USDA Agricultural Marketing Service Dairy Program

Regional Econometric Model Documentation

For Model Calibrated To
USDA Agricultural Projections to 2024

July 2015

Economics Analysis Branch

Dairy Program

USDA-AMS Dairy Program Regional Econometric Model Documentation

Introduction

Dairy Program's Economics Analysis Branch (EAB) maintains a dynamic regional econometric model of the U.S. dairy industry to support its economic analysis and forecasting responsibilities. The model is comprehensive. It includes: the supply of milk; the allocation of butterfat and non-fat solids to fluid milk and the major manufactured dairy products; and consumer demand for milk and dairy products. The model's supply and demand equations are estimated using historical annual data. The model includes variables for the Federal Milk Marketing Order (FMMO) system, Dairy Economic Loss Assistance Payment Program (DELAP), and Milk Income Loss Contract (MILC) program. The Margin Protection Program – Dairy (MPP-D) payouts also are estimated, but the payments do not interact with the other model variables, because the production response to the program is still unknown. The model is specified to generate long-term supply, demand, and price[1] projections that are consistent with USDA's official baseline projections.[2] The official USDA baseline is modified for Federal order analyses by specifying Federal order milk marketings from national milk marketings. The model is estimated and simulated with SAS statistical software.[3]

The model simultaneously forecasts annual regional milk production, regional fluid milk and national manufactured dairy product consumption, regional dairy classification, national dairy product prices, and regional farm milk prices sequentially along the time path of 2014 – 2024. Butterfat and non-fat solids are allocated through the use of conversion factors consistent with farm milk and dairy products. Prices for dairy products, fluid milk, and farm milk are solved within the model to achieve equilibrium conditions for supply and demand.

The model is based on various sub-regions of the United States. Because not all of the United States is covered by a FMMO, there are three geographic levels at which the model operates: supply regions, in which the milk is produced; pools, in which milk is classified by various uses; and national, in which the classified milk is processed into manufactured products and consumed.

Supply Regions and Milk Production

Milk is produced in all fifty States. The States are grouped into fourteen supply regions: Appalachian (KY, NC, SC, TN, VA), Arizona, California, Central (CO, IA, IL, KS, NE, OK), Florida, Former Western (ID, NV, UT), Hawaii/Alaska, Mideast (IN, MI, OH, WV), Northeast (CT, DE, MA, MD, ME, NJ, NH, NY, PA, RI, VT), Pacific Northwest (OR, WA), Southeast

---

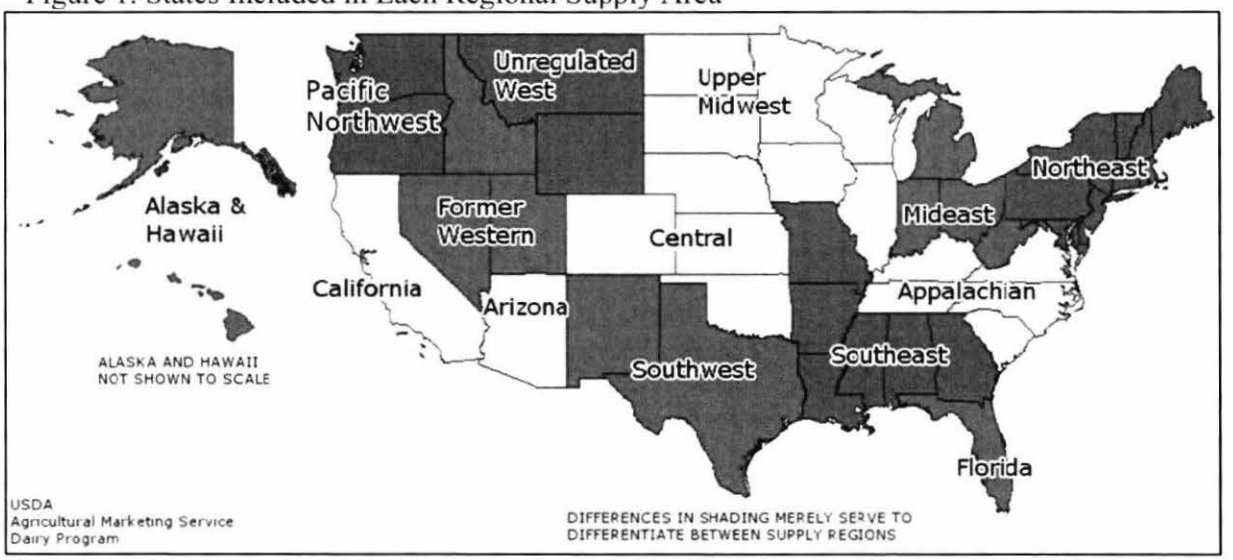
[1] All prices are discussed in real or relative terms.

[2] Dairy baseline forecasts are developed by an Interagency Commodity Estimates Committee at USDA. Intercept terms for the model are modified for each forecast year as needed to calibrate the model to approximate baseline forecasts. For information on USDA's official baseline, see U.S. Department of Agriculture, Office of the Chief Economist, World Agricultural Outlook Board, OCE-2015-1 (2014 February) *USDA Agricultural Projections to 2024*, Retrieved from: [illegible]

[3] See SAS Institute, Inc., Version 9.4 *SAS/ETS User's Guide*

(AL, AR, GA, LA, MS), Southwest (NM, TX), Upper Midwest (MN, ND, SD, WI), and the Unregulated West (MT, WY). The regions can be seen in Figure 1, presented below.

Figure 1. States Included in Each Regional Supply Area



The regional supply of milk is estimated by taking the number of cows and multiplying by the amount of milk each cow produces. The cow numbers and the yield per cow are driven by different variables in each region. The regional cow numbers are functions of the producer milk price, feed costs, slaughter prices, non-farm earnings, and/or other variables. Milk production per cow is estimated as a function of milk prices, feed costs, and/or other variables. Producers respond to milk price changes relative to feed costs by adjusting milk cow numbers. Milk per cow is assumed to move in response to changes in milk price relative to feed costs. The number of cows, milk per cow, and feed price data are reported at state level by NASS. Slaughter prices are reported by AMS Livestock Market News (LMN).[4] Non-farm earnings are reported by the U.S. Department of Commerce Bureau of Economic Analysis (BEA). Number of cows and milk per cow are estimated using data from 1980 – 2013. Milk marketings are estimated as milk production less farm use.

The all-milk price estimates that drive milk production for each region are a function of the effective blend price of the pool which predominantly resembles the milk supply region. For example, Order 131 is the "predominant" pool for the Arizona supply region. If there is no predominant pool for a supply region, because the supply region is associated with an unregulated region, a neighboring pool's blend price or all-milk price is used. All other pools for a given supply region are considered possible "supplemental" receivers of the milk supply. The all-milk prices are from NASS state all-milk data and are aggregated to the milk supply regions using a weighted average of milk production in the region. The prices are estimated using data

[4] Because of differences in data reporting practices over time, the slaughter price is actually represented by different prices in different years. Currently, it is represented by the dressed domestic cutter (90 percent lean) live weight price. From 1991 – 2007, it is represented by the Sioux Falls, SD, boner price. Prior to 1991, it is represented by weighted average boner cow price.

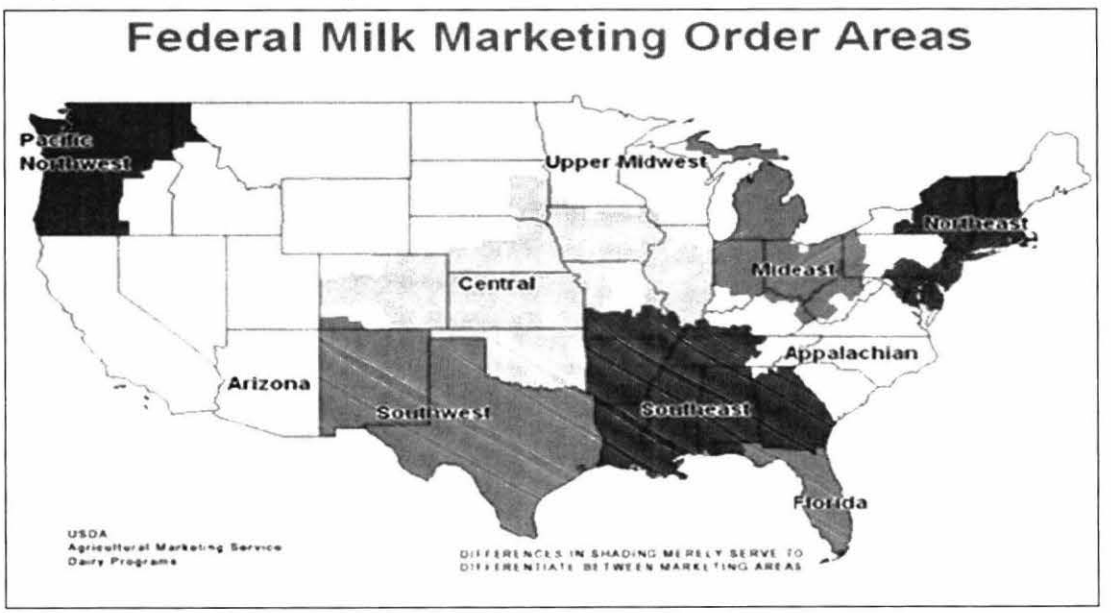
from 2000 – 2013 due to order reform. Prices are deflated by the Consumer Price Index (CPI) for all products as reported nationally by the Bureau of Labor Statistics, U.S. Department of Labor (BLS). The effective blend prices are calculated based on data reported by each FMMO's Market Administrator (MA) office. Some equations include variables to adjust for unusual circumstances over the historical period. The equations related to the regional milk production estimates are in Tables 1 – 14.[5]

The prices driving production are adjusted to reflect dairy support program payments. Total monthly MILC Program state payments data are available from the Farm Service Agency (FSA) from October 2002 – May 2006. State MILC data from FSA on a monthly or calendar year basis is no longer available after May 2006. However, total U.S. calendar year payments and fiscal year state payment data are available for 2006 and 2007. Given that data, monthly state payments are assumed to be proportional to the fiscal year state proportions. State level monthly data for fiscal years 2009 – 2013 are available from FSA as well. The total calendar year state requests for payment are used to proportion the FSA total U.S. payment data in 2009 – 2013. DELAP information is reported on a national level by FSA and included on a per hundredweight basis.

Pools, Supply Allocation, and Compositional Regressions

Milk produced in each supply region is allocated to, or "pooled on", one or more marketing areas, or "pools". There are twelve pools in the model, comprising the ten existing FMMOs, California,[6] and an unregulated area to handle the classification of products not otherwise covered.[7] Figure 2, presented below, shows a map of the existing FMMO structure. The

Figure 2. Areas Covered by Federal Milk Marketing Orders



[5] Most tables, due to their size, may be found at the end of the document.
[6] Data for the California pool that would otherwise come from an MA office is available from the California Department of Food and Agriculture (CDFA).
[7] The model accounts for the existence of Order 135 as a pool until 2005, after which it is considered to be part of the unregulated pool.

allocation of milk into various class uses, for later production into consumer products, is estimated within these pools.

The sum of the allocations to each pool from a supply region must equal the milk produced in the supply region and cannot be less than zero. To ensure that milk movements to the pools from the supply regions sums to total production, compositional regressions are utilized to estimate the movement of milk. The details of compositional regression estimation can be found in Aitchison;[8] however, a brief explanation follows. Compositional regressions utilize a functional form that ensures that allocations to each pool are greater than zero and add up to the milk produced in the supply region. The adding up constraint is accomplished by estimating a ratio of each allocation over a designated "filler-up" variable, with the ratio logged to satisfy the strict positivity constraint. The filler-up variable acts to balance the equations as a residual variable might, but is not a residual in the traditional sense. Because the filler-up variable is represented in each equation, it is not simply a leftover. Indeed, there is an implicit allocation equation in which the movement of milk to the predominant pool is estimated in relation to itself. However, this equation always equals one.

In the context of the regional model, compositional regressions are applied in the following manner: each supply region is associated with a predominant pool, as explained in the last section. Following Aitchison, milk pooled on this pool is assumed to be the filler-up variable. Milk quantities moving to other pools, relative to the milk staying in the predominant pool, are simultaneously estimated. Effective blend prices from each pool are assumed to be the driving factor, with prices based on MA and CDFA data. The producer milk marketed under each FMMO is based on AMS State of Origin data and CDFA unregulated grade A marketings.

The choice of the filler-up variable for each supply region could be arbitrary, but the predominant pool is chosen for two reasons: one, it makes economic sense that milk will be chiefly utilized in the area in which transportation costs are minimized. Two, relative prices are assumed to be the driving factor in the allocation of milk to pools. By choosing the predominant pool as the filler-up variable, the effective blend price of the other pool relative to the predominant pool's effective blend price becomes the driving factor, representing the decision to pool milk on one pool or another.

