Implications of the South Korea-U.S. Free Trade Agreement on South Korean Dairy Product Imports.

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Abstract

This study empirically estimates the South Korean short-run and long-run import demand parameters for source-based dairy products and assess the impacts of the KORUS FTA on dairy product trade. These estimates were derived using a Central Bureau of Statistics (CBS) demand system. The impact of the tariff reductions associated with the free trade agreement was calculated. Based on the results, it appears that the free trade agreements open up the South Korean dairy product markets primarily by reducing prices which in turn increases competition among possible suppliers and results in an overall expansion of dairy product imports.

Implications of the South Korea-U.S. Free Trade Agreement (KORUS FTA) on South Korean Dairy Product Imports.

Keithly Jones and Don. P. Blayney

Introduction

The international trade of agricultural products has undergone a significant restructuring since the Uruguay Round of the General Agreement on Tariffs and Trade (GATT/WTO) was concluded in 1994. Multilateral, regional, and bilateral trade agreements have become much more common components of the trade system (Wainio, Gehlhar, and Dyck, 2011). The U.S. is not always a signatory of these trade agreements and could be at a disadvantage should competing suppliers of products to a specific country also supplied by the U.S. conclude bilateral agreements or be part of a multilateral agreement with that specific country. We examine in this paper, the South Korea-U.S. Free Trade Agreement (KORUS FTA), a bilateral agreement. It removes disadvantages the U.S. had relative to other countries supplying dairy products to South Korea.

South Korea has not pursued multi-and bilateral trade agreements as actively as many other countries. However, an FTA, between the European Union and South Korea, that could have important dairy trade implications was signed in October 2010 and went into effect on July 1, 2011. On October 12, 2011, both houses of the U.S. Congress passed implementing legislation for the KORUS FTA signed into law later that same year (October, 21) by President Obama. The KORUS FTA went into effect on March 15, 2012, and is designed to strengthen economic ties

between the two countries, eliminating tariffs and other trade barriers from imported agricultural products as well as products and services from other sectors of the economy.

It is believed the U.S. stands to gain from the KORUS FTA after ratification with regard to dairy products, with the possibility of doubling of U.S. exports to South Korea. Whether that belief comes to fruition depends on two factors: 1) the South Korean demands for imported dairy products and 2) the supplies of those products available from the U.S. and other competing suppliers. The objective of this study is to empirically estimate the South Korean short-run and long-run import demand parameters for source-based dairy products and assess the impacts of the KORUS FTA on dairy product trade.

An overview of the dairy industry in Korea follows this introductory section, followed in turn by sections on the empirical modeling framework and data, model results and implications of the results on potential flows of selected dairy products from the U.S. and other major trading partners of South Korea, and summary/conclusions.

Background

South Korean Dairy Industry Overview

The promotion of a commercial dairy industry began around 1962 when the South Korean government sponsored a program to import large numbers of dairy cows. By 1970, there were about 13,000 cows in the country producing about 52,000 MT (metric tons; just over 114.6 million pounds) of raw milk. Actions to commercialize agricultural production was not limited to dairy farming—they were seen as the pathway to a stated set of agricultural and food policies enunciated by the government. What was uncertain was whether farmers would accept such

changes in agricultural industries. Over the course of the 1970s, commercial dairy farming was gradually developed and accepted by farmers (Kihl and Bark). Milk production grew rapidly, reaching just over 2.2 million MT (about 4.85 billion pounds) in 2002 before declining slightly to about 2.1 million MT (4.6 billion pounds) in 2011 from 207,000 cows.

Some of the raw milk production growth in the early years can be attributed to the rapid increase in dairy cow numbers. Much of the increase in more recent years has come from productivity, measured by milk per cow, increases. Output per cow has averaged 8.4 MT (18,500 pounds) for the 2000 to 2009 period, a level comparable to that found in the United States. Milk producers have likely also benefited from scale efficiencies on farms as herd sizes expanded. In 1996, the average dairy farm had 26 dairy cows. By 2009, that number had risen to 65 and a preliminary half-year estimate for 2010 shows an increase to 67 cows per farm (NACF, 2010).

Milk produced in South Korea enters two use "channels"--for drinking and for processing. Over time, the drinking milk sector has dominated usage. For the six-year period from 2005 to 2010, the average milk production was 2,153 MT and drinking milk usage averaged 1,562 MT, about 73 % of production (USDA, FAS, 2011). The Korea Dairy Committee (KDC) reported that as of 2009 there were 21 processing firms, five of them being cooperatives, operating 45 facilities in the country. The major products produced were fresh and fermented milks, cheese, and dry milk powders. The dairy processing/manufacturing sector in Korea is geared overwhelmingly toward providing products for the fresh (fluid beverage) and fermented (yogurts) milk product markets. Milk supplies above those needs are used in the manufactured products channel mostly to produce cheese, nonfat dry milk, and "mixed" milk products.

