IMPACT OF INCREASED IMPORTS OF AGRICULTURAL PRODUCTS DUE TO FTAS ON DOMESTIC PRICE DECLINE*

JEONG MIN-KOOK**
MOON HANPIL***
SONG WOO-JIN****

Keywords
import contribution rate, equilibrium displacement model, price elasticity, direct payment for damage

Abstract
The purpose of this paper is to propose a method of estimating the import contribution rate. The import contribution is a factor that should be considered in calculating the direct payment for damage. The decline in prices is caused by the combination of various factors. In this case, the decomposition of various factors can confirm the price drop due to the increase in imports. To this end, we set up a partial equilibrium model for individual markets and decompose various factors contributing to the price decline using the equilibrium displacement model.

Various types of elasticities are needed to calculate the import contribution rate derived from EDM. Because elasticity has a wide spectrum depending on the purpose of the study or the data used, a cautious approach is needed to obtain objective figures.

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* This paper contains the contents of Annual Reports on Agricultural Products Subject to FTA Direct Payment in 2013 and 2014.

** Senior Research Fellow, Korea Rural Economic Institute, Naju-si, Jeollanam-do, Korea.
*** Research Fellow, Korea Rural Economic Institute, Naju-si, Jeollanam-do, Korea.
**** Research Fellow, Korea Rural Economic Institute, Naju-si, Jeollanam-do, Korea. Corresponding author. e-mail: gnos@krei.re.kr

Ⅰ. Introduction

Since the Korea-Chile FTA entered into force in 2004, Korea has been continuing FTA negotiations and so far 15 FTAs have been in effect. If FTAs takes effect, imports will increase due to tariff cuts and TRQ increase effects, which will reduce demand for domestic products. Demand declines lead to price declines in domestic products and damage to domestic producers.

The government expected that the damage caused by FTAs would be concentrated in the agricultural sector. For this reason, the Special Act on Assistance to Farmers, Fishermen, Etc. Following the Conclusion of Free Trade Agreements (hereinafter referred to as the Special Act) was enacted and operated in response to the expansion of agricultural product market opening from the Korea-Chile FTA. The Special Act aims to compensate farmers and to improve the competitiveness of agriculture.

The direct payment program for compensating damage was introduced based on the Special Act as part of strengthening compensation for damage caused by FTAs. The government pays direct payments to farmers and fishermen who are hurt by the increase in agricultural imports due to the FTAs, to compensate for the decrease in income due to the price drop. The direct payment is a compensation system that makes up for price difference due to the rapid increase of import caused by FTA implementation.

Price support programs and direct payment programs for the income stability of farmers and fishermen are being implemented not only in Korea but also in many countries. However, it is difficult to find cases in which the government is compensating for the damage to farmers and fishermen due to the progress of trade liberalization such as FTAs. However, in foreign countries, the U.S. Trade Adjustment Assistance (TAA) is similar to Korea's FTA measures. In Korea, the 'Trade Adjustment Support System', which is applied to the manufacturing sector, is a similar case.

Compared with the previous measures (the income compensation direct payment program introduced in 2004 as a measure to the Korea-Chile FTA), the direct payment program for compensating damage is aimed at improving the quality of farmers and fishermen’s life by expanding the range of target items and improving the level of compensation. The target item selection method has been

changed from the pre-designation to the post-designation method. The post-designation includes virtually all agricultural products in a manner that is selected for support in case of damage to the agricultural product. The triggering requirement was relaxed from an '80% decline' to a '90% decline' in the average price[1] for that year. The compensation rate was raised from '80%' to '90%' of the base price and the year difference. In 2012, the payment limit was newly entered when supplementary measures were established. The limit is 50 million won for corporations and 35 million won for individuals. The implementation period of the program is sequentially extended to 10 years (2015.12 ~ 2025.12) after the entry into force of the Korea-China FTA.

