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An Economic Model of U.S. Imports of Butter and Milk Fat Products

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Abstract:

This study developed a model to explain monthly imports of butter and butter substitutes. The U.S. imports butter and other high milk fat products that can substitute for a strict definition of butter. These products include dairy spreads, butter substitutes, anhydrous milk fat, and food preparations. The U.S. imports these high milk fat products under a tariff-rate quota system (TRQ) implemented by the World Trade Organization (WTO). This study quantified all the milk fat contained in U.S. butter and butter substitute imports. A conceptual model was developed to explain imports of these products under a TRQ system. And an econometric model was estimated to analyze the economic factors that drive over-quota imports. The model found that the wedge between U.S. and world butter prices explains much of the incentive to import over-quota butter and butter substitutes.

Keywords: butter imports, tariff rate quota

Dairy farmers have been increasingly concerned about rising imports of dairy products since the conclusion of the Uruguay Round of the General Agreement on Tariffs and Trade (GATT). The U.S. Congress considered proposed legislation in 2003 and 2004 that would raise tariffs on certain dry milk proteins including casein, caseinates, and Milk Protein Concentrates (MPC). That request led to an investigation and hearing conducted by the U.S. International Trade Commission (USITC 2004). In addition to rising protein imports, there were other requests for trade restrictions. During the fall of 2004 the National Milk Producers Federation, a trade association representing U.S. dairy cooperatives, cited safeguard provisions from the Uruguay Round agreement on agriculture and petitioned the USDA to raise tariffs on butter imports

(NMPF 2004). That petition cited concern that butter product imports during the first nine months of 2004 grew more than 100 percent from the previous period.

The USITC hearing raised a number of interesting issues relative to trade in dairy products. First, how does one assess dairy trade when so many different products with alternative levels of dairy components are entering the country each year. Raw milk contains three major dairy components: milk fat, protein, and lactose. Imported dairy commodities contain various levels of these fundamental milk components. For example, under the Harmonized Tariff Schedule which was developed under the World Trade Organization (WTO), dried protein can enter the U.S. under a number of alternative HTS codes. Each of these codes has an alternative protein level and tariff schedule (i.e nonfat dry milk, MPC, or casein). So how does one assess whether total protein imports are significant relative to U.S. supply and demand for milk protein? The same issue exists for products containing large amounts of milk fat. How does one assess butter imports when so many products are now entering the U.S. that directly substitute for domestically produced butter? Second, what are the factors that could raise or lower dairy imports from one month to the next? This is an important issue since there has been concern that higher levels of dairy imports have depressed U.S. farm-gate milk prices.

The objectives of this study are two fold. First, the study will focus on imports of butter and milk fat products that substitute for butter. This will involve analyzing all HTS import codes that reflect significant quantities of butter and milk fat. It will also involve quantifying the milk fat content of all these imports based on a methodology developed by Bailey (2004). Second, an econometric model will be developed to analyze the factors that affect monthly imports of butter and milk fat products into the U.S. This model will then be used for forecasting purposes.

Dairy Import Literature Review

Novakovic and Thompson developed an econometric model of the U.S. dairy industry in order to study the effects of increased dairy imports on the U.S. dairy industry (1977). An annual simultaneous equations model was developed using five major product groups: fluid milk, American cheese, butter, nonfat dry milk, and frozen desserts. Imports of butter, American cheese, and nonfat dry milk were treated as exogenous due to the inelastic nature of Section 22 import quotas. A base year of 1974 was chose for the analysis. Salathe, Dobson and Peterson (1977) developed a quarterly recursive simulation model of the U.S. dairy industry to analyze four alternative import levels during the period 1976-80. Imports were exogenous and consisted of net cheese, butter, and other dairy products having a milk equivalent volume at alternative levels.

These earlier studies provided some insight into the impact of imports on the U.S. dairy industry, particularly on milk prices. However, they provided no insight into factors that explained trade. In addition, these earlier models were limited to imports of dairy products that fell under the strict definitions of Section 22 import controls.

Bailey (2002) analyzed the factors that lead to higher levels of imports of MPC. The latter is generally referred to as a dried protein product derived from milk using ultra filtration technology. Bailey used monthly trade data and analyzed an econometric model of MPC imports. This model investigated the relationship between MPC imports and relative U.S. domestic and world prices for nonfat dry milk. Gehrke, Babula, and Coleman (2004) more recently developed a vector autoregressive model to explain the factors affecting U.S. imports of MPC from the European Union (EU) during the period 1998-2002. Among the variables they analyzed was the gap between the U.S. support price and the EU export price of nonfat dry milk, and EU export refunds and casein production subsidies. Both of these studies estimated an econometric model of monthly dairy imports and linked them to the U.S.-world price gap.