The markets for most manufactured products in South Korea were perhaps best described as inconsequential until the 1980s. During that period, dry milk powders gained attention but in the context of manufacturing infant formula for a fast growing population. Butter had been a locally supplied product often viewed as a by-product of the dry milk powder production and was supplanted in consumer markets by margarine and butter substitutes. Cheese sales had been small but the 1988 Summer Olympics in Seoul triggered a significant interest and further growth in the industry.

The South Korean dairy industry has received significant government support over time. In 1967, the Dairy Promotion Law established a pricing program for fresh milk that was subjected to a review in the 1990s and a Dairy Promotion Council, a group comprised of all dairy-related groups, presented a proposal for a full-scale revision in 1993. Since the end of the 1990s, price-based protection measures have changed somewhat with the introduction of formal marketing quotas, and adjustments to the two-tier pricing system associated with them. The government set price system, however, has never been significantly changed (Lee *et al*., 2006).

From 1971 to the mid-1980s, an Integrated Dairy Development Project was implemented that aimed to expand production by providing financial support to dairy farmers and to establish more dairy processing facilities. In addition to the production supports, the government also put high barriers to trade in place that have included tariffs and their extension under the General Agreement on Tariffs and Trade/World Trade Organization multilateral trade agreements to tariff rate quotas (TRQs).

Since South Korea's milk producers are largely supplying the local fresh (fluid) markets, dairy trade policies emphasize actions related to the manufactured dairy products. The current policies on traded dairy products employ applied tariffs and tariff rate quotas (TRQs) as the trade

policy instruments of choice. Tariffs are applied on cheese, ice cream and mixed milk products; butter, nonfat and whole-fat dry milk powders, and whey powder imports are subject to TRQs.

The TRQ structure for most of the manufactured products consists of relatively low in-quota quantities and tariff rates and a very high over-quota tariff. The exception to this rule is the TRQ for whey powder; the in-quota quantity is high, the in quota tariff rate is low and, over-quota tariff is high but not as high as for the other products. It is these tariffs and TRQs that are altered by the KORUS FTA for all three products.

South Korea's Market Access for Dairy Products

Whey, butter, and cheese have been the primary dairy products imported by South Korea. According to the Global Trade Atlas, in 2011, South Korea imported whey and modified whey from 26 countries, with more than 42 % (12.89 thousand metric tons) coming from the United States valued at $43.9 million. More than two-thirds of imported whey powder is used for animal feed. The rest is used for bakery items and in confectionary products. In 2011 South Korea imported 8.579 thousand metric tons of butter from was 24 countries valued at $41.65 million, a 71 % increase over 2010. Ninety-five % of all imports come from 5 countries. Australia is by far its leading butter supplier, providing more than 50 % of all imports. In 2011, South Korea imported 76.2 metric tons of cheese valued at nearly $360 million. Its cheese imports come from 30 countries, but in 2011, 42.6 % came from the United States.

Summary statistics for South Korea's whey, butter, and cheese imports from the 7 country/regions selected for analysis are presented in table 1. The summary statistics highlight the quantity, unit values, and share of expenditure. On average, New Zealand is the largest supplier of whey to South Korea, followed by the United States and Denmark. However, whey

from France has by far the highest average per unit value at $11.19 thousand per ton while whey from New Zealand has the lowest per unit value.

Most of South Korea's butter comes from Oceana which supplied, on average, 80 % of its import expenditure share annually since 1990. Australia and New Zealand, both supplied an average of about 400 metric tons annually. However, butter from the United States had the highest unit value, followed by France.

The three big suppliers of cheese to South Korea are Australia, New Zealand and the United States, each supplying on average, about a quarter of the imported cheese. Cheese from France had the highest unit value followed by Denmark and the rest of Europe. The United States are the main suppliers of cheddar cheese to South Korea.

Prior to the KORUS FTA, Korea had a global WTO TRQ that allows for the importation of 54,223 tons of whey at a maximum bound tariff rate of 20 %. Feed whey was allowed to enter under a 35,000-ton TRQ with a tariff rate of 4 %. Whey for food was allowed to enter under a 19,233-ton TRQ with a tariff rate of 20 %. The out-of-quota tariff rate is 49.5 %. At the same time, Korea's global WTO TRQ on butter and butter fat was of 420 tons, with an in-quota tariff rate of 40 % and an out-of-quota rate is 89 %. Korea maintained its applied tariff rate for cheese at the WTO-bound rate of 36 %. Based on the KORUS FTA, unlimited quantities of all three products would enter Korea duty free after phased in tariff reduction of 10-15 years.