Article 7 (1) and Article 8 (3) of the Special Act shall apply the adjustment factor in the calculation of direct payment so that the payment can be paid within the range permitted by the Marrakesh Agreement. The adjustment coefficient has been determined to be applied in the calculation of direct payments at the "Committee for Supporting Farmers and Fishermen" (Feb. 28, 2012) so that the actual payment can be paid within the limits of the domestic agricultural and fishery subsidy specified in the WTO rules. Since then, the Committee for Supporting Farmers and Fishermen (Jan. 13, 2013) decided to reflect the additional import contribution rate to the adjustment coefficient for accurate compensation of actual import damages in addition to complying with WTO rules[2]. The adjustment coefficient and the import contribution rate have the following structure.

$$adjustment\ coefficient = \frac{amount\ payable}{amount\ applied} \times imports\ contribution\ rate$$

According to WTO regulations, direct payment for damage compensation is classified as AMS, which must be reduced. However, in the case of developing countries, it is possible to spend within 10% of the production value of a certain item, which is the limit for de-minimis support. According to the U.R. agreement, the ceiling of AMS in Korea is 1.4 trillion won since 2004, and the de-minimis of the commodity is 10% of the production value in the developing countries, 5%

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[1] the average price over the past five years excluding the highest and the lowest

[2] In accordance with Article 6 (1) of the Special Act, the direct payment is paid to the damaged commodities due to increase in imports from FTA partner countries.

of the production value in the advanced countries. The DDA has agreed to reduce the allowable limits of AMS and de-minimis, but the agreement was not concluded. Therefore, the adjustment coefficient can not exceed 1, and if the total amount applied is equal to or less than the allowable payment amount, the import contribution rate is to be the adjustment coefficient.

The effects of the opening of the agricultural market have long been a major research topic for economists. Early studies aimed at verifying the social efficiency of trade by measuring the loss of related interest parties due to opening of imports using the partial equilibrium model (Arzac and Wikinson, 1979; Freebairn and Rausser, 1975; Kulshreshtha and Wilson, 1972; Brester and Marsh, 1983).

However, it has been pointed out that the use of partial equilibrium analysis has a limited impact on the spillover effects of market opening in certain industries. Since the late 1980s, general equilibrium analysis has been spotlighted, studies have been actively conducted to estimate the spillover effect of policy changes including trade liberalization in the agricultural sector on the overall economy using the computable general equilibrium (CGE) model (Kenny, 1990; Robinson et al., 1989; Hertel and Tsigas, 1988; Shoven and Whalley, 1984).

In Korea, there has been an attempt to analyze the impacts of agricultural market opening such as UR, DDA, and FTA through general equilibrium analysis led by national research institutes. However, since the share of agriculture in the whole economy is small, it is difficult to measure the effect of individual commodities caused by trade liberalization. Park et al. (2000) used the CGE model to measure the impact of domestic livestock industry on market opening. However, it pointed out the difficulty in measuring the effects with subdivided production-input coefficients of livestock industries with a small share in the overall economy.

Domestic researches carried out in the meantime can be divided into pre-FTA and post-FTA studies. Pre-FTA studies are approaching from the supply side assuming that imports and domestic products are homogeneous (Eor et al., 2004; Kim et al., 2004). On the other hand, post-hoc analyzes are evaluating the effects of market opening by identifying alternatives in terms of demand based on the heterogeneity of domestic and imported goods, which are more realistic assumptions (Kim, 2006; Kim, Yoon-Sik and Choi, Seo-gyun, 2007; Choi et al., 2009; Ahn and Im, 2011; Moon et al., 2013). However, in order to quantitatively measure the impact on domestic price declines due to import increase, it is necessary to establish a partial equilibrium model for each item and to estimate demand

and supply on domestic goods and demand on imported goods. Based on these estimates, the relationship between increased imports from FTA-contracting countries and domestic price declines can be identified.

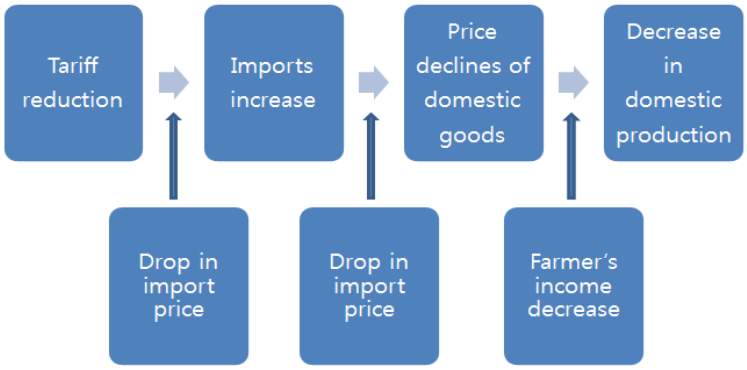
II. Mechanism of price decrease due to increase in imports

