Economic Impacts of Free Trade Agreements: The Case of the Korea-Chile Free Trade Agreement

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Abstract

After the Doha Round of the World Trade Organization (WTO), the regional or bilateral free trade agreements have increased around the world. While the evidence on greater trade volumes among the countries in the agreements is overwhelming, the empirical literature on how the greater agricultural imports affect the farms in importing countries is relatively thin. Thus, we directly estimate the impacts of the Korea-Chile Free Trade Agreements (FTA) on the revenue of the farms in South Korea as the FTA induced greater imports of fruits and vegetables from Chile to South Korea. As expected, we find the negative effect of the increased imports on total crop revenue and the share of fruits and vegetables in crop revenue.

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1. Introduction

After the Doha Round of the World Trade Organization (WTO), the regional or bilateral free trade agreements have increased around the world. According to the WTO, a total of 355 regional trade agreements were in force as of May 2022 (WTO 2022). South Korea is not an exception and has 17 free trade agreements (FTAs) in effect with 57 countries. With the increasing number of trade agreements, economic consequences of the trade agreements become more important (e.g. Sun and Reed 2010; Hirsch and Oberhofer 2020; He 2022).

The objective of this study is to directly estimate the impacts of the Korea-Chile FTA on farm revenues in South Korea. Increasing imports of goods can reduce the profitability of the producers of the good or the prices of the factors that are employed to produce the good. This is well-documented by the seminal study of Autor, Dorn, and Hanson (2013), which documents that the greater imports of manufactured goods from China into the US reduce the local wages of the manufacturing sector. The Korea-Chile FTA created the opportunity for Chilean fruits to be imported into South Korea. Thus, we attempt to examine the economic impacts of the increase in imports of fruits from Chile on farms in South Korea.

The direct estimation of how the increased imports affect farm revenue provides two important implications. First, a credible quantification of the causal effect can help policymakers assessing the economic gains and losses from FTAs. We provide useful estimates on possible losses to farms as a result of the increased imports. Second, by investigating whether the increased imports reduce farm revenue, we can assess the ability of the farms to mitigate the trade shock. The examples would be reallocating their resources to more profitable crops or differentiating their products from the imported products. If the effect on farm revenue is null or small, it indicates that farms have been able to mitigate the trade shock.

2. Economic Impacts of Trade Agreements

Many studies on the impacts of trade agreements investigate the trade creation and diversion effects of FTAs in both agricultural and non-agricultural sectors (e.g. Grant and Lambert 2008; Sun and Reed 2010; Chi, Chang, and Chang 2022). Using a gravity model, Grant and Lambert (2008) show that regional trade agreements (RTAs) increase the members' trade in agriculture. They find that RTAs lead to greater trade in agriculture compared to the non-agricultural sector, phase-in periods of RTAs exhibit in the agricultural sector and differ across specific agreements. Sun and Reed (2010) show that trade creation and diversion effects vary across FTAs and time. Chi, Chang, and Chang (2022) find the tariff concession under the preferential trade agreement (PTA) brings a decrease in output and an increase in imports of fishery products in South Korea.

With the growing empirical evidence that the FTAs or RTAs increase the volume of trade flows among the members, understanding how the increased trade flows affect the local economies or the producers become more important, especially in the importing countries. Many recent studies concentrate on the impacts of growth in imports on the labor market (e.g. Autor, Dorn, and Hanson 2013; Dix-Carneiro and Kovak 2017; Feenstra and Sasahara 2018; He 2020). Autor, Dorn, and Hanson (2013) find that import shocks from China provoke reductions in employment and wage levels in the US labor market. Dix-Carneiro and Kovak (2017) focus on the effects of trade liberalization on Brazilian local labor markets. This study finds larger tariff reductions bring about a decrease in larger formal earnings or employment in that region. Feenstra and Sasahara (2018) find that overall job losses due to US imports from China are around two million. He (2020) analyzes how US agricultural exports affect farm and nonfarm employment and finds that a one percentage increase in US agricultural imports contributes to a 0.974% decrease in farm employment significantly.