Model Specification

The Central Bureau of Statistics (CBS) demand system derived by Keller and Van Driel (1985) is used to estimate South Korean source country dairy product import demand parameters. The CBS model combines the non-linear expenditure effects of the Almost Ideal Demand System

(AIDS) (Deaton and Muellbauer, 1980b)) and the price effects of the Rotterdam model (Theil, (1966) and Barton, (1969)). The Rotterdam model meets negativity conditions on the Slutsky matrix required for a downward sloping demand curve if its price coefficients are negative, semi-definite. The CBS is a set of partial differential equations. Differential demand systems are commonly estimated under the assumption that differences are reasonable approximations of the differential demand. The general CBS model is expressed as:

$$(1)\quad w_i \cdot \left[\partial Lnq_i - \sum_j w_j \partial Lnq_j \right] = a_i + \sum c_{ij} \partial Lnp_j + b_j \left(\partial Lnx_i - \sum_j w_j \partial Lnp_j \right)$$

where: $w_i = \dfrac{p_i q_i}{x}$

and q_i is the quantity of dairy product imported from country "*i*," p is the price of dairy product in country "*j*," x is the total expenditure on dairy products from all countries, $\partial L\mathrm{n}\, q_i, .\partial L\mathrm{n}\, p_j$, and $\partial L\mathrm{n}\, x_i$ are the partial derivatives of the logarithms of the quantity, price, and expenditures, and c_{ij} and b_j are coefficients. The w_i represents the expenditure share of dairy product imports from the i^{th} country.

The following restrictions are satisfied for consistency with utility maximization:

$\sum_i c_{ij} = \sum_j c_{ij} = \sum_i b_{ij} = \sum_i a_i = 0,$ implies that homogeneity of degree zero and the adding-up conditions hold for the budget constraint, and $c_{ij} = c_{ji}, \forall ij$, implies symmetry.

The study does not address the range of supply issues that may impact on the ability of any source country to export dairy product. Instead, the assumption was that the supply from each country/region was perfectly elastic and South Korean importers (wholesalers) determine the quantities imported from individual countries given the international product market prices

and the preferences of South Korean consumers. Wholesale level import data was used for the analysis and unit values were used for imported dairy product price.

The South Korean dairy product import demand model rests on the assumption of a two-stage budgeting process outlined by Kesvan, et al., (1993) where the aggregate quantity of dairy product consumed by the South Korean is determined in the first stage, and the second stage focuses on the demands for dairy product by country of origin. Similar products from different sources may be physically different which may be the case for the 4 groups of dairy products being studied. However, perceived differences associated with a country's reputation for quality products, trade history, reliability and consistency, among other trade-related issues may arise that may cause price differences that are not explained by product attributes alone (Muhammad and Kilmer, 2008; Lopez, Pagoulatos, and Gonzalez, 2006). In the second stage, the South Korean demand for imported dairy product is specified as a function of prices and the mixed quantity Divisia index. Separability is assumed in the demand for each dairy product from other dairy products.

A dynamic approach is applied to the general CBS model used by Keller and Van Driel (1985) to capture both the short-run and long-run relations in South Korean dairy product import demand.

$$(2) \qquad w_{it} \cdot \left[\partial Lnq_i - \sum_j w_j \partial Lnq_j \right] = a_i + \sum c_{ij} \partial Lnp_{jt} + \sum d_{ij} \partial Lnp_{jt-1} + b_{i1} dBQ_t + b_{i2} dBQ_{t-1} + e_{it}$$

where w_{it} is the expenditure share of dairy product consumed from the i^{th} source country, p_j is the differential price based on the unit value of imports and the domestic wholesale price, and a, c_{ij}, d_{ij}, b_1, and b_2 are parameters to be estimated and e_{ij} is the disturbance term. The source countries included in the model are: Denmark, France, Australia, New Zealand, the United

States, the rest of the European Union (ROE) and the rest of the world (ROW). The rest of the world equation was omitted to avoid singularity in estimation of the empirical model. Three dairy products are evaluated—whey, butter, and cheese—and each product is evaluated independently since each product is mutually exclusive and goes to different end uses.

Own-price, cross-price, and expenditure elasticities, η are calculated for each country-specific import demand.

(3) $$\eta_{ij} = \frac{(c_{ij} - d_{ij} + w_i w_j)dLnp_j}{w_i}$$ Own-price and cross-price elasticities

(4) $$\eta_{iy} = 1 + \frac{\beta_i}{w_i}$$ Expenditure elasticity

Tariff Reduction Analysis

One of the key features of the free trade agreement is a reduction in tariffs. Cuts in tariffs help to reduce the wedge between the product prices in the exporting and importing countries and stimulate trade. It is in many ways similar to an export subsidy to the exporting country. The importing country simply pays a lower price for the product from the country from which the tariff is reduced or eliminated. Based on the tariff negotiated through KORUS, Korea will pay a lower price for products imported from the United States. The reduction or elimination of tariff expenditures for U.S. dairy products make prices fall thus allowing Korean imports from the United States to become more competitive relative to imports from other countries in which the tariff is imposed. Since all competing countries will also be relatively disadvantaged by same tariff reduction, both own price and cross-price effects must be allowed for. The cross-country competitiveness typically requires the assumption that similar products are differentiated by

country of origin. Given the cross price substitution effects between all import products and, given the elasticity of demand for that group of products in total, then the elasticity of demand for aggregate imports is derived based on the share of the imported products in the market. The impact of the tariff reductions (T) associated with the free trade agreement in each country, ζ is characterized as

(5) $\zeta = \eta_{ij} * \Psi$

where $\Psi$is the natural log of (1-T).