When analyzing the impact of FTAs on a particular commodity market, there are two main points of view of domestic changes caused by tariff cut. There is a way to approach from the supply side that imports directly increase the domestic supply, and there is a way to approach from the demand side that replaces some of the domestic demand (Choi and Kim, 2007). From the former point of view, imports and domestic products are regarded as homogeneous commodities, so if tariffs are lowered and imports increase, this directly leads to an increase in domestic supply. Under this approach, the impact on the domestic market is highly dependent on the price difference between domestic goods and imports.

On the other hand, the approach on the demand side is that imported goods and domestic goods are not the same goods, and imported goods are considered as substitutes for domestic goods. If imports increase due to tariff cuts, domestic supply will not increase but replace some of domestic demand. The degree of substitution depends on the size of the cross-price elasticity. Under this approach, the increase in imports of foreign agricultural products is interpreted as replacing some of the demand for domestic agricultural products, so the demand function shifts to the left. Therefore, the effect of the domestic industry depends on the degree of substitution between imported goods and domestic products, so that the price difference between imported and domestic agricultural products is less important than the former approach.

The increase in imports of agricultural products due to FTAs and the resulting impact of the domestic market will generally follow the process as shown in Figure 1. The most important factor in moving the graph in Figure 1 is the size of substitution effects between imported and domestic goods. If we can see these movement in real life, only the imports increase caused by FTAs would affect the market and all other exogenous factors affecting the market have not changed.

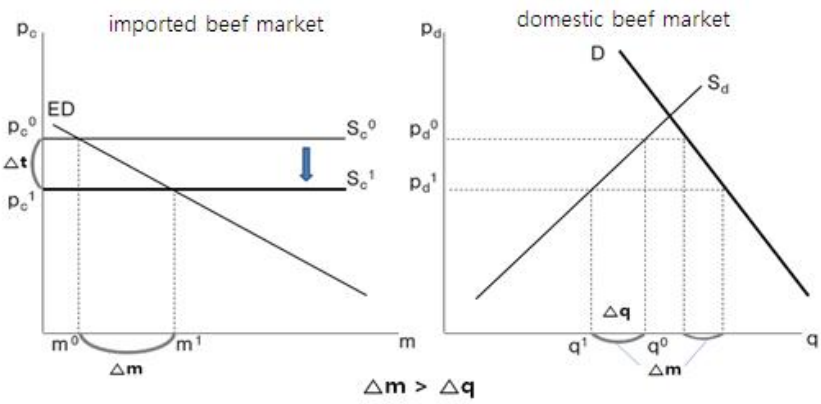
FIGURE 1. Impact of FTA on the domestic market



Consider beef as an example. If domestic consumers perceive imported beef and domestic beef as perfectly homogeneous goods, and Korea's import demand for beef is so small that it does not affect international prices, the FTA effects of tariff reductions can be expressed as in Figure 2.

As shown in the left graph of Figure 2, Korea is a small country and therefore has a fixed, fully elastic global supply function (S_c) at the price of imported beef (p_c). Since domestic and imported goods are perfectly substitutes in domestic market, equilibrium quantity and price are determined in the market unless they are separated. Therefore, before the FTA takes effect, the import price (p_c^0) of beef, which is subject to higher tariff, becomes the equilibrium price of the domestic beef market (p_d^0). The domestic production is determined at the intersection of this price and the supply function (S_d) of domestic beef, and the import quantity (m^0) is determined at the intersection of this price and the ED function.

FIGURE 2. Tariff reduction effects (assuming perfect substitute and small country)



Let's look at the changes in the supply-demand when the FTA is concluded and tariffs are reduced (or abolished). First, if the tariff is reduced as much as Δt, the import price of imported beef will fall from p_c^0 to p_c^1, and the price of domestic beef will fall as much as the drop in import price. If the other conditions are stable, the import volume will increase to m^0 on the fixed excess demand function, and the domestic beef production will decrease to q^1.

