USDA Agricultural Marketing Service Dairy Program

Regional Econometric Model Documentation

For Model Calibrated To
USDA Agricultural Projections to 2026

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Economics Analysis Branch

Dairy Program

USDA-AMS Dairy Program Regional Econometric Model Documentation

Introduction

Dairy Program's Economic 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 historic data capture changes in the marketplace, including policies and processing capacities. 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. However, the payments do not interact with the other model variables, because the program began recently in 2014 and 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 consumption, national manufactured dairy product consumption, regional dairy classification, national dairy product prices, and regional farm milk prices sequentially along the time path of 2016 – 2026. 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 operates on three geographic levels: 1) supply regions, in which the milk is produced; 2) pools, in which milk is classified by various uses; and 3) 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

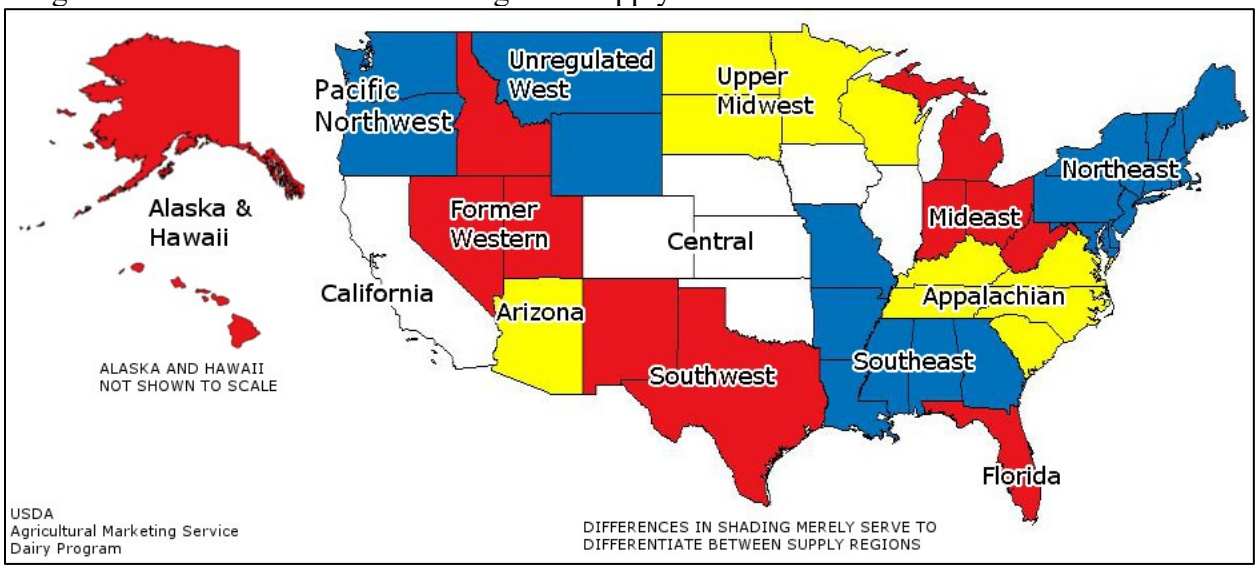
[1] All prices are discussed in real or relative terms.

[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, Interagency Agricultural Projections Committee-Long-term Projections Report OCE-20167-1, February 2017. Available at: https://www.ers.usda.gov/webdocs/publications/82539/oce-2017-1.pdf?v=42788

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

(CT, DE, MA, MD, ME, NJ, NH, NY, PA, RI, VT), Pacific Northwest (OR, WA), Southeast (AL, AR, GA, LA, MS, MO), 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 milk 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 all 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 – 2015. Milk marketings are estimated as milk production less farm use.

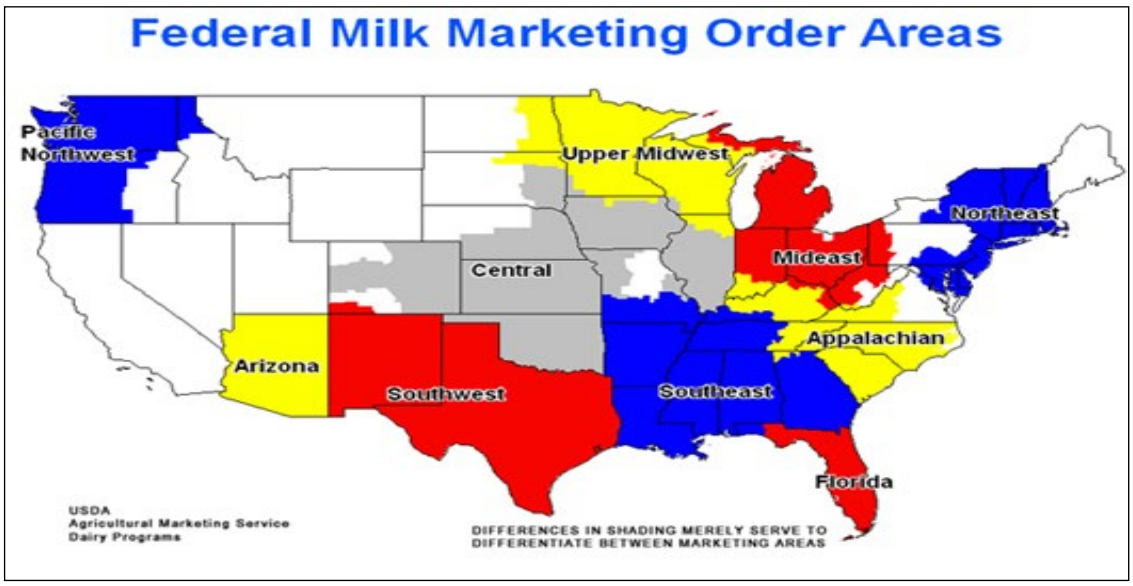
The all-milk price estimates that drive milk production for each region are a function of the effective blend price of the pool which predominantly resembles the milk supply region. For example, Order 131 is the "predominant" pool for the Arizona supply region. If there is no predominant pool for a supply 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

[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 was represented by the Sioux Falls, SD, boner price. Prior to 1991, it was represented by weighted average boner cow price.

using a weighted average of milk production in the region. The prices are estimated using data from 2000 – 2015 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 milk prices driving production are adjusted to reflect dairy support program payments. Dairy Market Loss Payments (MILC) and Dairy Economic Loss Assistance (DELAP) are included on a per-cwt basis.[6]

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, comprised of the ten existing FMMOs, California,[7] and an unregulated area to handle the classification of products not otherwise covered.[8] Figure 2, presented below, shows a map of the existing FMMO structure. The



allocation of milk into various class uses, for 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

[5] Tables are located at the end of the document.

[6] Total monthly MILC Program state payments data are available from the Farm Service Agency (FSA) from October 2002 – May 2006. After May 2006, state MILC data from FSA on a monthly or calendar year basis are no longer available. State MILC data is estimated for periods of June 2006 - December 2007, and fiscal years 2009-2015 assuming monthly state payments are proportional to the fiscal year state proportions. For calendar 2008 no MILC payments were made. Information on DELAP payments is reported by FSA.

[7] Data for the California pool that would otherwise come from an MA office are available from the California Department of Food and Agriculture (CDFA).

[8] 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.

movement of milk. The details of compositional regression estimation can be found in Aitchison (1982); however, a brief explanation follows.[9] 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 "fill-up" value, with the ratio logged to satisfy the strict positivity constraint. The fill-up value acts to balance the equations as a residual variable might, but is not a residual in the traditional sense. Because the fill-up value 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 (1982), milk pooled on this pool is assumed to be the fill-up value. 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 fill-up value 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 fill-up value, the effective blend price of the other pools relative to the predominant pool's effective blend price becomes the driving factor, representing the decision to pool milk on one pool or another.

[9] 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. https://www.jstor.org/stable/2345821?seq=1#page_scan_tab_contents

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.[10] 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 end with the most recently available annual data, 2015. The data for classified prices and classified utilization are regional. Since these are historic data, the data reflect regional changes in the orders' policies, handlers' marketing policies (such as base plans), plant capacities, transportation costs and demands for each class of milk.

[10] 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.

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 estimated. Given that the two percentages must sum to one, the estimated ratio can be solved easily 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 (located at the end of this document, beginning on page 20).

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 use
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.[11]

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 explanatory 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 – 2015. Fluid use is estimated for each of the ten Federal orders, California, and the unregulated pool. The USDA Economic Research Service provides National estimates for fluid milk use. The Class I fluid use in the unregulated pool is derived by subtracting the fluid use in the ten Federal orders and California (converted to FMMO Class I standards) from the National fluid use provided by Economic Research Service to create the historic unregulated fluid data. The unregulated fluid data are used to estimate the coefficients used to forecast unregulated fluid use in the model. The unregulated fluid use estimation is driven by income changes. 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 fill-up value is Class II milk. Class III allocations are driven by national average cheddar cheese prices, national average 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 national average butter prices, national average non-fat dry milk prices, and/or Class IV prices at test for a

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

given pool. All classified prices and class allocation variables are based on MA data, estimated from 2000 – 2015.

The structural form of the equations warrants the use of the input costs and own prices. However, in FMMOs, input costs are based on product prices. This may cause an issue of multicollinearity if the product prices are used as separate variables with the class prices. In order to avoid this issue, the product and class prices are included in the equations as ratios. These ratios capture the economic relationship between the input costs and own price that influences the class allocations. The Class III and IV allocations may also be driven by their respective lagged product-to-class price ratio. The FMMOs with equations that include these lags in their specifications are less flexible in switching their class utilization compared to FMMOs that have the current year product-to-class price ratio. Milk moves between classes in response to the product-to-class price ratios. This drives the milk to its highest value use.

The equations for class III and IV allocation are estimated together using Seemingly Unrelated Regression (SUR). Even though the equations for class III and IV allocations are distinct in terms of factors affecting them, there may exist an underlying relationship across the two equations as they operate in the same economic environment. This underlying relationship is captured through cross correlation among the error terms from both equations. The Hausman test confirms the existence of cross equation error correlation. Therefore, SUR is an efficient estimator compared to OLS in this context and consequently the coefficients efficiently capture the historic relationship between Class II, III and IV for the forecast years.

Data for classification in the unregulated pool are unavailable. Fluid use in the unregulated pool estimation is driven by income and is classified as Class I. For the milk other than Class I in the unregulated pool, a weighted average breakdown of manufacturing classes are used. The manufacturing class breakdown in the Upper Midwest and in the remaining Federal Orders-other-than-the-Upper Midwest are weighted by the quantity of milk other than for fluid use from the Unregulated West and Former West production regions, respectively. A proportional breakdown of unregulated manufacturing milk based on the Federal orders and the UMW is chosen to allow changes in class utilizations based on prices changes over time.[12] 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 – 2015.