[8] Aitchison, J. 1982. "The Statistical Analysis of Compositional Data." *Journal of the Royal Statistical Society. Series B (Methodological)*. Vol. 44, No. 2., pp. 139 - 177.
http://rbras.org.br/lib/exe/fetch.php/pessoais:abtmartins:thestatisticalanalysisofcompositionaldata.pdf

As an example, a portion of Table 15, the Allocation of Northeast Milk to Pools, is reproduced below. The full table may be found at the end of this document. Milk from the Northeast supply region is estimated to go to one of four pools: Order 1, Order 5, Order 33, or the Unregulated pool.[9] It should be noted that not all pools are explicitly estimated for each supply region. These specifications incorporate assumptions which follow historical transportation trends, i.e., milk produced in the Northeast is highly unlikely to be pooled on Order 124 (the Pacific Northwest order). In practical terms, the milk movements that are not historically observed or are extremely small (less than one percent of the pool's supply or less than one percent of the supply region's movements) are assumed to be zero. Order 1 is the Northeast region's predominant pool. Therefore, the supply allocations to supplemental pools, such as Order 33, are estimated in ratio to the milk pooled on Order 1. Continuing to use Order 33 as an example supplemental pool, the primary driver for movements to Order 33 relative to movements to Order 1 is the ratio of the Order 33 over the Order 1 blend prices. This means that there must be a greater increase in Order 33's effective blend price than in Order 1's to draw milk away from Order 1.

Example: Allocation of Northeast Milk to Federal Orders	
Dependent Variable	Parameter
log (Northeast Milk to Order 5 / Northeast Milk to Order 1)	Intercept log (Trend from 2000) Dummy 2006-2007 lag (log (Order 5 Blend Price / Order 1 Blend Price))
log (Northeast Milk to Order 33 / Northeast Milk to Order 1)	Intercept Dummy 2005-2007 lag (log (Order 33 Blend Price / Order 1 Blend Price))
log (Unregulated Northeast Milk / Northeast Milk to Order 1)	Intercept Dummy 2004 Dummy 2006-2008 log (Order 1 Class I Price/ Order 1 Class III Price) Dummy 2001

The milk movements to non-Federal order or California pools are allocated to an unregulated pool, which lacks a set of classified prices, and are estimated using a variety of data. The milk movements to unregulated areas are driven, depending on the supply region, by relative classified prices from the supply region's predominant pool, percentage of classified utilization within the predominant pool, or a proxy unregulated pool price. Classified prices and classified utilizations are discussed in a later section, but all such data are based on MA data. Data for the supply allocation equations begin from order reform in 2000 and ends with the most recently available annual data, 2013.

In certain supply regions, where milk is assumed to only go to two processing regions, the use of compositional regressions is unnecessary. In these milk supply regions, a logistic regression is used, in which the ratio of the percentages of raw milk allocated to each of the two pools is

[9] The Unregulated marketing area is not a "pool" in the strict sense of the word. However, for purposes of simplicity and to differentiate it from the Unregulated West supply region, here it is called a pool.

estimated. Given that the two percentages must sum to one, the estimated ratio can be easily be solved for each percentage. The percentages are multiplied by the milk supply region total to determine the pool allocations. The milk movement estimates from the supply regions to the pools are in Tables 15 – 28.

Milk Classification and Consumer Products

After milk is produced in the supply regions, it is allocated to the various pools for bottling or processing into manufactured dairy products. Under the FMMO system, milk is classified based on how it is utilized:

Class I—fluid uses
Class II—soft manufactured products (frozen products and other Class II)
Class III—cheese and dry whey
Class IV—butter, non-fat dry milk, whole dry milk, and canned milk.[10]

Because milk for fluid use is highly regional and commands the highest price, fluid use per capita is estimated first and separately from the other classes, driven by the Class I price within each pool. Some fluid demand equations may also include personal disposable income, the population of the U.S. under five years old, and/or other variables. Income data are available from BLS. Population data are available from the U.S. Census Bureau. Fluid use is estimated at the pool level based on MA data from 2000 – 2013. Fluid use is highly regional, due to fluid milk's high transportation cost and perishability. Therefore, fluid use for unregulated areas east of the Mississippi River is estimated separately from those to the west, and for Hawaii and Alaska. The fluid use estimates from these sub-pools are aggregated to comprise total fluid use for the unregulated pool. The fluid use estimates are presented in Table 29. Butterfat and non-fat solids pounds required to produce the quantity of fluid milk demanded are calculated using conversion factors found in Table 30.

The remaining milk is allocated to Class II, III, or IV using compositional regressions, as explained earlier. For the FMMOs, the filler-up variable is Class II milk. Class III allocations are driven by cheddar cheese prices, dry whey prices, Class III prices at test for a given pool, and/or a weighted average of the prices of frozen dairy products and other Class II products, as reported by BLS. Class IV allocations are driven by butter prices, non-fat dry milk prices, and/or Class IV prices at test for a given pool. All classified prices and class allocation variables are based on MA data, estimated from 2000 – 2013. Data for classification in the unregulated pool is unavailable. Fluid use in the unregulated pool estimations are driven by income and are classified as Class I. The remaining milk in the unregulated pool is assumed to have the same proportional breakdown as in seen in the Federal orders and California. The FMMO non-fluid classification equation estimates are found in Tables 31 – 40. Classified butterfat, non-fat solids, and protein (where appropriate) are calculated by applying pool test values to classified milk estimates. Forecast test values are assumed to be an average of the pool test values from 2011 – 2013.

[10] The term "canned milk" in this documentation refers to evaporated or sweetened condensed milk in consumer-type packages.

The California pool has a different structure from the FMMO system. Total solids by classification, defined as the sums of butterfat and non-fat solids within each class, are estimated as opposed to the total amount of milk allocated to each class, because milk pounds by classification are not reported. Class 2 remains the filler-up variable. Class 3 solids are a function of the CPIs of frozen dairy products and other Class 2 dairy products, deflated by the CPI for all products. Class 4a solids are driven by the price of non-fat dry milk. Class 4b solids are driven by the price of cheddar cheese and the CPI of other dairy products. The estimates for non-fluid classified milk allocation in the California marketing area can be found in Table 41. In the absence of a California Federal order, California classified solids are converted to their FMMO equivalents to account for classification differences.

National Level Aggregations and Estimations

Manufacturing Allocation

Supply and demand for manufactured dairy products is handled at the national level. Classified milk is aggregated from the pools to create a national supply, and is transformed into components based on the most recent three years' averages of the component tests for each pool. The aggregated class supplies are used to estimate the national manufactured product supplies.

The aggregated Class II total milk solids are divided using a logistic regression to estimate the production of frozen products and other Class II products. The other Class II solids requirements were established in the historical data by the residual butterfat and non-fat solids left when accounting for all solids in Class I, III, IV, and total frozen products. Frozen products and other Class II products are treated as aggregations of their respective products. The proportions of the solids in frozen products for the forecast period are held at recent year averages. The percentage of Class II total milk solids used to manufacture frozen products relative to the percentage of Class II milk used to manufacture all other Class II products is estimated as a function of the price of frozen goods relative to the price of other dairy products and other variables.

Class III milk is primarily used to produce cheese, with dry whey being produced as a result of the cheese manufacturing process. Total cheese production is calculated by applying conversion factors based on the most recent three years' average of the fat available for total cheese to the amount of total cheese production.[11] American and other cheese production percentages are estimated with a logistical function which responds to the price of cheddar and the price of mozzarella. The estimated production percentages are applied to the amount of total cheese produced to obtain pounds of American and other cheese production. Cheese production is assumed to use all necessary non-fat solids, with conversion factors determined in a like manner to those used for cheese butterfat. Dry whey production is driven by its own price, the amount of cheese produced, and other variables. Dry whey has a separate production equation because more than enough whey is produced as a result of cheese manufacture to meet dry whey demand. The CPI for food is used in the production of whey to account for inflation. Food CPI data comes from BLS and is estimated using the CPI for all products in projection years. Butterfat and non-fat product pounds of dry whey are calculated using conversion factors. All the conversion

[11] Non-fat dry milk and condensed skim milk used in cheese production are accounted for in this calculation.

factors can be found in Table 30. The conversion factors represent the pounds of solids required to create one pound of product.

Class IV milk is allocated to the production of butter, non-fat dry milk, dry whole milk, and canned milk. Because dry whole milk and canned milk are relatively minor products, dry whole milk's production is assumed to be a constant, and the production of canned milk is a function of that constant. For this reason, the production of dry whole milk and canned milk converted to fat and non-fat solids is taken first from the Class IV milk fat and non-fat solids supply. The remaining quantities of fat and non-fat solids that are available are used for butter and non-fat dry milk. The bulk of remaining Class IV fat goes to the production of butter. Therefore, butter production is not explicitly estimated; rather a small portion of Class IV fat is allocated to the production of non-fat dry milk, and the rest is assumed to be used for butter. Butter production is assumed to take what is needed from non-fat solids, and all remaining non-fat solids are allocated for the production of non-fat dry milk. The production of butter is calculated by using the residual Class IV fat divided by a fat conversion factor for butter. The remaining non-fat solids needed is used to calculate the non-fat dry milk production using non-fat dry milk non-fat solids conversion factors. The fat-test for non-fat dry milk is indirectly calculated as a result in the model. The manufacturing allocation equation estimates can be found in Table 42.

To accurately account for butterfat and non-fat solids content, it is necessary to make some adjustment to avoid duplication. Historical data used to account for duplication are taken for the most part from the American Dairy Products Institute (ADPI).[12] For the forecast period, the proportion of non-fat dry milk used in cheese to total cheese production is estimated as a function of butter and cheese prices. Condensed skim milk used in cheese is estimated as an inverse function of non-fat dry milk used in cheese. Other types of duplication such as non-fat solids used for fluid milk fortification are accounted for as constant percentages of the applicable dairy product quantities produced.

Demand, Stocks, and Trade for Non-Fluid Dairy Products

Per capita demands for manufactured dairy products are estimated as functions of product prices, per capita income, and other factors. Dairy product prices are deflated by the CPI for all products or the CPI for food. Per capita disposable income is deflated by the CPI for all products. Total consumption for each specific product or product aggregate is specified as per capita demand times the projected population for each year. Wholesale prices for cheese, butter and non-fat dry milk, and dry whey are taken from Dairy Product Mandatory Reporting Program data. Equations in this section are based on the model used to estimate the national baseline.[13] Adjustments for leap year are included in the forecast period. The estimates for non-fluid per capita product demand can be found in Table 43.

---

[12] American Dairy Products Institute (2014) *Dairy Products, Utilization and Production Trends*, Retrieved from: https://www.adpi.org/tabid/128/newsid554/4/Default.aspx

[13] U.S. Department of Agriculture, Office of the Chief Economist, World Agricultural Outlook Board, OCE-2015-1, (2015 February) *USDA Agricultural Projections to 2024*, Retrieved from: http://www.ers.usda.gov/publications/oce-publications/usda-agricultural-projections/projections-publication.aspx, and U.S. Department of Agriculture, Agricultural Marketing Service, Dairy Programs Economic Research, (2017 April) *USDA Agricultural Marketing Service Dairy Programs National Econometric Model Documentation (Model Calibrated to USDA Agricultural Baseline Projections to 2016*, Retrieved from: http://www.ams.usda.gov/AMSv1.0/ams.fetchTemplateData.do?template=TemplateN&navID=DairyNationalEconometricModel&leftNav=DairyNationalEconometricModel&page=DairyNationalEconometricModel&description=National%20Econometric%20Model&acct=dyprcinfo

Year-end stocks are estimated for American cheese, other cheese, butter, and non-fat dry milk. Estimating ending stock values is complicated by their volatility. For this reason a two-step process is used. First, average stock values are estimated, as seen in Table 44. For each year, this value is the simple average of the monthly ending stocks from the last half or last quarter of each year. For each equation, the average stock value has a negative relationship with the product. Second, year-end stocks are estimated from average stocks, reflecting the typical seasonal relationship that exists between average stocks and year-end stocks. Year-end stocks estimates are found in Table 45.

Imports and commercial exports for American cheese, other cheese, and butter are projected by the model, along with commercial exports of non-fat dry milk and dry whey. In observing the history of imports and exports of the various products included in the model, these imports and exports appear to be the most price responsive. Imports and exports for all other dairy products are exogenous in the model. Cheese and butter imports are controlled to some extent by a tariff rate quota (TRQ) that allows limited imports at lower in-quota tariff rates and unlimited imports at higher over-quota tariff rates. Those imports have usually exceeded the TRQ since it has been in place. The model assumes that the quota is filled each year, and thus only over-quota imports are estimated. Imports data are available from the Foreign Agriculture Service, and the equation is estimated using 1995 – 2013 data.[14] Exports and over-quota imports are estimated as a function of the difference between the domestic product price and the free-on-board international price, represented by the Oceania price with regards to butter, cheese, and non-fat dry milk and the European Union price for dry whey. Trade equation estimates can be found in Table 46.

Aggregated product supply is balanced against national consumer product demands, with price varied until a supply/demand balance is reached. In this manner, the prices estimated at the national level affect each pool's effective blend price, which drive the all-milk prices that influence milk production, connecting the system.