While the studies on the impacts of trade liberalization on the local labor market provide the empirical evidence that is consistent with the negative (positive) effects of greater imports (exports) on the profitability of the industry, the literature on the direct micro-level estimation of the immediate effect of greater imports on revenue is relatively thin (e.g. Hakobyan and McLaren 2016; Feler and Senses 2017), and more so in agriculture with a notable exception of Ali et al. (2019). Ali et al. (2019) conduct an ex-ante analysis on the possible negative impacts of tariff reduction on the farm income of domestic milled rice farms in Malaysia. We contribute to the literature by providing direct estimates from farm-level data.

3. Background: The Korea-Chile Free Trade Agreement

Over the past two decades, the farm economy in South Korea has been perceived as a diminishing sector. Rapid economic growth led to a decrease in the share of the agricultural sector in GDP, moreover, decreasing and aging in the farm household population has increased the burden of labor costs to produce agricultural products. In addition, South Korea is a net importer in the global agricultural market, and thus many trade agreements increase the pressure from imports of agricultural products. Figure 1 displays the trend in the annual agricultural imports of South Korea from the world. Both total agricultural imports and imports in fruits have been increasing from 2002 to 2020.

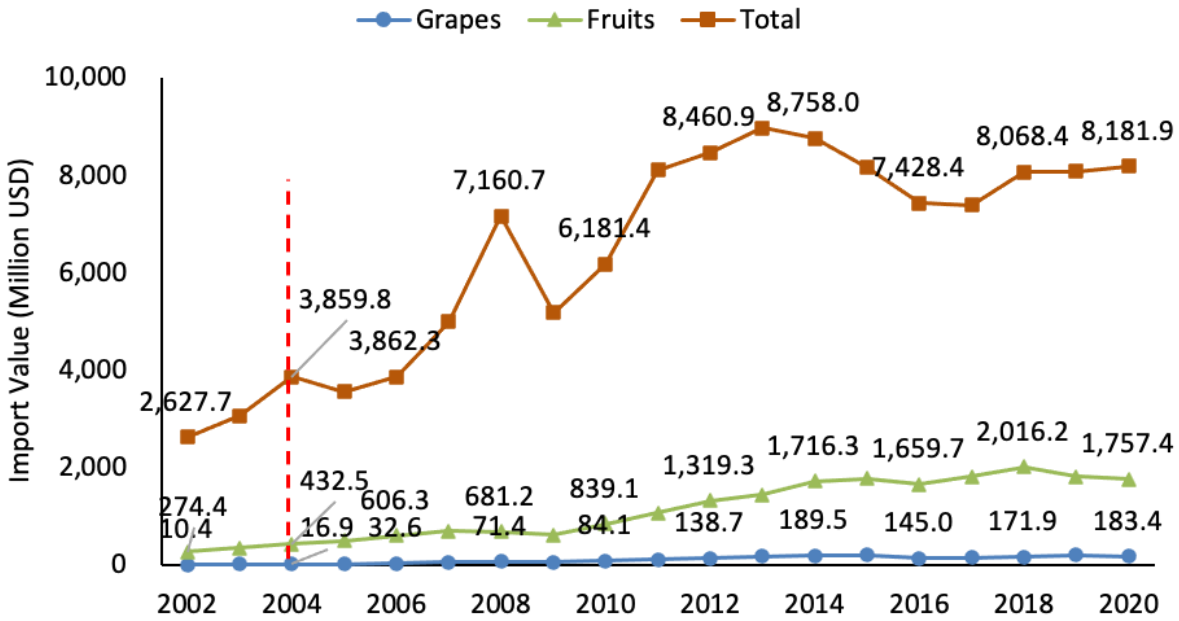

Figure 1 Annual Trends of Agricultural Imports from World: South Korea, 2002 – 2020 (Source: UN Comtrade)

The Korea-Chile FTA is the first FTA for South Korea. South Korea and Chile began to negotiate the FTA in 1999, and the agreement entered into force in April 2004 (MOTIE 2022). They held 6 rounds of negotiations; the first round of negotiation took place in Santiago on December 14-17, 1999, and the negotiation ended in Geneva on October 18-20, 2002. The Korea-Chile FTA was signed on February 15, 2003. The Chilean Senate approved the agreement and completed legislative procedures on January 22, 2004, and the Korean Parliament approved it on February 16, 2004. After approval of the agreement, the Korea-Chile FTA entered into force on April 1, 2004.

