The Derived Demand for Imported Cheese into Japan: A Two-Stage Differential Production Approach

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Japan is one of the largest importers of dairy products in the world. It ranked 9th among all importing countries in total dairy products imported (in milk equivalent pounds), and currently ranks 5th in imports of cheese. At present, Japan's share of world dairy imports is about 3 percent, which is about what its share has been for the last two decades. For individual dairy products, Japan's share of world imports in cheese, skim milk, and cheese are about 6, 4, and 4 percent respectively (FAO Statistics, 1999).

As diets in Japan became more westernized and the health benefits of milk consumption became more known, consumption of dairy products in Japan rapidly increased. As a result, daily per-capita consumption has grown faster than any other staple food. However, when compared to developed European countries and the U.S., per-capita consumption is still relatively low. At present, daily per-capita consumption of milk is about 114g, which is roughly one third of per-capita consumption in England and less than half of per-capita consumption in the U.S. (Japan Dairy Council, 1999).

Although per-capita dairy consumption in Japan is low when compared to developed western countries, the rate of growth in per-capita consumption has been phenomenal. According to FAO Statistics per-capita consumption in all milk consumed annually has increased from 26.05 kg per person in 1961 to 86.05 kg in 1997. The largest growth occurred in the 1960's when per-capita consumption increased by 8.56 percent per year on average, primarily driven by a 50 percent average annual increase in skim milk. In this recent decade growth has slowed to some degree. Since 1991, growth in per-capita consumption of all milk consumed decreased by .63

percent per year; however, growth in per-capita cheese consumption has increased by 5.67 percent per year for the same period.

The major goal of this paper is to provide the U.S. dairy industry with empirical estimates of conditional and unconditional elasticities of Japan's derived demand for imported cheese differentiated by source country of production with respect to cheese prices in supplying countries, wholesale cheese prices in Japan, wages and other input prices and the total amount of cheese imported. These estimates will then be used to assess the relative competitiveness of cheese imported from the U.S. to cheese imported from other source countries. Past studies that assessed the demand for imports differentiated by source country of production have used a utility or consumer approach to obtain import demand equations. However, given that imported cheese is purchased by firms, and that a significant amount of transformation and/or value added takes place after goods reached the importing country, this study will estimate demand from a production approach where imports are inputs into production processes.

Specific goals are: (1) To econometrically estimate the conditional derived demand, unconditional derived demand, and output supply for imported cheese in Japan; (2) To utilize the empirically estimated derived demand parameters to provide conditional and unconditional elasticities of derived demand and output supply; and (3) To project future derived demand using the unconditional elasticities resulting from export subsidy reductions mandated by the World Trade Organization.

The Differential Production Approach

Using the methodology of Laitinen and Theil, Laitinen, and Theil, the differential production model will be used to estimate the import demand. The differential production model is derived from the differential approach to the theory of the firm where firms maximize profit in a two-stage procedure. In the first stage, firms determine the profit maximizing level of output to produce and in the second stage firms minimize the cost of producing the profit maximizing level of output. According to Laitinen and Theil, and Davis and Jensen, this procedure is consistent with a one-step or direct profit maximization procedure. In the first stage the output supply equation is obtained and the conditional factor demand system is obtained in the second stage. Using the results of both stages, a system of unconditional derived demand equations is derived.

In the first stage a competitive firm seeks to identify the profit-maximizing level of output by equating marginal cost with marginal revenue. This procedure yields the differential output supply equation

$$(1) \qquad d(\log Q^*) = \varphi\, d(\log p^*) + \sum_{j=1}^{N} \pi_j\, d(\log w_j)$$

where Q^*, p^* and w_i represent the output, output price and the price of inputs respectively; φ and π are the price elasticity of supply and the elasticity of supply with respect to input prices respectively. N is the total number of inputs used in production.