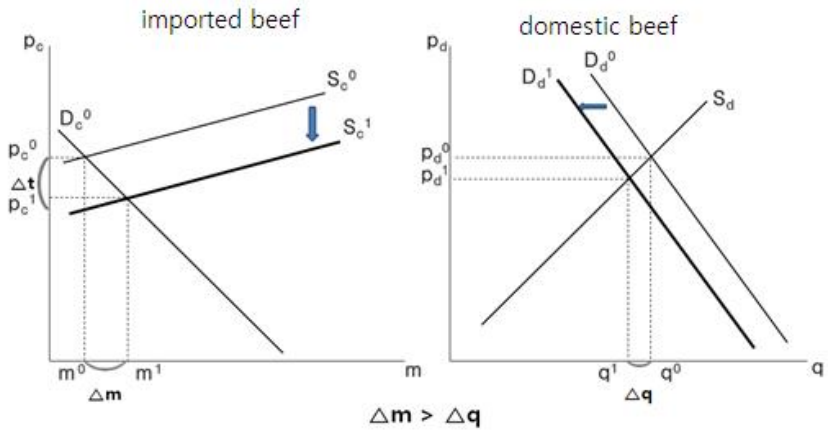
However, the reality of domestic beef market is different from this assumption. First, since the import portion of beef is not negligible, it can not be said that the import quantity of beef does not affect the price change of the global beef market. Therefore, assuming Korea as a small country in the global market for beef could lead to errors that would make the tariff reduction effect more significant than actual.

Unless Korea is a small country in the international market, the supply function of international beef (S_c) becomes upward-sloping as shown in the left graph in Figure 3. If Korea increases beef from the global market, the price of beef in the global market will also rise. As a result, the increase in imports due to tariff cuts is reduced compared to the case of the small country assumption. The greater the share of imports of beef in Korea, the steeper the slope of the supply function. As a result, the effect of imports increase caused by tariff reduction becomes smaller.

The unrealistic assumption that imported and domestic beef are perfect substitutes can lead to even greater errors in assessing the effects of tariff cuts. In the domestic market, imported beef and Korean beef (Hanwoo) are in an incomplete substitute relationship rather than a perfect substitute. In other words, domestic consumers are somewhat heterogeneous in recognizing two different types of beef in terms of taste, meat quality, marbling, and food safety. As a result, there are separate markets for two beef. In the case of imported and domestic incomplete substitutes, the impact of tariff cuts will be smaller than that of perfect substitutes. Even though imports are increased, demand for domestic products does not decrease accordingly. The weaker the substitute relationship between imported and domestic products, the weaker the impact of the tariff cut.

The graph on the right side of Figure 3 shows that the demand curve of imported beef in the incomplete substitute relationship is shifted to the left side, but the movement is smaller than that of perfect substitute. As the demand curve shifts slightly down compared to the case of complete substitute, the market price of domestic beef also declines. Likewise, the decrease in domestic production will be smaller than the increase in beef imports due to tariff cuts ($\Delta m > \Delta q$).

FIGURE 3. Tariff reduction effects (assuming incomplete substitute and large country)



As a result, it is important to consider the degree of substitution in the analysis of the impact of the tariff cut on beef. This can be seen through the cross-elasticity of domestic and imported beef. Therefore, if the main purpose of the study is to estimate the changes in the price and quantity of the individual market and examine the changes in welfare of economic entities, rather than measuring the effects on specific industries such as agriculture and livestock industry, applying the partial equilibrium model considering the supply and demand factors of the products can lead to more persuasive analysis results.

Ⅲ. Equilibrium displacement model

Considering the fact that the condition required for the direct payment of damages is specified in Article 7, Paragraph 1 of the Special Act, a comparative static analysis is appropriate which can explain the factors that change the market equilibrium between two specific item points.

It is necessary to establish the concept of "import contribution rate" as the ratio between "price drop rate caused by increase of import due to FTA" and "real price drop rate of agricultural product between two time points". The definition of "import contribution rate" described in this paper is the relative share of contribution of the increase in imports from the FTA partner countries to the fall of

domestic prices.

We set up a partial equilibrium model that takes into account the supply and demand system for each good to measure the imports contribution. As mentioned above, the partial equilibrium model is easy to quantitatively measure the relationship between FTA implementation and price decline by identifying not only increased imports but also various other factors affecting the market price of individual goods.