The California pool has a different structure than the FMMO system. Total solids by classification, defined as the sums of butterfat and non-fat solids within each class, are estimated (rather than the total amount of milk allocated to each class), because milk pounds by classification are not reported. Class 2 remains the fill-up value. 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 nonfat solids are driven by the national average price of non-fat dry milk.

[12] A fixed percentage breakdown would not have allowed class utilization to change as the market conditions changed. Furthermore, California is not included in computing proportional breakdown of the manufacturing milk because the manufacturing milk breakdown in the unregulated pool would have been altered significantly by processors choosing not to pool under a California FMMO.

Class 4b nonfat solids are driven by the national average 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. The manufactured milk in each class and their corresponding components are aggregated from the pools to create a national supply of milk, butterfat, and non-fat solids for each class. 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.[13] American and other cheese production percentages are estimated with a logistical function which responds to the price of cheddar and the price of mozzarella cheese. 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 similar 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 sufficient 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 are obtained from BLS and are estimated using the CPI for all products in projection years. Butterfat and non-fat solids per product pound of dry whey are calculated using conversion factors. All the conversion 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

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

milk's production is assumed to be 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 remain 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 are used to calculate the non-fat dry milk production using non-fat dry milk non-fat solids conversion factor. 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 production, it is necessary to make some adjustments to avoid double counting the non-fat dry milk and condensed skim milk used in cheese production. Historical data used to account for duplication are taken for the most part from the American Dairy Products Institute (ADPI).[14] 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 demand functions for manufactured dairy products are estimated using 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. National average wholesale prices for cheese, butter, 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.[15] Adjustments for leap year are included in the forecast period. The estimates for per capita non-fluid product demand can be found in Table 43.

[14] American Dairy Products Institute (2016) *Dairy Products, Utilization and Production Trends* https://www.adpi.org/tabid/128/newsid545/49/Default.aspx

[15] U.S. Department of Agriculture, Office of the Chief Economist, World Agricultural Outlook Board, OCE-2016-1 (2017 February) *USDA Agricultural Projections to 2026* www.ers.usda.gov/webdocs/publications/82539/oce-2017-1.pdf?v=42788
USDA Agricultural Marketing Service Dairy Programs National Econometric Model Documentation (Model Calibrated to USDA Agricultural Baseline Projections to 2016) https://www.ams.usda.gov/sites/default/files/media/National%20Econometric%20Model%20Documentation%20april%202007.pdf

Year-end stocks are estimated for American cheese, other cheese, butter, and non-fat dry milk. Estimating ending stock values is complicated because of 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 product demand. 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, they 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. Cheese and butter 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. Import quantity data are available from the Foreign Agriculture Service, and the equation is estimated using 1995 – 2015 data.[16] 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 changing 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 prices in a certain manner. Milk production variables (number of 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. per capita fluid use) 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.

[16] U.S. Department of Agriculture, Foreign Agricultural Service, *Dairy Monthly Imports*. Current report is available at: http://www.fas.usda.gov/data/dairy-monthly-imports

Parameter magnitudes vary based on specification, and they do not necessarily provide a clear picture of the impact of variable-in-question. 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 0.9124. 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 0.91 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 null 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.

Only the equations that have estimated parameter coefficients are presented in this documentation. Equations that reflect pricing formulas and static conversion relationships are not presented here. They remain unchanged as long as the underlying policy is in effect. Any formula updates required due to a policy change(s) are incorporated into the model at the time of an impact analysis.

Summary

The Dairy Program's Economic 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. The model's responses to price and policy changes follow economic theory and are statistically validated. This documentation serves to outline the model's sources, capabilities, and methods. The model is used for impact analyses, discussions of specific impacts are reserved for other 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	0.2200	0.1073	2.05	0.0596		0.9744
	log (Order 1 Blend Price at Test/ CPI all)	0.9124	0.0512	17.82	<.0001	0.9124	
log (Northeast Number of Cows)	Intercept	2.4986	0.5084	4.91	<.0001		0.9936
	lag (log ((Northeast All Milk Price + Northeast Average Dairy Market Loss Payments + Average Dairy Economic Loss Assistance Payments) / 16% Protein Feed Value))	0.0387	0.0144	2.69	0.0114	0.0387	
	Trend from 1980	-0.0045	0.0010	-4.57	<.0001		
	Dummy from 1980 to 1986	0.0345	0.0060	5.72	<.0001		
	lag (log (Northeast Number of Cows))	0.6598	0.0663	9.95	<.0001		
log (Northeast Milk Per Cow)	Intercept	4.2184	1.0694	3.94	0.0005		0.9963
	lag (log ((Northeast All Milk Price + Northeast Average Dairy Market Loss Payments + Average Dairy Economy Loss Assistance Payments) / 16% Protein Feed Value))	0.0334	0.0143	2.34	0.0263	0.0334	
	lag (log (Northeast Milk Per Cow))	0.5480	0.1151	4.76	<.0001		
	Trend from 1980	0.0084	0.0022	3.83	0.0006		
	Dummy: Dairy Diversion Program	-0.0255	0.0119	-2.14	0.0406		
	Dummy for years after 1999	-0.0254	0.0094	-2.70	0.0115		

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	0.0933	0.0985	0.9500	0.3595		0.9857
	log (Order 5 Blend Price at Test / CPI all)	0.9667	0.0459	21.0500	<.0001	0.9667	
log (Appalachian Number of Cows)	Intercept	24.0751	1.1941	20.16	<.0001		0.9833
	lag (log (Appalachian Milk Per Cow))	-1.8866	0.1232	-15.31	<.0001		
	log ((Appalachian All Milk Price + Appalachian Average Dairy Market Loss Payments + Average Dairy Economy Loss Assistance Payments) / 16% Protein Feed Value)	0.1616	0.0541	2.99	0.0055	0.1616	
	Dummy for years after 1997	-0.1651	0.0347	-4.76	<.0001		
log (Appalachian Milk Per Cow)	Intercept	9.2114	0.0199	462.4100	<.0001		0.9927
	lag (log(Appalachian All Milk Price + Appalachian Average Dairy Market Loss Payments + Average Dairy Economy Loss Assistance Payments) / 16% Protein Feed Value)	0.0502	0.0148	3.3800	0.0020	0.050225	
	Trend from 1980	0.0167	0.0005	30.6600	<.0001		
	Dummy for years after 1997	-0.0329	0.0100	-3.2900	0.0026		
	Dummy: Dairy Diversion Program	-0.0625	0.0145	-4.3100	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	0.1039	0.1117	0.93	0.3696		0.9878
	log (Order 6 Blend Price at Test / CPI all)	0.9252	0.0495	18.69	<.0001	0.9252	
	Trend from 2000	0.0066	0.0012	5.40	0.0001		
log (Florida Non-Farm Earnings Per Capita /CPI all)	Intercept	20.2854	0.0842	240.94	<.0001		0.9944
	log (Personal Disposable Income Per Capita / CPI all)	1.0430	0.0321	32.47	<.0001		
	Dummy for years after 2008	-0.1556	0.0120	-12.95	<.0001		
log (Florida Number of Cows)	Intercept	8.5314	1.9837	4.30	0.0002		0.9641
	lag (log ((Florida All Milk Price + Florida Average Dairy Market Loss Payments + Average Dairy Economy Loss Assistance Payments) / 16% Protein Feed Value))	0.0742	0.0347	2.14	0.0409	0.0742	
	lag (log (Florida Number of Cows))	0.7928	0.0601	13.20	<.0001		
	Dummy for years after 1985	0.0519	0.0187	2.78	0.0094		
	lag (log (Florida Non-Farm Earnings Per Capita / CPI all))	-0.3313	0.0770	-4.30	0.0002		
log (Florida Milk Per Cow)	Intercept	0.1913	0.2971	0.64	0.5246		0.9810
	log ((Florida All Milk Price + Florida Average Dairy Market Loss Payments + Average Dairy Economy Loss Assistance Payments) / 16% Protein Feed Value)	0.0633	0.0306	2.06	0.0477	0.0633	
	lag (log (Florida Milk Per Cow))	0.9738	0.0306	31.87	<.0001		
	Dummy for 1998	-0.0823	0.0232	-3.54	0.0013		
	Dummy for years after 2007	0.0374	0.0164	2.28	0.0299		

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	-0.0545	0.1234	-0.44	0.6657		0.9815
	log (Order 7 Blend Price at Test / CPI all)	1.0107	0.0573	17.63	<.0001	1.0107	
(Southeast Non-Farm Earnings Per Capita / CPI All)	Intercept	56.2218	253.8000	0.22	0.8261		0.9936
	Personal Disposable Income Per Capita	273.1474	87.5364	3.12	0.0039		
	Dummy for years after 2008	-422.6370	139.9000	-3.02	0.0050		
	lag (Southeast Non-Farm Earnings Per Capita / CPI All)	0.6207	0.1163	5.34	<.0001		
log (Southeast Number of Cows)	Intercept	35.0848	1.8470	19.00	<.0001		0.9586
	log ((Southeast All Milk Price + Southeast Average Dairy Market Loss Payments + Average Dairy Economy Loss Assistance Payments) / 16% Protein Feed Value)	0.6353	0.0933	6.81	<.0001	0.6353	
	Dummy for years 1980 to 1987	-0.3266	0.0667	-4.89	<.0001		

	lag(log (Southeast Non-Farm Earnings Per Capita / CPI all))	-3.1778	0.1974	-16.10	<.0001		
	log ((Southeast All Milk Price + Southeast Average Dairy Market Loss Payments + Average Dairy Economy Loss Assistance Payments) /Boning Cow Slaughter Price)	0.3321	0.0965	3.44	0.0017	0.3321	
log (Southeast Milk Per Cow)	Intercept	9.1370	0.0288	317.77	<.0001		0.9768
	log ((Southeast All Milk Price + Southeast Average Dairy Market Loss Payments + Average Dairy Economy Loss Assistance Payments) / 16% Protein Feed Value)	0.0936	0.0234	4.00	0.0003	0.0936	
	Dummy from 1991 to 1995	0.0568	0.0113	5.04	<.0001		
	Trend from 1980	0.0149	0.0004	34.71	<.0001		