In the second stage the differential factor demand model is derived, which will be used to estimate the system of source specific derived demand equations. This model is specified as

$$(2) \qquad f_i\, d(\log x_i) = \theta_i^* d(\log X) + \sum_{j=1}^{n} \pi_{ij}^*\, d(\log w_j)$$

where f_i is the factor share of imported good x from source country i in total input cost; x_i and w_i represent the quantity and price of inputs which include the price of each imported good from source country i; $d(\log X) = \sum_{i=1}^{n} f_{it}\, d(\log x_t)$ where $d(\log X)$ is the Divisia volume input index; θ_i^* is the mean share of the i^{th} input in the marginal cost of the firm; π_{ij}^* is the conditional price coefficient between the i^{th} and j^{th} importing sources or inputs; n is the number of inputs in the system, $n \in N$.

The differential factor demand model requires that the following parameter restrictions be met in order for the model to conform to theoretical considerations:

$\sum_j \pi_{ij}^* = 0$ (homogeneity), and

$\pi_{ij}^* = \pi_{ji}^*$ (symmetry).

The second stage procedure results in the conditional own price/cross price elasticity

(3) $$\varepsilon_{xw}^{c} = \frac{d(\log x_i)}{d(\log w_j)} = \frac{\pi_{ij}^*}{f_i},$$

and the conditional Divisia volume input elasticity,

(4) $$\varepsilon_{xX} = \frac{d(\log x_i)}{d(\log X)} = \frac{\theta_i^*}{f_i}.$$

Using the relationship between the Divisia volume input index and output, $d(\log X) = \gamma\, d(\log Q^*)$, equation (1) can be substituted into equation (2) to yield the unconditional derived demand system

(5) $$f_i\, d(\log x_i) = \theta_i^* \gamma [\varphi\, d(\log p^*) + \sum_{j=1}^{n} \pi_j\, d(\log w_j)] + \sum_{j=1}^{n} \pi_{ij}^*\, d(\log w_j).$$ [1]

1. γ is the elasticity of cost with respect to a proportionate output increase (Laitinen, 113).

From equation (5) we get the unconditional derived demand elasticities, the elasticity of input demand with respect to output price

(6) $$\varepsilon_{xp} = \frac{d(\log x_i)}{d(\log p^*)} = \gamma\varepsilon_{xX}\ \varphi\,,$$

and the unconditional own price/cross price elasticity of input demand

(7) $$\varepsilon_{xw} = \frac{d(\log x_i)}{d(\log w_j)} = \gamma\ \varepsilon_{xX}\ \pi_j + \varepsilon^c_{xw}\,.$$

Lastly we get the unconditional elasticity of derived demand with respect to the price of an input contained in *N* but not in *n*

(8) $$\varepsilon_{xw} = \frac{d(\log x_i)}{d(\log w_j)} = \gamma\varepsilon_{xX}\ \pi_j\,.$$

Equation (8) measures the affect of inputs that are not in the system of derived demand equations but are in the first stage estimation. Labor and other inputs are examples of these types of inputs.

Application to the Derived Demand for Imported Cheese in Japan

This study assess the competitiveness of cheese imports into Japan from the U.S. compared to cheese imported from other countries such as the EU, Australia, and New Zealand. Following Armington, similar imported dairy products such as US cheese and EU cheese are individual goods that are part of the product group cheese, but different based on country of origin. There are a number of reasons why similar products are viewed as different based on their source country of origin. Dairy products from different sources may actually be physically different. Physical differences include quality, protein, fat content, and taste. There may also be perceived differences, such as a country's reputation for a quality product, trade history, reliability and consistency, and political issues tied to trade (Zhou & Novakovic, 1996). The crux of this assumption is that within an importing country, a particular dairy product imported from a given source is considered a substitute for that same product from another source. However, because of the physical and perceived differences attributed to the product due to its origin, these products are imperfect substitutes.

In this paper it is assumed that dairy products are imported through firms that exclusively import. Although, there are firms within Japan that import cheese as well as transform cheese into other products, it is assume that there is a separate entity within the firm that deals primarily with the procurement of imported cheese. Also, cheese imports through this type of firm make up a smaller percentage of imports in Japan. In addition to providing imported products to other firms, these firms also provide the services that are associated with importing. These services include, search and acquisition, transportation, logistics, and storing. A major characteristic of this firm type is that it deals primarily in imported goods. This suggests that the procurement of imported goods by firms is a unique process separate from the procurement of similar products produced domestically. Even if the firm is a subsidiary or branch of a larger firm that purchases domestic and foreign produced inputs, it is not unlikely that the subsidiary that is responsible for imported inputs deals primarily in this activity. This is because the acquisition of foreign produced goods is more involved than purchasing domestically produced goods.