The equilibrium displacement model (EDM) is often used in empirical studies to analyze policy effects because it is suitable for comparative static analysis. EDM has the advantage of simulating changes in endogenous variables, such as price and quantity, by changing exogenous factors of demand and supply in individual markets. The theoretical model of the effects of increased imports on domestic market prices following FTA implementation can be expressed as an equation system composed of four functions as follows.

(1) $Q_M^S = f(P_M, P_D, I)$: demand for imported good

(2) $Q_D = g(P_D, P_M, I, P_{DS}, P_{OS}, H)$: demand for domestic good

(3) $Q_S = h(P_D, F, G)$: supply for domestic good

(4) $Q_D = Q_S$: market clearance condition

TABLE 1. Variables

variables	description	variables	description
P_M	price of an imported good	P_{OS}	price of imported substitute
Q_D	demand for domestic good	I	income
P_D	price of a domestic good	Q_S	supply for domestic good
P_{DS}	price of domestic substitute	H	factor affecting demand other than price
G	factor affecting supply other than price	F	price of input
Q_M^S	demand for imported good		

Using the rate of change of variables ($\frac{dX}{X} = EX$), we can rewrite equations (1) to (4) as follows.

(5) $EQ_M^S = \alpha_1 EP_M + \alpha_2 EP_D + \alpha_3 EI$

(6) $EQ_D = \beta_1 EP_D + \beta_2 EP_M + \beta_3 EI + \beta_4 EP_{DS} + \beta_5 EP_{OS} + \beta_6 EH$

(7) $EQ_S = \gamma_1 EP_D + \gamma_2 EF + \gamma_3 EG$

(8) $EQ_D = EQ_S$

The following is obtained by summarizing the equations (5) to (8) with respect to EP_D.

(9)
$$EP_D = -\frac{\beta_2}{\alpha_1\beta_1 - \alpha_2\beta_2 + \alpha_1\gamma_1} EQ_m^s + (\beta_2 \frac{\alpha_3}{\alpha_1} - \beta_3) \frac{\alpha_1}{\alpha_1\beta_1 - \alpha_2\beta_2 + \alpha_1\gamma_1} EI$$
$$- \frac{\beta_4\alpha_1}{\alpha_1\beta_1 - \alpha_2\beta_2 + \alpha_1\gamma_1} EP_{DS} - \frac{\beta_5\alpha_1}{\alpha_1\beta_1 - \alpha_2\beta_2 + \alpha_1\gamma_1} EP_{OS} - \frac{\beta_6\alpha_1}{\alpha_1\beta_1 - \alpha_2\beta_2 + \alpha_1\gamma_1} EH$$
$$+ \frac{\gamma_2\alpha_1}{\alpha_1\beta_1 - \alpha_2\beta_2 + \alpha_1\gamma_1} EF + \frac{\gamma_3\alpha_1}{\alpha_1\beta_1 - \alpha_2\beta_2 + \alpha_1\gamma_1} EG$$

The left side of the above equation represents the rate of change in domestic prices. The first term on the right hand side indicates the degree to which the change in imports contributed to the domestic price fluctuation. The second term on the right side indicates the degree of change in income attributable to domestic price fluctuations and the third term indicates the degree to which domestic substitute price contribute to domestic price fluctuations. The remaining terms also indicate the extent to which each variable contributed to domestic price volatility.

The equation above decomposes domestic price fluctuations by factors. The imports contribution that this paper is interested in is the portion of the fluctuation of imports to domestic price fluctuations. The extent to which fluctuations in imports contribute to domestic price fluctuations are shown in the first term of the right-hand side of Equation (9). Therefore, the ratio between actual change of the domestic price and the first term of the right side is the import contribution rate. This can be expressed as follows.