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 / CPI all)	Intercept	0.2284	0.0540	4.23	0.0008		0.9944
	log (Order 30 Blend Price at Test / CPI all)	0.9188	0.0269	34.21	<.0001	0.9188	
log (Upper Midwest Number of Cows)	Intercept	0.2421	0.1447	1.67	0.1044		0.9596
	lag (log (Upper Midwest Number of Cows))	0.9540	0.0210	45.34	<.0001		
	lag (log ((Upper Midwest All Milk Price + Upper Midwest Average Dairy Market Loss Payments + Average Dairy Economy Loss Assistance Payments - 16% Protein Feed Value)/ CPI all))	0.0543	0.0168	3.23	0.0029	0.0543	
	Dummy for years after 2008	0.0297	0.0083	3.58	0.0012		
log (Upper Midwest Milk Per Cow)	Intercept	9.3245	0.0128	729.82	<.0001		0.9972
	lag (log ((Upper Midwest All Milk Price + Upper Midwest Average Dairy Market Loss Payments + Average Dairy Economy Loss Assistance Payments) / 16% Protein Feed Value))	0.0277	0.0109	2.55	0.0160	0.0277	
	Trend from 1980	0.0200	0.0004	47.10	<.0001		
	Dummy for years after 1983	-0.0290	0.0078	-3.71	0.0008		
	Dummy for years after 2000	-0.0307	0.0074	-4.14	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 / CPI all)	Intercept	-4.3639	0.0638	-68.45	<.0001		0.9925
	log (Order 32 Blend Price at Test / CPI all)	0.9026	0.0314	28.76	<.0001	0.9026	
log (Central Number of Cows)	Intercept	0.5887	0.1958	3.01	0.0053		0.9895

	lag (log ((Central All Milk Price + Central Average Dairy Market Loss Payments + Average Dairy Economy Loss Assistance Payments) / 16% Protein Feed Value))	0.0385	0.0180	2.14	0.0405	0.0385	
	lag (log (Central Number of Cows))	0.9079	0.0282	32.21	<.0001		
	Dummy for years after 1985	-0.0386	0.0113	-3.42	0.0018		
	Dummy for years after 2005	0.0243	0.0084	2.91	0.0067		
log (Central Milk Per Cow)	Intercept	0.2084	0.1508	1.38	0.1767		0.9920
	lag (log ((Central All Milk Price + Central Average Dairy Market Loss Payments + Average Dairy Economy Loss Assistance Payments) / 16% Protein Feed Value))	0.0448	0.0228	1.97	0.0581	0.0448	
	lag (log (Central Milk Per Cow))	0.9758	0.0157	62.13	<.0001		
	Dummy for years after 2008 * Trend from 2000	0.0016	0.0009	1.72	0.0963		

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	-4.4309	0.0645	-68.71	<.0001		0.9930
	log (Order 33 Blend Price at Test / CPI All)	0.9367	0.0315	29.75	<.0001	0.9367	
log (Mideast Number of Cows)	Intercept	6.4857	0.1137	57.04	<.0001		0.9229
	Dummy for years after 1988	-0.1220	0.0221	-5.53	<.0001		
	log ((Mideast All Milk Price + Mideast Average Dairy Market Loss Payments + Average Dairy Economy Loss Assistance Payments) / CPI All)	0.1576	0.0443	3.56	0.0012	0.1576	
	Dummy from 1995 to 2004	-0.0997	0.0138	-7.20	<.0001		
log (Mideast Milk Per Cow)	Intercept	9.3281	0.0198	471.66	<.0001		0.9933
	lag (log ((Mideast All Milk Price + Mideast Average Dairy Market Loss Payments + Average Dairy Economy Loss Assistance Payments) / 16% Protein Feed Value))	0.0420	0.0166	2.54	0.0162	0.0420	
	Trend from 1980	0.0194	0.0003	63.43	<.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	-4.4505	0.0688	-64.68	<.0001		0.9899
	log (Order 124 Blend Price at Test/ CPI All)	0.9448	0.0340	27.82	<.0001	0.9448	
log (Pacific Northwest Number of Cows)	Intercept	1.9192	0.2674	7.18	<.0001		0.9709

	lag (log (Pacific Northwest Number of Cows))	0.2893	0.0963	3.01	0.0055		
	lag (log ((Pacific Northwest All Milk Price + Pacific Northwest Average Dairy Market Loss Payments + Average Dairy Economy Loss Assistance Payments) / CPI All))*Dummy for years after 2009	0.0245	0.0038	6.41	<.0001	0.0245	
	lag (log (Pacific Northwest Milk Per Cow))	0.2264	0.0405	5.58	<.0001		
	Dummy from 1998 to 2001	-0.0333	0.0084	-3.96	0.0005		
	Dummy from 1992 to 1995	0.0372	0.0080	4.67	<.0001		
	Dummy from 1986 to 1989	-0.0350	0.0078	-4.48	0.0001		
log (Pacific Northwest Milk Per Cow)	Intercept	10.0508	0.0848	118.59	<.0001		0.9813
	log ((Pacific Northwest All Milk Price + Pacific Northwest Average Dairy Market Loss Payments + Average Dairy Economy Loss Assistance Payments) / 16% Protein Feed Value)	0.0600	0.0237	2.53	0.0165	0.0600	
	log (Producer Price Index for Fuel/GDP Deflator)	-0.1075	0.0141	-7.64	<.0001		
	Trend from 1980	0.0175	0.0005	38.85	<.0001		
	Dummy for years after 2013	-0.0847	0.0164	-5.17	<.0001		

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	-4.5213	0.0689	-65.61	<.0001		0.9931
	log (Order 126 Blend Price at Test / CPI All)	0.9542	0.0334	28.61	<.0001	0.9542	
log (Southwest Land Value / CPI All)	Intercept	-0.7335	0.3636	-2.02	0.0530		0.9845
	lag (log (Southwest Land Value / CPI All))	0.8784	0.0645	13.63	<.0001	0.8784	
	log (Personal Disposable Income Per Capita / CPI All)	0.6047	0.1334	4.53	<.0001	0.6047	
	lag (log (Southwest Number of Cows))*Dummy for years after 2010	-0.0023	0.0092	-0.25	0.8046		
	Dummy for years after 1986	-0.1598	0.0501	-3.19	0.0034		
	Dummy for years after 2009	-0.0091	0.0632	-0.14	0.8871		
log (Southwest Number of Cows)	Intercept	-0.1540	0.1556	-0.99	0.3299		0.9601
	lag (log ((Southwest All Milk Price + Southwest Average Dairy Market Loss Payments + Average Dairy Economy Loss Assistance Payments) / 16% Protein Feed Value))	0.0730	0.0254	2.87	0.0072	0.0730	
	lag (log (Southwest Number of Cows))	1.0166	0.0220	46.26	<.0001		
log (Southwest Milk Per Cow)	Intercept	0.0182	0.1669	0.11	0.9140		0.9786
	lag (log (Southwest Milk Per Cow))	0.9964	0.0160	62.09	<.0001		

	log ((Southwest All Milk Price + Southwest Average Dairy Market Loss Payments + Average Dairy Economy Loss Assistance Payments) /U.S. Corn Price)	0.0241	0.0136	1.77	0.0876	0.0241	
	Dummy for 1995	-0.0471	0.0191	-2.46	0.0202		
	Dummy for 2001	-0.0512	0.0196	-2.61	0.0142		
	Dummy for 2007	-0.0379	0.0195	-1.95	0.0615		

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	-4.5891	0.0387	-118.69	<.0001		0.9972
	log (Order 131 Blend Price at Test/ CPI All)	0.9933	0.0191	52.04	<.0001	0.9933	
log (Arizona Number of Cows - lag (Arizona Number of Cows))	Intercept	-30.9366	11.8651	-2.61	0.0139		0.9922
	log ((Arizona All Milk Price + Arizona Average Dairy Market Loss Payments + Average Dairy Economic Loss Assistance Payments) / Boning Cow Slaughter Price)	6.8950	3.1209	2.21	0.0347	6.8950	
	Trend from 1980	0.1938	0.0719	2.69	0.0113		
	lag (log ((Arizona All Milk Price + Arizona Average Dairy Market Loss Payments + Average Dairy Economy Loss Assistance Payments) / 16% Protein Feed Value))	7.6313	3.2040	2.38	0.0235	7.6313	
log (Arizona Milk Per Cow)	Intercept	9.4414	0.0368	256.35	<.0001		0.9703
	log ((Arizona All Milk Price + Arizona Average Dairy Market Loss Payments + Average Dairy Economy Loss Assistance Payments) / 16% Protein Feed Value)	0.0875	0.0318	2.75	0.0098	0.0875	
	Dummy for 1994 to 1997	0.0463	0.0166	2.79	0.0089		
	Trend from 1980	0.0210	0.0008	26.72	<.0001		
	Dummy for years after 2004	-0.0912	0.0198	-4.61	<.0001		

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 Price / CPI All)	Intercept	0.1824	0.1091	1.67	0.1183		0.9870
	log (California All Milk Price / CPI All)	0.9109	0.0566	16.09	<.0001	0.9109	
	log (Post-Order Reform Class II Price / CPI All) * Dummy After 2010	0.0251	0.0088	2.86	0.0134	0.0251	