TRQ Model

The Uruguay Round of Multilateral Trade Negotiations was completed in 1994 and replaced the GATT as an institutional framework with the WTO. One of the most significant accomplishments of the Uruguay Round was its focus on agriculture, which fundamentally changed the rules for trade (USDA 1998). Under the agreement, members converted all non-tariff agricultural barriers to tariffs and agreed to reduce these tariffs over time. Tariff rate quotas (TRQ's) were established to maintain historical trade volumes and assure increase access to highly protected markets. TRQ's employ two levels of tariffs for imported goods. Boughner et al. (2000) note that a TRQ is an import quota combined with two tariff levels. The first tier tariff, called here the quota tariff, is for imports within the quota. The second tariff, which is much higher than the quota tariff, is for imports above the quota level.

A conceptual model for U.S. butter and milk fat imports was developed based on the Morath-Sheldon TRQ model that applies the tariffs to the excess supply curves for the rest-of-the-world. This model is presented in Figure 1. A TRQ employs two tariff levels, one for the quota and a second higher tariff on all over-quote imports. In Figure 1 the first tariff, T_q, applies to all imports up to the binding quota QT. The quota tariff effectively raises the excess supply schedule for the rest-of-the-world ES_{ROW} to ES'_{ROW} by the amount of the tariff. The tariff forms a wedge between the domestic and world price, thus lowering imports. Given the position of ED_{us}, imports are now reduced from Q* to QT. The domestic price is raised to P'_{us} and the world price is lowered to P'_{w}. The difference between these two prices is the quota tariff T_q. The revenue generated by the quota tariff is the shaded box.

The second part of the TRQ is the over quota or high-tier tariff $T_{oq.}$ This duty or tariff only applies to imports above the quota level QT. This is illustrated in Figure 2. Note that the high tier tariff rate T_{oq} is much greater than the quota tariff rate T_q. Thus the true excess supply

curve where equilibrium conditions are to be computed is the thick excess supply curve ES^{**}_{ROW}. For imports that exceed QT the curve becomes ES''_{ROW}. This reflects the extra burden of the over-quota duty T_{oq}. For imports at QT there is a vertical distance that reflects the difference between T_{oq} and T_q. For imports below QT the curve becomes ES'_{ROW}.

In Figure 1 market equilibrium conditions are reflected in the intersection of ED_{US} and ES^{**}_{ROW}. This determines U.S. imports of QT, a U.S. price of P'us, and a world price of P'w. But how would market equilibrium conditions for butter imports under a TRQ change if domestic demand were to suddenly increase? This is reflected in Figure 2 where U.S. excess demand for butter imports shifted from ED_{US} to ED''_{US}.

When the domestic U.S. demand for butter is strong and supply limited the ED curve for the U.S. market will shifted to the right. For each price the U.S. market will demand more butter. The intersection of ED''_{us} and the kinked ES^{**}_{ROW} curve forms a new equilibrium level of imports at Q". This new level of imports consists of QT imports within the quota (subject to tariff T_q) and Q"-QT over-quota imports (subject to the higher tariff T_{oq}). At this level of imports, the quota is no longer binding (imports exceed QT). Domestic prices rise significantly due to the shift in ED and the impact of the higher over-quota tariff T_{oq}. U.S. domestic prices rise from P'_{us} to P''_{us}. In addition, since the U.S. is a large importer, world prices rise from P'_w to P''_w. Within quota tariff revenue is still equal to $QT*T_q$. The over quota tariff revenue is equal to the tariff T_{oq} times the over quota imports Q"-QT. Thus a strong shift in domestic market demand under a two-tiered TRQ for a large importer will result in over-quota imports, a larger wedge between domestic and world prices, higher domestic and world prices, and two sources of tariff revenue for the government.

Quantifying Butter Imports

Prior to the Uruguay Round Agreement, dairy imports were restricted to Section 22 import quotas. This restrictive import policy provided accounted for a limited number of dairy commodities that entered the U.S. under these quotas. Since implementation of the Uruguay Round, a much larger number of dairy commodities, or products with significant quantities of dairy ingredients, are eligible and regularly enter the U.S. Some of these product categories are subject to the TRQ, some face only a limited tariff, and a small number have no tariffs at all. This has made analysis of dairy trade difficult because dairy ingredients can enter the U.S. under a number of different import categories that are assigned by the U.S. Customs.