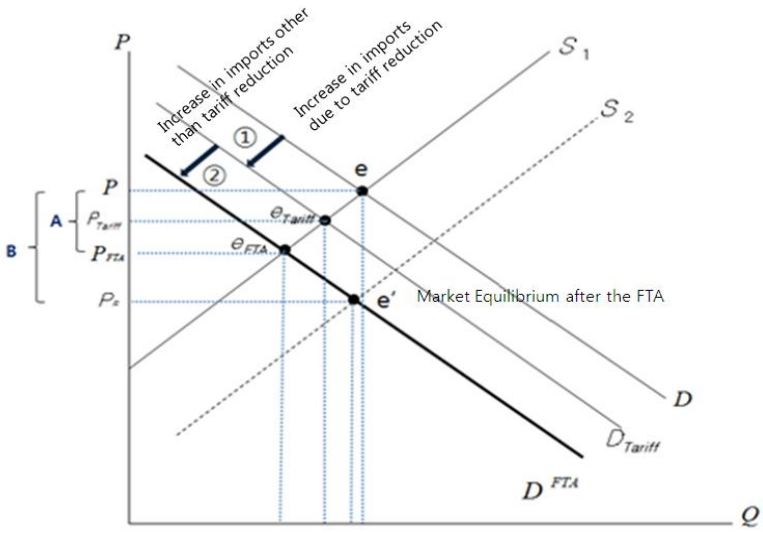
(10)
$$import\ contribution\ rate = \frac{-\frac{\beta_2}{\alpha_1\beta_1 - \alpha_2\beta_2 + \alpha_1\gamma_1} EQ_m^s}{change\ rate\ of\ actual\ domestic\ price}$$

Figure 4 graphically illustrates the theoretical framework for measuring the imports contribution of the individual market when various elasticity values are given proactively. The graph shows the situation in which the equilibrium price and the quantity fluctuate as the demand curve and the supply curve move in the domestic market.

Let us first assume that imported goods (imperfect substitutes) are sold at lower prices due to tariff cuts caused by the effects of FTAs. Demand for domestic goods is reduced from D to D_{Tariff} due to the fall in price of imported commodity. As the demand declines, the equilibrium point shifts from e to e_{Tariff} in the domestic commodity market, and the market price of domestic commodity falls from P to P_{Tariff}. In the end, domestic production and consumption will also decrease as import price drops due to tariff cuts.

However, as mentioned above, in addition to the direct effects such as tariff cuts, implementation of the FTA also requires various investments to strengthen marketing capabilities such as expansion of the domestic distribution network of import-export companies and promotion and discounts of imported goods. In addition, as the consumption experience of imported products increases and the perception of domestic consumers increases, the market share of imported products may gradually increase. In addition to the tariff reduction effect, the effect of this indirect FTA implementation can be ascertained through the increase in imports from FTA partner countries.

FIGURE 4. Decomposition of price decrease



The elasticities derived from the import demand function suggest how much the demand for domestic products decreases due to the increase in imports from the FTA partner countries. That is, due to the increase in the volume of imports, the domestic demand curve shifts from D to D_{FTA}. As the demand diminishes, the equilibrium of domestic market shifts from e to e_{FTA}, and the market price of domestic commodities drops from P to P_{FTA}. After the FTA implementation, the equilibrium quantity will also decrease due to the decrease in demand for domestic products due to the increase in import volume.

However, this may not be a visible equilibrium in the actual market after FTA implementation. This is because, besides the FTA implementation, there are various factors that can change the demand and supply of the relevant commodity market. Figure 4 shows an example where the supply curve shifts to the right-side. This assumes that FTA implementation and supply increases only. If the crop of the product is improved, or if the cultivation technique to increase productivity or the introduction of new seed, the supply of domestic products increases, and the equilibrium observed in reality becomes e'. Therefore, the degree of contribution of increase in imports from FTA partner countries to market price decline can be estimated as A/B.

Ⅳ. Empirical analysis

Using the import contribution rate formula, we estimate the contribution of US beef to Hanwoo price decline in 2012. With the entry into force of the Korea-US FTA in 2012, US beef imports as well as total beef imports have increased. Reflecting the impact of increased beef imports, domestic beef prices and Korean cattle prices have fallen to less than 90% of five year average. The US beef import growth rate was 11.59% and the Korean beef price decline rate was 11.17%. As a result, it met the criteria for direct payment program in 2013.

In order to measure the import contribution rate, we need values of $\alpha_1, \alpha_2, \beta_1, \beta_2, \gamma_1,$ and EQ_m^s in the equation (10) and the rate of the beef price change. The above characters represent the own-price elasticity of import demand, the cross-price elasticity of import demand, the own-price elasticity of domestic demand, the cross-price elasticity of domestic demand, the price elasticity of do-

mestic supply, and change rate in beef import volume respectively.

To obtain the above parameters, we specify the following demand and supply functions.

