a higher rate of decrease in price

means that price competitiveness is higher and therefore there is a higher possibility of increase in production. This is because import demand occurs from the trade partner. Korea's industries with a high rate of price decrease are vessels and transportation machineries, electric machines, automobiles and parts, etc. In the case of Japan, due to little change of tariff rates, it had an insignificant rate of decrease in price, whereas the rates of decrease in price of textiles and foodstuffs was relatively high.

2. Increase of Production Rate and Scale of Production Increase

We estimate an increase of production rate and amount increase of production resulted from a

Table 2. Korea and Japan's Changes of Tariffs and Rate of Decrease in Price (%)

	Korea		Japan	
	Changes in Tariff Rates	Rate of Decrease in Price	Changes in Tariff Rates	Rate of Decrease in Price
Agriculture and Fisheries	0.010	0.036	0.002	0.004
Petroleum, Natural Gas	0.000	0.000	0.000	0.001
Other Mining Industry	0.005	0.032	0.000	0.002
Foodstuffs	0.031	0.065	0.010	0.013
Textile Products	0.062	0.117	0.018	0.025
Other Light Industry	0.041	0.085	0.002	0.004
Chemical Products	0.088	0.128	0.004	0.006
Ceramics and Earth Products	0.056	0.105	0.001	0.003
Metal	0.122	0.226	0.002	0.006
General Machines	0.147	0.249	0.000	0.003
Special Machines	0.138	0.242	0.000	0.002
Electric Machines & Equipments	0.187	0.272	0.002	0.005
Home Appliances and Communication Instruments	0.155	0.205	0.000	0.003
Computers and Office Machines	0.118	0.162	0.000	0.003
Electronic Machines and Equipments	0.001	0.056	0.000	0.002
Automobiles and Parts	0.119	0.254	0.001	0.003
Vessels & Transportation Machineries	0.199	0.291	0.000	0.003
Precision Instruments	0.160	0.222	0.001	0.003
Other Manufacturing Industry	0.071	0.127	0.004	0.007
Electric Power, Gas, and Water	0.022	0.047	0.000	0.002
Construction	0.029	0.098	0.001	0.003
Commerce and Transportation	0.023	0.048	0.000	0.001
Services	0.008	0.029	0.001	0.003
Total	1.792	3.096	0.049	0.107

decrease in price. As a result, Korea's increase of production rate is greater than Japan's increase of production rate. This is because the decrease of price rate of Korea is greater than that of Japan. Namely, the demand for goods made in Korea increases due to a decrease of price.

When tariffs are removed, Korea's and Japan's production rates are expected to increase 6.35% and 0.56%, respectively. Among both countries' manufacturing industries, metal products production rate is the highest for Korea and Japan with the rate of 0.85% and 0.09%, respectively. The size of production increase of Korea and Japan based on production rate of increase is

Table 3. Korea and Japan's Increase of Production Rate and Amount of Each Industry

(Unit: %, 100 Mil.)

	Korea		Japan	
	Increase of Production Rate	Amount of Increase in Production	Increase of Production Rate	Amount of Increase in Production
Agriculture and Fisheries	0.08	28.2	0.01	12.3
Petroleum, Natural Gas	0.00	0.0	0.00	0.0
Other Mining Industry	0.05	1.3	0.00	0.4
Foodstuffs	0.11	55.3	0.02	63.4
Textile Products	0.18	74.6	0.04	23.6
Other Light Industry	0.20	47.4	0.02	43.7
Chemical Products	0.58	723.3	0.06	306.7
Ceramics and Earth Products	0.18	27.4	0.01	7.7
Metal	0.85	592.7	0.09	305.5
General Machines	0.37	78.6	0.02	26.9
Special Machines	0.32	54.1	0.01	12.6
Electric Machines and Equipments	0.41	78.6	0.03	33.0
Home Appliances & Communication Instruments	0.23	79.5	0.01	7.7
Computers and Office Machines	0.18	34.8	0.01	5.6
Electronic Machines and Equipments	0.28	149.0	0.04	77.7
Automobiles and Parts	0.39	205.2	0.02	52.1
Vessels & Transportation Machineries	0.32	43.4	0.00	2.4
Precision Instruments	0.27	16.1	0.01	5.4
Other Manufacturing Industry	0.14	12.3	0.01	7.9
Electric Power, Gas, and Water	0.16	43.8	0.01	35.8
Construction	0.12	103.4	0.01	46.8
Commerce and Transportation	0.29	409.3	0.04	480.4
Services	0.64	2,329.6	0.09	2,674.8
Total	6.35	5,188	0.56	4,232

expected to be USD 520 million and USD 420 million, respectively. For Korea, chemical products' size of production was the largest with USD 750 million, followed by metal products, and automobiles and parts. For Japan, metal products and chemical products' production is expected to go over USD 300 million.

Ⅴ. Conclusion

This study analyzes industrial effects of tariff removal between Korea and Japan. To consider the relationship - industrial and dependence structure between the two countries, we estimate of tariffs and rate of decrease in price, and increase of production rate and scale of production increase from each industry.