If we assume a production function for these firms, then the output of these firms is the imported goods that are sold to other firms and the inputs are the imported goods from the various exporting countries. If we minimize cost subject to this function, the system of input demand equations resulting from the optimization procedure will be a system of import demand equations. If we assume product differentiation across source countries, then each import demand equation represents the demand for a product from a particular source.

In the first stage the importing firm seeks to maximize profit by equating marginal cost with marginal revenue. This procedure yields the differential output supply equation (expressed in finite log changes with disturbance term)

$$(9) \qquad \Delta Q_t^* = \varphi \Delta \ p_t^* \ + \sum_{j=1}^{N} \pi_j \Delta w_{jt} + \varepsilon_{it}$$

where $\Delta Q_t = \log(Q_t / Q_{t-1})$, $\Delta p_t = \log(p_t / p_{t-1})$ and $\Delta w_{it} = \log(w_{it} / w_{it-1})$, where *q*, *p* and w_i*'s* represent the output, output price and input prices; φ and π are the parameters to be estimated which are also the own-price elasticity of supply and the elasticity of supply with respect to input prices respectively; ε_{it} is the disturbance term. *Q** represents Japan's total imports of cheese that is to be supplied, *p* is the price which firms in Japan sell cheese, and the w_i 's are the prices paid for cheese imports from each of the exporting countries, the price of labor (wages), and the price of other inputs used. *N* is the total number of inputs used in production.

In the second stage the differential factor demand model is derived, which is used to estimate the system of derived demand equations where each equation is the derived demand for imported cheese from a particular source. This model is specified as follows (expressed in finite log changes with disturbance term)

$$(10) \qquad \bar{f}_{it} \Delta x_{it} = \theta_i^* \Delta X_t + \sum_{j=1}^{n} \pi_{ij}^* \Delta w_{jt} + \varepsilon_{it}$$

where $\bar{f}_{it} = (f_{it} + f_{it-1})/2$; $\Delta x_{it} = \log(x_{it} / x_{it-1})$ and $\Delta w_{it} = \log(w_{it} / w_{it-1})$, where x_i and w_i represent the quantity and price of imported cheese from source country *i*; $\Delta X_t = \sum_{i=1}^{n} \bar{f}_{it} \Delta x_{it}$ where ΔX_t is the finite version Divisia volume input index; θ_i^* and π_{ij}^* parameters to be estimated; *n* is the number of inputs in the system; ε_{it} is the disturbance term.

In addition to the imports from each individual source country, labor and other inputs are used in the production process. Here we assume that labor and other inputs are independent of the source specific cheese imports. This is to say that although labor and other inputs affect the total to be imported these inputs do not directly affect the amount imported from an individual source country.

Estimation of the system of derived demand equations, equation (10) and the output supple equation, equation (9), will be accomplished using the LSQ procedure in the econometric program package Time Series Processor (TSP), version 4.4. The LSQ procedure in TSP when estimating the seemingly unrelated regression problem uses the multivariate Gauss-Newton method to estimate the parameters in the system. This procedure generates parameter estimates, standard errors, and probability values; also, a goodness of fit measure for each equation (R^2), the Durbin Watson statistic for each equation, and the log likelihood function value for the system. (Hall and Cummins, 1998)

Forecasting Procedure

An objective of this study is to project Japan's future derived demand for imported cheese given the reduction in export subsidies mandated by the WTO. Elasticity based forecast are derived using an approach similar to the approach used by Kastens and Brester (1996). The elasticity-based forecasting equation for the differential factor demand model is

(11) $$x_{i,t} = \left(\sum_{j=1}^{n} \varepsilon_{ij} \left[\frac{w_{jt} - w_{jt-1}}{w_{jt-1}} \right] \right) x_{it-1} + x_{it-1}$$

where the ε_{ij}'s are the unconditional price elasticities evaluated at the mean.