The WTO created the Harmonized Tariff Schedule (HTS) to assign individual products to a numbered classification system. Customs authorities around the world use this system to classify products and assign duties and taxes. HTS codes are typically 6 to 10 digits long. The U.S. HTS is published by the U.S. International Trade Commission (2004b). Milk and dairy products are contained in Chapter 4 of the U.S. HTS, although many products that contain significant amounts of dairy ingredients are classified in other HTS chapters. Butter is defined in the schedule as a product derived exclusively from milk that contains 80-95 percent by weight of milk fat. However, the U.S. imports many other products that contain milk fat and therefore can substitute with this strict definition of butter. These include dairy spreads, butter substitutes, anhydrous milk fat, and food preparations. Most of these butter and butter-like products are located under heading 04 and subheading 05 in the U.S. HTS. There are 17 separate HTS codes in the 2004 U.S. HTS under this heading and subheading for butter.

Table 1 contains a partial listing of the major butter and butter substitute products that enter the U.S. in a given year. This is not an exhaustive list since some products that contain a substantial portion of milk fat could be imported into the U.S. as a food product, which is not

listed here. Note that Table 1 contains columns "TRQ status" and "TRQ notes." These differentiate each product according to whether there is an applicable quota. Most products in the U.S. HTS generally have 3 HTS codes. One code is referred to as General Note 15 of the U.S. HTS. It does not refer to any specific quota. Items under this category are exclusions and classified for market samples, government use, or products which do not enter commerce. Imports under this category are very limited. The next code refers to an applicable quota. These items reference an additional note in the U.S. HTS that lists all the HTS codes that apply to a specific quota. The last category of codes refers to products that exceed a specific quota. This difference in codes is useful to customs authorities since the tariffs that are applied to over-quota products are greater than those within the quota.

Butter for example has an HTS code of 040510. An additional two digits is then added to reflect whether imports fall under General Note 15, quota, or over-quota. Quota butter is subject to Additional Note 6 under the U.S. HTS which states imports of butter and sour and fresh cream shall not exceed 7 million kilograms per year. The tariff rate for quota butter in 2004 was 12.3 cents per kilogram. Butter imported beyond the quota, called over-quota butter, was subject to a higher tariff rate of $1.541 per kilogram.

A final concern is how to quantify imports of butter in a given year. First, all of the HTS codes for butter imports and products that substituted directly with butter were analyzed. In 2004 only 9 of the 19 HTS codes identified had significant levels of imports. These included quota and over quota HTS codes for butter, dairy spreads (non quota), anhydrous milk fat, and food preparation. Following the methodology developed by Bailey (2004) the amount of milk fat contained in these imports were computed by multiplying the imports by the percent milk fat. The amount of milk fat was then normalized by a factor of 80.5 percent to reflect the milk fat

content of U.S. produced butter. The result in Figure 3 indicates that monthly imports of butter and butter substitutes are highly volatile from one year to the next.

Data and Model

With a TRQ there is a strong incentive for importers to maximize trade within the quota. That's because the TRQ is designed to ensure profitability for imports within the quota. Within-quota imports face a relatively low tariff and a significant wedge between high domestic prices and lower international prices. Thus estimating an econometric model to explain within-quota imports is not necessary. However, what are less obvious are the economic factors that determine imports outside of the quota. Profits are not guaranteed for traders since high tariff levels often bridge the gap between volatile domestic and international prices.

A general model is specified below to explain imports of dairy products based on an earlier model by Bailey (2002). In this case the model is specified for over-quota imports of butter as following:

$$(1) \qquad ID_{bt}^{us} = \alpha_{bt}^{us} + \beta_{bt}^{us} P_{bt}^{us} + \delta_{bt}^{us} P_{bt}^{w} + \gamma_{bt}^{us} T_{bt}^{oq} + \lambda_{bt}^{us} Z_{bt}^{us} + \mu_{bt}^{us}$$

U.S. import demand for over-quota butter imports (ID_{bt}^{us}) is a function of domestic butter prices (P_{bt}^{us}) and world butter prices (P_{bt}^{w}), over quota tariffs (T_{bt}^{oq}), and a vector of demand shifters (Z_{bt}^{us}) which indicates all other factors that affects import demand. Often the U.S. price is much higher than the world price due to import restrictions and other domestic policies. One would expect a positive coefficient for P_{bt}^{us} and a negative coefficient for P_{bt}^{w} since over-quota imports are expected to increase whenever the gap between domestic U.S. and world prices increases. The α, β, δ, γ, λ are notations that represent unknown coefficients to be estimated, and μ denotes a random error term.

