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By

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# Derived Demand for Fresh Cheese Products Imported into Japan

Andreas P. Christou, Richard L. Kilmer, James A. Sterns, Shiferaw T. Feleke and Jiaoju Ge[1]

## Abstract

The objective of this article is to estimate the derived demand for imported fresh cheese products into Japan when fresh cheese import data are disaggregated by source country of production. We provide empirical measures of the sensitivity of demand to changes in total imports, own-price, and cross-prices among exporting countries for fresh cheese. Japan's derived demand for U.S. fresh cheese products is perfectly inelastic. Thus, the import demand competition among importing countries should be based upon differences in product characteristics.

## Introduction

Changes in domestic and international policies will have a major effect on the international cheese market. Specifically, U.S. dairy price supports may be phased out in the future which may reduce milk costs for U.S. dairy products. This will cause U.S. cheese products to become more competitive worldwide. As a result of the General Agreement on Tariffs and Trade (GATT), which ended in 1997 but is still applied by the WTO since the new act is still in the process of negotiation, world agricultural

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export subsidies will be reduced by 21% and the budget expenditures for export subsidies will be reduced by 36%. Since an export subsidy is a payment by a government to their exporters, this allows the exporters to sell their commodity to another country at a reduced price. If a government reduces it's subsidies to its exporters, the exporters must increase the price they charge importers for the exporters' commodity. Because the subsidizing country's exporters must charge a higher price in order to cover expenses, their exports are reduced. At the same time, exporters from other countries will experience an increase in their exports as they are more price competitive with the previously subsidized exporters.

The export subsidy reduction will have a major effect on the European Union (E.U.) but a small effect on the U.S. In 2001, the E.U. was both the largest producer (21.3%) and the largest consumer (21%) of cow's milk in the world, compared to 13.1% and 12% for the U.S. (CEC). The E.U. provides more than $1 billion in dairy export subsidies which is more than 100 times what the U.S. spends on export subsidies (NMPF). From 2000 through 2002, U.S. dairy exports that were unsubsidized represented 81, 86, and 84 percent of total U.S. dairy exports (NMPF). The reduction in export subsidies by other countries will help the U.S. be more competitive in the international cheese market and increase market share.

The United States Dairy Export Council (USDEC) has identified Japan as one of the countries that will increase its share of world imports of dairy products in the future. Even though cheese consumption in Japan is low, the cheese market shows room for expansion and potential in the future.

The objective of this study is to estimate the derived demand for imported fresh cheese into Japan when cheese import data are disaggregated by source country of production and to provide empirical estimates of the sensitivity of fresh cheese demand to changes in total imports, own price, and cross prices among exporting countries.

**Background of U.S. and Japan fresh cheese market**

The quantity of U.S. fresh cheese exports ranged from 472 metric tons in 1991 to 8,034 metric tons in 2003 (Table 1). Fresh cheese exports increased an average of 31.2% per year which is higher than the average annual rate of 12.5% for all cheeses exported by the U.S. However, the percentage change per year in fresh cheese exports is variable. Furthermore, the fresh cheese share of total U.S. cheese exports increased from 3.4 percent in 1991 to 15 percent in 2003 (Table 1).

**Table 1.** U.S. Fresh Cheese Exports, 1991-2003.

| Year | U.S. Cheese Exports (Metric Tons) | | | | |
|---|---|---|---|---|---|
| | Fresh Cheese | Percent Change | All Cheese | Percent Change | Percent Share |
| 1991 | 472 | ~ | 13,856 | ~ | 3.4 |
| 1992 | 364 | -22.8 | 17,467 | 26.1 | 2.1 |
| 1993 | 677 | 85.7 | 18,521 | 6.0 | 3.7 |
| 1994 | 1,024 | 51.4 | 24,761 | 33.7 | 4.1 |
| 1995 | 1,487 | 45.2 | 31,990 | 29.2 | 4.6 |
| 1996 | 1,994 | 34.1 | 35,845 | 12.1 | 5.6 |
| 1997 | 2,178 | 9.2 | 40,156 | 12.0 | 5.4 |
| 1998 | 2,095 | -3.8 | 40,591 | 1.1 | 5.2 |
| 1999 | 3,253 | 55.3 | 43,120 | 6.2 | 7.5 |
| 2000 | 3,628 | 11.5 | 49,865 | 15.6 | 7.3 |
| 2001 | 6,717 | 85.2 | 53,958 | 8.2 | 12.4 |
| 2002 | 5,917 | -11.9 | 55,620 | 3.1 | 10.6 |
| 2003 | 8,034 | 35.8 | 53,700 | -3.5 | 15.0 |
| Total | 37,839 | ~ | 479,449 | ~ | 7.9 |
| Average | 2,911 | 31.2 | 36,881 | 12.5 | ~ |

Source: United Nations COMTRADE Databases, 2004

Over the same time period, Japan's fresh cheese imports from the U.S. were also variable. The average annual rate increase was 68.3% (Table 2), more than twice the change in U.S. exports of fresh cheese (31.2%). The 68.3% is inflated due to the large percentage increases in 1992, 1993, and 1994. Furthermore, U.S. fresh cheese imports to Japan peaked in 2001 at 2,360 metric tons and continued to drop in 2002 and 2003. The U.S. share of fresh cheese imports into Japan peaked at 4.8% in 1996 and has trended downward through 2003 with the trend being reversed in 2000 and 2001. This suggests that U.S. fresh cheese exports to Japan have the potential to increase if the cheese industry finds an effective marketing strategy.