Future imported quantities of cheese from subsidy reductions are simulated until the year 2003, which is the first half of the new World Trade Organization (WTO) implementation period. The EU is the only country that subsidizes cheese to Japan. Although the U.S. subsidizes dairy exports, subsidized exports to Asian countries overall have been negligible.

In order to assess the effects of subsidy reductions on the quantity of imported cheese demanded by Japan, we must first know how subsidy reductions affect the price that an individual exporting country charges. Since export subsidies are a policy exclusive to the exporting country, the importing country only realizes a lower price for the products exported under subsidy. Since we are assuming that imported products are differentiated by country of origin, we can view the EU-cheese market as a separate market when analyzing the effects of export subsidy changes. When subsidies are reduced, this result in a fall in the total exported, thereby increasing the world price of EU-cheese. The increase in the world price is the only change realized in the Japanese market for EU-cheese. This indicates that a reduction in export subsidies can be simulated in the differential demand model by increasing the price of the subsidized commodity. However, what is still needed is the effect of a subsidy reduction on prices. Gardner (1987) shows that the elasticity of demand price with respect to a 1 percent change in a producer subsidy payment is

$$(12) \qquad \frac{\%\Delta P}{\%\Delta V} = \frac{-1}{1-\eta/\varepsilon}$$

where P is the demand price, V is the subsidy payment, η and ε are the own price demand and supply elasticity respectively. Applying equation (7) to export subsidies, it becomes the percentage change in the world price of the subsidized product resulting from a 1 percent change in export subsidy payments. The resulting change in price will then be used in the forecasting procedures to assess the changes in import demand.

Empirical Results

The Commodity Trade Statistics section of the United Nations provided the data used in this study. Imported quantities are in metric tons and values are in $1000US. Source countries are the U.S., Australia, New Zealand, and the EU. The time period for the data set was from 1962 to 1998. The value of imports was on a cost, insurance, and freight (CIF) basis, which include the cost of the product, the insurance paid, and the transportation cost. Commodity prices were calculated by dividing the value of the commodity imported by the quantity, which results in a per-unit cost per kilogram measure. The rest of the world quantities and values were calculated by subtracting from the total quantity and value imported the quantity and value from the U.S., Australia, New Zealand, and the EU. First stage estimation required the domestic wholesale price of cheese in Japan. The Statistic Bureau Management and Coordination Agency report this price series for the Government of Japan. To account for the labor requirement in the importation of cheese, an index of Japan's hourly wages was included in the estimation (US Department of Labor). To account for other inputs an industry input price index was also included (Economagic.com).

In addition to autocorrelation, LR tests were also used to test if the data satisfied the economic properties, homogeneity and symmetry. The results of these tests are summarized in Table 1. LR tests indicate that the property of homogeneity was rejected by at least the .05 significance level. However, Laitinen's test for homogeneity, which is a more precise test, indicated that homogeneity could not be rejected. Given the homogeneity constraint, symmetry could not be rejected at the .05 significance level.

Table 2 displays the fully constrained (homogeneity and symmetry imposed) parameter estimates for Japan's derived demand for imported cheese. All own-price parameter estimates

Table 1 Likelihood ratio test results for economic constraints

Country/Product	Model	Log-likelihood Value	LR*	**P[$\chi^2_{(j)}$ ≤LR*]=.95**
Japan Cheese	Unrestricted	367.369		
	Homogeneity	362.395	9.948	9.49(4)[a]
	Symmetry	356.428	11.934	12.60(6)
	Laitinen's Test			
		W*[b]	*P*[T^2≤W*]=.95[c]	
Japan Cheese	Homogeneity	4.027	12.133	

[a] The number of restrictions are in parenthesis.
[b] W* is the Wald statistic for the homogeneity constraint.
[c] T^2 is the Hotelling's T^2 statistic.

are negative as to be expected, and the estimates for the U.S., New Zealand, and the EU are significant by at least the .05 significance level. All of the estimates for the marginal factor shares are highly significant for each equation and are all positive indicating that as total imports increase, imports from each source country should also increase as well. Of all the cross-price coefficients, only two are not significantly different from zero. These are the U.S.-ROW and the Australia-EU coefficients. Both cross-price coefficients indicate that US cheese and cheese from other sources, and Australia and EU cheese are substitutes in Japan. All other cross-price coefficients indicate little to no relationship in other cheese imports.