Next, using the general import demand model defined above, individual import demand functions were specified for three dairy products based on an analysis of over-quota imports of butter and butter substitute products. This analysis examined the HTS codes for all imported dairy products that contained significant quantities of butter and milk fat products that directly substitute for butter. This analysis identified butter, dairy spreads, and food preparation. Butter contains 80% to 95% milk fat. Dairy spread is defined as one kind of butter substitute, whether in liquid or solid state, containing 45% to 80% milk fat. Food preparation contains over 10% milk solids. Bailey noted that binding rulings issued by the U.S. Customs Service indicates that food preparations contain 89 to 97 percent milk fat, with the balance consisting of salt, sugar, and other nondairy products (Bailey 2004).

The econometric model specification for the three types of butter imports is specified below based on the TRQ conceptual model and the butter model defined in equation 1. The model in equation 2 explains over-quota imports for butter and butter substitutes as a function of the price wedge, over quota tariff, and demand shifters:

$$(2) \qquad \ln(ID_i^{us}) = a_1 + a_2 * \ln(\frac{P_i^{us} - P_i^{w}}{T_i^{oq}}) + a_3 * \ln(I / Pop / cpiall) + a_4 * \ln(P_{of})$$

Endogenous Variables:

ID_i^{us} U.S. import demand for product i.

(i = dairy spread, food preparation, and butter)

Exogenous Variables:

P_i^{us} Domestic price of product i.

P_i^{w} World price of product i.

T_i^{oq} Over-quota tariff level for product i.

I U.S. personal disposable income ($ bil.).

Pop Total U.S. population (mil. Persons).

cpiall Consumer Price Index, all items (1982-84=100)

In order to analyze the price effect on the demand for imports, we examined two specifications for the price wedge between the domestic and world prices. First we used the ratio of the domestic price to the import price of dairy products. For the domestic price we used the butter domestic price in all three equations since data sources were limited and we could not get data for butter substitutes. For the world price we used the customs value less the over-quota tariff rate for each dairy product i. Customs value is the value of imports as appraised by the U.S. Customs Service. This price is used in computing ad valorem tariffs. It represents the price actually paid or payable for merchandise, excluding U.S. import duties, freight, insurance, and other charges at the port. We used the custom value of specific milk fat products to proxy the world price. The econometric results from this specification showed no significant impact of the price wedge on over-quota imports.

The second specification of the price wedge used the ratio of (a) the difference between the domestic and world butter prices and (b) the over-quota tariff rate for each HTS product. This is the specification shown in equation 2. Butter prices were used in all three equations for domestic and international prices as proxies for the market value of milk fat products. In other words, we assumed that the world price of butter would be a good proxy for the world price of food preparation. This specification emphasized the significant role that the price wedge and the tariff play in the demand for over-quota imports. The difference of butter domestic price and world price represents a price wedge. If the wedge is equal to or less than the over-quota tariff for a specific product, there will be no incentive to import. However, if the price wedge grows

relative to the tariff, one would expect increased demand for over-quota imports. The econometric results of this specification were more significant than the previous specification.

Using the second specification, we used the price to emphasis the positive impact of the wedge between the domestic and world prices of butter and the over-quota tariff rate on over-quota import demand. Per capital income was included in the model to specify as the variable for demand shifter. We also included P_{of}, the price of other food, in the specifications for dairy spread and food preparation as other demand shifters. This reflects a substitute price that might have an impact on the import demand besides the butter price.

Time effects are also considered in the model. Quarterly and Monthly time dummy variables were initially included in the econometric model to test for seasonal effects of different time periods on over-quota imports. Yet those dummies showed no significant effects and were not included in the model. However, various price lags were tested. It was hypothesized that it would take some time (more than one month) for importers to source product for importing purchases when there was a significant change in domestic and international prices.

The period of study was from January 1997 to December 2003. Monthly data were used for the analysis. The over quota import demand function was specified using a double log model which produces the elasticities of each explanatory variable. The source of import data is from US International Trade Commission interactive tariff and trade data web (usitc.gov) online. The prices of dairy products were from the website of USDA. Tariff data were collected from the Harmonized Tariff Schedule of the United States. The consumer price index was used to deflate the income variable, and the consumer price indexes for other food used to analyze the substitution. The cpi data are from the bureau of labor statistics. SAS Econometric Time series (ETS) software was used to estimate and simulate the three import demand equations for dairy products.