log (Former Western Order Number of Cows)	Intercept	-0.1648	0.0965	-1.71	0.0975		0.9920
	lag (log (Former Western Number of Cows))	1.0229	0.0136	75.25	<.0001		
	lag (log ((Former Western Order All Milk Price + Former Western Order Average Dairy Market Loss Payments + Average Dairy Economic Loss Assistance Payments) / 16% Protein Feed Value))	0.0538	0.0268	2.01	0.0536	0.0538	
	Dummy from 1994 to 2000	0.0466	0.0111	4.21	0.0002		
log (Former Western Order Milk Per Cow)	Intercept	6.4193	0.3150	20.38	<.0001		0.9952
	log ((Former Western Order All Milk Price + Former Western Order Average Dairy Market Loss Payments + Average Dairy Economy Loss Assistance Payments) / 16% Protein Feed Value)	0.0388	0.0177	2.20	0.0356	0.0388	
	Trend from 1980	0.1708	0.0162	10.55	<.0001		
	lag (log (Former Western Order Milk Per Cow)) * Trend from 2000	-0.0155	0.0017	-9.32	<.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 / CPI All)	Intercept	0.3577	0.1267	2.82	0.0135		0.9707
	log (Central Region All Milk Price / CPI All)	0.8165	0.0611	13.37	<.0001	0.8165	
log (Unregulated West Number of Cows)	Intercept	0.1028	0.0855	1.20	0.2382		0.9687
	lag (log (Unregulated West Number of Cows))	0.8133	0.0610	13.34	<.0001		
	lag (log ((Unregulated West All Milk Price + Unregulated West Average Dairy Market Loss Payments + Average Dairy Economy Loss Assistance Payments) / 16% Protein Feed Value))	0.1123	0.0423	2.65	0.0124	0.1123	
	log ((Unregulated West All Milk Price + Unregulated West Average Dairy Market Loss Payments + Average Dairy Economy Loss Assistance Payments) / CPI All)	0.1760	0.0673	2.62	0.0136	0.1760	
log (Unregulated West Milk Per Cow)	Intercept	9.2792	0.0222	417.48	<.0001		0.9953
	lag (log ((Unregulated West All Milk Price + Unregulated West Average Dairy Market Loss Payments + Average Dairy Economy Loss Assistance Payments) / 16% Protein Feed Value))	0.0361	0.0175	2.06	0.0482	0.0361	
	Dummy from 2006 to 2008	-0.0447	0.0104	-4.28	0.0002		
	lag (log (Unregulated West Milk Per Cow)*Dummy for years after 1999	0.0076	0.0011	6.62	<.0001		
	Trend from 1980	0.0172	0.0006	28.06	<.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	-0.0031	0.0054	-0.58	0.5686		1.0000
	log (California Blend Price at Test / CPI All)	1.0007	0.0027	368.32	<.0001	1.0007	
log (California Number of Cows)	Intercept	0.1108	0.0996	1.11	0.2743		0.9670
	log ((California All Milk Price + California Average Dairy Market Loss Payments + Average Dairy Economy Loss Assistance Payments) / 16% Protein Feed Value)	0.0324	0.0145	2.24	0.0325	0.0324	
	lag (log (California Number of Cows))	0.9834	0.0128	76.73	<.0001		
log(California Milk Per Cow)	Intercept	4.2160	1.2402	3.40	0.0019		0.9740
	lag (log ((California All Milk Price + California Average Dairy Market Loss Payments + Average Dairy Economy Loss Assistance Payments) / 16% Protein Feed Value))	0.0962	0.0441	2.18	0.0371	0.0962	
	lag (log (California Milk Per Cow))	0.5573	0.1300	4.29	0.0002		
	Trend from 1980	0.0063	0.0019	3.26	0.0027		
	Dummy for 1994	0.0667	0.0206	3.25	0.0029		

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	-0.7001	0.8163	-0.86	0.4094		0.8830
	log (Wholesale Cheddar Cheese Price / CPI All)	0.3255	0.1173	2.78	0.0180	0.3255	
	lag (log (Hawaii and Alaska All Milk Price / CPI All))	0.7202	0.2050	3.51	0.0049	0.7202	
	Dummy for 2009	0.2389	0.0577	4.14	0.0017		
log (Hawaii and Alaska Cows)	Intercept	-12.7522	2.2357	-5.70	<.0001		0.9836
	log ((Hawaii and Alaska All Milk Price + Hawaii and Alaska Average Dairy Market Loss Payments + Average Dairy Economy Loss Assistance Payments) / CPI All)	0.6353	0.1145	5.55	<.0001	0.6353	
	log (Hawaii and Alaska Milk Per Cow)	1.1658	0.2185	5.33	<.0001		
	lag (log (Hawaii and Alaska Cows))	0.9469	0.0234	40.39	<.0001		
log (Hawaii and Alaska Milk Per Cow)	Intercept	7.4432	1.2785	5.82	<.0001		0.7524
	lag (log ((Hawaii and Alaska All Milk Price + Hawaii and Alaska Average Dairy Market Loss Payments + Average Dairy Economy Loss Assistance Payments) / 16% Protein Feed Value)	0.2312	0.0637	3.63	0.0011	0.2312	
	Dummy for years after 1985	0.0818	0.0261	3.13	0.0039		
	Dummy for years after 2003	-0.0824	0.0240	-3.44	0.0018		
	Dummy for 2008	-0.1584	0.0373	-4.25	0.0002		
	lag (log (Hawaii and Alaska Milk Per Cow))	0.1348	0.1412	0.96	0.3474		

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)	Intercept	-3.4205	0.1854	-18.45	<.0001	0.7731
/ Northeast Milk to Order 1)	log (Trend from 2000)	-0.2260	0.0683	-3.31	0.007	
	Dummy from 2006 to 2007	0.3803	0.1022	3.72	0.0034	
	lag (log (Order 5 Blend Price at Test/ Order 1 Blend Price at Test))	2.7801	1.2721	2.19	0.0514	
log (Northeast Milk to Order 33	Intercept	-2.1885	0.0339	-64.64	<.0001	0.8334
/ Northeast Milk to Order 1)	Dummy from 2005 to 2007	0.2579	0.0355	7.27	<.0001	
	log (Order 33 Blend Price at Test / Order 1 Blend Price at Test)	0.7682	0.5080	1.51	0.1587	
	Dummy for years after 2012	-0.1553	0.0385	-4.03	0.002	
log (Unregulated Northeast Milk	Intercept	-2.8794	0.0170	-169.7	<.0001	0.9154
/ Northeast Milk to Order 1)	Dummy for 2004	0.3861	0.0475	8.13	<.0001	
	Dummy from 2006 to 2008	0.2087	0.0317	6.58	<.0001	
	log (Order 1 Class I Price at Test / Order 1 Class III Price at Test)	-0.3131	0.1689	-1.85	0.0935	
	Dummy for 2001	0.2894	0.0481	6.02	0.0001	

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	Intercept	-1.5687	0.4732	-3.31	0.0069	0.9273
/ Appalachia Milk to Order 5)	log (Order 5 Blend Price at Test / CPI all)	-0.5699	0.2202	-2.59	0.0252	
	Dummy for years after 2005	-0.7950	0.0646	-12.30	<.0001	
	Dummy for years after 2014	-1.4604	0.1819	-8.03	<.0001	
log (Appalachia Milk to Order 7	Intercept	0.1381	0.3207	0.43	0.6769	0.9119
/ Appalachia Milk to Order 5)	log (Order 5 Blend Price at Test / CPI all)	-0.3674	0.0903	-4.07	0.0028	
	Dummy for years after 2006	0.2054	0.0259	7.92	<.0001	
	Dummy for 2012	0.1809	0.0446	4.06	0.0029	
	lag (log (Order 5 Blend Price at Test / CPI all))	-0.3266	0.1132	-2.88	0.0181	
	Dummy for years after 2014	-0.2429	0.0618	-3.93	0.0035	
log (Unregulated Appalachia Milk	Intercept	-1.1975	0.2985	-4.01	0.0025	0.7558
/ Appalachia Milk to Order 5)	log (Order 5 Class III Price at Test / Order 5 Class I Price at Test)	0.9453	0.1600	5.91	0.0001	
	Dummy for 2011	-0.4666	0.0534	-8.74	<.0001	
	lag(log(Order 5 Class I Price at Test / CPI all))	-0.4291	0.1440	-2.9800	0.0138	
	Dummy for 2014	-0.4601	0.1081	-4.26	0.0017	

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	Intercept	-10.1194	2.2843	-4.43	0.0007	0.7427
/ 1 - Percentage of Florida Milk to	log (Order 7 Blend Price at Test / CPI All)	2.6955	1.0662	2.53	0.0252	
Order 7)	Dummy for years after 2008	1.6997	0.2837	5.99	<.0001	

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	-2.9684	0.1343	-22.10	<.0001	0.8488
	log (Order 5 Blend Price at Test / Order 7 Blend Price at Test)	22.3350	9.1476	2.44	0.0327	
	Trend from 2000* Dummy for years after 2012	0.1253	0.0210	5.96	<.0001	
	lag (log (Order 6 Blend Price at Test / Order 7 Blend Price at Test) * Dummy for years after 2003)	-8.3507	2.3306	-3.58	0.0043	
log (Southeast Milk to Order 6 / Southeast Milk to Order 7)	Intercept	-2.5551	0.2346	-10.89	<.0001	0.8587
	lag (log (Order 6 Blend Price at Test / Order 7 Blend Price at Test)) * Dummy for years after 2002	2.4650	1.0382	2.37	0.0369	
	Dummy for years after 2013	-0.5918	0.1366	-4.33	0.0012	
	log(Trend from 2000)	0.4725	0.0827	5.72	0.0001	
log (Southeast Milk to Order 32 / Southeast Milk to Order 7)	Intercept	-1.5055	0.2137	-7.04	<.0001	0.7771
	log (Order 32 Blend Price at Test / Order 7 Blend Price at Test)	4.8555	1.5522	3.13	0.0096	
	Dummy for years after 2004	0.3031	0.0794	3.82	0.0029	
	Dummy from 2005 to 2006	0.1814	0.0885	2.05	0.0649	
log (Unregulated Southeast Milk / Southeast Milk to Order 7)	Intercept	-3.6011	0.5581	-6.45	<.0001	0.7096
	log (Order 7 Class III Milk at Test / Order 7 Class I Milk at Test)	0.5415	0.2733	1.98	0.0731	
	Dummy for 2007 to 2008	0.3079	0.1319	2.33	0.0396	
	Dummy for 2010	0.5477	0.1686	3.25	0.0077	

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	-1.4350	0.7283	-1.97	0.0745	0.9691
	lag (log (Order 32 Blend Price at Test / CPI All))	0.8409	0.3840	2.19	0.051	
	Dummy for years after 2007	-0.6306	0.2620	-2.41	0.0348	
	log (Trend from 2000)	-1.1294	0.0959	-11.78	<.0001	
log (Upper Midwest Milk to Order 33 / Upper Midwest Milk to Order 30)	Intercept	-1.7775	0.0795	-22.36	<.0001	0.9353
	lag (log (Order 33 Blend Price at Test / Order 30 Blend Price at Test))	2.8317	0.8786	3.22	0.0073	
	Dummy for years after 2005	-1.9600	0.2806	-6.99	<.0001	
log (Unregulated Upper Midwest Milk / Upper Midwest Milk to Order 30)	Intercept	-2.0976	0.1965	-10.68	<.0001	0.8650
	Dummy from 2003 to 2004	1.3620	0.1758	7.75	<.0001	
	log (Order 30 Class III Milk at Test / Order 30 Class I Milk at Test)	2.3768	1.1241	2.11	0.0581	
	Dummy from 2007 to 2008	0.5388	0.2601	2.07	0.0626	