Data

Quarterly dairy product import data for South Korea is obtained from the Global Trade Atlas for the period 1992 to 2011. Three dairy product categories will be analyzed: whey, cheese, and butter from 6 importing countries/regions. Over-quota tariff reductions of 40% were evaluated for whey, 36% % reductions were evaluated for cheese, and 89 % reductions for butter. Based on the KORUS FTA, unlimited quantities of all three products would enter the Korea duty free after phased in tariff reduction of 10-15 years, hence over quota tariff would be fully removed.

Since a similar free trade agreement was also brokered with the EU, the impact of tariffs reductions afforded to EU countries was included in the model. The source countries included in the model from which South Korea imports these products are the United States, Australia, New Zealand, Denmark, France, the Rest of the European Union, and the rest of the world (ROW). The United States supplies all three products to South Korea. Australia and New Zealand are also consistent suppliers of dairy products to South Korea. Denmark and France are two European Union countries with significant exports to South Korea. A category describing the rest of

Europe (ROE) consists of aggregate dairy product supply from other European countries besides Denmark and France. The final category consists of aggregate dairy supply from all other categories not listed and grouped as the rest of the world (ROW). Import data for each of the dairy products were aggregated to a quarterly total for each country/region. Quarterly import quantities and value of imports from each country were obtained from the Global Trade Atlas. Using value of imports and quantities, per-unit values ($/lb) for each country were calculated.

Results

The conditional short run and long run own-price elasticities for all three dairy products are presented in table 2. The conditional elasticities are averaged over the quarterly values from 1990 to 2011. The own-price elasticities for both the short-run and long-run for whey imports were negative, as expected, for most of the countries except ROE, which had a positive but statistically insignificant long run own price elasticitity. South Korea was highly price responsive to Australia and France's whey imports both in the short-and long-run, but were relatively unresponsive to whey imports from other countries. The impact of price changes on whey imports from the United States was also found to be statistically insignificant despite its growing share of the South Korean market. These results suggest that a price reduction associated with the FTA is likely to have less than proportional increases in whey imports from the United States.

In the short run South Korea was quite responsive to butter imports from most countries. Australia (-1.579), Denmark (-1.812), the United States (-1.691) and the ROW (-1.021) were all elastic suggesting that a 10 % decrease in the price of butter from these countries would increase South Korea's demand for their butter by 15.79%, 18.12%, 16.91% and 10.21% respectively.

This suggests that price reductions through the FTA could result in substantial increase in demand for U.S. butter. Only Australia, New Zealand, United States and the ROW had statistically significant own price elasticities in both the short- and long-run for butter.

Australia, New Zealand and the United States are the primary suppliers of cheese to South Korea. The short run own price elasticity for cheese shows that all countries, except Denmark and the ROE were highly price sensitive. The ROW had the highest short run own price elasticity for cheese (-2.902) followed by Australia (-1.386), New Zealand (-1.365) and France (-1.165). The United States had a short run own price elasticity of near unitary (-1.027) in the short run, which increased to -1.511 in the long run.

For the purpose of adhering to space requirements, the complete elasticity results (own and cross price matrix) were relegated to the appendix and can be found in Appendix tables 1-6. For the most part the calculated cross price elasticities were positive, small in values, and statistically insignificant. However, these cross elasticities play an important role in the overall impact of KORUS on Korea's dairy products imports.

Tables 3 and 4 present the calculated effect of KORUS on the demand from different countries. The analysis for the impact of the KORUS is done *a priori* since data is from1990-2011 and does not capture data since KORUS took effect. It is expected that for Korean firms importing dairy products, KORUS would decrease the price of imported dairy products from the United States relative to other countries since they would be relieved of paying the tariff. As a result, dairy product imports from the United States are expected to become more attractive to Korean firms.

The results are presented in 2 scenarios. The first scenario takes into account the overall impact of the KORUS and the EU FTA on Korea's import demand. A similar FTA was signed

between Korea and the European Union in July 2011. Since, the data for the analysis ends in December 2011, it would contain, at most, 2 quarters (2 observations) reflecting the EU FTA. The second scenario evaluates the effect of the EU agreement, assuming there was no KORUS. Out-of-quota tariff rates of 49.5 % for whey and 89 % for butter, plus an applied tariff rate 36 % for cheese are evaluated.

