# 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.

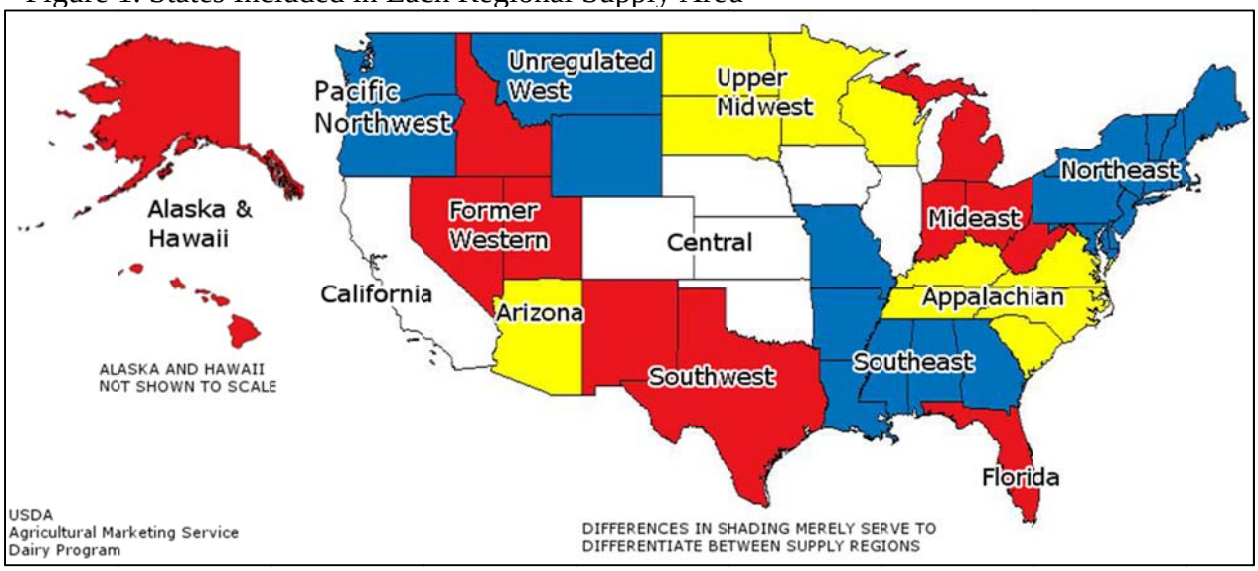
## Supply Regions and Milk Production

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: http://www.ers.usda.gov/publications/oce-usda-agricultural-projections/oce151.aspx
[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.

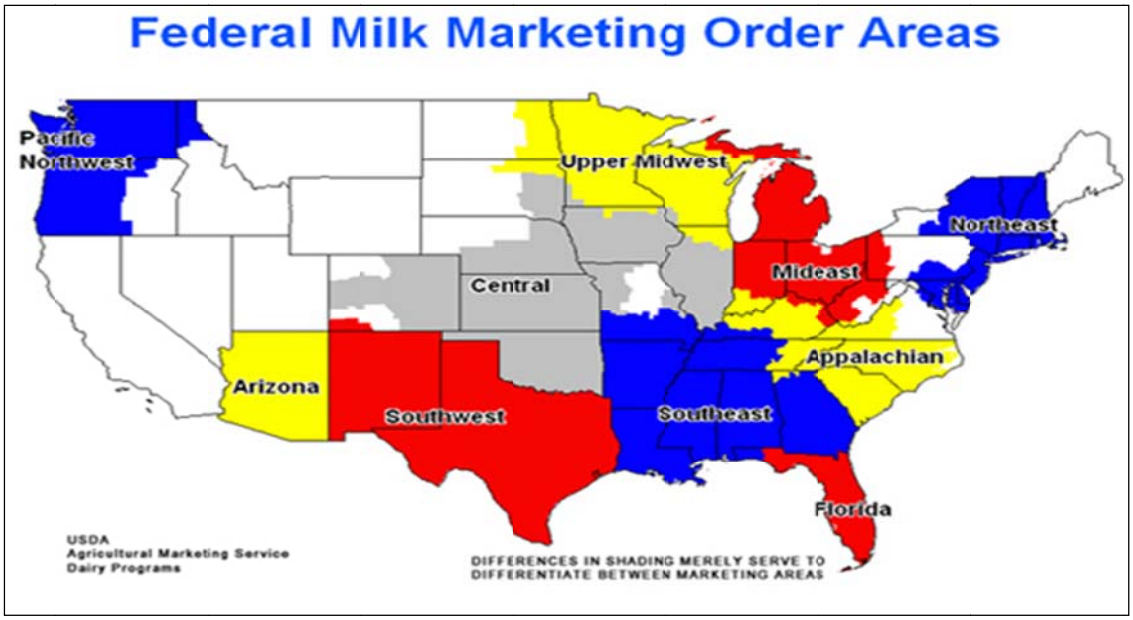
from 2000 – 2013 due to order reform. Prices are deflated by the Consumer Price Index (CPI) for all products as reported nationally by the Bureau of Labor Statistics, U.S. Department of Labor (BLS). The effective blend prices are calculated based on data reported by each FMMO's Market Administrator (MA) 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.