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	Intercept	-6.9214	0.7187	-9.63	<.0001	0.8020
/ Central Milk to Order 32)	Trend from 2000	0.1408	0.0344	4.09	0.0018	
	Dummy from 2004 to 2005	1.7385	0.3113	5.58	0.0002	
	lag (log (Order 5 Blend Price at Test / Order 32 Blend Price at Test))	8.1443	3.7164	2.19	0.0508	
log (Central Milk to Order 7	Intercept	-3.0712	0.1334	-23.02	<.0001	0.8267
/ Central Milk to Order 32)	log(Order 7 Blend Price at Test / Order 32 Blend Price at Test)	3.6907	1.0828	3.41	0.0067	
	Dummy from 2003 to 2004	0.3068	0.0667	4.60	0.001	
	Dummy for years after 2007	0.2337	0.0494	4.73	0.0008	
	Dummy for years after 2013	-0.2994	0.0659	-4.54	0.0011	
log (Central Milk to Order 30	Intercept	-2.5965	0.0798	-32.53	<.0001	0.8521
/ Central Milk to Order 32)	lag (log (Order 30 Blend Price at Test / Order 32 Blend Price at Test))	4.3265	1.4018	3.09	0.0094	
	Dummy for years after 2003	0.8301	0.0702	11.82	<.0001	
log (Central Milk to Order 126	Intercept	-4.9776	0.3942	-12.63	<.0001	0.8076
/ Central Milk to Order 32)	Dummy from 2006 to 2007	0.9649	0.1577	6.12	<.0001	
	Dummy for years after 2001	1.0584	0.3041	3.48	0.0051	
	lag (log (Order 126 Blend Price at Test / Order 32 Blend Price at Test))	13.6844	3.7266	3.67	0.0037	
log (Unregulated Central Milk	Intercept	-1.9380	0.0534	-36.27	<.0001	0.8072
/ Central Milk to Order 32)	log (Order 32 Class III Price at Test / Order 32 Class I Price at Test)	2.9097	0.6178	4.71	0.0008	
	Dummy for 2003	0.5163	0.1194	4.32	0.0015	
	Dummy from 2007 to 2008	0.5580	0.0822	6.79	<.0001	
	Dummy for 2009	0.3467	0.1159	2.99	0.0135	

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 5	Intercept	-2.3383	0.2592	-9.02	<.0001	0.7117
/ Mideast Milk to Order 33)	log (Order 5 Blend Price at Test / Order 33 Blend Price at Test)	2.4662	2.5458	0.97	0.3555	
	Dummy for years after 2012	-0.4014	0.1018	-3.94	0.0028	
	Dummy for years before 2003	-0.2921	0.1262	-2.31	0.0432	
	Dummy for years after 2006	0.1549	0.0872	1.78	0.1061	
log (Mideast Milk to Order 7	Intercept	-1.7331	0.4338	-4.00	0.0021	0.8643
/ Mideast Milk to Order 33)	log(Order 7 Blend Price at Test / Order 33 Blend Price at Test) * Dummy After 2004	4.0704	1.3517	3.01	0.0118	
	lag (log (Mideast Milk to Order 7 / Mideast Milk to Order 33))	0.4628	0.1217	3.8	0.0029	
	Dummy for years after 2011	-0.3573	0.1073	-3.33	0.0067	
log (Mideast Milk to Order 30	Intercept	-5.7430	0.1669	-34.41	<.0001	0.8176

/ Mideast Milk to Order 33)	lag (log (Order 30 Blend Price at Test / Order 33 Blend Price at Test))	6.6855	2.5615	2.61	0.0243	
	Dummy for years after 2007 * (Trend from 2000)	0.1329	0.0131	10.14	<.0001	
	Dummy for 2011	0.7086	0.3281	2.16	0.0537	
log (Unregulated Mideast Milk	Intercept	-7.4595	0.6703	-11.13	<.0001	0.7634
/ Mideast Milk to Order 33)	log (Former Western Order All Milk Price / CPI All)	2.4874	0.3323	7.49	<.0001	
	Dummy for 2005	-0.9007	0.1922	-4.69	0.0007	
	Dummy for 2003	0.3677	0.1986	1.85	0.0912	

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	-1.8199	0.1269	-14.34	<.0001	0.8380
	log (Order 124 Class IV Price at Test / Order 124 Class I Price at Test)	-4.3897	1.0920	-4.02	0.0017	
	Dummy for 2012	0.9354	0.3955	2.37	0.0357	
	Dummy for years after 2014	1.3969	0.3975	3.51	0.0043	

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 7 / Southwest Milk to Order 126)	Intercept	-2.5403	0.3285	-7.73	<.0001	0.9416
	lag (log (Order 7 Blend Price at Test / CPI All))	0.3384	0.1518	2.23	0.0476	
	Dummy for years after 2012	-1.0185	0.1562	-6.52	<.0001	
	Dummy from 2004 to 2007	0.4361	0.0449	9.70	<.0001	
log (Southwest Milk to Order 32 / Southwest Milk to Order 126)	Intercept	-2.1627	0.1978	-10.93	<.0001	0.8274
	log (Order 32 Blend Price at Test / Order 126 Blend Price at Test)	11.1857	4.5635	2.45	0.0305	
	Dummy for years after 2007	0.6569	0.1387	4.74	0.0005	
log (Southwest Milk to Order 131 / Southwest Milk to Order 126)	Intercept	-14.8376	2.9467	-5.04	0.0004	0.7972
	log (Order 131 Blend Price at Test / CPI All) *Dummy for years after 2007	1.5799	0.7900	2.00	0.0708	
	log (Trend from 2000)	2.2920	0.9249	2.48	0.0307	
	Dummy for 2009	1.1436	0.5579	2.05	0.0650	
log (Unregulated Southwest Milk / Southwest Milk to Order 126)	Intercept	-0.8488	0.1042	-8.15	<.0001	0.8135
	Dummy 2013	-0.8318	0.2288	-3.64	0.0039	
	Dummy from 2004 to 2006	-1.1434	0.3180	-3.60	0.0042	
	log (Order 126 Class III Price at Test / Order 126 Class I Price at Test)	9.9190	1.9161	5.18	0.0003	

Table 24: Allocation of Arizona Milk to Pools

Dependent Variable	Parameter	Estimate	Std. Error	t-Value	Pr>|t|	R-Square
log (Arizona Milk to Order 126	Intercept	-5.7360	0.9152	-6.27	<.0001	0.8025
/ Arizona Milk to Order 131)	lag (log (Order 126 Blend Price at Test	22.7375	6.9471	3.27	0.0074	
	/ Order 131 Blend Price at Test))* Dummy After 2003					
	log (Trend from 2000)	1.0999	0.4828	2.28	0.0437	
	Dummy for years after 2006	-1.8132	0.4437	-4.09	0.0018	
log (Unregulated Arizona Milk	Intercept	0.2428	1.1154	0.22	0.8317	0.9229
/ Arizona Milk to Order 131)	log (Order 131 Class I Price at Test / CPI all)	-1.1985	0.5747	-2.09	0.0611	
	Dummy for years after 2008	-2.1117	0.6018	-3.51	0.0049	
	Dummy for 2004 to 2005	0.5635	0.1200	4.69	0.0007	

Table 25: Allocation of Former Western Order Milk to Pools

Dependent Variable	Parameter	Estimate	Std. Error	t-Value	Pr>|t|	R-Square
Almost 100% of the milk produced in the Former Western Region is allocated to the Unregulated pool.						

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	Intercept					
log (Percentage of Unregulated West	Intercept	-4.4011	0.6854	-6.42	<.0001	0.9523
Milk to Order 32	log (Order 32 Blend Price at Test/ CPI All)	0.5084	0.3438	1.48	0.1630	
/ 1 - Percentage of Unregulated	Dummy for years after 2005	1.9026	0.1086	17.51	<.0001	
West Milk to Order 32)						

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	Intercept	-4.3189	0.5627	-7.68	<.0001	0.9137
/ California Milk used in California)	lag (log (Order 131 Blend Price at Test	4.1865	1.8752	2.23	0.0473	
	/ California State Blend Price at Test))					
	Dummy from 2002 to 2005					
	lag (log (California Milk to Order 131	-2.0470	0.8724	-2.35	0.0387	
	/ California Milk used in California))	0.2441	0.0986	2.48	0.0308	
log (Unregulated California Milk	Intercept	-2.3640	0.3836	-6.16	<.0001	0.7412
/ California Milk used in California)	lag (log (California State Blend Price at Test / CPI All))	-0.7627	0.2000	-3.81	0.0029	
	Dummy for 2009	0.4463	0.0845	5.28	0.0003	
	Dummy for 2015	0.3397	0.1180	2.88	0.015	

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	4.0211	0.5371	7.49	<.0001		0.9841
	log (Order 1 Class I Price at Test / CPI All)	-0.0419	0.0207	-2.02	0.0710	-0.0419	
	Dummy for years after 2006	0.0424	0.0114	3.73	0.0039		
	lag (log (Personal Disposable Income / CPI All))	0.4972	0.1942	2.56	0.0284	0.4972	
	Trend from 2000	-0.0222	0.0016	-13.77	<.0001		
log (Order 5 Fluid Use Per Capita)	Intercept	-0.2113	0.3133	-0.67	0.5128		0.8921
	log (Order 5 Class I Price at Test / CPI All)	-0.0741	0.0294	-2.52	0.0268	-0.0741	
	lag (log (Order 5 Fluid Use Per Capita))	1.0679	0.0607	17.60	<.0001		
log (Order 6 Fluid Use Per Capita)	Intercept	1.5729	1.0468	1.50	0.1611		0.9680
	log (Order 6 Class I Price at Test/ CPI All)	-0.0839	0.0348	-2.41	0.0345	-0.0839	
	Trend from 2000	-0.0059	0.0034	-1.74	0.1098		
	lag (log (Order 6 Fluid Use Per Capita))	0.7348	0.2012	3.65	0.0038		
log (Order 7 Fluid Use Per Capita)	Intercept	5.5121	0.1181	46.69	<.0001		0.8861
	lag(log (Order 7 Class I Price at Test / CPI All))	-0.1849	0.0554	-3.34	0.0066	-0.1849	
	Dummy for years after 2009	-0.1267	0.0144	-8.80	<.0001		
	Dummy for years 2003-2005	-0.0401	0.0180	-2.23	0.0472		
log (Order 30 Fluid Use Per Capita)	Intercept	5.6166	0.0694	80.92	<.0001		0.9274
	lag (log (Order 30 Class I Price at Test / CPI All))	-0.1204	0.0367	-3.28	0.0065	-0.1204	
	Dummy for years after 2009 * Trend for 2000	-0.0089	0.0008	-11.40	<.0001		
log (Order 32 Fluid Use Per Capita)	Intercept	5.5238	0.0856	64.51	<.0001		0.9193
	lag(log (Order 32 Class I Price at Test / CPI All))	-0.0952	0.0472	-2.02	0.0689	-0.0952	
	Dummy for years after 2009	-0.0671	0.0226	-2.97	0.0127	-0.0671	
	Trend from 2000 * Dummy for years after 2001	-0.0061	0.0026	-2.36	0.0377		
log (Order 33 Fluid Use Per Capita)	Intercept	1.6149	0.9358	1.73	0.1185		0.9615
	log (Order 33 Class I Price at Test / CPI All)	-0.0636	0.0251	-2.54	0.0319	-0.0636	
	lag (log (Order 33 Fluid Use Per Capita))	0.4051	0.1303	3.11	0.0126		
	lag (log (Personal Disposable Income / CPI All))	0.6199	0.2422	2.56	0.0307		
	Trend from 2000	-0.0125	0.0026	-4.87	0.0009		
	Dummy for 2011	0.0967	0.0149	6.49	0.0001		
log (Order 124 Fluid Use Per Capita)	Intercept	-0.3491	0.1956	-1.78	0.1018		0.9760
	log (Order 124 Class I Price at Test/ CPI All)	-0.0626	0.0159	-3.95	0.0023	-0.0626	
	lag (log (Order 124 Fluid Per Capita))	1.0841	0.0352	30.83	<.0001		
	Dummy for 2008	0.0413	0.0092	4.50	0.0009		