In the first scenario, table 3, the overall impact of the EU FTA and KORUS would result in a short term increase in whey imports from all countries except France. Initially, Australia stands to be the biggest gainer with an 84.5 % increase, but in the long run would only have a 36.8 % increase. In the long run, Denmark and the United States would experience further expansions in their whey exports to Korea, increasing from 74.2% to 99.6%, and 68% to 78%, respectively. France, New Zealand and the ROW would experience long run decreases in whey exports to Korea. The reduction in Korea's imports of whey from France is expected since it is highly responsive to own price changes.

In the short run, Korea's imports of butter from all countries, except the ROW would increase. Particularly large short run increases of 383% and 295% would be seen in imports from Denmark and the United States. However, in the long run, these increases are tempered, and surprisingly, imports from both Denmark and the United States would decrease by 291% and 91%, respectively. Australia appears to be the major long run gainer from the agreements as butter imports would increase further from a short run position of 18.5% to 62.4%.

In the case of cheese, in the short run, Korea would expand imports from all countries, except the ROW. The United States stands to be the largest beneficiary, increasing 52.6% in the short run and expanding further to 67.2% in the long run. France, which would have a short run expansion in cheese sales to Korea (24%), would experience a long run decline of 79.5%.

Table 4 shows the impact of the EU agreement without KORUS. It is clear that liberalizing trade could positively impact markets that are not the direct recipients of the benefits signatory countries receive from free trade agreements. The United States whey sales to Korea would expand in both the short and long run. However it is clear that Denmark and France would be the largest beneficiaries of the EU agreement without KORUS in whey sales. Australia and New Zealand would be the greatest beneficiaries of butter sales in both the short and long run with long run. In the case of cheese, the impacts are relatively small. France which would have a short run increase in sales of 25% sees an equal decline the long run.

Summary and Conclusions

Overall, based on the results, it appears that the free trade agreements open up the South Korean dairy product markets primarily by reducing prices which in turn increases competition among possible suppliers and results in an overall expansion of dairy product imports. The question is: do the results appear reasonable? To answer that question some discussion of the supplying country dairy industries must be considered—in particular, the manufactured products sectors of those industries.

The price sensitivity of Korean importers suggests if many suppliers of a particular product exist, then those with the "best" price into the country will garner the larger shares of the imports. For the three products discussed in the analysis, Australia, New Zealand, and the United States have manufactured product industries that are either already oriented to exporting (Australia and New Zealand) or are large enough to be in a position to redirect significant quantities of products into export channels (U.S.) The EU industries likely fit the final

description at present but in general have focused attention on dairy trade toward the U.S. and closer markets such as Russia and areas around the Mediterranean Sea.

The results regarding cheese and whey are as we would expect. The mere size of the U.S. industry gives it the capacity to produce both cheese and whey in quantities that can satisfy export market demands in Korea and that meet specifications of importers. It is also important to recall that cheese and whey are essentially joint products—a large, vibrant cheese industry can support the same kind of whey industry. It is likely that the quality of most dairy products provided by the manufacturers in the four countries do not vary significantly—so price is the decision variable for importers. Since the Korean dairy industry is so much focused on supplying the fresh drinking milk market first, any rising demands for the manufactured products will depend on imports. The emphasis of further processing of dairy product imports suggests that "commodity" type products rather than final consumer packaged products would be preferred, a situation that generally favors Australia, new Zealand and the United States.

As concerns about fat intakes grow for consumers, butter industries are evolving to meet a reduced demand. However, there are parts of the world where butter is still a desired product. The butter industry in the U.S. is capable of supplying products but may not enjoy a favorable position relative to other country's industries with respect to the number of such products available. Australia and New Zealand would likely have more butter-type products to meet import demand specifications.

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Table 1 Summary Statistics of South Korea's Whey, Butter, and Cheese Imports, 1990-2011