In the tariff schedule of Korea, 21 agricultural commodities, including rice, apples, and pears, were excluded from the tariff elimination, and both governments agreed to discuss the elimination of tariffs on 373 other sensitive commodities, such as garlic, onions, peppers, powdered milk, and oranges, after the Doha Development Agenda negotiations of the WTO.

Fresh grapes are one of the sensitive agricultural products in Korea. In consideration of the grape growing seasons in Korea, it was agreed to eliminate tariffs evenly on fresh grapes imported from November 1 to April 30 and apply seasonal tariffs that maintain the current Most-favored-nation (MFN) tariffs for the rest of the import period.

One of South Korea's major agricultural products imported from Chile is fresh grapes. Since Korea-Chile FTA entered into force in 2004, the imports of fresh grapes from Chile to Korea have increased from $13.1 million in 2003 to $74.3 million in 2020 (WITS 2022).

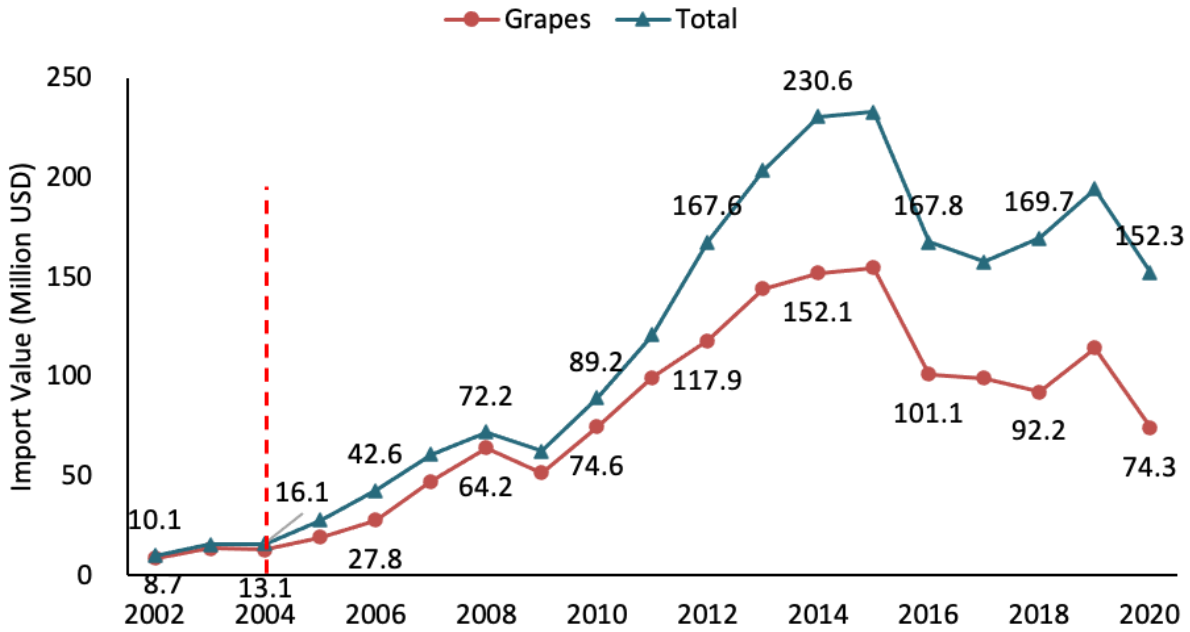

Figure 2 Annual Trends of Agricultural Imports from Chile: South Korea, 2002 – 2020 (Source: UN Comtrade)

During similar period, the ratio of production area for fresh grapes has steadily decreased from 8.2% in 2003 to 4.4% in 2020 (figure 3). During the first 3 years after entry into force of Korea-Chile FTA, the ratio of production area for grapes has decreased by around 0.9 percent points between 2004 and 2006. This makes us conjecture that Korea-Chile FTA may have a negative influence on fruit production in Korea.