log (Order 126 Fluid Use Per Capita)	Intercept	0.0120	0.2156	0.06	0.9566		0.9733
	log (Order 126 Class I Price at Test/ CPI All)	-0.0468	0.0163	-2.87	0.0140	-0.0468	
	lag (log (Personal Disposable Income / CPI All))	1.0139	0.0412	24.59	<.0001	1.0139	
log (Order 131 Fluid Use Per Capita)	Intercept	1.3222	0.5056	2.62	0.0240		0.9825
	log (Order 131 Class I Price at Test/ CPI All)	-0.0761	0.0303	-2.51	0.0290	-0.0761	
	lag (log (Order 131 Fluid Per Capita))	0.7829	0.0928	8.44	<.0001		
	log (Trend from 2000)	-0.0518	0.0205	-2.53	0.0282		
log (California Fluid Use Per Capita)	Intercept	5.5856	0.0815	68.50	<.0001		0.9308
	lag(log (California Class I Price at Test / CPI All))	-0.1629	0.0432	-3.77	0.0031	-0.1629	
	Trend from 2000 * Dummy for years after 2001	-0.0131	0.0013	-10.02	<.0001		
	Dummy from 2008 to 2009	0.0808	0.0186	4.34	0.0012		
log(Unregulated Fluid Use Per Capita)	Intercept	1.6485	0.9735	1.69	0.1162		0.6769
	lag (log (Personal Disposable Income / CPI All))	1.2505	0.3477	3.60	0.0037	1.250462	
	Dummy form 2004 to 2005	0.1247	0.0582	2.14	0.0533		
	Dummy from 2007 to 2009	-0.1254	0.0365	-3.43	0.005		

Table 30: Dairy Products Conversion Table

	Solids Required per Product Unit	
Products	Butterfat	Non-fat Solids
Producer Milk[1]	3.75	8.94
Butter	80.4	1.0
American Cheese[2]	33.7	87.2
Other Cheese[2]	28.6	87.8
Non-fat Dry Milk[2]	0.8	96.2
Canned Milk	7.9	18.5
Dry Whey	1.1	95.0
Dry Whole Milk	26.5	71.0
Fluid Milk[2]	1.9	8.9

[1] The Butterfat and Non-fat Solids test for Producer Milk are a simple average over the forecasted years for the assumed tests

[2] The Non-fat Solids test for American Cheese, Other Cheese, and Fluid Milk and the Butterfat test for Other Cheese, Non-fat Dry Milk, and Fluid Milk are estimated by the model. The Butterfat test for the numbers presented are simple averages of the results for the forecasted 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	0.5886	0.0355	16.58	<.0001	0.9299
+ Order 1 Class III Non-Pool Milk)	log (Cheddar Cheese Wholesale Price Index	1.7423	0.2785	6.26	<.0001	
/ (Order 1 Class II Pooled Milk	/ Order 1 Class III Price at Test Index)					
+ Order 1 Class II Non-Pool Milk))	log (Weighted Class II CPI / Order 1 Class II Price at Test Index)	-0.3813	0.1237	-3.08	0.0095	
	Dummy for years after 2002	-0.2411	0.0528	-4.56	0.0007	
log ((Order 1 Class IV Pooled Milk	Intercept	-0.6737	0.0350	-19.26	<.0001	0.8347
+ Order 1 Class IV Non-Pool Milk)	log (Grade-AA Butter Wholesale Price Index	0.7754	0.2263	3.43	0.0057	
/ (Order 1 Class II Pooled Milk	/ Order 1 Class IV Price at Test Index)					
+ Order 1 Class II Non-Pool Milk))	log (Non-Fat Dry Milk Wholesale Price Index	0.6948	0.3791	1.83	0.0941	
	/ Order 1 Class IV Price at Test Index)					
	Dummy for 2008	0.2444	0.1206	2.03	0.0676	
	Dummy for 2012	0.5456	0.1129	4.83	0.0005	

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	-0.5831	0.0478	-12.19	<.0001	0.8766
+ Order 5 Class III Non-Pool Milk)	log (Cheddar Cheese Wholesale Price Index	1.4520	0.4035	3.60	0.0049	
/ (Order 5 Class II Pooled Milk	/ Order 5 Class III Price at Test Index)					
+ Order 5 Class II Non-Pool Milk))	log (Weighted Class II CPI / Order 5 Class II Price at Test Index)	-0.8134	0.2170	-3.75	0.0038	
	Dummy from 2006 to 2008	-0.4456	0.0798	-5.58	0.0002	
	Dummy for years after 2013	-0.5032	0.1025	-4.91	0.0006	
log ((Order 5 Class IV Pooled Milk	Intercept	-0.3459	0.0295	-11.71	<.0001	0.8540
+ Order 5 Class IV Non-Pool Milk)	lag (log (Grade-AA Butter Wholesale Price Index	0.5278	0.1722	3.06	0.0119	
/ (Order 5 Class II Pooled Milk	/ Cheddar Cheese Wholesale Price Index))					
+ Order 5 Class II Non-Pool Milk))	Dummy for years after 2006	-0.2180	0.0478	-4.56	0.001	
	Dummy for years after 2011	0.1437	0.0555	2.59	0.0271	
	Dummy for 2014	0.2333	0.0865	2.70	0.0225	

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	-1.0479	0.0896	-11.70	<.0001	0.8261
+ Order 6 Class III Non-Pool Milk)	log (Cheddar Cheese Wholesale Price Index	1.0093	0.3112	3.24	0.0078	
/ (Order 6 Class II Pooled Milk	/ Order 6 Class III Price at Test Index)					
+ Order 6 Class II Non-Pool Milk))	log (Weighted Class II CPI / Order 6 Class II Price at Test Index)	-1.4491	0.4343	-3.34	0.0066	
	Dummy for years after 2011	-0.9088	0.1504	-6.04	<.0001	
	Dummy for 2001	-0.7853	0.2969	-2.65	0.0228	

log ((Order 6 Class IV Pooled Milk	Intercept	-0.7847	0.0830	-9.45	<.0001	0.9020
+ Order 6 Class IV Non-Pool Milk)	log (Grade-AA Butter Wholesale Price Index	0.6234	0.1516	4.11	0.0017	
/ (Order 6 Class II Pooled Milk	/ Order 6 Class IV Price at Test Index)					
+ Order 6 Class II Non-Pool Milk))	log (Non-Fat Dry Milk Wholesale Price Index	0.6517	0.1311	4.97	0.0004	
	/ Order 6 Class IV Price at Test Index)					
	Dummy from 2005 to 2012	0.4068	0.0569	7.15	<.0001	
	Dummy for years after 2001	-0.3275	0.0967	-3.39	0.0061	

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	0.5279	0.0814	6.48	<.0001	0.7757
+ Order 7 Class III Non-Pool Milk)	log (Cheddar Cheese Wholesale Price Index	4.0268	1.1345	3.55	0.0046	
/ (Order 7 Class II Pooled Milk	/ Order 7 Class III Price at Test Index)					
+ Order 7 Class II Non-Pool Milk))	log (Dry Whey Wholesale Price Index	0.4031	0.2321	1.74	0.1103	
	/ Order 7 Class III Price at Test Index)					
	Dummy from 2010 to 2011	0.6009	0.1721	3.49	0.0050	
	Dummy for 2014	-0.9645	0.2248	-4.29	0.0013	
log ((Order 7 Class IV Pooled Milk	Intercept	-0.2440	0.0306	-7.98	<.0001	0.8598
+ Order 7 Class IV Non-Pool Milk)	log (Grade-AA Butter Wholesale Price Index	1.7636	0.1922	9.18	<.0001	
/ (Order 7 Class II Pooled Milk	/ Order 7 Class IV Price at Test Index)					
+ Order 7 Class II Non-Pool Milk))	log (Non-Fat Dry Milk Wholesale Price Index	1.3263	0.1889	7.02	<.0001	
	/ Order 7 Class IV Price at Test Index)					
	Dummy for 2010	0.4679	0.1209	3.87	0.0022	

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	2.8821	0.0395	72.90	<.0001	0.7120
+ Order 30 Class III Non-Pool Milk)	log (Cheddar Cheese Wholesale Price Index	1.3792	0.2781	4.96	0.0003	
/ (Order 30 Class II Pooled Milk	/ Order 30 Class III Price at Test Index)					
+ Order 30 Class II Non-Pool Milk))	Dummy for years before 2007	-0.1596	0.0333	-4.79	0.0004	
log ((Order 30 Class IV Pooled Milk	Intercept	-5.6125	1.5386	-3.65	0.0029	0.7795
+ Order 30 Class IV Non-Pool Milk)	log (Non-Fat Dry Milk Wholesale Price Index	1.4246	0.1859	7.66	<.0001	
/ (Order 30 Class II Pooled Milk	/ Order 30 Class IV Price at Test Index)					
+ Order 30 Class II Non-Pool Milk))	log (Grade-AA Butter Wholesale Price Index / CPI All)	1.0152	0.3527	2.88	0.0129	