Price Relationships, Elasticities, and Statistics

Milk and dairy products, in aggregate, are expected to respond to changes in price in a certain manner. Milk production variables (cows and yield-per-cow) and imports are expected to move in the same direction as domestic own prices, like the all-milk price: higher domestic prices will encourage farmers to produce more, while making foreign products more appealing to the consumer. Conversely, demand variables (e.g. fluid use per capita) and exports are expected to move in the opposite direction from domestic own prices: higher prices will decrease domestic consumption, while making domestic sales more appealing to producers. Competing prices, or those representing costs of production, such as the price of feed, are expected to have the opposite relationships. Income is expected to move in the same direction with both supply and demand variables, with higher income meaning greater capacity for farm investment, as well as greater capacity to purchase dairy products.

[14] U.S. Department of Agriculture, Foreign Agricultural Service (July 2014) *Dairy Monthly Imports*, Retrieved from:

Parameter sizes vary based on specification, and they do not necessarily provide a clear picture of the variable-in-question's impact. To provide a clearer picture of the actual impact, each price and income variable have an additional statistic reported called the "elasticity": It is the percent change in the left-hand side variable in response to a percent change in the right-hand side variable. For example, the Northeast supply region's all-milk price is driven by the Order 1 effective blend price (see Table 1). This price-price elasticity is 0.8865. This means that, for every 1 percent increase in the Order 1 effective blend price, the Northeast supply region's all-milk price will increase by about 0.89 percent. The positive sign in the elasticity means that the all-milk price and the effective blend price move together, which follows expectations. The elasticities presented are averaged over the relevant data period for each equation.

Statistical fit is represented by the R-Square for each equation. R-Square is the percent of variation in the data explained by the given equation, and therefore falls between 0 – 1. A higher R-Square is better, and represents how closely the model estimates historical data. Statistical significance is best represented by the p-value for each variable. The p-value is defined as the level of significance at which one can reject the default hypothesis that the variable is not significantly different from zero. In other words, it is a measure of confidence in the estimates the model produces: a smaller p-value indicates a higher level of statistical significance, and therefore greater confidence that the model produces reliable estimates.

Conclusion

The Dairy Program's Economics Analysis Branch maintains a regional econometric model of the U.S. dairy industry to support its economic analysis and forecasting responsibilities. The model's construction is regional and covers milk produced in all fifty States. It includes a framework to estimate the allocation and classification of milk under the FMMO system. It estimates the supply of classified milk solids, which are used to estimate product supplies through the use of logistic functions and conversion factors. The product supplies are balanced against demand for dairy products by varying prices until a balance is reached. This model's responses to price and policy changes follow economic theory and are statistically validated. The model is estimated based on available data that explains general economic based relationships between observed industry variables. This documentation serves to outline the model's sources, capabilities, and methods. Although the model is capable of impact analysis, discussions of specific impacts are reserved for later publications.

Table 1: Northeast Regional Milk Supply Equations

Dependent Variable	Parameter	Estimate	Std. Error	t-Value	Pr>|t|	Elasticity	R-Square
log (Northeast All Milk Price ÷ CPI all)	Intercept	0.2704	0.1203	2.25	0.0442		0.9681
	log (Order 1 Blend Price ÷ CPI all)	0.8865	0.0577	15.37	<.0001	0.8865	
log (Northeast Number of Cows)	Intercept	3.2173	0.5002	6.43	<.0001		0.9972
	lag ((Northeast All Milk Price	0.0008	0.0003	2.95	0.0063	0.0034	
	- Northeast Average Dairy Market Loss Payments						
	- Average Dairy Economic Loss Assistance						
	Payments) ÷ Cow Slaughter Price)						
	Trend from 1980	-0.0053	0.0009	-5.63	<.0001		
	Dummy for years 1980-1986	0.0404	0.0051	7.92	<.0001		
	lag (log (Northeast Number of Cows))	0.5759	0.0650	8.86	<.0001		
log (Northeast Milk Per Cow)	Intercept	4.5976	1.1354	4.05	0.0004		0.9956
	lag (log (Northeast All Milk Price	0.0387	0.0154	2.51	0.0184	0.0387	
	- Northeast Average Dairy Market Loss Payments						
	- Average Dairy Economic Loss Assistance						
	Payments) ÷ 16% Protein Feed Value)						
	lag (log (Northeast Milk Per Cow))	0.4966	0.1248	3.98	0.0005		
	Trend from 1970	0.0095	0.0024	3.92	0.0005		
	Dummy: Dairy Diversion Program	-0.0242	0.0121	-2.00	0.0558		
	Dummy for years after 1999	-0.0293	0.0101	-2.90	0.0073		

Table 2: Appalachian Regional Milk Supply Equations

Dependent Variable	Parameter	Estimate	Std. Error	t-Value	Pr>|t|	Elasticity	R-Square
log (Appalachian All Milk Price ÷ CPI all)	Intercept	0.1541	0.1073	1.44	0.1765		0.9839
	log (Order 5 Blend Price ÷ CPI all)	0.9367	0.0503	18.64	<.0001	0.9367	
log (Appalachian Number of Cows)	Intercept	23.5979	1.2304	19.18	<.0001		0.9829
	lag (log (Appalachian Milk Per Cow))	-1.8367	0.1272	-14.44	<.0001		
	log ((Appalachian All Milk Price	0.1692	0.0535	3.16	0.0036	0.1692	
	- Appalachian Average Dairy Market Loss Payments						
	- Average Dairy Economic Loss Assistance						
	Payments) ÷ 16% Protein Feed Value)						
	Dummy for years after 1997	-0.1721	0.0346	-4.98	<.0001		
log (Appalachian Milk Per Cow)	Intercept	9.2230	0.0205	450.36	<.0001		0.9893
	log ((Appalachian All Milk Price	0.0446	0.0166	1.95	0.0606	0.0446	
	- Appalachian Average Dairy Market Loss Payments						
	- Average Dairy Economic Loss Assistance						
	Payments) ÷ 16% Protein Feed Value)						
	Trend from 1980	0.0153	0.0003	47.68	<.0001		
	Dummy: Dairy Diversion Program	-0.0701	0.0166	-4.21	0.0002		

Table 3: Florida Regional Milk Supply Equations

Dependent Variable	Parameter	Estimate	Std. Error	t-Value	Pr>|t|	Elasticity	R-Square
log (Florida All Milk Price ÷ CPI all)	Intercept	0.1582	0.1316	1.20	0.2546		0.9833
	log (Order 6 Blend Price ÷ CPI all)	0.9012	0.0583	15.47	<.0001	0.9012	
	Trend from 2000	0.0065	0.0016	4.19	0.0015		
Florida Non-Farm Earnings Per Capita ÷ CPI all	Intercept	-399.2770	323.9000	-1.23	0.2269		0.9953
	Personal Disposable Income Per Capita	751.2639	23.2278	32.34	<.0001	1.0636	
	Dummy for years after 2008	-1648.26	131.5000	-12.54	<.0001		
log (Florida Number of Cows)	Intercept	3.5880	1.0009	3.58	0.0013		0.9599
	lag (log ((Florida All Milk Price × Florida Average Dairy Market Loss Payments − Average Dairy Economic Loss Assistance Payments) ÷ 16% Protein Feed Value))	0.0689	0.0388	1.78	0.0862	0.0689	
	lag (log (Florida Number of Cows))	0.8252	0.0635	13.00	<.0001		
	Dummy for years after 1985	0.0492	0.0202	2.44	0.0215		
	log (Florida Non-Farm Earnings Per Capita ÷ CPI all)	-0.3081	0.0839	-3.67	0.0010		
log (Florida Milk Per Cow)	Intercept	-0.1197	0.3709	-0.32	0.7493		0.9734
	log ((Florida All Milk Price + Florida Average Dairy Market Loss Payments − Average Dairy Economic Loss Assistance Payments) ÷ U.S. Alfalfa Price)	0.0753	0.0375	2.01	0.0541	0.0753	
	lag (log (Florida Milk Per Cow))	1.0278	0.0432	23.79	<.0001		
	Dummy for year 1998	-0.0820	0.0234	-3.51	0.0016		
	Dummy for years after 2007	0.0235	0.0139	1.69	0.1020		

Table 4: Southeast Regional Milk Supply Equations

Dependent Variable	Parameter	Estimate	Std. Error	t-Value	Pr>|t|	Elasticity	R-Square
log (Southeast All Milk Price ÷ CPI all)	Intercept	-0.0053	0.1196	-0.04	0.9655		0.9837
	log (Order 7 Blend Price ÷ CPI all)	0.9847	0.0559	17.62	<.0001	0.9847	
Southeast Non-Farm Earnings Per Capita ÷ CPI All	Intercept	-19.6989	243.9000	-0.08	0.9362		0.9944
	Personal Disposable Income Per Capita	284.2765	88.2414	3.22	0.0031	0.4010	
	Dummy for years after 2008	-468.1580	126.7000	-3.70	0.0009		
	lag (Southeast Non-Farm Earnings Per Capita ÷ CPI All)	0.6136	0.1156	5.31	<.0001		
Southeast Number of Cows	Intercept	3196.2770	385.0000	8.30	<.0001		0.9971
	lag (log (Southeast Number of Cows))	269.9684	12.5975	21.43	<.0001		
	lag (log ((Southeast All Milk Price + Southeast Average Dairy Market Loss Payments − Average Dairy Economic Loss Assistance Payments) ÷ U.S. Corn Price))	17.5483	9.5216	1.84	0.0756	0.0759	
	log (Southeast Non-Farm Earnings Per Capita ÷ CPI all)	-478.8150	35.0907	-13.65	<.0001		

log (Southeast Milk Per Cow)	Intercept	3.8746	1.0746	3.61	0.0012		0.9817
	log ((Southeast All Milk Price	0.0177	0.0116	1.52	0.1389	0.0177	
	- Southeast Average Dairy Market Loss Payments						
	+ Average Dairy Economic Loss Assistance						
	Payments) U.S. Corn Price)						
	lag (log (Southeast Milk Per Cow))	0.5394	0.1291	4.18	0.0003		
	Dummy: Dairy Diversion Program	-0.0370	0.0165	-2.23	0.0340		
	Dummy for year 2001	-0.0487	0.0165	-2.96	0.0064		
	log (Trend)	0.1484	0.0469	3.17	0.0038		

Table 5: Upper Midwest Regional Milk Supply Equations

Dependent Variable	Parameter	Estimate	Std. Error	t-Value	Pr>$\|t\|$	Elasticity	R-Square
log (Upper Midwest All Milk Price	Intercept	0.2544	0.0633	4.02	0.0017		0.9922
CPI all)	log (Order 30 Blend Price CPI all)	0.9053	0.0317	28.54	<.0001	0.9053	
log (Upper Midwest Number of Cows)	Intercept	0.3436	0.1598	2.15	0.0400		0.9584
	lag (log (Upper Midwest Number of Cows))	0.9386	0.0239	39.20	<.0001		
	lag (log ((Upper Midwest All Milk Price	0.0649	0.0207	3.13	0.0040	0.0649	
	- Upper Midwest Average Dairy Market Loss Payments						
	+ Average Dairy Economic Loss Assistance Payments						
	- 16% Protein Feed Value) CPI all))						
	Dummy for years after 2009	0.0347	0.0114	3.05	0.0048		
log (Upper Midwest Milk Per Cow)	Intercept	9.3272	0.0133	699.06	<.0001		0.9969
	lag (log ((Upper Midwest All Milk Price	0.0246	0.0115	2.14	0.0415	0.0246	
	- Upper Midwest Average Dairy Market Loss Payments						
	+ Average Dairy Economic Loss Assistance Payments)						
	16% Protein Feed Value))						
	Trend from 1980	0.0201	0.0005	44.29	<.0001		
	Dummy for years after 1983	-0.0302	0.0080	-3.77	0.0008		
	Dummy for years after 2000	-0.0319	0.0076	-4.18	0.0003		

Table 6: Central Regional Milk Supply Equations

Dependent Variable	Parameter	Estimate	Std. Error	t-Value	Pr>$\|t\|$	Elasticity	R-Square
log (Central All Milk Price	Intercept	-4.3217	0.0720	-60.04	<.0001		0.9907
CPI all)	log (Order 32 Blend Price CPI all)	0.8813	0.0357	24.69	<.0001	0.8813	
log (Central Number of Cows)	Intercept	0.5908	0.1999	2.96	0.0063		0.9911
	lag (log ((Central All Milk Price	0.0422	0.0193	2.19	0.0371	0.0422	
	- Central Average Dairy Market Loss Payments						
	+ Average Dairy Economic Loss Assistance Payments)						
	16% Protein Feed Value))						
	lag (log (Central Number of Cows))	0.9071	0.0288	31.53	<.0001		
	Dummy for years after 1985	-0.0390	0.0115	-3.39	0.0021		
	Dummy for years after 2005	0.0229	0.0089	2.58	0.0155		

log (Central Milk Per Cow)	Intercept	0.1241	0.1288	0.96	0.3432		0.9939
	lag ((Central All Milk Price + Central Average Dairy Market Loss Payments - Average Dairy Economic Loss Assistance Payments) / U.S. Corn Price)	0.0038	0.0022	1.69	0.1022	0.0021	
	lag (log (Central Milk Per Cow))	0.9873	0.0132	74.91	<.0001		
	Dummy for year 2007	-0.0346	0.0163	-2.12	0.0425		