Figure 3 The ratio of production area for fresh grapes: South Korea, 2003 – 2020 (Source: KOSIS)

4. Data and Variables

Our primary data source is Farm Household Economy Survey (FHES) in South Korea from 2003 to 2007. The dataset includes total crop revenue, total farm revenue, labor cost, agricultural income, farm size, the age of the owner, and the revenue from 10 types of agricultural products[1] farm produced. The dataset is panel but the survey samples and the identifiers change every 5 years. Therefore, we focus on the period from 2003 to 2007 which includes both pre-FTA and post-FTA.

Since all samples in our dataset do not consistently exist every 5 years, we restrict our samples to the farms that appeared in the data in 2003, 2004, 2006, and 2007. Moreover, some

[1] The types of agricultural products are rice, wheat, mixed grain, pulses, potatoes, vegetables, fruits, floriculture crops, specialty crops, and agricultural byproducts.

farm households have negative values in their crop revenue[2], thus we exclude farms that have any negative revenue in crops from the dataset.

Data on import value in agricultural products are from the World Integrated Trade Solution (WITS) database that provides access to the United Nations Statistical Division Commodity Trade (UN Comtrade). We extract import data using the 6-digit Harmonized Tariff Schedule (HS) code from 2003 to 2007. Since we only have the types of agricultural products in FHES data, we match the HS code in import data with HS codes for agricultural products in South Korea, and then aggregate import value by the types of agricultural products. After constructing the agricultural import dataset, all import values were exchanged for South Korean won (KRW) and deflated to 2003 KRW to calculate the import shock variable for analysis.

The key challenge is to construct an individualized variable that measures the individual-level exposure to increased imports of fruits and vegetables from Chile. Motivated by Autor, Don, and Hanson (2013), we compute the individualized import shock by the following equation:

$$Import\ Shock_i^j = \frac{Revenue_{i\ pre}^{F\&V}}{Total\ Revenue_{pre}^{F\&V}} \times (Import_{Post}^{F\&V,j} - Import_{pre}^{F\&V,j}) \qquad (1)$$

where $Total\ Revenue_{pre}^{F\&V}$ denotes national-level total farm revenue from fruits and vegetables sales in 2003 - 2004, $Revenue_{i\ pre}^{F\&V}$ is the fruits and vegetables revenue of farm i in 2003 - 2004, and $Import_t^{F\&V,j}$ is the import value of fruits and vegetables from partner j in period t and $j = \{World, Chile\}$ and $t = \{Pre, Post\}$.

[2] Crop revenue in FHES consists of sales revenue and others (e.g., self-consumption, inventory). It is calculated by the quantity and price of crops that the farm has at that time. If the value of inventory is decreased and the losses from it are higher than the new production of the farm, FHES considers that the farm has a negative production.

Since there is a sample restriction to keep the same sample in 2003 - 2004 and 2006 - 2007, we have 940 observations in each pre-FTA (average in 2003 - 2004) and post-FTA (average in 2006 - 2007). Table 1 reports the summary statistics for the key variables in the pre-FTA and the post-FTA periods. Between the two periods, the real total crop revenue decreased from 22.6 million KRW to 22.2 million KRW, while the share of crop revenue in fruits and vegetables increased from 0.39% to 0.41%. The average import shocks computed by equation (1) are 76.3 million KRW for imports from the world and 9.9 million KRW for imports from Chile.

Table 1 Summary Statistics

VARIABLES	2003-2004 Average (Pre-FTA)	2006-2007 Average (Post-FTA)
Total Crop Revenue	23,113	24,483
(Thousand KRW)	(25,655)	(29,290)
Total Crop Revenue	22,643	22,158
(Deflated thousand KRW in 2003)	(25,126)	(26,488)
Share of Fruits and Vegetables Crop Revenue	0.393	0.413
(%)	(0.336)	(0.331)
Individualized Fruit & Vegetables Import shock	-	76,252
(World, Deflated thousand KRW in 2003)		(131,756)
Individualized Fruit & Vegetables Import shock	-	9,931
(Chile, Deflated thousand KRW in 2003)		(17,160)
No. of Observations	940	940

Note: Standard deviations are in parentheses. Data are from FHES.