Results

The results of the econometric estimation are presented in Table 2. The model for food preparation has the highest adjusted R^2. The ratio of price wedge in each model showed significantly effect on over-quota import demand which demonstrates our hypothesis that price wedge is the major factor that determines over-quota imports. The results indicate that the domestic price for each dairy product relative to the world price has positive and significant effect on over-quota imports. Increasing domestic price of each dairy product relative to the world price and give a fixed tariff will increase the quantity of imports. World price for butter and over-quota tariff on each dairy product have negative effects on the quantity of imports.

Parameters for per capital income in these models were not statistically significant. It is surprising that there are no significant effects of income on the demands of over-quota imports for these dairy products. The lack of significance of this variable may due to the fact that domestic income level is trivial when facing the world market. Importers do not consider income as an important indicator for over-quota imports of butter and butter substitutes.

In our econometric analysis, we hypothesized that it might take more than 1 month for the importers to respond to the price change and then implement the change of quantity of imports. Lagged price ratios are used in each equation to analyze the lagged price effect. The results showed that only the coefficients of lagged price in the butter model are significant. Only a one month price lag was significant. This suggests that importers are much more responsive to price changes than initially hypothesized.

For time series models, autocorrelation of the errors is a major concern. Autocorrelation biases estimation of the coefficients, rendering the parameter results inefficient. We tested the autocorrelation in the econometric model with AR(1) specification in SAS which indicates one degree of autocorrelation. According to the econometric results, the food preparation and butter

equations showed no signs of autocorrelation of residuals. Only the dairy spread model showed signs of first-order autocorrelation. However, using the AR(1) correction rendered the parameter insignificant and changed the sign. The price wedge specification was significant in the other equations and is theoretically appropriate. Since our overall goal is to construct a relationship between price and over-quota import demand, we dropped the AR(1) correction in the dairy spreads specification. Without a parameter estimate of the correct sign we could not explain the incentive of over-quota imports for dairy spreads. That said, we likely biased our parameter estimation for dairy spread. Future studies and better descriptions of the model for dairy spreads are needed to more precisely estimate the price effects on over-quota dairy spread imports.

Simulation and Forecast

The models were validated by simulating them over the period from 2000 to 2003. The simulation period was reduced to a shorter time period in order to have a systematic estimation due to some missing values of imports in the previous years. The root mean square percentage (RMSP) error was estimated over the simulation period to measure the deviation of the simulated variables from the actual values. The RMSP errors were 0.63% for dairy spread, 17.49% for food preparation, and 1.48% for butter. These values indicate that our models are reasonable in simulation of over quota imports over the relevant time period.

Imports were forecasted monthly for 2004 for butter, dairy spread and food preparation using actual price and income data. The forecasted results were then compared to the actual quantity of imports in 2004. The results are shown in Table 3. The results show that forecasted imports is convergent to the actual import data (Figure 4). Overall, our model is price response, and the trend of our forecasting model follows approximately the same pattern as the actual trend of imports. For dairy spread, the forecasted imports reached a peak in March and April, however

actual imports decreased in March due to a drop in the price. Forecasting for food preparation model is more elastic compared to actual import trend which tended to be relatively unresponsive to price changes. The forecasted imports increased due to a high price ratio in April 2004. Forecasted imports then declined thereafter. Yet actual over-quota imports of food preparation showed little response to price. It showed an almost flat trend and imported less than our forecasted amount.

Forecasted butter imports increased from January 2004 and peaked in May, but declined thereafter. The actual import quantity was much higher than what the model forecasted. The domestic U.S. market was short of milk fat production in 2004, particularly in the spring months. The strong increase in imports indicates that our model specification may not be elastic enough. Imports of over-quota butter responded to a significant price change immediately, resulting in imports greater than the model projected.

Conclusions

The objective of this study was to analyze imports of butter and milk fat products that directly substitute for butter in the domestic U.S. market. This involved analyzing a number of relevant HTS import codes that reflect significant quantities of butter and milk fat. It also involved quantifying the milk fat content of all these imports based on an earlier methodology. This is particularly important in developing a supply and demand accounting system for U.S. butter. Another objective was to estimate an econometric model of U.S. over-quota imports of butter and butter products. A theoretical model was specified and an econometric model was estimated. Such a model could be used for forecasting and or policy analysis purposes.