Table 7: Mideast Regional Milk Supply Equations

Dependent Variable	Parameter	Estimate	Std. Error	t-Value	Pr>|t|	Elasticity	R-Square
log (Mideast All Milk Price / CPI All)	Intercept	-4.4214	0.0712	-62.10	<.0001		0.9922
	log (Order 33 Blend Price / CPI All)	0.9331	0.0350	26.68	<.0001	0.9331	
log (Mideast Number of Cows)	Intercept	-0.3724	0.4324	-0.86	0.3967		0.9070
	Dummy for years before 1989	0.0204	0.0124	1.65	0.1098		
	lag (log (Mideast Number of Cows))	1.0253	0.0643	15.95	<.0001		
	lag (log (Mideast All Milk Price - Mideast Average Dairy Market Loss Payments - Average Dairy Economic Loss Assistance Payments))	0.0969	0.0205	4.73	<.0001	0.0969	
	lag (log (16% Protein Feed Value / CPI All))	-0.0376	0.0118	-3.19	0.0036	-0.0376	
	Whole Herd Buyout Program Dummy	-0.0512	0.0197	-2.60	0.0149		
log (Mideast Milk Per Cow)	Intercept	9.1322	0.0225	406.28	<.0001		0.9927
	lag (log ((Mideast All Milk Price - Mideast Average Dairy Market Loss Payments - Average Dairy Economic Loss Assistance Payments) / 16% Protein Feed Value))	0.0403	0.0173	2.33	0.0269	0.0403	
	Trend from 1970	0.0196	0.0003	60.89	<.0001		

Table 8: Pacific Northwest Regional Milk Supply Equations

Dependent Variable	Parameter	Estimate	Std. Error	t-Value	Pr>|t|	Elasticity	R-Square
log (Pacific Northwest All Milk Price / CPI All)	Intercept	-4.3996	0.0771	-57.09	<.0001		0.9877
	log (Order 124 Blend Price / CPI All)	0.9183	0.0383	23.96	<.0001	0.9183	
log (Pacific Northwest Number of Cows)	Intercept	5.6057	0.0271	206.62	<.0001		0.7788
	log ((Pacific Northwest All Milk Price - Pacific Northwest Average Dairy Market Loss Payments - Average Dairy Economic Loss Assistance Payments) / 16% Protein Feed Value) * Trend from 1980)	0.0612	0.0075	8.13	<.0001	0.0612	
	Dummy for years after 2009	0.0854	0.0188	4.54	<.0001		
log (Pacific Northwest Milk Per Cow)	Intercept	1.9227	0.5313	3.62	0.0012		0.9966

	log ((Pacific Northwest All Milk Price – Pacific Northwest Average Dairy Market Loss Payments – Average Dairy Economic Loss Assistance Payments) / 16% Protein Feed Value)	0.0346	0.0133	2.61	0.0145	0.0346	
	lag (log (Pacific Northwest Milk Per Cow))	0.7937	0.0576	13.77	<.0001		
	Trend from 1970	0.0037	0.0012	3.20	0.0034		
	Dummy for years after 1999	-0.0252	0.0076	-3.30	0.0027		

Table 9: Southwest Regional Milk Supply Equations

Dependent Variable	Parameter	Estimate	Std. Error	t-Value	Pr > |t|	Elasticity	R-Square
log (Southwest All Milk Price / CPI All)	Intercept	-4.4962	0.0819	-54.91	<.0001		0.9901
	log (Order 126 Blend Price / CPI All)	0.9417	0.0399	23.62	<.0001	0.9417	
log (Southwest Land Value / CPI All)	Intercept	-0.3700	0.3110	-1.19	0.2435		0.9150
	lag (log (Southwest Land Value / CPI All))	0.9725	0.0455	21.35	<.0001	0.9725	
	log (Personal Disposable Income Per Capita / CPI All)	0.2045	0.0835	2.45	0.0204	0.2045	
log (Southwest Number of Cows)	Intercept	-0.1997	0.1551	-1.29	0.2077		0.9554
	lag (log ((Southwest All Milk Price – Southwest Average Dairy Market Loss Payments – Average Dairy Economic Loss Assistance Payments) / 16% Protein Feed Value))	0.0893	0.0261	3.43	0.0018	0.0893	
	lag (log (Southwest Number of Cows))	1.0211	0.0220	46.51	<.0001		
log (Southwest Milk Per Cow)	Intercept	0.2777	0.2117	1.31	0.1997		0.9859
	lag (log (Southwest Milk Per Cow))	0.9652	0.0220	43.83	<.0001		
	lag (log ((Southwest All Milk Price – Southwest Average Dairy Market Loss Payments – Average Dairy Economic Loss Assistance Payments) / U.S. Corn Price))	0.0443	0.0191	2.31	0.0279	0.0443	
	log ((Southwest All Milk Price – Southwest Average Dairy Market Loss Payments – Average Dairy Economic Loss Assistance Payments) / U.S. Corn Price) * Dummy for years after 2007	0.0278	0.0121	2.29	0.0297	0.0278	

Table 10: Arizona Regional Milk Supply Equations

Dependent Variable	Parameter	Estimate	Std. Error	t-Value	Pr > |t|	Elasticity	R-Square
log (Arizona All Milk Price / CPI all)	Intercept	-4.5726	0.0440	-103.86	<.0001		0.9967
	log (Order 131 Blend Price / CPI All)	0.9845	0.0218	45.07	<.0001	0.9845	
Arizona Number of Cows	Intercept	-34.1600	13.9503	-2.45	0.0206		0.9914

- lag (Arizona Number of Cows)	log ((Arizona All Milk Price	7.6806	3.7618	2.04	0.0504	6.6702	
	- Arizona Average Dairy Market Loss Payments						
	- Average Dairy Economic Loss Assistance						
	Payments) - Boning Cow Slaughter Price)						
	Trend from 1980	0.1914	0.0742	2.58	0.0152		
	lag (log ((Arizona All Milk Price	8.1566	3.4274	2.38	0.0241	1.9637	
	- Arizona Average Dairy Market Loss Payments						
	- Average Dairy Economic Loss Assistance						
	Payments) - 16% Protein Feed Value))						
log (Arizona Milk Per Cow)	Intercept	3.4076	1.1915	2.86	0.0078		0.9773
	lag (log ((Arizona All Milk Price	0.0464	0.0235	1.97	0.0585		
	- Arizona Average Dairy Market Loss Payments						
	- Average Dairy Economic Loss Assistance						
	Payments) - 16% Protein Feed Value))						
	lag (log (Arizona Milk Per Cow))	0.5928	0.1435	4.13	0.0003		
	log (Trend from 1970)	0.1787	0.0687	2.60	0.0145		

Table 11: Former Western Order Regional Milk Supply Equations

Dependent Variable	Parameter	Estimate	Std. Error	t-Value	Pr>|t|	Elasticity	R-Square
log (Former Western Order All Milk	Intercept	0.1632	0.1269	1.29	0.2246		0.9822
Price / CPI All)	log (California All Milk Price / CPI All)	0.9208	0.0658	14.00	<.0001	0.9208	
	log (Post-Order Reform Class II Price / CPI All)	0.0196	0.0108	1.82	0.0963	0.0196	
	* Dummy for years after 2010						
log (Former Western Order	Intercept	4.6803	0.2185	21.42	<.0001		0.9807
Number of Cows)	Trend from 1980	0.0428	0.0013	32.68	<.0001		
	lag (log ((Former Western Order All Milk Price	0.1529	0.0636	2.41	0.0228	0.1529	
	- Former Western Order Average Dairy						
	Market Loss Payments						
	- Average Dairy Economic Loss Assistance						
	Payments) - Boning Cow Slaughter Price))						
	Dummy for years 1980-1984	0.2489	0.0380	6.55	<.0001		
log (Former Western Order	Intercept	9.3349	0.0311	299.84	<.0001		0.9832
Milk Per Cow)	log ((Former Western Order All Milk Price	0.1117	0.0274	4.08	0.0003	0.1117	
	- Former Western Order Average Dairy						
	Market Loss Payments						
	- Average Dairy Economic Loss Assistance						
	Payments) / 16% Protein Feed Value)						
	Trend from 1980	0.0206	0.0005	37.66	<.0001		

Table 12: Unregulated West Regional Milk Supply Equations

Dependent Variable	Parameter	Estimate	Std. Error	t-Value	Pr>|t|	Elasticity	R-Square
log (Unregulated West All Milk Price	Intercept	0.3685	0.1136	3.24	0.0070		0.9802
CPI All)	log (Central Region All Milk Price CPI All)	0.8146	0.0552	14.77	<.0001	0.8146	

log (Unregulated West Number of Cows)	Intercept	0.8519	0.3181	2.68	0.0121		0.9671
	lag (log (Unregulated West Number of Cows))	0.7681	0.0780	9.85	<.0001		
	lag (log ((Unregulated West All Milk Price - Unregulated West Average Dairy Market Loss Payments - Average Dairy Economic Loss Assistance Payments) / 16% Protein Feed Value))	0.0811	0.0394	2.06	0.0486	0.0811	
	log (Trend from 1980)	-0.0662	0.0250	-2.65	0.0131		
log (Unregulated West Milk Per Cow)	Intercept	1.1792	0.3897	3.03	0.0052		0.9791
	log (16% Protein Feed Value / CPI All) * Dummy for years before 2008	-0.0704	0.0255	-2.76	0.0099	-0.0704	
	log ((Unregulated West All Milk Price + Unregulated West Average Dairy Market Loss Payments - Average Dairy Economic Loss Assistance Payments) / 16% Protein Feed Value) * Dummy for years after 2007	0.0065	0.0033	1.96	0.0598	0.0065	
	lag (log (Unregulated West Milk Per Cow))	0.8878	0.0380	23.35	<.0001		

Table 13: California Regional Milk Supply Equations

Dependent Variable	Parameter	Estimate	Std. Error	t-Value	Pr>|t|	Elasticity	R-Square
log (California All Milk Price / CPI All)	Intercept	0.0850	0.0632	1.35	0.2034		0.9922
	log (California Blend Price / CPI All)	0.9386	0.0317	29.60	<.0001	0.9386	
log (California Number of Cows)	Intercept	7.1015	0.0655	108.40	<.0001		0.9787
	log ((California All Milk Price - California Average Dairy Market Loss Payments - Average Dairy Economic Loss Assistance Payments) / 48% Soybean Meal Price)	0.0535	0.0286	1.87	0.0713	0.0535	
	Trend from 1980	0.0229	0.0008	29.50	<.0001		
	log (lag (16% Protein Feed Value / CPI All))	-0.1153	0.0276	-4.18	0.0002	-0.1153	
log(California Milk Per Cow)	Intercept	3.7752	1.1135	3.39	0.0022		0.9703
	log ((California All Milk Price - California Average Dairy Market Loss Payments - Average Dairy Economic Loss Assistance Payments) / 16% Protein Feed Value)	0.0465	0.0193	2.41	0.0230	0.0465	
	lag (log (California Milk Per Cow))	0.5975	0.1178	5.07	<.0001		
	Trend from 1970	0.0059	0.0017	3.46	0.0018		
	Dummy for year 1994	0.0672	0.0187	3.59	0.0013		
	Dummy for year 1998	-0.0376	0.0194	-1.94	0.0632		

Table 14: Hawaii and Alaska Regional Milk Supply Equations

Dependent Variable	Parameter	Estimate	Std. Error	t-Value	Pr>|t|	Elasticity	R-Square
log (Hawaii and Alaska All Milk Price CPI All)	Intercept	0.1376	0.1378	1.00	0.3257		0.8893
	log (Wholesale Cheddar Cheese Price CPI All)	0.1364	0.0608	2.24	0.0324	0.1364	
	lag (log (Hawaii and Alaska All Milk Price / CPI All))	0.7228	0.0900	8.03	<.0001	0.7228	
log (Hawaii and Alaska Cows)	Intercept	0.2738	0.2025	1.35	0.1863		0.9105
	Trend from 1980	-0.0081	0.0041	-1.99	0.0560		
	lag (log (Hawaii and Alaska Cows))	0.9145	0.0635	14.40	<.0001		
log (Hawaii and Alaska Milk Per Cow)	Intercept	8.8437	0.1863	47.47	<.0001		0.7906
	log ((Hawaii and Alaska All Milk Price + Hawaii and Alaska Average Dairy Market Loss Payments + Average Dairy Economic Loss Assistance Payments) / 16% Protein Feed Value)	0.1839	0.0621	2.96	0.0061	0.1839	
	Dummy for years after 1985	0.1115	0.0170	6.56	<.0001		
	Dummy for years after 2003	-0.0888	0.0210	-4.23	0.0002		
	Dummy for year 2008	-0.1614	0.0336	-4.81	<.0001		