**Methodology**

The differential factor allocation model is an input derived demand model (i.e., not consumer demand). The derived demand model is determined from the minimization of the cost to obtain a predetermined level of output. The inputs are cheeses that come from different countries. This formulation allows the competitive advantage/disadvantage to be analyzed that each country experiences relative to other countries. The sensitivity of the quantity demanded to a country's own price (price elasticity of demand) as well as to the price of a competing country (cross price elasticity of demand) is calculated from the derived demand equation. The price elasticity of demand is used to determine the impact of export subsidy reduction on an exporters' quantity of exports. The cross price elasticities of demand are used to determine the level of competition between countries. The Divisia import elasticity shows the percentage change in a country's exports that are imported into another country given a one percent change in the importing country's imports.

**Table 2.** Japan Fresh Cheese Imports, 1991-2003.

| Year | Fresh Cheese Imports (Metric Tons) | | | | |
|---|---|---|---|---|---|
| | U.S. | Percent Change | Total | Percent Change | Percent Share |
| 1991 | 33 | ~ | 5,637 | ~ | 0.6 |
| 1992 | 58 | 76.9 | 11,641 | 106.5 | 0.5 |
| 1993 | 356 | 508.8 | 18,461 | 58.6 | 1.9 |
| 1994 | 842 | 136.5 | 25,079 | 35.8 | 3.4 |
| 1995 | 1,275 | 51.4 | 28,708 | 14.5 | 4.4 |
| 1996 | 1,652 | 29.6 | 34,383 | 19.8 | 4.8 |
| 1997 | 1,863 | 12.8 | 42,059 | 22.3 | 4.4 |
| 1998 | 2,023 | 8.5 | 47,901 | 13.9 | 4.2 |
| 1999 | 1,750 | -13.5 | 53,165 | 11.0 | 3.3 |
| 2000 | 2,160 | 23.4 | 63,525 | 19.5 | 3.4 |
| 2001 | 2,360 | 9.2 | 59,987 | -5.6 | 3.9 |
| 2002 | 1,879 | -20.4 | 65,657 | 9.5 | 2.9 |
| 2003 | 1,804 | -4.0 | 58,521 | -10.9 | 3.1 |
| Total | 18,055 | ~ | 514,724 | ~ | 3.5 |
| Average | 1,389 | 68.3[a] | 39,594 | 24.6 | ~ |

[a] This figure is inflated due to the large percentage increases in 1992, 1993, and 1994.

Source: “Ministry of Finance Japan” website, 2004

**Empirical Projection**

The Divisia index elasticities are 0.788, 0.367, 1.301, 0.505, 1.117, and 0.824 for the U.S., Norway, the European Union (E.U.), New Zealand, Australia, and ROW, respectively (Table 3). This indicates that if total fresh cheese imports into Japan increase by 1.0%, cheese exports to Japan from these countries will increase by 0.788%, 0.367%, 1.301%, 0.505%, 1.117%, and 0.824%. Therefore, the biggest beneficiary when total cheese imports into Japan increase is the E.U. and the U.S. is the fourth beneficiary base on the Divisia elasticity.

For the conditional own-price elasticities, only Norway (-0.366) and the E.U. (-0.474) are significantly different from zero (Table 3). If the price of Norway and the E.U. decreased by 1%, the fresh cheese exported into Japan from those two countries

Table 3. Conditional[a] Divisia and Price Elasticities of the Derived Demand for Imported Fresh Cheese.