5. Effects of Increased Fruits and Vegetables Imports on Farm Revenue

To estimate the effect of the increased imports, we consider the following estimation equation:

$$D.Crop\ Revenue_i = \beta_0 + \beta_1 Import\ Shock_i^j + X'_i\Gamma + \epsilon_i \qquad (2)$$

where $D.Crop\ Revenue_i$ is the change in crop revenue between the two periods, $Import\ Shock_i^j$ is defined by equation (1) and X_i is the vector of covariates, which in this draft we only consider the share of fruits and vegetables sales in crop revenue in pre-period. We transform the dependent variable and the key regressor using the inverse hyperbolic sine (IHS) transformation to interpret the coefficients as elasticities (Bellemare and Wichman 2020). Also, note that the IHS transformation can handle negative values whereas the log transformation cannot.

Table 2 presents the estimation results of equation (2). Column (1) and (3) presents the estimates of the change in crop revenue using the import shocks from the world and Chile respectively. Column (2) and (4) presents the estimation results controlling for the share of fruits and vegetables sales in crop revenue in pre-FTA. The estimate in column (2) indicates that one percentage increase in the individualized imports of fruits and vegetables from the world leads to a 0.86% decrease in crop revenue. The result in Column (4) indicates that one percentage increase in the individualized imports of fruits and vegetables from Chile brings a 0.98% decrease in crop revenue.

Table 2 Effects of Fruits and Vegetables Imports on Farm Revenue

	(1)	(2)	(3)	(4)
	IHS(D.Crop Revenue) Deflated			
VARIABLES				
IHS(F & V Import Shock -- World)	0.0574	-0.863***		
	(0.206)	(0.245)		
IHS(F & V Import Shock -- Chile)			0.0989	-0.982***
			(0.226)	(0.274)
Share of F & V (pre-FTA)		12.60***		12.99***
		(2.020)		(2.068)
Constant	-4.302**	0.287	-4.536**	-0.585
	(2.164)	(2.209)	(1.924)	(1.953)
Observations	939	939	939	939
Province FE	Yes	Yes	Yes	Yes

Note: Robust standard errors are in parentheses.

We also investigate how the import shocks affect the share of fruits and vegetables in total crop revenue. To do so, we estimate

$$D.Share\ of\ F\ \&\ V_i = \beta_0 + \beta_1 Import\ Shock_i^j + \epsilon_i \qquad (3)$$

where $D.Share\ of\ F\ \&\ V_i$ is the difference in the shares of fruits and vegetables in total crop revenue between the two periods. As the outcome variable is already in shares, we only transform the key regressor using the IHS transformation.

Table 3 presents the estimation results of equation (3). Columns (1) and (2) show each impact of imports from the world and Chile on the share of fruits and vegetables in the crop revenue. The results indicate that one percentage increase in the individualized imports of fruits and vegetables from the world leads to a 0.005% decrease in the share of fruits and vegetables in the crop revenue. The estimate in the Chile case indicates that one percentage increase in fruits and vegetables imports causes a 0.0056% decrease in the share of fruits and vegetables in the crop revenue.

Table 3 Effects of Fruits and Vegetables Imports on the Share of Fruits and Vegetables in the Total Crop Revenue

	(1)	(2)
VARIABLES	D.Share of F & V	
IHS(F & V Import Shock -- World)	-0.00501**	
	(0.00198)	
IHS(F & V Import Shock -- Chile)		-0.00555***
		(0.00212)
Constant	0.0714***	0.0659***
	(0.0217)	(0.0190)
Observations	939	939
Province FE	Yes	Yes

Note: Robust standard errors are in parentheses.

6. Concluding Remarks

An increase in regional or bilateral free trade agreements around the world has contributed to greater trade volumes among the countries in the agreements. Recent studies find that greater imports affect the labor market, especially the wage or the employment, resulting in less profitability for the industry. Although extensive research has shown the economic impact of trade agreements in manufacturing sector, the empirical literature on how greater agricultural imports affect individual farms in importing countries is relatively thin.

Using the comprehensive dataset on farm and import values by types of agricultural products from 2003 to 2007 and the individualized import shock, we find that one percentage increase in the individualized imports of fruits and vegetables from Chile brings a 0.98% decrease in crop revenue. In addition, we show that one percentage increase in fruits and vegetables imports from Chile causes a 0.0056% decrease in the share of fruits and vegetables in the crop revenue. While there need more robustness checks, we find that the immediate impact is substantial and the magnitude of adjustment to other crops is relatively small.

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