Table 15: Allocation of Northeast Milk to Pools

Dependent Variable	Parameter	Estimate	Std. Error	t-Value	Pr>|t|	R-Square
log (Northeast Milk to Order 5 Northeast Milk to Order 1)	Intercept	-3.5156	0.2051	-17.14	<.0001	0.7828
	log (Trend from 2000)	-0.1817	0.0792	-2.29	0.0475	
	Dummy for years 2006-2007	0.3856	0.1058	3.65	0.0053	
	lag (log (Order 5 Blend Price Order 1 Blend Price))	3.2591	1.3832	2.36	0.0429	
log (Northeast Milk to Order 33 Northeast Milk to Order 1)	Intercept	-2.1627	0.0169	-169.13	<.0001	0.8000
	Dummy for years 2005-2007	0.2574	0.0382	9.14	<.0001	
	lag (log (Order 33 Blend Price / Order 1 Blend Price))	1.3389	0.0250	6.98	0.0001	
log (Unregulated Northeast Milk Northeast Milk to Order 1)	Intercept	-2.8530	0.1757	-2.96	0.0181	0.9424
	Dummy for year 2004	0.3491	0.0378	7.53	<.0001	
	Dummy for years 2006-2008	0.1743	0.0308	-70.33	<.0001	
	log (Order 1 Class I Price Order 1 Class III Price)	-0.5205	0.0325	7.93	<.0001	
	Dummy for year 2001	0.2848	0.4571	2.93	0.0151	

Table 16: Allocation of Appalachian Milk to Pools

Dependent Variable	Parameter	Estimate	Std. Error	t-Value	Pr>|t|	R-Square
log (Appalachia Milk to Order 1 Appalachian Milk to Order 5)	Intercept	-1.3944	0.5152	-2.71	0.0241	0.9325
	log (Order 5 Blend Price / CPI all)	-0.6310	0.2398	-2.63	0.0273	
	Dummy for years after 2005	-0.8792	0.0675	-13.03	<.0001	
	Dummy for year 2008	0.3175	0.1601	1.98	0.0787	
log (Appalachian Milk to Order 6 Appalachian Milk to Order 5)	Intercept	-4.9184	0.7451	-6.60	<.0001	0.7894
	lag (log (Order 6 Blend Price - Order 5 Blend Price))	14.4050	4.2300	3.41	0.0078	
	* Dummy for years after 2004					

	Dummy for years after 2007	2.0078	0.5183	3.87	0.0038	
	Trend from 2000	-0.1661	0.0804	-2.06	0.0690	
log (Appalachian Milk to Order 7 / Appalachian Milk to Order 5)	Intercept	-1.3594	0.0248	-54.71	<.0001	0.8749
	log (Order 7 Blend Price / Order 5 Blend Price)	6.1993	2.4510	2.53	0.0323	
	Dummy for years after 2006	0.1791	0.0307	5.84	0.0002	
	Dummy for years 2009-2010	0.0854	0.0416	2.05	0.0703	
log (Appalachian Milk to Order 33 / Appalachian Milk to Order 5)	Intercept	-4.1237	0.4520	-9.12	<.0001	0.8701
	log (Order 33 Blend Price / Order 5 Blend Price)	13.6706	4.3573	3.14	0.0120	
	Dummy for years 2009-2010	0.5569	0.1926	2.89	0.0178	
	Dummy for years after 2007	0.8533	0.1720	4.96	0.0008	
log (Unregulated Appalachian Milk / Appalachian Milk to Order 5)	Intercept	-2.1007	0.0363	-57.93	<.0001	0.7274
	log (Order 5 Class I Price / Order 5 Class III Price)	-1.3714	0.2364	-5.80	0.0003	
	Dummy for year 2008	-0.2472	0.1056	-2.34	0.0439	
	Dummy for year 2011	-0.4823	0.0748	-6.45	0.0001	

Table 17: Allocation of Florida Milk to Pools

Dependent Variable	Parameter	Estimate	Std. Error	t-Value	Pr > t	R-Square
All Florida Milk is assumed to be used within either Order 6 or Order 7.						
log (Percentage of Florida Milk to Order 7 / 1 - Percentage of Florida Milk to Order 7)	Intercept	-11.4179	2.6424	-4.32	0.0012	0.8309
	log (Order 7 Blend Price / CPI All)	3.3036	1.2342	2.68	0.0215	
	Dummy for years after 2008	1.7234	0.3216	5.36	0.0002	

Table 18: Allocation of Southeast Milk to Pools

Dependent Variable	Parameter	Estimate	Std. Error	t-Value	Pr > t	R-Square
log (Southeast Milk to Order 5 / Southeast Milk to Order 7)	Intercept	-21.6652	4.7912	-4.52	0.0019	0.7730
	log (Order 5 Blend Price / Order 7 Blend Price)	129.0001	30.7974	4.19	0.0030	
	Trend from 1970	0.5512	0.1420	3.88	0.0047	
	Order 6 Blend Price / Order 5 Blend Price * Dummy for years after 2005	-3.5130	1.0163	-3.46	0.0086	
	Dummy for year 2001	1.3109	0.4071	3.22	0.0122	
log (Southeast Milk to Order 6 / Southeast Milk to Order 7)	Intercept	-2.3703	0.3672	-6.45	0.0001	0.8773
	lag (log (Order 6 Blend Price / CPI All)) * Dummy for years after 2004	0.1140	0.0455	2.50	0.0336	
	Trend from 1970	0.0237	0.0101	2.35	0.0434	
	Dummy for years before 2003	-0.7400	0.2072	-3.57	0.0060	
log (Southeast Milk to Order 32 / Southeast Milk to Order 7)	Intercept	-1.5289	0.1782	-8.58	<.0001	0.8546
	log (Order 32 Blend Price / Order 7 Blend Price)	4.1945	1.2883	3.26	0.0099	
	Dummy for years after 2004	0.2732	0.0751	3.64	0.0054	

	Dummy for year 2006	0.2145	0.0717	2.99	0.0151	
log (Unregulated Southeast Milk Southeast Milk to Order 7)	Intercept	-0.5357	0.4436	-1.21	0.2580	0.7247
	log (Order 7 Class I Milk / Order 7 Pooled Milk)	4.2278	1.0380	4.07	0.0028	
	Dummy for year 2003	-0.3300	0.1816	-1.82	0.1025	
	Dummy for year 2007	0.5076	0.0951	5.34	0.0005	

Table 19: Allocation of Upper Midwest Milk to Pools

Dependent Variable	Parameter	Estimate	Std. Error	t-Value	Pr>|t|	R-Square
log (Upper Midwest Milk to Order 32 Upper Midwest Milk to Order 30)	Intercept	-0.6431	0.1529	-4.21	0.0018	0.9331
	lag (log (Order 32 Blend Price / Order 30 Blend Price))	16.7445	2.2991	7.28	<.0001	
	lag (log (Upper Midwest Milk to Order 32 / Upper Midwest Milk to Order 30))	0.8914	0.1222	7.29	<.0001	
log (Upper Midwest Milk to Order 33 Upper Midwest Milk to Order 30)	Intercept	-1.4987	0.1711	-8.76	<.0001	0.9528
	lag (log (Order 33 Blend Price - Order 30 Blend Price))	6.0008	2.0497	2.93	0.0168	
	Dummy for years after 2005	-1.1997	0.2798	-4.29	0.0020	
	lag (log (Upper Midwest Milk to Order 33 / Upper Midwest Milk to Order 30))	0.2386	0.1378	1.73	0.1174	
log (Unregulated Upper Midwest Milk Upper Midwest Milk to Order 30)	Intercept	3.9730	0.3862	10.29	<.0001	0.9607
	Dummy for years 2001-2002	-1.0483	0.2919	-3.59	0.0058	
	log (Order 30 Class I Milk / Order 30 Pooled Milk)	3.1730	0.2664	11.91	<.0001	
	Dummy for year 2012	1.1428	0.2453	4.66	0.0012	

Table 20: Allocation of Central Milk to Pools

Dependent Variable	Parameter	Estimate	Std. Error	t-Value	Pr>|t|	R-Square
log (Central Milk to Order 5 Central Milk to Order 32)	Intercept	-6.5767	0.6980	-9.42	<.0001	0.8603
	Trend From 2000	0.1392	0.0366	3.81	0.0042	
	Dummy for years 2004-2005	1.6476	0.2952	5.58	0.0003	
	lag (log (Order 5 Blend Price - Order 32 Blend Price))	5.9905	3.5881	1.67	0.1294	
log (Central Milk to Order 7 Central Milk to Order 32)	Intercept	-3.0254	0.1224	-24.73	<.0001	0.7554
	log(Order 7 Blend Price - Order 32 Blend Price)	3.5018	1.0149	3.45	0.0073	
	Dummy for years 2003-2004	0.2866	0.0605	4.74	0.0011	
	Dummy for years after 2007	0.2521	0.0476	5.30	0.0005	
log (Central Milk to Order 30 Central Milk to Order 32)	Intercept	-2.5552	0.0946	-27.01	<.0001	0.7557
	lag (log (Order 30 Blend Price - Order 32 Blend Price))	5.7829	1.5205	3.80	0.0035	
	Dummy for years after 2003 * log (Trend from 2000)	0.4479	0.0383	11.70	<.0001	
log (Central Milk to Order 126 Central Milk to Order 32)	Intercept	-5.0206	0.4821	-10.41	<.0001	0.8324
	Dummy for years 2006-2007	0.8166	0.1838	4.44	0.0016	
	Dummy for years after 2001	1.1880	0.3464	3.43	0.0075	
	lag (log (Order 126 Blend Price - Order 32 Blend Price))	13.2380	4.8040	2.76	0.0223	

log (Unregulated Central Milk Central Milk to Order 32)	Intercept	-1.9181	0.0617	-31.10	<.0001	0.7462
	log (Order 32 Class III Price / Order 32 Class I Price)	3.7270	0.8670	4.30	0.0020	
	Dummy for year 2003	0.5076	0.1236	4.11	0.0026	
	Dummy for years 2007-2008	0.5434	0.0795	6.84	<.0001	

Table 21: Allocation of Mideast Milk to Pools

Dependent Variable	Parameter	Estimate	Std. Error	t-Value	Pr > |t|	R-Square
log (Mideast Milk to Order 1 Mideast Milk to Order 33)	Intercept	-6.8533	0.7339	-9.34	<.0001	0.9378
	log (Order 1 Blend Price / CPI All)	0.7300	0.3508	2.08	0.0672	
	Dummy for year 2010	0.9191	0.1711	5.37	0.0005	
	Dummy for years after 2008	0.9136	0.1104	8.27	<.0001	
log (Mideast Milk to Order 5 Mideast Milk to Order 33)	Intercept	-2.4416	0.1284	-19.02	<.0001	0.7544
	log (Order 5 Blend Price / Order 33 Blend Price)	3.0141	1.2771	2.36	0.0459	
	Dummy for year 2013	-0.1826	0.0530	-3.45	0.0087	
	Dummy for years before 2003	-0.1764	0.0557	-3.17	0.0132	
	Dummy for years after 2006	0.1818	0.0384	4.74	0.0015	
log (Mideast Milk to Order 7 Mideast Milk to Order 33)	Intercept	-5.4799	0.7604	-7.21	<.0001	0.9003
	lag (log(Order 7 Blend Price / Order 33 Blend Price)) * Dummy for years after 2005	7.9007	0.8831	8.95	<.0001	
	lag (log (Order 7 Blend Price / CPI All))	1.0184	0.3539	2.88	0.0182	
	Dummy for years after 2011	-0.2909	0.1278	-2.28	0.0488	
log (Mideast Milk to Order 30 Mideast Milk to Order 33)	Intercept	-5.5399	0.1524	-36.36	<.0001	0.9315
	lag (log (Order 30 Blend Price / Order 33 Blend Price))	9.0492	2.0609	4.39	0.0017	
	Dummy for years after 2007 * log (Trend from 2000)	0.5810	0.0710	8.19	<.0001	
	Dummy for year 2011	0.5467	0.2344	2.33	0.0445	
log (Unregulated Mideast Milk Mideast Milk to Order 33)	Intercept	-7.3436	0.8244	-8.91	<.0001	0.8075
	Former Western Order All Milk Price / CPI All	2.4271	0.4182	5.80	0.0003	
	Dummy for year 2007	-0.2417	0.1922	-1.26	0.2402	
	Dummy for year 2005	-0.9402	0.1747	-5.38	0.0004	