(11) $\ln(Q_D) = C + \beta_1 \ln(P_D) + \beta_2 \ln(P_M) + \beta_3 \ln(I) + \beta_7 D_{04-06} + \beta_8 D_{08-12} + \beta_9 D_{09} + e$

variables	sources	periods
Q_D domestic beef demand/population	National Agricultural Cooperative Federation KOSTAT	1996~2012 yearly
P_D domestic beef consumer price/CPI	National Agricultural Cooperative Federation Bank of Korea	1996~2012 yearly
P_M US beef consumer price/CPI	Korea International Trade Association Bank of Korea	1996~2012 yearly
I GDP(real)/population	Bank of Korea KOSTAT	1996~2012 yearly

(12) $$\ln(Q_M^S) = C + \alpha_1 \ln(P_M) + \alpha_2 \ln(P_D) + \alpha_5 \ln(P_{OS}) + \alpha_3 \ln(I) + \alpha_7 D_{10/4-11/4} + \alpha_8 D_{11/3-12/4} + \alpha_9 D_{09/1-09/4} + e$$

variables	sources	periods
Q_M^S US beef demand/population	Korea International Trade Association KOSTAT	2008~2012 quarterly
P_M US beef consumer price/CPI	Korea International Trade Association Bank of Korea	2008~2012 quarterly
P_D Hanwoo price/CPI	National Agricultural Cooperative Federation Bank of Korea	2008~2012 quarterly
P_{OS} imported beef consumer price/CPI	Korea International Trade Association Bank of Korea	2008~2012 quarterly
I GDP(real)/population	Bank of Korea KOSTAT	2008~2012 quarterly

(13) $$\ln(Q_S) = C + \gamma_1 \ln(P_D) + \gamma_2 \ln(F) + \gamma_6 D_{01} + \gamma_6 D_{04-08} + \gamma_7 D_{07-08} + \gamma_8 D_{09-10} + \gamma_9 trend + e$$

variables	sources	periods
Q_S Hanwoo beef supply	National Agricultural Cooperative Federation	1996~2012 yearly
P_D wholesale price of domestic beef/CPI	National Agricultural Cooperative Federation Bank of Korea	1996~2012 yearly
F production cost/PPI	KOSTAT Bank of Korea	1996~2012 yearly

The above equations are estimated to obtain the coefficients necessary for the measurement of the import contribution rate. In the estimation process, the autocorrelation detected and the problem was solved by using the AR process. The estimation results are summarized below.

TABLE 2. Estimation results

coefficients	values	standard errors
β_1	-1.33	0.074
β_2	0.28	0.060
α_1	-0.65	0.146
α_2	0.32	0.120
γ_1	0.64	0.051

Table 3 shows the estimates related to demand and supply elasticities from the previous research carried out since 2000. There have been a number of studies dealing with the domestic demand elasticities but few studies have estimated the import demand elasticities.

TABLE 3. Elasticities from previous research

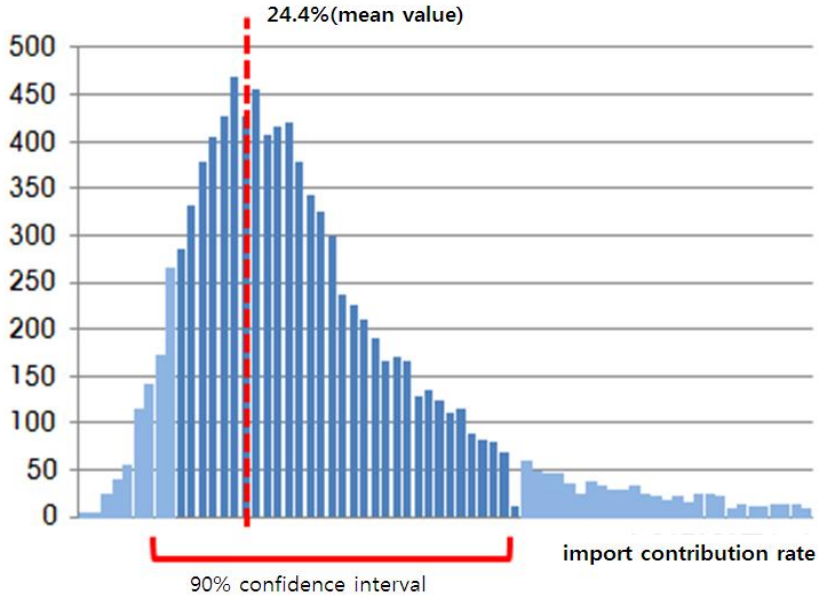
	domestic demand		import demand		supply
	own-price elasticities	cross-price elasticities	own-price elasticities	cross-price elasticities	price elasticities
Jeong et al. (2006)	-0.67	0.4~0.6			0.60
Choi et al. (2006)	-1.06	0.47			0.49
Jeong et al. (2011)	-1.06				1.11
Livestock Office of Agricultural Outlook Center			-0.87	0.52	
this study	-1.33	0.28	-0.65	0.32	0.64