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	-2.0744	1.4807	-1.40	0.1865	0.8223
+ Order 32 Class III Non-Pool Milk)	log (Cheddar Cheese Wholesale Price Index	0.9515	0.3571	2.66	0.0206	
/ (Order 32 Class II Pooled Milk	/ CPI All)					
+ Order 32 Class II Non-Pool Milk))	Dummy for years after 2003 * log(Trend from 2000)	-0.2071	0.0385	-5.38	0.0002	
	Dummy from 2007 to 2008	-0.6659	0.1302	-5.11	0.0003	
log ((Order 32 Class IV Pooled Milk	Intercept	-2.6627	1.0707	-2.49	0.0286	0.7200
+ Order 32 Class IV Non-Pool Milk)	log (Non-Fat Dry Milk Wholesale Price Index	1.1367	0.2308	4.92	0.0004	
/ (Order 32 Class II Pooled Milk	/ Order 32 Class IV Price at Test Index)					
+ Order 32 Class II Non-Pool Milk))	log(Grade-AA Butter Wholesale Price Index	-0.2071	0.0385	-5.38	0.0002	
	/ CPI All)					
	Dummy for 2007	-0.6659	0.1302	-5.11	0.0003	

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	1.1634	0.0744	15.65	<.0001	0.7643
+ Order 33 Class III Non-Pool Milk)	log (Cheddar Cheese Wholesale Price Index	3.4121	0.5667	6.02	<.0001	
/ (Order 33 Class II Pooled Milk	/ Order 33 Class III Price at Test Index)					
+ Order 33 Class II Non-Pool Milk))	Dummy for 2000	-0.5986	0.1498	-4.00	0.0018	
	Dummy form 2008 to 2009	-0.3587	0.1051	-3.41	0.0051	
log ((Order 33 Class IV Pooled Milk	Intercept	-1.0257	0.0488	-21.00	<.0001	0.8778
+ Order 33 Class IV Non-Pool Milk)	log (Grade-AA Butter Wholesale Price Index	1.0889	0.1857	5.86	<.0001	
/ (Order 33 Class II Pooled Milk	/ Order 33 Class IV Price at Test Index)					
+ Order 33 Class II Non-Pool Milk))	log(Non-Fat Dry Milk Wholesale Price Index	0.7577	0.1577	4.81	0.0003	
	/ Order 33 Class IV Price at Test 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	1.6734	0.0352	47.49	<.0001	0.8546
+ Order 124 Class III Non-Pool Milk)	log (Cheddar Cheese Wholesale Price Index	0.8540	0.2993	2.85	0.0145	
/ (Order 124 Class II Pooled Milk	/ Order 124 Class III Price at Test Index)					
+ Order 124 Class II Non-Pool Milk))	Dummy for 2002	0.3151	0.0645	4.89	0.0004	
	Dummy for years after 2008*Trend from 2000	0.0267	0.0030	8.81	<.0001	
log ((Order 124 Class IV Pooled Milk	Intercept	1.5390	0.0212	72.76	<.0001	0.7159
+ Order 124 Class IV Non-Pool Milk)	log(Grade-AA Butter Wholesale Price Index	1.2012	0.1797	6.68	<.0001	
/ (Order 124 Class II Pooled Milk	/ Order 124 Class IV Price at Test Index)					
+ Order 124 Class II Non-Pool Milk))	log (Non-Fat Dry Milk Wholesale Price Index	1.5237	0.2816	5.41	0.0002	
	/ Order 124 Class IV Price at Test Index)					
	Dummy for 2009	-0.2707	0.0672	-4.03	0.0017	

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	1.2330	0.1162	10.61	<.0001	0.8547
+ Order 126 Class III Non-Pool Milk)	log (Cheddar Cheese Wholesale Price Index	4.4087	1.3979	3.15	0.0092	
/ (Order 126 Class II Pooled Milk	/ Order 126 Class III Price at Test Index)					
+ Order 126 Class II Non-Pool Milk))	log (Dry Whey Wholesale Price Index	0.6015	0.2302	2.61	0.0242	
	/ Order 126 Class III Price at Test Index)					
	Dummy for years after 2003*Trend from 2000	0.0614	0.0149	4.11	0.0017	
	log (Weighted Class 2 CPI / Order 126 Class 2 Price at Test Index)	-1.1149	0.3361	-3.32	0.0069	
log ((Order 126 Class IV Pooled Milk	Intercept	0.0215	0.0369	0.58	0.5728	0.8600
+ Order 126 Class IV Non-Pool Milk)	log(Grade-AA Butter Wholesale Price Index	0.3503	0.0919	3.81	0.0029	
/ (Order 126 Class II Pooled Milk	/ Order 126 Class IV Price at Test Index)					
+ Order 126 Class II Non-Pool Milk))	log(Non-Fat Dry Milk Wholesale Price Index	1.1626	0.1546	7.52	<.0001	
	/ Order 126 Class IV Price at Test Index)					
	log (Weighted Class II CPI / Order 126 Class II Price at Test Index)	-0.4428	0.1125	-3.94	0.0023	
	Dummy for 2011	0.2176	0.0869	2.50	0.0292	

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	1.4182	0.0440	32.24	<.0001	0.9560
+ Order 131 Class III Non-Pool Milk)	log (Cheddar Cheese Wholesale Price Index	2.1186	0.3449	6.14	<.0001	
/ (Order 131 Class II Pooled Milk	/ Order 131 Class III Price at Test Index)					
+ Order 131 Class II Non-Pool Milk))	Dummy for years before 2003	0.7417	0.0796	9.32	<.0001	
log ((Order 131 Class IV Pooled Milk	Intercept	0.2637	0.6439	0.41	0.6894	0.8468
+ Order 131 Class IV Non-Pool Milk)	log (Non-Fat Dry Milk Wholesale Price Index	0.3684	0.1599	2.30	0.0399	
/ (Order 131 Class II Pooled Milk	/ CPI All)					
+ Order 131 Class II Non-Pool Milk))	Dummy from 2004 to 2007	-0.4755	0.0831	-5.72	<.0001	
	Dummy for years after 2002	-0.4137	0.1001	-4.13	0.0014	

Table 41: California "Order" Non-Fluid Milk Use

Dependent Variable	Parameter	Estimate	Std. Error	t-Value	Pr>|t|	R-Square
log (California Class 3 Total Solids	Intercept	0.0265	0.0367	0.72	0.4837	0.8737
/ California Class 2 Total Solids)	log (Frozen Dairy Products CPI	2.2621	0.7405	3.05	0.0100	
	/ Other Dairy Products CPI (2000 Base Year))					
	Dummy for years after 2008	-0.3870	0.0496	-7.81	<.0001	
log (California Class 4a Total Solids	Intercept	1.3544	0.2661	5.09	0.0003	0.6993
/ California Class 2 Total Solids)	lag (log (Grade-AA Butter Wholesale Price Index	0.1349	0.0643	2.10	0.0599	
	/ CPI All)					
	Dummy for 2015	-0.1660	0.0430	-3.86	0.0026	
	Dummy for 2008	0.1351	0.0408	3.31	0.0069	

log (California Class 4b Total Solids / California Class 2 Total Solids)	Intercept	1.0313	0.3317	3.11	0.0099	0.9286	
	log (Cheddar Cheese Wholesale Price Index / CPI All)	0.1816	0.0814	2.23	0.0476		
	Dummy for years after 2007 * log(Trend from 2000)	-0.1213	0.0105	-11.58	<.0001		
	lag (log (Dry Whey Wholesale Price Index / CPI All))	0.1393	0.0358	3.89	0.0025		

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	0.0001	0.0186	0.01	0.9958		0.9824
	log (Frozen Products CPI / Other Dairy Products CPI (2000 Base Year))	1.7953	0.3542	5.07	0.0003	1.795285	
	Dummy for 2008	0.1270	0.0454	2.80	0.0160		
	Trend from 2000	-0.0443	0.0020	-21.78	<.0001		
log (Condensed Skim Milk Used in Cheese Production)	Intercept	-3.0049	3.4674	-0.87	0.3938		0.8863
	log (American Cheese Production + Other Cheese Production)	0.7814	0.3921	1.99	0.0565		
	Dummy for years after 2005	0.9526	0.2108	4.52	0.0001		
	Dummy for 1993	0.7833	0.3468	2.26	0.0322		
log (American Cheese Production Percentage / 1- American Cheese Production Percentage)	Intercept	0.0707	0.0522	1.35	0.1857		0.9580
	lag (log (Cheddar Cheese Wholesale Price Index / Mozzarella Price Index))	0.3575	0.1344	2.66	0.0124	0.3575	
	Dummy for years after 2007	0.0925	0.0370	2.50	0.0182		
	Trend from 1980	-0.0187	0.0020	-9.42	<.0001		
	Dummy for years before 1985	0.2849	0.0389	7.31	<.0001		
log (Dry Whey Production)	Intercept	-6.2459	3.6715	-1.70	0.1044		0.8928
	log (Dry Whey Wholesale Price / CPI Food)	0.0333	0.0243	1.37	0.1849	0.0333	
	log (Other Cheese Production + American Cheese Production)	1.5461	0.4236	3.65	0.0016		
	Trend from 1990	-0.0508	0.0115	-4.41	0.0003		
	Dummy for 2001	-0.0751	0.0304	-2.47	0.0227		
	Dummy for 2014	-0.1304	0.0329	-3.97	0.0008		
log (Canned Milk Production)	Intercept	7.0077	0.1630	43.00	<.0001		0.7349
	log (Dry Whole Milk Production)	-0.0566	0.0301	-1.88	0.0690	-0.0566	
	log (Trend from 1980)	-0.1610	0.0191	-8.43	<.0001		
log (Non-fat Dry Milk Ratio)	Intercept	-3.4049	0.0886	-38.42	<.0001		0.6360
	lag (log (Grade-AA Butter Wholesale Price / Cheddar Cheese Wholesale Price))	-0.7912	0.5030	-1.57	0.1440	-0.7912	
	Dummy for years after 2007	-0.3657	0.1216	-3.01	0.0119		
	Dummy for 2005	0.4470	0.2412	1.85	0.0908		