Table 22: Allocation of Pacific Northwest Milk to Pools

Dependent Variable	Parameter	Estimate	Std. Error	t-Value	Pr > |t|	R-Square
Pacific Northwest Milk is assumed to be used within either an Unregulated Region or Order 124.						
log (Percentage of Unregulated Pacific Northwest Milk 1- Percentage of Unregulated Pacific Northwest Milk)	Intercept	-1.8422	0.1158	-15.91	<.0001	0.8293
	log (Order 124 Class IV Price / Order 124 Class I Price)	-4.7855	1.0128	-4.72	0.0006	
	Dummy for year 2012	0.9829	0.3598	2.73	0.0195	

Table 23: Allocation of Southwest Milk to Pools

Dependent Variable	Parameter	Estimate	Std. Error	t-Value	Pr>|t|	R-Square
log (Southwest Milk to Order 5 / Southwest Milk to Order 126)	Intercept	-5.8084	0.4335	-13.40	<.0001	0.8954
	lag (log (Order 5 Blend Price / CPI All)) * Dummy for years after 2004	0.2089	0.0685	3.05	0.0138	
	Dummy for years 2004-2005	1.0816	0.1400	7.73	<.0001	
	log (Trend from 2000)	0.5120	0.2043	2.51	0.0335	
log (Southwest Milk to Order 7 / Southwest Milk to Order 126)	Intercept	-2.3522	0.2138	-11.00	<.0001	0.8325
	lag (log (Order 7 Blend Price / Order 126 Blend Price))	4.1514	2.2338	1.86	0.0961	
	Dummy for years 2004-2007	0.5489	0.0705	7.79	<.0001	
	Dummy for year 2002	0.4501	0.1226	3.67	0.0051	
log (Southwest Milk to Order 32 / Southwest Milk to Order 126)	Intercept	-2.0873	0.2280	-9.15	<.0001	0.8288
	log (Order 32 Blend Price / Order 126 Blend Price)	13.3697	5.5983	2.39	0.0381	
	Dummy for years after 2007	0.6688	0.1554	4.30	0.0016	
log (Unregulated Southwest Milk / Southwest Milk to Order 126)	Intercept	-0.9536	0.1015	-9.40	<.0001	0.8048
	Dummy for years 2004-2006	-1.0342	0.2845	-3.63	0.0046	
	log (Order 126 Class III Price / Order 126 Class I Price)	10.5883	1.9382	5.46	0.0003	

Table 24: Allocation of Arizona Milk to Pools

Dependent Variable	Parameter	Estimate	Std. Error	t-Value	Pr>|t|	R-Square
All Arizona Milk is assumed to be used within either Order 126 or Order 131.						
log (Percentage of Arizona Milk to Order 126 / 1- Percentage of Arizona Milk to Order 126)	Intercept	-11.5029	0.1825	-63.03	<.0001	0.8876
	(Order 126 Blend Price / Order 131 Blend Price) * Dummy for years after 2002	5.7051	0.3465	16.47	<.0001	
	Dummy for years 2004-2006	2.6024	0.3597	7.23	<.0001	
	Dummy for years after 2006	1.7268	0.3331	5.18	0.0004	

Table 25: Allocation of Former Western Order Milk to Pools

Dependent Variable	Parameter	Estimate	Std. Error	t-Value	Pr>|t|	R-Square
Milk in the Former Western Order is assumed to be used within either an Unregulated Area or Order 32.						
log (Percentage of Former Western Order Milk to Order 32 / 1 - Percentage of Former Western Order Milk to Order 32)	Intercept	-5.6319	0.5493	-10.25	<.0001	0.8147
	lag (log (Order 32 Blend Price / Former Western Order All Milk Price))	12.7312	4.3720	2.91	0.0155	
	Dummy for years after 2008	1.8551	0.5032	3.69	0.0042	

Table 26: Allocation of Unregulated West Milk to Pools

Dependent Variable	Parameter	Estimate	Std. Error	t-Value	Pr>|t|	R-Square
Milk in the Unregulated West Region is assumed to be used within either an Unregulated Area or Order 32.						
log (Percentage of Unregulated West Milk to Order 32	Intercept	-4.7513	0.7836	-6.06	<.0001	0.9670
	log (Order 32 Blend Price / CPI All)	0.6856	0.3937	1.74	0.1094	

1 - Percentage of Unregulated West Milk to Order 32)	Dummy for years after 2005	1.9277	0.1152	16.74	<.0001	

Table 27: Allocation of California Milk to Pools

Dependent Variable	Parameter	Estimate	Std. Error	t-Value	Pr>|t|	R-Square
log (California Milk to Order 131 California Milk used in California)	Intercept	-3.4013	0.5325	-6.39	0.0001	0.7539
	lag (log (Order 131 Blend Price California Blend Price))	3.8594	1.5505	2.49	0.0345	
	Dummy for years 2002-2005	-1.9403	0.8751	-2.22	0.0538	
	lag (log (California Milk to Order 131 California Milk used in California))	0.3796	0.0995	3.81	0.0041	
log (Unregulated California Milk California Milk used in California)	Intercept	-2.2569	0.3726	-6.06	0.0001	0.9349
	lag (log (California Blend Price CPI All))	-0.8072	0.1925	-4.19	0.0018	
	Dummy for year 2009	0.4543	0.0803	5.66	0.0002	

Table 28: Allocation of Hawaii and Alaska Milk to Pools

Dependent Variable	Parameter	Estimate	Std. Error	t-Value	Pr>|t|	R-Square

All milk produced in Hawaii and Alaska is assumed to be allocated to the Unregulated Pool.

Table 29: Fluid Use Equations

Dependent Variable	Parameter	Estimate	Std. Error	t-Value	Pr>|t|	Elasticity	R-Square
log (Order 1 Fluid Use Per Capita)	Intercept	4.7138	0.1994	23.64	<.0001		0.9700
	log (Order 1 Class I Price / CPI All)	-0.0355	0.0229	-1.55	0.1546	-0.0355	
	lag (Personal Disposable Income / CPI All)	0.0414	0.0132	3.14	0.0120	0.0414	
	Trend from 2000	-0.0185	0.0021	-8.94	<.0001		
log (Order 5 Fluid Use Per Capita)	Intercept	5.4566	0.1479	36.90	<.0001		0.7522
	log (Order 5 Class I Price / CPI All)	-0.1544	0.0713	-2.16	0.0533	-0.1544	
	Dummy for years after 2008	-0.1023	0.0174	-5.89	0.0001		
log (Order 6 Fluid Use Per Capita)	Intercept	5.4317	0.0848	64.02	<.0001		0.9545
	log (Order 6 Class I Price / CPI All)	-0.0921	0.0387	-2.38	0.0363	-0.0921	
	Trend from 2000	-0.0150	0.0010	-15.16	<.0001		
Order 7 Fluid Use Per Capita	Intercept	210.9578	22.6727	9.30	<.0001		0.7491
	log (Order 7 Class I Price / CPI All)	-19.9637	10.7144	-1.86	0.0920	-0.2572	
	Dummy for years after 2008 * Population Under 5 Years Old	-2.2671	0.4213	-5.38	0.0003		
	Dummy 03-05	-6.6149	3.1791	-2.08	0.0641		
log (Order 30 Fluid Use Per Capita)	Intercept	5.6254	0.0774	72.65	<.0001		0.8572
	log (Order 30 Class I Price / CPI All)	-0.1224	0.0407	-3.01	0.0119	-0.1224	
	Dummy for years after 2008	-0.0899	0.0115	-7.84	<.0001		
log (Order 32 Fluid Use Per Capita)	Intercept	1.1717	0.6708	1.75	0.1188		0.9855
	log (Order 32 Class I Price / CPI All)	-0.0358	0.0143	-2.51	0.0365	-0.0358	
	log (Personal Disposable Income / CPI All)	0.8342	0.1589	5.25	0.0008	0.8342	
	lag (log (Order 32 Fluid Use Per Capita))	0.3686	0.1412	2.61	0.0311		
	Trend from 2000	-0.0138	0.0023	-6.09	0.0003		
log (Order 33 Fluid Use Per Capita)	Intercept	5.4039	0.0286	189.00	<.0001		0.9220
	log (Order 33 Class I Price / CPI All)	-0.0088	0.0042	-2.11	0.0589	-0.0088	
	Trend from 2000	-0.0096	0.0009	-10.42	<.0001		
log (Order 124 Fluid Use Per Capita)	Intercept	5.5832	0.0497	112.26	<.0001		0.9634
	log (Order 124 Class I Price / CPI All)	-0.0690	0.0263	-2.62	0.0239	-0.0690	
	Trend from 2000	-0.0132	0.0009	-15.19	<.0001		
log (Order 126 Fluid Use Per Capita)	Intercept	3.6114	0.5802	6.22	0.0002		0.9663
	log (Order 126 Class I Price / CPI All)	-0.0556	0.0232	-2.39	0.0402	-0.0556	
	lag (log (Personal Disposable Income / CPI All))	0.6318	0.2147	2.94	0.0164	0.6318	
	Trend from 2000	-0.0173	0.0021	-8.28	<.0001		
log (Order 131 Fluid Use Per Capita)	Intercept	5.2678	0.0488	107.99	<.0001		0.9817
	log (Order 131 Class I Price / CPI All)	-0.0112	0.0060	-1.88	0.0892	-0.0112	
	Trend from 2000	-0.0224	0.0026	-8.66	<.0001		
	Dummy for years 2000-2005	0.0741	0.0208	3.56	0.0052		
California Fluid Use Per Capita	Intercept	-16.9813	53.4583	-0.32	0.7589		0.9664
	log (California Class I Price / CPI All)	-0.7447	0.4480	-1.66	0.1351	-0.0339	
	Personal Disposable Income / CPI All	4.6548	2.3024	2.02	0.0779	0.4261	
	lag (California Fluid Use Per Capita)	0.8504	0.2081	4.09	0.0035		
	Trend from 1980	-1.0242	0.4986	-2.05	0.0740		
log (Unregulated West Fluid Use Per Capita)	Intercept	-1.7044	3.3738	-0.51	0.6234		0.7283
	log (Personal Disposable Income / CPI All)	2.3286	1.2119	1.92	0.0810	2.3286	
	Dummy for years after 2010	0.3006	0.1083	2.78	0.0180		
log (Unregulated East Fluid Use Per Capita)	Intercept	14.9115	5.4036	2.76	0.0186		0.8162
	Trend from 1980	0.0843	0.0192	4.40	0.0011		
	log (Personal Disposable Income / CPI All)	-4.4252	2.1072	-2.10	0.0596	-4.4252	
Hawaii and Alaska Fluid Use Per Capita	Intercept	-232.8620	139.9000	-1.66	0.1270		0.8484
	Personal Disposable Income / CPI All	21.7754	8.7363	2.49	0.0319	2.7959	
	Dummy for year 2007	-34.3479	16.3706	-2.10	0.0623		
	Dummy for years after 2008	34.2309	10.7929	3.17	0.0100		

Table 30: Dairy Products Conversion Factors

	Solids Required per Product Unit	
Products	Butterfat	Non-fat Solids
Producer Milk /1,2	3.78	8.90
Butter	80.4	1.0
American Cheese /2	33.2	77.8
Other Cheese /2	26.6	78.4
Non-fat Dry Milk /2	0.97	96.2
Canned Milk	7.9	18.5
Dry Whey	1.1	95.0
Dry Whole Milk	26.5	71.0
Fluid Milk /2	1.8	8.9

/1: The Butterfat and Non-fat Solids test for Producer Milk are a simple average over the forecasted years for the weighted average of the regional assummed tests.

/2: The Non-fat Solids test for American Cheese, Other Cheese, and Fluid Milk and the Butterfat tests for American Cheese, Other Cheese, Non-fat Dry Milk, and Fluid Milk are estimated by the model. The numbers presented are simple averages of the results for the forecast years.