Jeong et al. (2006) estimates the elasticities of demand for domestic beef using yearly data from 1970 to 2004. Choi et al. (2006) estimates the elasticities of the main items in the process of studying the effects of the Korea-US FTA on the domestic industry. The Livestock Office of Agricultural Outlook Center estimates them using quarterly data from 1993 to 2003.

The estimates above have meanings of some random variables. Therefore, by calculating the import contribution rate using properties of the distribution of the elasticities, the interval of the results can be obtained and the probability that the actual value is within the interval can be calculated. In the previous studies, we do not have all the elements needed to calculate the import contribution rate. Therefore, we estimated the 90% confidence interval of the import contribution rate using the elasticities estimated in this study.

Using the elasticities and standard errors shown in Table 2, 10,000 random elasticity combinations are extracted randomly by assuming a normal distribution. Figure 5 shows the asymmetric distribution with a mean of 24.4. This is because the import contribution rate formula is a nonlinear combination of the elasticities. Using this result, we find that the mean of the import contribution rate is 24.4% and the 90% confidence interval of the rate is 14.0% ~ 45.1%.

FIGURE 5. Distribution of the import contribution rate



Ⅴ. Conclusion and discussion

15 FTAs are currently in effect in Korea. The FTA implementation has the effect of increasing the welfare of consumers by promoting international trade. It also contributes to industrial development by increasing demand for highly competitive industries. However, less competitive industries are exposed to intense competition and face price declines and reduced output. Korea's agriculture is considered as an industry with low competitiveness.

Various policies have been proposed to mitigate the damage faced by agriculture. Among them, the Special Act was enacted on the basis of a Korea-Chile FTA, aiming at improving the competitiveness of agriculture and compensating the damage. The direct payment for damage is a program that compensates a portion of the price drop if the price declines due to increased imports. In the process of calculating the amount of compensation, the portion of the price fall due to increase in imports is considered to be important. In 2013, it was decided to reflect this part by the Committee for Supporting Farmers and Fishermen, in the form of the import contribution rate in the calculation of direct payments.

The import contribution rate is defined as the portion of the impact of the increase in imports to the price drop. To do this, it is necessary to disaggregate the various components that make up the price decrease to identify the impact of import increase. This paper uses EDM to decompose the elements that constitute the price decline and measure the impact of the increase in imports. We propose the method of estimating the import contribution rate as

$$imports\,contribution\,rate = \frac{-\dfrac{\beta_2}{\alpha_1\beta_1 - \alpha_2\beta_2 + \alpha_1\gamma_1} EQ_m^s}{change\,rate\,of\,actual\,domestic\,price}$$

In order to actually use the above income contribution derived from EDM, various elasticity values are needed. Price elasticity of demand, cross-price elasticity of demand, import price elasticity of demand, price elasticity of supply and so on. There are two ways to obtain such elasticity. First, utilizing the results of previous studies and second, estimating elasticity from the equations directly.

Concerns may arise from the fact that previous research results are based on relatively old data, and there is concern that researchers' subjectivity may be

involved in selecting various results. Direct estimation may raise doubts about the lack of understanding of the commodity and the lack of objectivity of the result. It is difficult to obtain satisfactory results by any methods.

Therefore, it is necessary to be careful in determining the elasticity to calculate the import contribution rate. This is because the elasticity value can vary greatly depending on the subject of the researcher. Therefore, the value should be estimated by using updated data, but care should be taken to obtain reasonable estimates by consulting the relevant commodity experts.

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Date Submitted: Oct. 16, 2017
Period of Review: Oct. 26～Dec. 15, 2017