CPI Food	Intercept	0.2352	0.0446	5.27	<.0001		0.9983
	log (CPI All)	0.9506	0.0090	105.71	<.0001		
	Dummy for years after 2008	0.0527	0.0069	7.68	<.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	3.2377	1.7844	1.81	0.0911		0.8382
	log (Other Dairy Products CPI (2000 Base Year) / CPI All)	-2.2617	0.5459	-4.14	0.0010	-2.2617	
	log (Personal Disposable Income Per Capita / CPI All)	2.9832	0.6881	4.34	0.0007	2.9832	
	Trend from 1996	-0.0507	0.0106	-4.77	0.0003		
	Trend from 1996 * Dummy for years after 2003	0.0235	0.0061	3.85	0.0018		
	Dummy for 2012	-0.1746	0.0570	-3.06	0.0085		
log (Frozen Product Per Capita Domestic Consumption)	Intercept	6.1928	0.6148	10.07	<.0001		0.8535
	log (Frozen Products CPI / CPI All)	-0.7295	0.1509	-4.83	<.0001	-0.7295	
	Dummy for years after 2003	-0.1813	0.0139	-13.06	<.0001		
log (American Cheese Per Capita Domestic Consumption)	Intercept	0.7725	0.3920	1.97	0.0574		0.9667
	log (Cheddar Cheese Wholesale Price / CPI Food)	-0.1064	0.0438	-2.43	0.0211	-0.1064	
	log (Personal Disposable Income Per Capita / CPI All)	0.8045	0.0765	10.52	<.0001	0.8045	
	Trend from 1980 * Dummy for years after 2000	0.0027	0.0008	3.44	0.0016		
log (Other Cheese Per Capita Domestic Consumption)	Intercept	-0.6017	0.5061	-1.19	0.2430		0.9594
	log (Mozzarella Price / CPI Food)	-0.5582	0.1527	-3.66	0.0009	-0.5582	
	log (Personal Disposable Income Per Capita / CPI All)	1.2886	0.1787	7.21	<.0001	1.2886	
log (Dry Whey Per Capita Domestic Consumption)	Intercept	2.0482	0.1956	10.47	<.0001		0.9215
	log (Dry Whey Wholesale Price / CPI All)	-0.2554	0.0797	-3.20	0.0038	-0.2554	
	Trend from 1989	-0.0392	0.0031	-12.60	<.0001		
log (Butter Per Capita Domestic Consumption)	Intercept	0.6467	0.2740	2.36	0.0250		0.9651
	log (Grade-AA Butter Wholesale Price / CPI Food)	-0.0426	0.0223	-1.91	0.0660	-0.0426	
	log (Personal Disposable Income Per Capita / CPI All)	0.3678	0.0747	4.92	<.0001	0.3678	
	Trend from 2000 * Dummy for years after 2003	0.0080	0.0022	3.62	0.0011		
	Dummy from 1989 to 1992	-0.1311	0.0172	-7.61	<.0001		
	Dummy for years after 2010	0.0839	0.0247	3.40	0.0019		
log (Non-Fat Dry Milk Per Capita Domestic Consumption)	Intercept	0.5922	1.0354	0.57	0.5715		0.7615
	log (Non-Fat Dry Milk Wholesale Price / CPI Food)	-0.3808	0.1250	-3.05	0.0047	-0.3808	
	log (Personal Disposable Income Per Capita / CPI All)	0.7492	0.2165	3.46	0.0016	0.7492	
	Dummy from 1994 to 1997	0.3125	0.0630	4.96	<.0001		
	Dummy from 1985 to 1987	-0.2727	0.0748	-3.65	0.0010		

Table 44: National Average Stock Equations

Dependent Variable	Parameter	Estimate	Std. Error	t-Value	Pr>|t|	Elasticity	R-Square
log (Fourth Quarter Average	Intercept	5.8992	0.0342	172.60	<.0001		0.7364
American Cheese Stocks)	log (Cheddar Cheese Wholesale Price / CPI Food)	-0.4645	0.1276	-3.64	0.0009	-0.4645	
	Dummy for years after 2006	0.3773	0.0739	5.10	<.0001		
log (Fourth Quarter Average	Intercept	-1.2465	1.0932	-1.14	0.2624		0.8906
Other Cheese Stocks)	log (Mozzarella Price / CPI All)	-1.3968	0.2511	-5.56	<.0001	-1.3968	
	Dummy for years after 2006	0.8339	0.1041	8.01	<.0001		
log (Second Half of the Year	Intercept	2.8698	0.1710	16.78	<.0001		0.8444
Dry Whey Average Stocks)	log (Dry Whey Wholesale Price / CPI Food)	-0.2496	0.0841	-2.97	0.0057	-0.2496	
	Trend from 1980	0.0124	0.0023	5.32	<.0001		
	Dummy from 2007 to 2008	0.4365	0.0947	4.61	<.0001		
	Dummy for years after 2012	0.4388	0.0907	4.84	<.0001		
log (Second Half of the Year	Intercept	4.3312	0.0841	51.52	<.0001		0.8918
Butter Average Stocks)	log (Grade-AA Butter Wholesale Price / CPI All)	-1.4978	0.2182	-6.87	<.0001	-1.4978	
	Dummy from 1990 to 1997	-1.6869	0.1881	-8.97	<.0001		
	Dummy from 1999 to 2000	-0.6255	0.2947	-2.12	0.0419		
	Dummy for years after 2010	0.4450	0.1975	2.25	0.0315		
log (Second Half of the Year	Intercept	4.3193	0.1026	42.12	<.0001		0.6502
Non-Fat Dry Milk Average Stocks)	log (Non-Fat Dry Milk Wholesale Price / CPI All)	-0.3176	0.2298	-1.38	0.1772	-0.3176	
	Dummy for 2006	-0.5483	0.3227	-1.70	0.0996		
	Dummy for years after 2006	0.5096	0.1313	3.88	0.0005		
	Dummy for 2014	0.4561	0.3242	1.41	0.1698		

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	-0.0565	0.0752	-0.75	0.4579		0.9963
	log (Fourth Quarter Average American Cheese Stocks)	1.0096	0.0124	81.13	<.0001		
log (Other Cheese Ending Stocks)	Intercept	-0.0871	0.0466	-1.87	0.0700		0.9979
	log (Fourth Quarter Average Other Cheese Stocks)	1.0178	0.0091	112.19	<.0001		
log (Dry Whey Ending Stocks)	Intercept	0.4746	0.3152	1.51	0.1414		0.8047
	log (Second Half of the Year Dry Whey Average Stocks)	0.8860	0.0866	10.23	<.0001		

log (Butter Ending Stocks)	Intercept	0.1379	0.2620	0.53	0.6020		0.8710
	log (Second Half of the Year Butter Average Stocks)	0.8867	0.0609	14.55	<.0001		
log (Non-Fat Dry Milk Ending Stocks)	Intercept	0.2424	0.2836	0.85	0.3987		0.8740
	log (Second Half of the Year Non-Fat Dry Milk Average Stocks)	0.9513	0.0616	15.44	<.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 over Tariff Rate Quota)[1]	Intercept	0.2059	0.0959	2.15	0.0465		0.7655
	(Cheddar Cheese Wholesale Price - Oceania Cheddar Cheese Price)^3	1.4643	0.8246	1.78	0.0937	0.0733	
	Dummy for 2002	0.5266	0.2906	1.81	0.0877		
	Dummy for years after 2009	-0.6979	0.1514	-4.61	0.0002		
log (Other Cheese Imports over Tariff Rate Quota)[1] The equation is not updated	Intercept	-33.3135	14.1668	-2.35	0.0328		0.8532
	(Mozzarella Price - Oceania Cheddar Cheese Price)	63.4321	14.7941	4.29	0.0006	50.1694	
	lag (Other Cheese Imports over Tariff Rate Quota)	0.8083	0.0892	9.06	<.0001		
	Dummy for 1997	-36.5867	16.5049	-2.22	0.0425		
	Dummy for 2015	58.1624	16.3752	3.55	0.0029		
log (Milk Fat Imports)	Intercept	5.0406	0.9009	5.60	<.0001		0.6958
	log (Major Imports of Fat)	1.4434	0.1847	7.81	<.0001	1.4434	
	Trend from 1996	0.0104	0.0058	1.79	0.0917		
log (Solids Non Fat Imports)	Intercept	8.7425	0.6024	14.51	<.0001		0.7119
	log (Major Imports of Fat)	0.8656	0.1207	7.17	<.0001	0.8656	
	Trend from 1996	0.0108	0.0033	3.26	0.0046		
log (Other Class 4 Imports)	Intercept	2.8159	0.8872	3.17	0.0059		0.5777
	lag (log (Other Class 4 Imports))	0.5020	0.1583	3.17	0.0059	0.5020	
	Dummy for 2008	0.2161	0.0861	2.51	0.0232		
	Dummy for 2009	-0.2744	0.0964	-2.85	0.0116		
log (American Cheese Exports)	Intercept	3.8001	0.1657	22.93	<.0001		0.8257
	(Cheddar Cheese Wholesale Price - Oceania Cheddar Cheese Price)	-1.9143	0.4167	-4.59	0.0002	-0.3597	
	Dummy for years after 2010	1.2974	0.2847	4.56	0.0002		

log (Other Cheese Exports)	Intercept	5.3142	0.3332	15.95	<.0001		0.9197
	(Mozzarella Price - Oceania Cheddar Cheese Price)	-1.1227	0.3713	-3.02	0.0073	-0.8880	
	Dummy for years after 2008	0.8999	0.2521	3.57	0.0022		
	Dummy for years after 2011	0.8286	0.2850	2.91	0.0094		
log (Dry Whey Exports)	Intercept	5.5874	0.0584	95.65	<.0001		0.7788
	(Dry Whey Wholesale Price - EU Dry Whey Price)	-1.6583	0.5675	-2.92	0.0087	0.0417	
	Dummy for years after 2004	0.5291	0.0885	5.98	<.0001		
log (Butter Imports over Tariff Rate Quota)[1]	Intercept	-0.2397	0.1446	-1.66	0.1138		
	(Grade AA Butter Wholesale Price - Oceania Butter Price)^3	1.3769	0.3587	3.84	0.0011	0.2982	0.6019
log (Butter Exports)	Intercept	4.1661	0.1235	33.73	<.0001		0.8705
	(Grade AA Butter Wholesale Price - Oceania Butter Price)	-3.8569	0.5782	-6.67	<.0001	-1.3993	
log (Non-Fat Dry Milk Exports)	Intercept	3.6237	0.3458	10.48	<.0001		0.9710
	(Non-Fat Dry Milk Wholesale Price/Oceania Skim Milk Powder Price)	-0.8397	0.3810	-2.20	0.0408	-0.9061	
	Trend from 1985 * Dummy form 2004 to 2013	0.1127	0.0137	8.20	<.0001		
	Dummy for years after 2013	3.4681	0.3502	9.90	<.0001		

[1] In-quota butter imports are assumed to be filled over the projection period.