	Mean	Std Dev	Min	Max	Mean	Std Dev	Min	Max	Mean	Std Dev
Whey	------Quantity (metric tons)------				----Unit Value ($000/ton)---				------Expendi	
Australia	403.9	452.7	1.0	2509.0	2.08	1.82	0.43	9.77	2.57%	2.24%
Denmark	1410.8	713.1	262.0	3121.0	1.34	0.50	0.62	2.48	11.21%	8.12%
France	165.8	168.0	7.0	1024.0	11.19	16.70	1.11	81.38	4.03%	2.69%
New Zealand	4890.5	1875.8	2070.0	10595.0	0.72	0.27	0.43	1.66	19.31%	8.08%
United States	3033.7	1284.6	666.0	7420.0	2.09	0.78	0.99	4.48	32.34%	10.11%
ROE	1481.8	679.4	52.0	3459.0	1.83	0.60	0.86	3.23	14.57%	7.57%
ROW	2047.8	1531.9	100.0	7019.0	1.75	0.59	0.65	4.24	15.98%	8.73%
Butter										
Australia	397.2	328.3	28.0	1172.0	3.06	1.11	1.94	7.47	35.53%	16.27%
Denmark	9.0	5.3	2.0	30.0	4.52	1.55	1.84	7.69	1.89%	1.14%
France	22.3	17.9	1.0	91.0	5.11	1.73	1.93	8.42	4.33%	2.75%
New Zealand	414.3	307.0	138.0	1471.0	2.79	0.90	1.72	4.74	45.29%	13.36%
United States	21.4	49.5	1.0	252.0	6.30	2.63	3.25	12.52	2.79%	2.79%
ROE	50.3	52.1	1.0	265.0	3.22	1.60	1.07	6.73	5.98%	5.11%
ROW	42.8	45.3	1.0	195.0	2.48	1.16	0.44	6.06	4.20%	4.02%
Cheese										
Australia	2430.6	900.7	990.0	4331.0	3.04	0.83	1.86	5.38	27.47%	12.15%
Denmark	201.0	159.3	63.0	746.0	5.10	1.91	2.82	10.10	3.99%	4.11%
France	172.2	210.9	4.0	801.0	9.81	4.39	5.58	25.98	3.22%	2.50%
New Zealand	2941.4	1377.2	470.0	5816.0	2.92	0.79	2.09	4.87	27.10%	5.99%
United States	1885.2	1854.0	329.0	9375.0	4.03	0.41	3.44	4.96	21.75%	7.84%
ROE	300.7	291.1	1.0	1016.0	5.22	2.35	1.38	11.28	3.74%	2.98%
ROW	1513.0	1378.3	78.0	4557.0	3.26	0.74	2.53	5.16	12.73%	8.69%

Table 2 Estimated Short-run and Long-run Own-Price Elasticities for South Korean Imported Dairy Products

	Whey		Butter		Cheese	
	Short-run	Long-run	Short-run	Long-run	Short-run	Long-run
Australia	**-1.076*** **	**-1.042*** **	**-1.579*** **	**-1.341*** **	**-1.386** **	**-2.098** **
	(0.233)	(0.371)	(0.267)	(0.478)	(0.550)	(0.854)
Denmark	**-0.432**	**-0.466**	**-1.812**	**0.323**	**-0.698** **	**-0.737**
	(0.329)	(0.514)	(1.105)	(1.360)	(0.330)	(0.525)
France	**-1.397*** **	**-1.381*** **	**-0.545**	**-0.604**	**-1.165*** **	**-0.029**
	(0.170)	(0.270)	(0.507)	(0.792)	(0.196)	(0.306)
New Zealand	**-0.465**	**-0.056**	**-0.931** **	**-1.415** **	**-1.365** **	**-1.780** **
	(0.327)	(0.504)	(0.428)	(0.687)	(0.616)	(0.883)
United States	**-0.482**	**-0.323**	**-1.691*** **	**-1.698** *	**-1.027*** **	**-1.511*** **
	(0.348)	(0.598)	(0.527)	(0.898)	(0.259)	(0.376)
ROE	**-0.295**	**0.079**	**0.820**	**1.469**	**-0.576*** **	**-0.820*** **
	(0.353)	(0.526)	(0.548)	(0.913)	(0.181)	(0.305)
ROW	**-0.558*** **	**-0.031**	**-1.021** *	**3.362** *	**-2.902*** **	**0.050**
	(0.191)	(0.696)	(0.536)	(1.846)	(0.513)	(0.598)

Asymptotic standard errors are in brackets

***<0.01

**<0.05

*<0.10

Table 3. Overall Impact of EU FTA & KORUS

	Whey		Butter		Cheese	
	Short-Run	Long-Run	Short-Run	Long-Run	Short-Run	Long-Run
Australia	84.51%	36.84%	18.53%	62.44%	3.63%	14.62%
Denmark	74.28%	99.61%	383.38%	-291.09%	1.81%	0.72%
France	-13.91%	-15.77%	64.62%	11.35%	23.98%	-79.47%
New Zealand	0.11%	-2.33%	56.32%	24.07%	6.81%	-5.44%
United States	67.99%	77.95%	295.52%	-91.49%	52.57%	62.72%
ROE	65.03%	63.38%	20.63%	43.96%	45.34%	25.68%
ROW	30.01%	-12.14%	-446.65%	137.92%	-26.32%	-14.22%

Table 4 Effect of EU only Without U.S. Agreement

	Whey		Butter		Cheese	
	Short-Run	Long-Run	Short-Run	Long-Run	Short-Run	Long-Run
Australia	19.12%	-2.65%	16.96%	32.20%	15.27%	30.33%
Denmark	27.54%	30.31%	415.19%	-141.29%	2.34%	9.07%
France	52.36%	72.76%	196.07%	306.45%	25.60%	-25.69%
New Zealand	-14.38%	-26.97%	71.10%	29.21%	5.85%	2.83%
United States	35.03%	55.86%	-77.82%	-466.24%	6.74%	-4.70%
ROE	32.75%	1.05%	-50.32%	17.38%	9.66%	13.57%
ROW	19.73%	-6.32%	-538.91%	-161.12%	-31.56%	-32.69%