Table 31: Federal Order 1 Non-Fluid Milk Use

Dependent Variable	Parameter	Estimate	Std. Error	t-Value	Pr>|t|	R-Square
log ((Order 1 Class III Pooled Milk	Intercept	0.5570	0.0377	14.79	<.0001	0.8111
+ Order 1 Class III Non-Pool Milk)	log (Cheddar Cheese Wholesale Price Index	3.9828	0.4439	8.97	<.0001	
(Order 1 Class II Pooled Milk	Order 1 Class III Price Index)					
+ Order 1 Class II Non-Pool Milk))	log (Dry Whey Wholesale Price Index	0.3538	0.1121	3.16	0.0102	
	Order 1 Class III Price Index)					
	log (Weighted Class 2 CPI	-0.6981	0.1567	-4.45	0.0012	
	/ Order 1 Class 2 Price Index)					
log ((Order 1 Class IV Pooled Milk	Intercept	-0.6890	0.0376	-18.30	<.0001	0.9056
+ Order 1 Class IV Non-Pool Milk)	log (Grade-AA Butter Wholesale Price Index	0.3283	0.1864	1.76	0.1087	
(Order 1 Class II Pooled Milk	Order 1 Class IV Price Index)					
+ Order 1 Class II Non-Pool Milk))	Dummy for year 2008	0.3656	0.1116	3.28	0.0083	
	Dummy for year 2012	0.6077	0.1128	5.39	0.0003	

Table 32: Federal Order 5 Non-Fluid Milk Use

Dependent Variable	Parameter	Estimate	Std. Error	t-Value	Pr>|t|	R-Square
log ((Order 5 Class III Pooled Milk	Intercept	-0.6144	0.0470	-13.08	<.0001	0.8238
+ Order 5 Class III Non-Pool Milk)	log (Cheddar Cheese Wholesale Price Index	1.1629	0.4394	2.65	0.0245	
/ (Order 5 Class II Pooled Milk	Order 5 Class III Price Index)					
+ Order 5 Class II Non-Pool Milk))	log (Weighted Class 2 CPI	-0.6512	0.2562	-2.54	0.0293	
	/ Order 5 Class 2 Price Index)					
	Dummy for years 2006-2008	-0.4412	0.0847	-5.21	0.0004	
log ((Order 5 Class IV Pooled Milk	Intercept	-0.3398	0.0314	-10.84	<.0001	0.7443
+ Order 5 Class IV Non-Pool Milk)	log (Grade-AA Butter Wholesale Price Index	0.5431	0.1860	2.92	0.0153	
(Order 5 Class II Pooled Milk	/ Cheddar Cheese Wholesale Price Index)					
+ Order 5 Class II Non-Pool Milk))	Dummy for years after 2007	-0.2821	0.0526	-5.36	0.0003	
	Dummy for years after 2011	0.2883	0.0746	3.87	0.0031	

Table 33: Federal Order 6 Non-Fluid Milk Use

Dependent Variable	Parameter	Estimate	Std. Error	t-Value	Pr>|t|	R-Square
log ((Order 6 Class III Pooled Milk	Intercept	-1.1784	0.0771	-15.29	<.0001	0.8277
+ Order 6 Class III Non-Pool Milk)	log (Cheddar Cheese Wholesale Price Index	1.5953	0.3046	5.24	0.0004	
/ (Order 6 Class II Pooled Milk	/ Order 6 Class III Price Index)					
+ Order 6 Class II Non-Pool Milk))	log (Weighted Class 2 CPI	-1.3679	0.4408	-3.10	0.0112	
	/ Order 6 Class 2 Price Index)					
	Dummy for years after 2011	-0.4813	0.1770	-2.72	0.0216	
log ((Order 6 Class IV Pooled Milk	Intercept	-0.9866	0.1003	-9.84	<.0001	0.7583
+ Order 6 Class IV Non-Pool Milk)	log (Grade-AA Butter Wholesale Price Index	0.6583	0.2909	2.26	0.0472	
/ (Order 6 Class II Pooled Milk	/ Order 6 Class IV Price Index)					
+ Order 6 Class II Non-Pool Milk))	log (Non-Fat Dry Milk Wholesale Price Index	0.4813	0.2793	1.72	0.1156	
	/ Order 6 Class IV Price Index)					
	Dummy for years after 2005	0.2727	0.1191	2.29	0.0450	

Table 34: Federal Order 7 Non-Fluid Milk Use

Dependent Variable	Parameter	Estimate	Std. Error	t-Value	Pr>|t|	R-Square
log ((Order 7 Class III Pooled Milk	Intercept	0.4133	0.0572	7.23	<.0001	0.8208
+ Order 7 Class III Non-Pool Milk)	log (Cheddar Cheese Wholesale Price Index	2.8836	0.6835	4.22	0.0022	
/ (Order 7 Class II Pooled Milk	/ Order 7 Class III Price Index)					
+ Order 7 Class II Non-Pool Milk))	log (Dry Whey Wholesale Price Index	0.5673	0.1483	3.82	0.0041	
	/ Order 7 Class III Price Index)					
	Dummy for years 2002-2004	0.2425	0.0935	2.59	0.0290	
	Dummy for years 2010-2011	0.5292	0.1004	5.27	0.0005	
log ((Order 7 Class IV Pooled Milk	Intercept	-0.3025	0.0393	-7.70	<.0001	0.7430
+ Order 7 Class IV Non-Pool Milk)	log (Grade-AA Butter Wholesale Price Index	1.2458	0.1938	6.43	<.0001	
/ (Order 7 Class II Pooled Milk	/ Order 7 Class IV Price Index)					
+ Order 7 Class II Non-Pool Milk))	log (Non-Fat Dry Milk Wholesale Price Index	0.4378	0.2373	1.84	0.0922	
	/ Order 7 Class IV Price Index)					

Table 35: Federal Order 30 Non-Fluid Milk Use

Dependent Variable	Parameter	Estimate	Std. Error	t-Value	Pr>|t|	R-Square
log ((Order 30 Class III Pooled Milk	Intercept	2.8829	0.0442	65.20	<.0001	0.7147
- Order 30 Class III Non-Pool Milk)	log (Cheddar Cheese Wholesale Price Index	1.3946	0.3128	4.46	0.0010	
(Order 30 Class II Pooled Milk	/ Order 30 Class III Price Index)					
- Order 30 Class II Non-Pool Milk))	Dummy for years before 2007	-0.1604	0.0373	-4.30	0.0013	
log ((Order 30 Class IV Pooled Milk	Intercept	-1.3605	0.1018	-13.36	<.0001	0.8521
- Order 30 Class IV Non-Pool Milk)	log (Non-Fat Dry Milk Wholesale Price Index	0.9447	0.3072	3.08	0.0106	
(Order 30 Class II Pooled Milk	/ Order 30 Class IV Price Index)					
- Order 30 Class II Non-Pool Milk))	log (Grade-AA Butter Wholesale Price Index	0.4347	0.2416	1.80	0.0994	
	/ Order 30 Class IV Price Index)					

Table 36: Federal Order 32 Non-Fluid Milk Use

Dependent Variable	Parameter	Estimate	Std. Error	t-Value	Pr>|t|	R-Square
log ((Order 32 Class III Pooled Milk	Intercept	2.0365	0.1174	17.35	<.0001	0.7016
- Order 32 Class III Non-Pool Milk)	log (Cheddar Cheese Wholesale Price Index	7.5351	1.2988	5.80	0.0002	
/ (Order 32 Class II Pooled Milk	/ Order 32 Class III Price Index)					
- Order 32 Class II Non-Pool Milk))	log (Weighted Class 2 CPI	-1.8366	0.4318	-4.25	0.0017	
	/ Order 32 Class 2 Price Index)					
	Dummy for years after 2011	0.5897	0.1814	3.25	0.0087	
log ((Order 32 Class IV Pooled Milk	Intercept	-0.0608	0.0430	-1.41	0.1880	0.7739
- Order 32 Class IV Non-Pool Milk)	log (Non-Fat Dry Milk Wholesale Price Index	0.7761	0.1627	4.77	0.0008	
/ (Order 32 Class II Pooled Milk	/ Order 32 Class IV Price Index)					
- Order 32 Class II Non-Pool Milk))	Dummy for year 2003	-0.2867	0.1099	-2.61	0.0261	
	Dummy for year 2007	-0.5745	0.1209	-4.75	0.0008	

Table 37: Federal Order 33 Non-Fluid Milk Use

Dependent Variable	Parameter	Estimate	Std. Error	t-Value	Pr>|t|	R-Square
log ((Order 33 Class III Pooled Milk	Intercept	1.1753	0.0637	18.45	<.0001	0.8131
- Order 33 Class III Non-Pool Milk)	log (Cheddar Cheese Wholesale Price Index	3.2593	0.5059	6.44	<.0001	
(Order 33 Class II Pooled Milk	/ Order 33 Class III Price Index)					
- Order 33 Class II Non-Pool Milk))	Dummy for year 2000	-0.6122	0.1255	-4.88	0.0006	
	Dummy for years 2008-2009	-0.3873	0.0880	-4.40	0.0013	
log ((Order 33 Class IV Pooled Milk	Intercept	-2.4884	0.2958	-8.41	<.0001	0.8438
+ Order 33 Class IV Non-Pool Milk)	Grade-AA Butter Wholesale Price Index	0.7136	0.2489	2.87	0.0153	
(Order 33 Class II Pooled Milk	Order 33 Class IV Price Index					
- Order 33 Class II Non-Pool Milk))	Non-Fat Dry Milk Wholesale Price Index	0.7558	0.1449	5.21	0.0003	
	/ Order 33 Class IV Price Index					

Table 38 Federal Order 124 Non-Fluid Milk Use

Dependent Variable	Parameter	Estimate	Std. Error	t-Value	Pr>|t|	R-Square
log ((Order 124 Class III Pooled Milk	Intercept	1.6543	0.0437	37.89	<.0001	0.7504
- Order 124 Class III Non-Pool Milk)	log (Cheddar Cheese Wholesale Price Index	0.6256	0.3634	1.72	0.1159	
(Order 124 Class II Pooled Milk	/ Order 124 Class III Price Index)					
+ Order 124 Class II Non-Pool Milk))	Dummy for year 2002	0.3137	0.0823	3.81	0.0034	
	Dummy for years after 2008	0.3249	0.0488	6.66	<.0001	
log ((Order 124 Class IV Pooled Milk	Intercept	1.5415	0.0229	67.24	<.0001	0.8343
- Order 124 Class IV Non-Pool Milk)	Grade-AA Butter Wholesale Price Index	1.2141	0.1992	6.09	0.0001	
/ (Order 124 Class II Pooled Milk	/ Order 124 Class IV Price Index					
+ Order 124 Class II Non-Pool Milk))	Non-Fat Dry Milk Wholesale Price Index	1.6772	0.3338	5.02	0.0005	
	/ Order 124 Class IV Price Index					
	Dummy for year 2009	-0.2866	0.0741	-3.87	0.0031	

Table 39: Federal Order 126 Non-Fluid Milk Use

Dependent Variable	Parameter	Estimate	Std. Error	t-Value	Pr>|t|	R-Square
log ((Order 126 Class III Pooled Milk	Intercept	1.2355	0.0929	13.30	<.0001	0.8747
+ Order 126 Class III Non-Pool Milk)	log (Cheddar Cheese Wholesale Price Index	2.4271	0.9403	2.58	0.0296	
(Order 126 Class II Pooled Milk	/ Order 126 Class III Price Index)					
+ Order 126 Class II Non-Pool Milk))	log (Dry Whey Wholesale Price Index	0.6958	0.2413	2.88	0.0181	
	/ Order 126 Class III Price Index)					
	Dummy for years after 2009	0.6541	0.1412	4.63	0.0012	
	Dummy for year 2008	0.6387	0.2085	3.06	0.0135	
log ((Order 126 Class IV Pooled Milk	Intercept	0.0297	0.0470	0.63	0.5407	0.7518
+ Order 126 Class IV Non-Pool Milk)	Grade-AA Butter Wholesale Price Index	0.3718	0.1288	2.89	0.0162	
(Order 126 Class II Pooled Milk	/ Order 126 Class IV Price Index					
+ Order 126 Class II Non-Pool Milk))	Non-Fat Dry Milk Wholesale Price Index	1.1044	0.2068	5.34	0.0003	
	/ Order 126 Class IV Price Index					
	log (Weighted Class 2 CPI	-0.5483	0.1541	-3.56	0.0052	
	/ Order 126 Class 2 Price Index)					

Table 40: Federal Order 131 Non-Fluid Milk Use

Dependent Variable	Parameter	Estimate	Std. Error	t-Value	Pr>|t|	R-Square
log ((Order 131 Class III Pooled Milk	Intercept	1.4060	0.0443	31.72	<.0001	0.9494
+ Order 131 Class III Non-Pool Milk)	log (Cheddar Cheese Wholesale Price Index	1.5821	0.4375	3.62	0.0047	
(Order 131 Class II Pooled Milk	/ Order 131 Class III Price Index)					
+ Order 131 Class II Non-Pool Milk))	Dummy for years before 2003	0.7716	0.0916	8.43	<.0001	
log ((Order 131 Class IV Pooled Milk	Intercept	-0.9382	1.2371	-0.76	0.4676	0.7580
+ Order 131 Class IV Non-Pool Milk)	lag (log (Non-Fat Dry Milk Wholesale Price Index	0.6142	0.3104	1.98	0.0792	
/ (Order 131 Class II Pooled Milk	/ CPI All))					
+ Order 131 Class II Non-Pool Milk))	Trend from 2000	0.0568	0.0217	2.61	0.0281	
	Dummy for years after 2002	-0.8378	0.2301	-3.64	0.0054	