| | Elasticities | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Conditional [a] Cross-Price | | | | | |
| Exporting Countries | Divisia Index | Conditional Own-Price | United States | Norway | EU | New Zealand | Australia | ROW [b] |
| United States | 0.788*** (0.223) [c] | -0.014 (0.091) | | -0.129 (0.123) | 0.641*** (0.200) | -0.309*** (0.090) | -0.226*** (0.071) | 0.038 (0.091) |
| Norway | 0.367*** (0.126) | -0.366** (0.170) | -0.033 (0.031) | | 0.663*** (0.194) | -0.451*** (0.113) | 0.192*** (0.025) | -0.006 (0.035) |
| European Union | 1.301*** (0.133) | -0.474*** (0.131) | 0.066*** (0.021) | 0.270*** (0.079) | | 0.205*** (0.058) | -0.052 (0.041) | -0.016 (0.027) |
| New Zealand | 0.505*** (0.172) | 0.056 (0.202) | -0.125*** (0.036) | -0.717*** (0.180) | 0.802*** (0.228) | | -0.170*** (0.030) | 0.154*** (0.041) |
| Australia | 1.117*** (0.099) | 0.056 (0.035) | -0.022*** (0.007) | 0.075*** (0.010) | -0.050 (0.039) | -0.041*** (0.007) | | -0.017 (0.011) |
| ROW | 0.824** (0.399) | -0.078 (0.171) | 0.043 (0.103) | -0.025 (0.156) | -0.173 (0.297) | 0.434*** (0.116) | -0.201 (0.131) | |

Source: Andreas P. Christou, Richard L. Kilmer, James A. Sterns and Shiferaw T. Feleke.

[a] Conditional: the elasticities are based on a predetermined level of output

[b] ROW = rest of the world

[c] The ANALYZ routine in TSP was used to calculate the asymptotic standard errors in parentheses

*** Significance level = 0.01

** Significance level = 0.05

* Significance level = 0.10

will increase by 0.366% and 0.474%, respectively. However, for the U.S., New Zealand, Australia and ROW, the conditional own-price elasticities are not statistically significant. This suggests that price is not a significant factor for the fresh cheese exported into Japan. A change in the price of these source countries will not change the quantity of their imports into Japan.

The cross-price elasticities for EU/US, New Zealand/US and Australia/US are 0.066, -0.125 and -0.022, respectively. These elasticities show that if the price of U.S. fresh cheese increases by 1%, the quantity of fresh cheese exported into Japan from the E.U. will increase by 0.066%, but the quantity of fresh cheese exported from New Zealand and Australia will decrease by 0.125% and 0.022%, respectively. This indicates that there is a substitution relationship between the E.U. and the U.S., but complimentary relationships among New Zealand, Australia and the U.S. The cross price elasticity between Norway and the U.S. is statistically insignificant, which indicates that Norway is not a competitor of the U.S.

The cross-price elasticities for US/EU, US/New Zealand and US/Australia are 0.641, -0.309, and -0.226 and statistically significant. E.U. is a competitor for U.S. fresh cheese exported into the Japan market. When the E.U. changes its price by 1%, the U.S. is impacted more (0.641%) than the E.U. is impacted (0.066%) when the U.S.changes its price by 1%. This indicates that the E.U.’s quantity is more insulated from U.S. price changes than the U.S. quantity is from E.U. price changes. In fact, this asymmetric relationship between the U.S. and the E.U. is also true between Norway and the E.U and New Zealand and the E.U. There is no relationship between

the E.U. and either Australia or ROW. Their cross price elasticities are not significantly different from zero.

New Zealand and Australia act in a complementary fashion with the U.S. If the fresh cheese price of New Zealand or Australia rises by 1%, the U.S. quantity is impacted more (-0.309% and -0.226%) than the New Zealand and Australia quantities are impacted (-0.125% and -0.22%) when the U.S. changes its price. This indicates that the New Zealand and Australia quantities are more insulated from U.S. price changes that the U.S. quantity is from New Zealand and Australian price changes.

**Summary**

The U.S. is the second largest cheese producer in the world, accounting for 25 percent of world cheese output (Christou, et.al., p.2). However, exports of U.S. cheese have been a small share of total U.S. production (Christou, et.al., p.2). and international dairy markets have been unattractive to U.S. dairy companies. Given the attempts of domestic and international policy makers to reduce trade barriers, U.S. manufacturers of cheese products have a growing interest in becoming successful in international markets.

Results of the derived demand for imported fresh cheese show that as Japan's total imports increase, U.S. fresh cheese imports will increase as well. The U.S. had the third largest change in imports among all countries (see Divisia index elasticity).

Conditional cross-price elasticities in Japan indicate that the U.S., Norway, and New Zealand fresh cheeses are substitutable for the E.U. fresh cheese. However,

when the E.U. prices increase because of potential subsidy reductions, U.S. fresh cheese imports will increase by a smaller percentage than Norway and New Zealand; however, Australia and ROW will realize no gain.

In conclusion, when the E.U. subsidy is reduced, the reduction will benefit the U.S. fresh cheese exports to Japan; however, the fresh cheese market is an inelastic price competitive market given that all own-price elasticities are inelastic or insignificant. This suggests that the U.S. should compete through product characteristics in the fresh cheese market since its own-price elasticity is insignificant, meaning that a change in the U.S. price will have a very small effect on the quantity consumed of U.S. fresh cheese. Following this strategy as well as the increasing Japan fresh cheese market, the market share of U.S. fresh cheese exports to Japan have the potential to increase.

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