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Appendix Table 1 Short Run Elasticities for Korean Whey Import Demand

	Australia	Denmark	France	New Zealand	United States	ROE	ROW
Australia	**-1.076**	0.092	-0.276	-0.430	-0.957	-0.096	-0.032
	(0.233)	(0.398)	(0.163)	(0.541)	(0.761)	(0.495)	(0.053)
Denmark	0.046	**-0.432**	0.131	0.350	-0.684	-0.102	0.251
	(0.096)	(0.329)	(0.094)	(0.317)	(0.474)	(0.312)	(0.126)
France	-0.131	0.454	**-1.397**	-0.110	0.970	0.177	-0.042
	(0.108)	(0.254)	(0.170)	(0.364)	(0.539)	(0.319)	(0.083)
New Zealand	-0.028	0.222	-0.048	**-0.465**	-0.212	0.036	-0.091
	(0.072)	(0.177)	(0.072)	(0.327)	(0.359)	(0.226)	(0.184)
United States	-0.074	-0.338	0.052	-0.334	**-0.482**	-0.227	-0.523
	(0.055)	(0.140)	(0.056)	(0.192)	(0.348)	(0.166)	(0.223)
ROE	-0.013	-0.169	-0.015	-0.141	-0.473	**-0.295**	-0.368
	(0.084)	(0.218)	(0.081)	(0.287)	(0.386)	(0.353)	(0.155)
ROW	0.194	-0.018	-0.004	-0.037	-0.151	-0.266	**-0.558**
	(0.102)	(0.295)	(0.092)	(0.386)	(0.473)	(0.307)	(0.191)

Appendix Table 2 Long Run Elasticities for Korean Whey Import Demand

	Australia	Denmark	France	New Zealand	United States	ROE	ROW
Australia	**-1.042**	-0.048	-0.388	-0.040	-0.578	0.475	-0.155
	(0.371)	(0.633)	(0.259)	(0.843)	(1.269)	(0.766)	(0.082)
Denmark	-0.008	**-0.466**	-0.013	0.327	-1.014	0.036	0.515
	(0.153)	(0.514)	(0.153)	(0.488)	(0.774)	(0.481)	(0.195)
France	-0.226	0.046	**-1.381**	-0.234	1.296	0.270	-0.070
	(0.174)	(0.414)	(0.270)	(0.589)	(0.889)	(0.510)	(0.126)
New Zealand	0.014	0.261	-0.053	**-0.056**	-0.361	0.187	-0.084
	(0.112)	(0.269)	(0.114)	(0.504)	(0.577)	(0.339)	(0.283)
United States	-0.073	-0.482	0.085	-0.563	**-0.323**	-0.421	-0.625
	(0.090)	(0.224)	(0.090)	(0.305)	(0.598)	(0.265)	(0.343)
ROE	0.058	-0.095	0.001	-0.087	-0.912	**0.079**	-0.348
	(0.129)	(0.327)	(0.128)	(0.430)	(0.626)	(0.526)	(0.242)
ROW	0.124	0.267	0.023	-0.260	0.085	-0.198	**-0.031**
	(0.152)	(0.425)	(0.152)	(0.545)	(0.687)	(0.593)	(0.696)

Appendix Table 3 Short Run Elasticities for Korean Butter Import Demand

	Australia	Denmark	France	New Zealand	United States	ROE	ROW
Australia	**-1.579**	-0.051	0.058	-0.046	-0.007	-0.084	-2.794
	(0.267)	(0.041)	(0.092)	(0.366)	(0.077)	(0.117)	(0.798)
Denmark	-0.334	**-1.812**	0.512	-0.663	0.144	-0.581	0.139
	(0.660)	(1.105)	(0.524)	(1.116)	(0.336)	(0.404)	(0.119)
France	1.015	0.219	**-0.545**	-1.141	0.596	-0.562	0.052
	(0.640)	(0.229)	(0.507)	(1.040)	(0.281)	(0.348)	(0.251)
New Zealand	0.379	-0.039	-0.124	**-0.931**	0.067	-0.159	-3.409
	(0.222)	(0.044)	(0.093)	(0.428)	(0.084)	(0.117)	(0.941)
United States	0.530	0.097	0.933	1.349	**-1.691**	-0.677	-0.385
	(0.883)	(0.229)	(0.449)	(1.521)	(0.527)	(0.537)	(0.255)
ROE	0.058	-0.187	-0.405	-1.025	-0.321	**0.820**	-0.665
	(0.638)	(0.131)	(0.263)	(1.014)	(0.252)	(0.548)	(0.470)
ROW	-0.467	1.190	0.118	2.113	-0.418	1.133	**-1.021**
	(1.753)	(0.833)	(0.836)	(2.377)	(0.620)	(0.776)	(0.536)