As a result, it is estimated that Korea's industry production will increase USD 5.2 billion by removing tariffs. And also Japan's industry production will increase USD 4.2 billion by removing tariffs. In order to realize the industrial production, importing intermediary goods from Japan is inevitable. The result of estimation shows that Korea's import of intermediary goods from Japan will increase. This is because Korean industries' dependence on Japan exists. On the other hand, since the removal of tariffs effect on Japan is low and Japan has low dependence on importing Korea's intermediary goods, it will be difficult to realize Korea's intermediary goods export effect.

As intermediary goods import increases, Korea's trade balance deficit with Japan is expected to grow. In the short run, importing intermediary goods from Japan, which is necessary to increase production, is inescapable and the amount will exceed the increase in export of final products to Japan. In the case of chemical products and metal products, respectively, of increase in trade deficit is expected. Moreover, general machines, electric machines, electronic equipments, etc., which are Korea's primary industries, are expecting increase in trade deficit as well. In contrast, home appliances and communication instruments, and computers and office machines are expected to record a surplus.

However, Korea's increase in export to the world is the largest benefit Korea can earn from tariff removal between Korea and Japan. From Korea's final products production companies' perspective, increase in intermediary goods import from Japan is a multiplier effect accompanying the decrease in expenditure that occurs from removing tariffs. Therefore, if the effect of decrease in price of intermediary goods imported from Japan is reflected, Korea's final products price competitiveness will increases in the world import market. As a result, Korea's increase in export to the world is expected to grow.

Korea's export to the world can contribute to keep and increase the trade balance surplus with the world. This will facilitate in forming political strategies to conclude FTAs of Korea, especially in east Asia. In addition, when using the international input-output analysis, it is possible to indentify with which countries Korea can be in a favorable position when concluding FTAs with them.

This study conducted an actual analysis from the suppliers' production perspective. Therefore,

compared to the studies conducted from the consumers' consumption perspective the scale of economic effect is smaller. The effect given to the Korean economy is also reflected in a smaller respect. To make up for this, it is important to develop and analyze a model that compares the actual analysis from the suppliers' perspective with the actual analysis from the demand's (consumer's) perspective.

Additionally, depending on assumptions and models, the result of the actual analysis may be different. To overcome this disadvantage, various types of analysis should be conducted. However, it is undeniable that international input-output analysis is the only method that can analyze the interrelations (dependence structure) between industries' transactions and the multiplier effect of export and import of each industry at the moment. Likewise, grasping the effect of each industry correctly is international input-output analysis' advantage and therefore, the most suitable model for the analysis.

Furthermore, international input-output analysis has its limits since it is a general equilibrium model, which is similar to CGE model.[14] The consistency of the actual analysis used in this paper has been guaranteed, but whether it matches the real consistency is not known. This is the limits of metric models. Therefore, it is necessary to overcome the limits by mutual preservation between models that utilize the characteristics of each model.

Notes

1) Kim, (2004), p. 39.
2) Ibid.
3) Korea Institute for International Economic Policy, Economic Research Institute for Asia (2000)
4) For more information please refer to Cheong (2004), pp. 2-3.
5) For more information, please refer to Park (2002), pp. 153-157.
6) It was estimated, assuming that 50% of non-tariff barriers were eliminated. For more information, please refer to Cheong (2004), p. 12.
7) Global Trade Analysis Project (GTAP) is composed of necessary economy data on economic policy, especially trade policy's quantitative analysis centered on and produced from the US' Purdue University.
8) Yoo and Bae (2007), p. 427.
9) Gradual FTAs first take place between middle technological level countries and technologically advanced countries such as the Korea-Japan FTA, forming by excluding other Asian countries such as, China, ASEAN, etc. Hub & Spoke FTA model is simultaneously concluding the Korea-Japan FTA with Korea-ASEAN or Korea-China FTA, where middle technological level countries with technologically advanced countries, and with technologically underdeveloped countries. Wide FTAs are cases in which ASEAN and China participate in the Korea-Japan FTA.
10) Likewise, the reason for Hub & Spoke FTA model having the largest effect is because Korea is located in a geographically preferential area where it can easily reach China and ASEAN markets, and enjoys lower tariff effects in the Japanese market.
11) There have been no studies related to price elasticity. In the 1960s and 1970s when North-South problems were actively discussed, the price elasticity issue was often raised. However, it is difficult to find actual related studies.
12) This study especially focuses on analyzing and deriving implications from the multiplier effects of each industry, when concluding tariff removal between Korea and Japan. Therefore, to clearly understand the degree of multiplier effects, it has been decided that the assumption of the scope of the actual analysis model should be largely estimated.
13) For example, when assuming that the tariff for production price of a USD 20 semiconductor and of a USD 100 cutting tool is both USD 10, then, tariff changes of a semiconductor is 50% (10/20) and of a cutting tool is 10% (10/100).
14) The international input-output analysis is a model that considers the correlation of intermediary goods input between industries and realizing the possibility of exogenously given final demand. However, since it is difficult to explain the allocation of resources through price mechanism and incentives in market

economy, it has been argued that it is a partial balance model. The general observation from CGE model as a dominant model to measure the quantity effects is that the supply side does indeed matter and that the quantity effects of an exogenous final output injection such as exports may be considerably smaller than is suggested by input-output alone (Round 1985). Put the other way round, traditional input-output models, which typically capture only the quantity, tend to overestimate the multipliers. These are because, while the influence of any exogenous shock in the form of either prices or quantities will be transmitted to both prices and quantities, in the input-output model the whole effect is subsumed into a quantity response.

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