Our study identified a number of products that enter the U.S. market that contain significant quantities of milk fat that directly substitute for domestically produced butter. We

also specified a price wedge model that reasonably explains dairy trade for over-quota imports. This model can be used for a number of purposes including forecasting and policy analysis. This model format could be expanded to monthly estimation of imports of other key dairy products including cheese and dry proteins. Care must be taken in estimating the correct time lags for the price wedges and correcting for the presence of autocorrelation. Given the potential impact of greater imports of dairy products on the domestic market in light of the current and future WTO, such a model would be useful for both price and policy analysis.

Our study does however result in a number of limitations. We focused on measuring the significant effect of the price wedge relative to the over-quota tariff in explaining imports. Therefore, we only included major price and income factors in our econometric model. Low adjusted R^2 for the dairy spread model suggests that a number of factors explaining the variation in over-quota imports were not captured in the current model specification. Thus other variables are likely important and should be considered in future research. Lastly, greater care must be taken in measuring and correcting for autocorrelation of the error terms in future studies.

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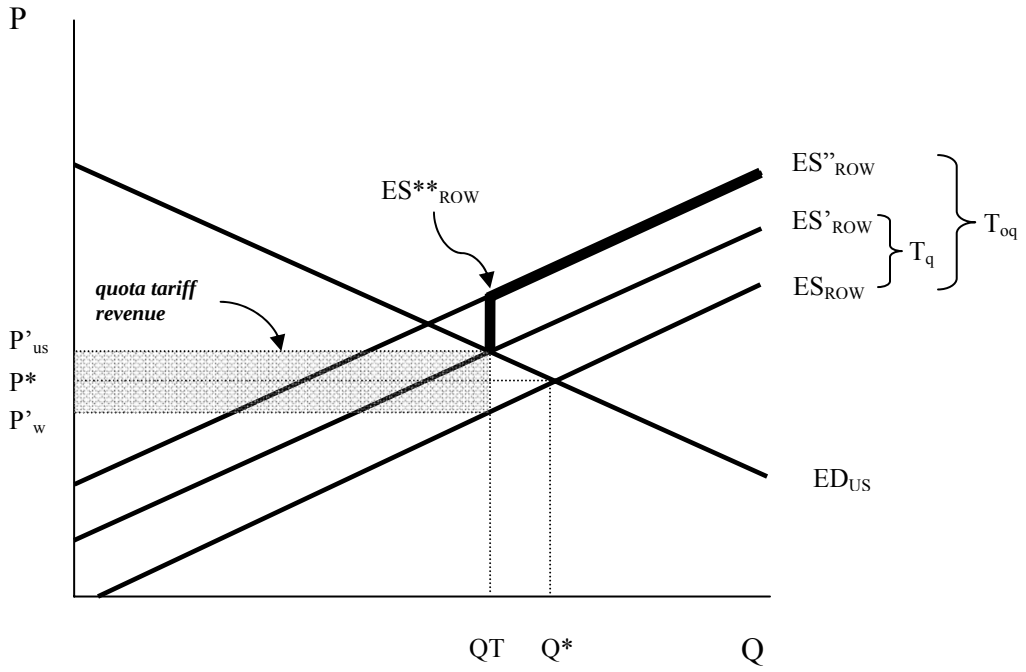


Figure 1. Morath-Sheldon Tariff Rate Quota Model of U.S. Imports at a Binding Quota Level