Table 41: California Pool Non-Fluid Milk Use

Dependent Variable	Parameter	Estimate	Std. Error	t-Value	Pr >|t|	R-Square
log (California Class 3 Total Solids / California Class 2 Total Solids)	Intercept	-2.1114	1.8949	-1.11	0.2743	0.5124
	log (Frozen Dairy Products CPI / CPI All)	2.2454	0.5773	3.89	0.0005	
	log (Other Dairy Products CPI / CPI All)	-1.7483	0.3561	-4.91	<.0001	
	Dummy for years after 2011	-0.2619	0.0742	-3.53	0.0014	
	Dummy for year 2000	0.3126	0.1017	3.07	0.0046	
log (California Class 4a Total Solids / California Class 2 Total Solids)	Intercept	1.7308	0.0609	28.42	<.0001	0.5047
	log (Non-Fat Dry Milk Wholesale Price Index / Cheddar Cheese Wholesale Price Index)	0.7311	0.2126	3.44	0.0017	
	Dummy for years after 1999	0.3217	0.0584	5.51	<.0001	
log (California Class 4b Total Solids / California Class 2 Total Solids)	Intercept	16.8155	2.0141	8.35	<.0001	0.8046
	log (Cheddar Cheese Wholesale Price Index / Non-Fat Dry Milk Wholesale Price Index)	0.0592	0.2430	0.24	0.8092	
	Dummy for years after 1998	0.8276	0.0624	13.27	<.0001	
	log (Other Dairy Products CPI / CPI All)	-3.8088	0.5042	-7.55	<.0001	

Table 42: National Domestic Production Equations

Dependent Variable	Parameter	Estimate	Std. Error	t-Value	Pr >|t|	Elasticity	R-Square
log (Percentage of Class II Solids Used in Frozen Production / (1 - Percentange of Class II Solids Used in Frozen Production))	Intercept	-0.0402	0.0273	-1.47	0.1718		0.9578
	log (Frozen Products CPI / Other Dairy Products CPI (2000 Base Year))	1.2994	0.4204	3.09	0.0114	1.2994	
	Dummy for year 2013	0.4369	0.0572	7.63	<.0001		
	Trend from 2000	-0.0395	0.0040	-9.93	<.0001		
log (Condensed Skim Milk Used in Cheese Production)	Intercept	3.1638	0.4312	7.34	<.0001		0.8907
	log (NDM Ratio * (American Cheese Production / Other Cheese Production))	-0.1298	0.1227	-1.06	0.3009		
	American Cheese Production / Other Cheese Production	0.0002	0.0001	2.16	0.0417		
	Dummy for years after 2005	0.7931	0.2695	2.94	0.0073		
	Dummy for year 1992	0.6251	0.3511	1.78	0.0882		
	Dummy for year 1993	0.8618	0.3503	2.46	0.0218		
log (American Cheese Production Percentage / 1- American Cheese Production Percentage)	Intercept	-0.0701	0.0886	-0.79	0.4346		0.7646
	log (Cheddar Cheese Wholesale Price Index / Mozzarella Price Index)	0.9118	0.2991	3.05	0.0047	0.9118	
	Dummy for years after 1991	-0.3641	0.0590	-6.17	<.0001		
log (Dry Whey Production)	Intercept	-6.2021	3.7439	-1.66	0.1140		0.8420
	Dry Whey Wholesale Price / CPI Food	0.0366	0.0250	1.46	0.1603	0.0366	
	log (Other Cheese Production / American Cheese Production)	1.5419	0.4321	3.57	0.0021		
	Trend from 1990	-0.0508	0.0118	-4.30	0.0004		

	Dummy for year 2001	-0.0753	0.0307	-2.45	0.0240		
log (Canned Milk Production)	Intercept	7.8265	0.2038	38.40	<.0001		0.7998
	log (Dry Whole Milk Production)	-0.0840	0.0255	-3.29	0.0025		
	Trend from 1970	-0.3416	0.0358	-9.55	<.0001		
log (Non-fat Dry Milk Ratio)	Intercept	-6.1227	2.5471	-2.40	0.0397		0.4524
	lag (log (Grade-AA Butter Wholesale Price / Cheddar Cheese Wholesale Price))	-0.7720	0.6069	-1.27	0.2352	-0.7720	
	log (Trend from 1985)	0.9301	0.8513	1.09	0.3030		
	Dummy for years after 2007	-0.6734	0.2968	-2.27	0.0494		
CPI Food	Intercept	0.2395	0.0424	5.65	<.0001		0.9986
	CPI All	0.9497	0.0085	111.32	<.0001		
	Dummy for years after 2008	0.0467	0.0071	6.63	<.0001		

Table 43: National Product Domestic Consumption Equations

Dependent Variable	Parameter	Estimate	Std. Error	t-Value	Pr>|t|	Elasticity	R-Square
log (Other Class II Per Capita Domestic Consumption)	Intercept	-1.3087	2.3280	-0.56	0.5836		0.7984
	log (Other Dairy Products CPI (2000 Base Year) / CPI All)	-1.9850	0.6720	-2.95	0.0112	-1.9850	
	log (Personal Disposable Income Per Capita / CPI All)	4.2911	0.8581	5.00	0.0002	4.2911	
	Trend from 1996	-0.0857	0.0140	-6.13	<.0001		
	Trend from 1996 * Dummy for years after 2003	0.0317	0.0075	4.23	0.0010		
log (Frozen Product Per Capita Domestic Consumption)	Intercept	5.7044	0.6181	9.23	<.0001		0.7589
	log (Frozen Products CPI / CPI All)	-0.6096	0.1517	-4.02	0.0003	-0.6096	
	Dummy for years after 2003	-0.1388	0.0146	-9.51	<.0001		
log (American Cheese Per Capita Domestic Consumption)	Intercept	1.3884	0.6385	2.17	0.0374		0.9208
	log (Cheddar Cheese Wholesale Price / CPI Food)	-0.1841	0.0724	-2.54	0.0163	-0.1841	
	log (Personal Disposable Income Per Capita / CPI All)	0.7099	0.1237	5.74	<.0001	0.7099	
log (Other Cheese Per Capita Domestic Consumption)	Intercept	-0.3179	0.5343	-0.60	0.5561		0.9622
	log (Mozzarella Price / CPI Food)	-0.6619	0.1605	-4.12	0.0003	-0.6619	
	log (Personal Disposable Income Per Capita / CPI All)	1.1908	0.1888	6.31	<.0001	1.1908	
log (Dry Whey Per Capita Domestic Consumption)	Intercept	1.9282	0.1421	13.57	<.0001		0.9560
	log (Dry Whey Wholesale Price / CPI All)	-0.1466	0.0602	-2.44	0.0270	-0.1466	
	Trend from 1989	-0.0503	0.0035	-14.30	<.0001		
log (Butter Per Capita Domestic Consumption)	Intercept	0.3878	0.6017	0.64	0.5241		0.7589
	log (Grade-AA Butter Wholesale Price / CPI Food)	-0.0968	0.0587	-1.65	0.1097	-0.0968	
	log (Personal Disposable Income Per Capita / CPI All)	0.5738	0.1449	3.96	0.0004	0.5738	
	Dummy for years 1989-1992	-0.2459	0.0471	-5.22	<.0001		
log (Non-Fat Dry Milk Per Capita Domestic Consumption)	Intercept	-0.1129	0.9557	-0.12	0.9068		0.8430
	log (Non-Fat Dry Milk Wholesale Price / CPI Food)	-0.2708	0.1170	-2.31	0.0280	-0.2708	

	log (Personal Disposable Income Per Capita ÷ CPI All)	0.8333	0.1951	4.27	0.0002	0.8333	
	Dummy for years 1994-1997	0.3275	0.0517	6.34	<.0001		
	Dummy for years 1985-1987	-0.2536	0.0612	-4.14	0.0003		

Table 44: National Average Stock Equations

Dependent Variable	Parameter	Estimate	Std. Error	t-Value	Pr>|t|	Elasticity	R-Square
log (American Cheese Average Stocks)	Intercept	5.8530	0.0584	100.15	<.0001		0.6246
	log (Cheddar Cheese Wholesale Price ÷ CPI Food)	-1.1688	0.2297	-5.09	<.0001	-1.1688	
	Dummy for years before 1987	1.1295	0.1442	7.83	<.0001		
log (Other Cheese Average Stocks)	Intercept	-0.4273	1.1933	-0.36	0.7227		0.8292
	log (Mozzarella Price ÷ CPI All)	-1.2048	0.2749	-4.38	0.0001	-1.2048	
	Dummy for years after 2005	0.7976	0.1159	6.88	<.0001		
log (Dry Whey Average Stocks)	Intercept	2.7915	0.1900	14.69	<.0001		0.7169
	log (Dry Whey Wholesale Price ÷ CPI Food)	-0.2176	0.0869	-2.50	0.0180	-0.2176	
	Trend from 1970	0.0132	0.0023	5.63	<.0001		
	Dummy for years 2007-2008	0.4146	0.0970	4.27	0.0002		
log (Butter Average Stocks)	Intercept	88.1188	29.6888	2.97	0.0057		0.6876
	log (Grade-AA Butter Wholesale Price ÷ CPI All)	-106.2000	58.2926	-1.82	0.0781	-106.20	
	Dummy for years before 1994	315.5302	42.7077	7.39	<.0001		
log (Non-Fat Dry Milk Average Stocks)	Intercept	4.3120	0.1024	42.12	<.0001		0.4606
	log (Non-Fat Dry Milk Wholesale Price ÷ CPI All)	-0.3376	0.2294	-1.47	0.1515	-0.3376	
	Dummy for year 2006	-0.5572	0.3221	-1.73	0.0939		
	Dummy for years after 2006	0.4810	0.1311	3.67	0.0009		

Table 45: National Ending Stock Equations

Dependent Variable	Parameter	Estimate	Std. Error	t-Value	Pr>|t|	Elasticity	R-Square
log (American Cheese Ending Stocks)	Intercept	0.0470	0.1026	0.46	0.6496		0.9895
	log (American Cheese Average Stocks)	0.9921	0.0166	59.91	<.0001		
log (Other Cheese Ending Stocks)	Intercept	-0.1278	0.0510	-2.50	0.0176		0.9974
	log (Other Cheese Average Stocks)	1.0263	0.0101	102.02	<.0001		
log (Dry Whey Ending Stocks)	Intercept	0.4362	0.4143	1.05	0.3003		0.6758
	log (Dry Whey Average Stocks)	0.8982	0.1151	7.80	<.0001		
log (Butter Ending Stocks)	Intercept	-1.4591	0.2403	-6.07	<.0001		0.9557
	log (Butter Average Stocks)	1.2059	0.0458	26.30	<.0001		
log (Non-Fat Dry Milk Ending Stocks)	Intercept	0.2371	0.3259	0.73	0.4722		0.8278
	log (Non-Fat Dry Milk Average Stocks)	0.9530	0.0717	13.30	<.0001		

Table 46: National Product Import and Export Equations

Dependent Variable	Parameter	Estimate	Std. Error	t-Value	Pr >|t|	Elasticity	R-Square
log (American Cheese Imports)	Intercept	0.2105	0.0865	2.43	0.0279		0.7882
	(Cheddar Cheese Wholesale Price - Oceania Cheddar Cheese Price)^3	1.4001	0.7441	1.88	0.0794	0.0194	
	Dummy for year 2002	0.5265	0.2620	2.01	0.0629		
	Dummy for years after 2009	-0.8592	0.1560	-5.51	<.0001		
log (Other Cheese Imports)	Intercept	-0.7517	0.0947	-7.94	<.0001		0.9035
	Mozzarella Price - Oceania Cheddar Cheese Price	0.2052	0.0425	4.83	0.0002	0.0267	
	lag (Other Cheese Imports)	0.0024	0.0002	9.69	<.0001		
log (American Cheese Exports)	Intercept	6.9328	0.3812	18.19	<.0001		0.9586
	(Cheddar Cheese Wholesale Price / Oceania Cheddar Cheese Price)	-2.8403	0.3886	-7.31	<.0001	-1.0479	
	Dummy for years after 2010	0.8778	0.0818	10.73	<.0001		
log (Other Cheese Exports)	Intercept	5.3384	0.3468	15.39	<.0001		0.9372
	Mozzarella Price - Oceania Cheddar Cheese Price	-1.1509	0.3866	-2.98	0.0089	-0.2024	
	Dummy for years after 2008	0.8927	0.2613	3.42	0.0035		
	Dummy for years after 2011	0.6765	0.3506	1.93	0.0716		
log (Dry Whey Exports)	Intercept	5.5909	0.0571	97.87	<.0001		0.8235
	Dry Whey Wholesale Price - EU Dry Whey Price	-1.8935	0.5855	-3.23	0.0049	0.0083	
	Dummy for years after 2004	0.5162	0.0935	5.52	<.0001		
log (Butter Imports)	Intercept	-0.0944	0.0844	-1.12	0.2788		0.6723
	(Grade-AA Butter Wholesale Price - Oceania Butter Price)^3	0.8528	0.1154	7.39	<.0001	0.0478	
log (Butter Exports)	Intercept	9.1232	0.8872	10.28	<.0001		0.8530
	(Grade-AA Butter Wholesale Price - Oceania Butter Price)	-4.6222	0.9725	-4.75	0.0002	-2.4048	
log (Non-Fat Dry Milk Exports)	Intercept	12.5983	0.8103	15.55	<.0001		0.9509
	Non-Fat Dry Milk Wholesale Price - Oceania Skim Milk Powder Price	-7.1719	0.9410	-7.62	<.0001	-2.5527	
	Dummy for years after 2010	0.7465	0.0844	8.84	<.0001		