Appendix Table 4 Long Run Elasticities for Korean Butter Import Demand

	Australia	Denmark	France	New Zealand	United States	ROE	ROW
Australia	**-1.341**	-0.074	0.019	0.166	-0.137	-0.091	-2.902
	(0.478)	(0.070)	(0.162)	(0.640)	(0.137)	(0.203)	(1.291)
Denmark	-0.723	**0.323**	1.338	-0.409	0.679	-1.020	0.246
	(1.150)	(1.360)	(0.752)	(1.729)	(0.579)	(0.666)	(0.194)
France	0.866	0.586	**-0.604**	-0.281	1.337	-1.370	-0.217
	(1.128)	(0.328)	(0.792)	(1.657)	(0.477)	(0.579)	(0.401)
New Zealand	0.553	-0.030	-0.062	**-1.415**	0.023	-0.041	-3.875
	(0.389)	(0.067)	(0.147)	(0.687)	(0.139)	(0.194)	(1.511)
United States	-0.750	0.476	2.107	1.108	**-1.698**	-0.471	-0.813
	(1.550)	(0.395)	(0.760)	(2.502)	(0.898)	(0.893)	(0.409)
ROE	-0.283	-0.344	-1.046	-0.519	-0.278	**1.469**	0.336
	(1.093)	(0.218)	(0.440)	(1.680)	(0.422)	(0.913)	(0.758)
ROW	-2.515	-0.067	-0.386	3.848	0.105	-0.277	**3.362**
	(2.898)	(0.884)	(1.167)	(3.115)	(1.023)	(1.551)	(1.846)

Appendix Table 5 Short Run Elasticities for Korean Cheese Import Demand

	Australia	Denmark	France	New Zealand	United States	ROE	ROW
Australia	**-1.386**	-0.210	-0.142	0.362	0.261	0.010	0.395
	(0.550)	(0.113)	(0.082)	(0.495)	(0.252)	(0.057)	(0.802)
Denmark	-1.386	**-0.698**	0.404	0.214	0.012	0.242	0.338
	(0.774)	(0.330)	(0.163)	(0.832)	(0.487)	(0.102)	(0.213)
France	-1.235	0.488	**-1.165**	-0.847	0.036	0.103	0.475
	(0.690)	(0.200)	(0.196)	(0.716)	(0.421)	(0.099)	(0.162)
New Zealand	0.361	0.022	-0.099	**-1.365**	-0.021	-0.054	-0.489
	(0.499)	(0.122)	(0.086)	(0.616)	(0.261)	(0.066)	(0.880)
United States	0.315	-0.008	0.006	-0.036	**-1.027**	-0.149	0.606
	(0.306)	(0.087)	(0.061)	(0.316)	(0.259)	(0.042)	(0.455)
ROE	0.142	0.260	0.099	-0.322	-0.799	**-0.576**	-0.046
	(0.435)	(0.110)	(0.087)	(0.488)	(0.276)	(0.181)	(0.299)
ROW	0.398	0.149	0.413	0.627	-0.117	0.145	**-2.902**
	(0.610)	(0.198)	(0.125)	(0.660)	(0.376)	(0.068)	(0.513)

Appendix Table 6 Long Run Elasticities for Korean Cheese Import Demand

	Australia	Denmark	France	New Zealand	United States	ROE	ROW
Australia	**-2.098**	-0.337	-0.311	0.737	0.352	-0.032	-0.101
	(0.854)	(0.174)	(0.125)	(0.738)	(0.379)	(0.097)	(1.030)
Denmark	-2.469	**-0.737**	0.267	0.443	0.187	0.266	0.386
	(1.208)	(0.525)	(0.254)	(1.234)	(0.734)	(0.174)	(0.292)
France	-2.482	0.377	**-0.029**	-0.357	1.205	0.227	0.033
	(1.076)	(0.314)	(0.306)	(1.076)	(0.635)	(0.168)	(0.211)
New Zealand	0.799	0.094	-0.056	**-1.780**	0.185	-0.101	0.917
	(0.756)	(0.182)	(0.128)	(0.883)	(0.374)	(0.111)	(1.132)
United States	0.333	0.040	0.145	0.069	**-1.511**	-0.080	0.177
	(0.470)	(0.131)	(0.092)	(0.452)	(0.376)	(0.071)	(0.590)
ROE	-0.102	0.325	0.191	-0.658	-0.271	**-0.820**	0.469
	(0.735)	(0.187)	(0.146)	(0.817)	(0.453)	(0.305)	(0.333)
ROW	1.721	0.214	0.179	0.287	-0.414	0.339	**0.050**
	(0.877)	(0.294)	(0.191)	(0.903)	(0.532)	(0.131)	(0.598)