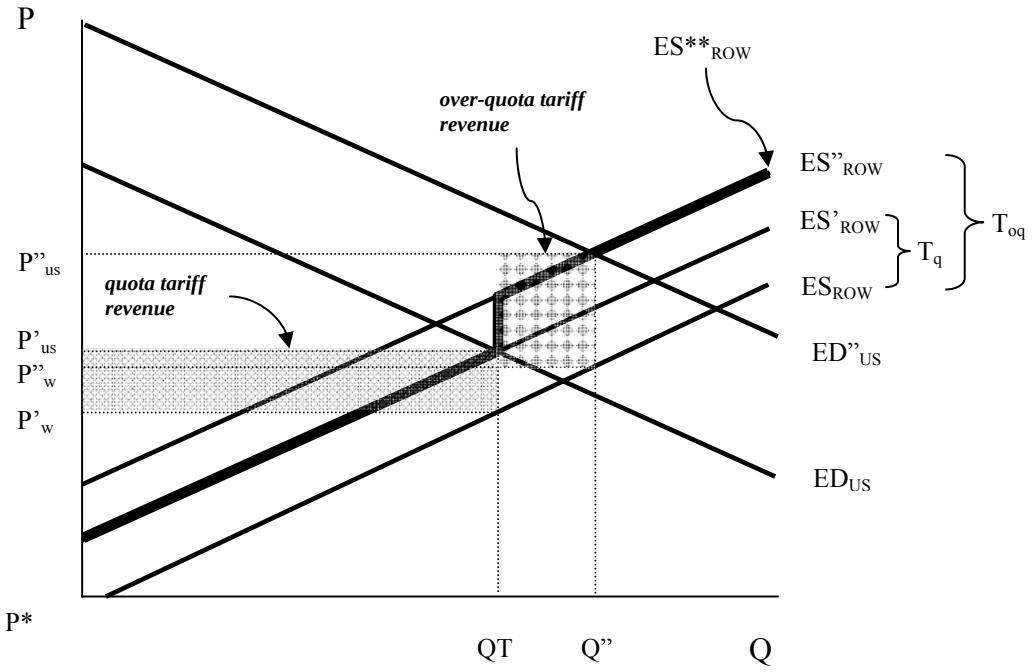
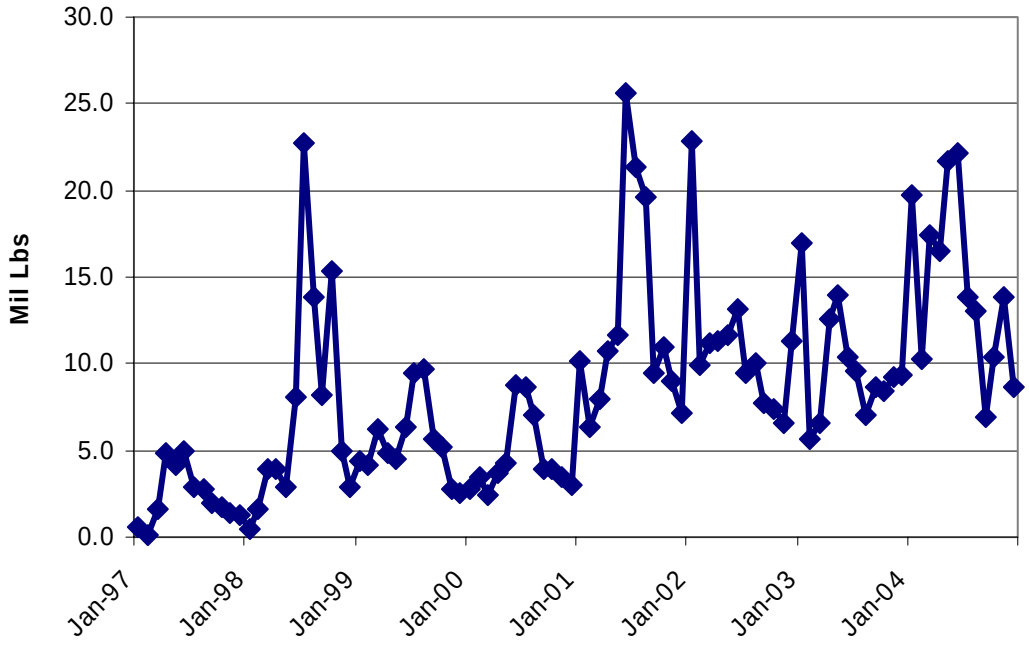


Figure 2. Impact of a Shift in U.S. Demand with Imports Above a Binding Quota Level



Note: butter equivalent is 80.5 percent milkfat.

Figure 3. U.S. Imports of Butter and Butter Substitutes in U.S. Butter Equivalents

Table 1. U.S. Customs Classifications for Butter and Butter Substitute Products as Classified Under the U.S. Harmonized Tariff Schedule for 2004