Divisia index and price elasticities evaluated at the mean are presented in Table 3. The Divisia index elasticities for the U.S. Australia, New Zealand, EU, and the ROW are 0.855, 1.224, 0.727, 0.674, and 1.636 respectively. These elasticities indicate that as imports of total cheese into Japan increases, imports from the ROW should increase by the larger percent when compare to the percentage increase in imports from all other sources. Second in terms of percentage increase would be the U.S. Own-price elasticities for the U.S., Australia, New

Table 2 DFAM parameter estimates for Japan imports of cheese

Exporting Country	Price Coefficients, π_{ij} U.S.	Australia	New Zealand	EU	ROW[a]	Marginal Factor Shares, θ_i
U.S.	.-0246 (.0068)[b]***	.0044 (.0202)	.0007 (.0187)	-.0099 (.0117)	.0293 (.0169)*	.0243 (.0061)***
Australia		-.1752 (.1151)	.1162 (.0965)	.1405 (.0640)**	-.0860 (.0757)	.3449 (.0356)***
New Zealand			-.2121 (.1007)**	.0153 (.0470)	.0798 (.0702)	.1766 (.0242)***
EU				-.1950 (.0976)**	.0490 (.0830)	.1937 (.0530)***
ROW					-.0722 (.1145)	.2605 (.0414)***
System R^2 = .81						

[a] ROW= rest of the world.
[b] Asymptotic standard errors are in parentheses.
*** Significant level = .01
** Significant level = .05
* Significant level = .10

Zealand, EU and the ROW are -0.867, -0.621, -0.873, -0.678, and -0.453 respectively. All own-price elasticities, with the exception of Australia and the ROW are significant. These elasticities indicate inelastic demand for imported cheese in Japan, with the demand for ROW cheese being the most inelastic. The own price elasticities for the U.S. and New Zealand are more elastic than the elasticities for Australia and the EU. This indicates that as prices increase, the percentage decrease in quantities imported from Australia and the EU will be smaller when compared to the U.S. and New Zealand. Cross-price elasticities indicate a high degree of substitutability between cheese from the U.S. and the ROW (1.034). The U.S. is also a substitute for the ROW but to a

Table 3 Japan Divisia and price elasticities of the derived demand for imported cheese

Exporting Country	Divisia Import	Conditional Own-Price	Conditional Cross-Price: U.S.	Australia	New Zealand	EU	ROW[a]
U.S.	*.855*[b]	*-.867*		.156	.024	-.347	*1.034*
	(.213)[c]	(.239)		(.711)	(.660)	(.411)	(.594)
Australia	*1.224*	-.621	.016		.412	*.498*	-.305
	(.126)	(.408)	(.071)		(.342)	(.226)	(.268)
New Zealand	*.727*	*-.873*	.003	.478		.063	.329
	(.099)	(.414)	(.077)	(.397)		(.193)	(.288)
EU	*.674*	*-.678*	-.034	*.489*	.053		.170
	(.184)	(.346)	(.040)	(.223)	(.163)		(.289)
ROW	*1.636*	-.453	*.184*	-.540	.501	.308	
	(.422)	(.719)	(.106)	(.476)	(.440)	(.521)	

[a]ROW = rest of the world.
[b] *Italics* indicates that the elasticity was significant by at least .10.
[c] Asymptotic standard errors are in parentheses.

lesser extent (.184). Cross-price elasticities also indicate that Australia and EU cheeses are substitutes as well, both elasticities are about .500 (Table 3).