HTS Chapter	Sub Heading	HTS Code	Description	Milkfat Level (%)	TR Status	TRQ Note	Tariff 2004
4	5	0405100500	Butter	80-95	NQ	GN15	12.3¢/kg
4	5	0405101000	Butter	80-95	QT	AD6	12.3¢/kg
4	5	0405102000	Butter	80-95	OQ	NONE	$1.541/kg
4	5	0405201000	Dairy spreads, Butter substitutes,	45-80	NQ	GN15	15.4¢/kg
4	5	0405202000	Dairy spreads, Butter substitutes	45-80	QT	AD14	15.4¢/kg
4	5	0405203000	Dairy spreads, Butter substitutes,	45-80	OQ	NONE	$1.996/kg
4	5	0405204000	Dairy spreads, Butter substitutes, Other	39-45	NQ	NONE	13.1¢/kg
4	5	0405205000	Dairy spreads, Other, Described in AD Note 1- Chp 4	39-80	NQ	GN15	10%
4	5	0405206000	Dairy spreads, Other, Described in AD Note 1- Chp 4	39-80	QT	AD10	10%
4	5	0405207000	Dairy spreads, Other, Described in AD Note 1- Chp 4	39-80	OQ	NONE	70.4¢/kg+8.5%
4	5	0405208000	Dairy spreads, Other, Described in other chapter	NA			6.40%
4	5	0405900520	Other fats and oils, GN15, Anhydrous milk fat	99	NQ	GN15	10%
4	5	0405900540	Other fats and oils, GN15, Other	99	NQ	GN15	10%
4	5	0405901020	Other fats and oils, AD, Anhydrous milk fat	99	QT	AD14	10%
4	5	0405901040	Other fats and oils, AD, Other	99	QT	AD14	10%
4	5	0405902020	Other fats and oils, Other, Anhydrous milk fat	99	OQ	NONE	$1.865/kg+8.5%
4	5	0405902040	Other fats and oils, Other, Other	99	OQ	NONE	$1.865/kg+8.5%
21	6	2106906400	Food preparation, other, over 10% milk solid	95	QT	AD10	10%
21	6	2106906600	Food preparation, other, over 10% milk solid	95	OQ	NONE	70.4¢/kg+8.5%

Note: NQ=no quota; QT=quota; OQ=over quota; GN=general note; and AD=additional note. Tariff percentages apply to customs values.

Source: U.S. International Trade Commission.

Table 2: Estimation Results for Dairy Spread, Food Preparation and Butter.

Variables	Estimate	Standard Error	p-Value
Dairy Spread:			
Intercept	-83.2805	16.3367	<.0001
	(-5.10)		
Price Ratio	0.6365	0.2581	0.0168
	(2.4700)		
Per Capital Income	5.8313	8.0456	0.4716
	(0.7200)		
Price of Other Food	11.5644	7.8059	0.1441
	(1.4800)		
Adjusted R^2	0.3660		
Durbin-Watson	0.6938		
Food Preparation:			
Intercept	-501.6790	41.8758	<.0001
	(-11.98)		
Price Ratio	1.9230	0.6189	0.0030
	(3.1100)		
Per Capital Income	33.8392	20.3832	0.1025
	(1.6600)		
Price of Other Food	65.1852	20.8392	0.0028
	(3.1300)		
Adjusted R^2	0.7465		
Durbin-Watson	1.6382		
Butter			
Intercept	34.2405	26.5088	0.2020
	(1.2900)		
Price Ratio	1.2780	0.5785	0.0314
	(2.2100)		
Per Capital Income	-6.0590	5.2962	0.2577
	(-1.14)		
Lag 1 of Price Ratio	2.2478	0.7716	0.0052
	(2.9100)		
Lag 2 of Price Ratio	0.5858	0.5946	0.3289
	(0.9900)		
Dummy	-3.5677	0.7044	<.0001
	(-5.06)		
Adjusted R^2	0.6855		
Durbin-Watson	1.3771		

Table 3: Comparison of actual and forecasted quantity of over-quota import demand for dairy products in 2004.

Time		Dairy Spread		Food Preparation		Butter	
Year	Month	Forecast	Actual	Forecast	Actual	Forecast	Actual
2004	Jan	1,297	1,329	2,843	2,479	45	10
2004	Feb	1,715	1,801	9,977	1,265	106	64
2004	Mar	2,324	1,269	21,009	3,555	375	569
2004	Apr	2,413	1,585	32,082	2,044	983	1,614
2004	May	2,130	1,626	20,581	1,989	1,070	3,414
2004	Jun	1,974	1,555	11,630	4,275	650	1,715
2004	Jul	1,802	1,644	13,719	2,531	298	817
2004	Aug	1,586	1,958	18,217	2,251	110	730
2004	Sep	1,593	865	11,364	1,277	79	345
2004	Oct	1,524	1,195	11,904	1,988	99	428
2004	Nov	1,326	1,353	7,009	3,314	63	142
2004	Dec	1,145	1,115	4,148	773	32	96

Figure 4: Forecasted and actual over-quota import demand of dairy products.