First stage estimation required the estimation of equation (9), which is the output supply equation. Results are presented in Table 4. All are parameter estimates are not significantly different from zero. Parameter estimates for Australia and ROW prices are the only estimates with the correct sign.

Using the output supply results and equations (6) through (8) the unconditional elasticities of derived demand were obtained. Results are presented in Table 5. All elasticity estimates are significant with the exception of the EU/U.S. cross-price elasticity. Due to parameter estimates in the output supply equation for output price, wage and input price index having the wrong sign, the unconditional elasticities for these variables also have the wrong sign.

Table 4 Parameter estimates for the supply of cheese in Japan

Input Price Coefficients, π_{ij}							Output Price Coefficient
U.S.	Australia	New Zealand	EU	ROW[a]	Wage	Input price index	
.1332 (.2335)[b]	-.2286 (.6481)	.5270 (.7343)	.1887 (.2471)	-.3168 (.7036)	.6700 (.4238)	.1699 (1.3589)	-.4409 (.4074)
$R^2 = .15$							

[a] ROW= rest of the world.

[b] Asymptotic standard errors are in parentheses.

Unconditional elasticities also indicate that cheese import from the source countries are for the most part substitutes. However, U.S. cheese and EU cheese are complements, as well as Australia and the rest of the world. The complementary relationship between the U.S. and the EU only occurs when EU prices change, however U.S. prices appear to have no effect on Japan's imports of EU cheese.

Out of commitment to the Uruguay Round (UR) General Agreement on Tariffs and Trade (GATT), the EU has agreed to reduce export subsidy expenditures by 36 percent during the period 1995 to 2000. The question thus arises, how will import quantities change given the continuation of this policy or that new trade policy is more aggressive. Equation (14) was used to assess the percentage change in demand price resulting from a percentage change in a producer subsidy payment. Zhu et al. (1998) indicates that the own-price supply elasticity for the EU is .65

Table 5 Unconditional elasticities of derived demand

					Elasticities				
Exporting Country	Output Price	Wage	Input price index	Own-Price	Cross-Price				
					U.S.	Australia	New Zealand	EU	ROW[a]
U.S.	**-.1531**[b] (.038)[c]	**.2327** (.058)	**.0590** (.015)	**-.8210** (.012)		**.0767** (.020)	**.2074** (.046)	**-.2815** (.016)	**.9238** (.027)
Australia	**-.2192** (.023)	**.3331** (.034)	**.0845** (.009)	**-.7350** (.012)	**.0819** (.007)		**.6742** (.027)	**.5921** (.010)	**-.4624** (.0160
New Zealand	**-.1303** (.018)	**.1979** (.027)	**.0502** (.007)	**-7174** (.021)	**.0422** (.005)	**.4109** (.009)		**.1189** (.008)	**.2350** (.013)
EU	**-.1207** (.033)	**.1834** (.050)	**.0465** (.013)	**-.6264** (.014)	.0022 (.009)	**.4260** (.017)	**.1977** (.039)		**.0837** (.024)
ROW	**-.2930** (.047)	**.4453** (.071)	**.1129** (.018)	**-.6638** (.034)	**.2728** (.014)	**-.6916** (.024)	**.8513** (.056)	**.4330** (.020)	

[a] ROW = rest of the world.
[b] **Bold** indicate that the elasticity was significant by at least .10.
[c] Asymptotic standard errors are in parentheses.

for all milk produced and the own-price demand elasticity for cheese and dry milk is -0.40. Using these elasticities in equation (14), the elasticity of the cheese demand price with respect to a subsidy payment is -0.619. A 36 percent reduction over a six-year period is a 6 percent per year reduction on average. Using -0.619, a 6 percent subsidy reduction results in a 3.7 percent increase in the demand price per year. A 72 percent subsidy reduction over a six-year period results in a 7.43 percent per year increase in the demand price. These percentages are use to simulate the effects of EU subsidy reductions at the current rate and twice the current rate. Since the UR GATT implementation period ends the year 2000, the 72 percent reduction is applied to the period 2001 to 2003.

Table 6 presents the expected quantities of cheese imported into Japan if the upcoming World Trade Organization (WTO) agreement continues subsidy reduction at the current rate or twice the rate of the UR GATT agreement. Although the parameter estimate and cross-price elasticity for the U.S. and EU was insignificant, it was also negative, indicating a complementary relationship between cheese from the EU and the U.S. As a result, EU subsidy reductions resulted in and decrease in the quantity of cheese imported from the U.S. If subsidy reduction were to continue at the same pace in the upcoming WTO agreement, Japan imports of cheese from the U.S. is expected to fall by 151 metric tons to 4,044 metric ton by the year 2003. If reduction were to double beginning the year 2001, imports would decrease even more to 3,896 metric tons. The primary beneficiary to a reduction in export subsidies is Australia. For the period 1999 to 2003, cheese imports from Australia are expected to increase to 78,774 metric tons if subsidy reductions in the future are at the same pace, and increase to 83,970 metric tons if the rate in subsidy reductions doubled beginning 2001. In both scenarios imports from Australia are expected to increase by 6,500 and 11,760 metric tons for the 36 percent and 72 percent reduction scenarios respectively and imports quantities in the year 2003 are expected to be 78,774 and 83,970 metric tons respectively. Import from New Zealand are expected to increase but by a smaller amount. For the period 1999 to 2003, cheese imports from New Zealand are expected to increase by 955 and 1680 metric tons for the 36 percent and 72 percent reduction scenarios respectively and ending quantities by the year 2003 for both policies are 54,701 and 54,426 metric tons respectively. The unconditional own price demand elasticity for the EU is – 0.626, which indicates inelastic demand. As a result imports from the EU decreased by 3,400

Table 6 Japan cheese imports given a 36 and 72 percent EU export subsidy reduction: 1999-2003

Year	U.S.	Australia	New Zealand	EU	ROW[a]
			36% Subsidy Reduction:1999-03		
			Metric tons		
1999	4,194.69	72,209.82	53,745.34	37,869.93	16,456.86
2000	4,150.84	73,797.81	53,982.73	36,988.86	16,644.85
2001	4,107.45	75,420.73	54,221.16	36,128.29	16,834.99
2002	4,064.51	77,079.33	54,460.65	35,287.73	17,027.30
2003	4,044.02	78,774.41	54,701.19	34,466.73	17,221.80
			36% Subsidy Reduction:1999-00 72% Subsidy Reduction:2001-03		
1999	4,194.69	72,209.82	53,745.34	37,869.94	16,456.86
2000	4,150.84	73,797.81	53,982.73	36,988.86	16,644.85
2001	4,064.06	77,043.64	54,459.59	35,267.71	17,025.12
2002	3,979.09	80,432.23	54,940.67	33,626.65	17,414.08
2003	3,895.90	83,969.86	55,426.00	32,061.94	17,811.93

[a] ROW = rest of the world.

metric tons for the period 1999 to 2003 when reduction were maintained at 36 percent. If reduction were twice the previous rate, imports would have decreased by 5,808 metric tons. Ending quantities for the EU by the year 2003 for both policy scenarios are 34,466 and 32,062 metric tons respectively. Imports from all other sources are expected to increase by 765 metric tons and 1,355 metric tons if reductions were 36 percent and 72 percent respectively.

Summary and Conclusion

This study is an attempt to assess the competitiveness of U.S. cheese imported into Japan when compared to cheese imported from other countries. Overall the own-price elasticities for all the exporting countries consider indicated that Japan's demand for cheese is inelastic. The Divisia Import elasticities indicate that as total cheese imports increase the largest percentage increase in source-specific imports will be from the rest of the world, second Australia, then the U.S.

The Japanese market is one of the world largest markets for imported cheese, however, estimation and simulation results suggest that the U.S. will see little benefit from EU subsidy reductions. Although result indicate a possible reduction in imports of U.S. cheese as a result of EU subsidy reduction, imports from the U.S. may remain steady or even possibly increase. However, results indicate that the primary beneficiary of subsidy reductions is likely to be Australia. According to results imports of Australia cheese into Japan is projected to increase by as much as 16.67 percent.

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