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[12] American Dairy Products Institute (2014) *Dairy Products, Utilization and Production Trends*, Retrieved from: https://www.adpi.org/tabid/128/newsid545/49/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-usda-agricultural-projections/oce151.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/getfile?dDocName=STELPRDC5056334

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: http://www.fas.usda.gov/data/dairy-monthly-imports

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 + Arizona Average Dairy Market Loss Payments + Average Dairy Economic Loss Assistance Payments) / Boning Cow Slaughter Price) | 7.6806 | 3.7618 | 2.04 | 0.0504 | 6.6702 | |
| | Trend from 1980 | 0.1914 | 0.0742 | 2.58 | 0.0152 | | |
| | lag (log ((Arizona All Milk Price + Arizona Average Dairy Market Loss Payments + Average Dairy Economic Loss Assistance Payments) / 16% Protein Feed Value)) | 8.1566 | 3.4274 | 2.38 | 0.0241 | 1.9637 | |
| log (Arizona Milk Per Cow) | Intercept | 3.4076 | 1.1915 | 2.86 | 0.0078 | | 0.9773 |
| | lag (log ((Arizona All Milk Price + Arizona Average Dairy Market Loss Payments + Average Dairy Economic Loss Assistance Payments) / 16% Protein Feed Value)) | 0.0464 | 0.0235 | 1.97 | 0.0585 | | |
| | 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 Price / CPI All) | Intercept | 0.1632 | 0.1269 | 1.29 | 0.2246 | | 0.9822 |
| | 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) * Dummy for years after 2010 | 0.0196 | 0.0108 | 1.82 | 0.0963 | 0.0196 | |
| log (Former Western Order Number of Cows) | Intercept | 4.6803 | 0.2185 | 21.42 | <.0001 | | 0.9807 |
| | Trend from 1980 | 0.0428 | 0.0013 | 32.68 | <.0001 | | |
| | lag (log ((Former Western Order All Milk Price + Former Western Order Average Dairy Market Loss Payments + Average Dairy Economic Loss Assistance Payments) / Boning Cow Slaughter Price)) | 0.1529 | 0.0636 | 2.41 | 0.0228 | 0.1529 | |
| | Dummy for years 1980-1984 | 0.2489 | 0.0380 | 6.55 | <.0001 | | |
| log (Former Western Order Milk Per Cow) | Intercept | 9.3349 | 0.0311 | 299.84 | <.0001 | | 0.9832 |
| | 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) | 0.1117 | 0.0274 | 4.08 | 0.0003 | 0.1117 | |
| | 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 / CPI All) | Intercept | 0.3685 | 0.1136 | 3.24 | 0.0070 | | 0.9802 |
| | 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 | Intercept | 0.1376 | 0.1378 | 1.00 | 0.3257 | | 0.8893 |
| / CPI All) | 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 | 0.1839 | 0.0621 | 2.96 | 0.0061 | 0.1839 | |
| | + Hawaii and Alaska Average Dairy Market Loss Payments | | | | | | |
| | + Average Dairy Economic Loss Assistance | | | | | | |
| | Payments) / 16% Protein Feed Value) | | | | | | |
| | 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 | Intercept | -3.5156 | 0.2051 | -17.14 | <.0001 | 0.7828 |
| / Northeast Milk to Order 1) | 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 | Intercept | -2.1627 | 0.0169 | -169.13 | <.0001 | 0.8000 |
| / Northeast Milk to Order 1) | 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 | Intercept | -2.8530 | 0.1757 | -2.96 | 0.0181 | 0.9424 |
| / Northeast Milk to Order 1) | 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 | Intercept | -1.3944 | 0.5152 | -2.71 | 0.0241 | 0.9325 |
| / Appalachian Milk to Order 5) | 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 | Intercept | -4.9184 | 0.7451 | -6.60 | <.0001 | 0.7894 |
| / Appalachian Milk to Order 5) | 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 | Intercept | -1.3594 | 0.0248 | -54.71 | <.0001 | 0.8749 |
| / Appalachian Milk to Order 5) | 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 | Intercept | -4.1237 | 0.4520 | -9.12 | <.0001 | 0.8701 |
| / Appalachian Milk to Order 5) | 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 | Intercept | -2.1007 | 0.0363 | -57.93 | <.0001 | 0.7274 |
| / Appalachian Milk to Order 5) | log (Order 5 Class 1 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 | Intercept | -11.4179 | 2.6424 | -4.32 | 0.0012 | 0.8309 |
| / 1 - Percentage of Florida Milk to | log (Order 7 Blend Price / CPI All) | 3.3036 | 1.2342 | 2.68 | 0.0215 | |
| Order 7) | 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 | Intercept | -21.6652 | 4.7912 | -4.52 | 0.0019 | 0.7730 |
| / Southeast Milk to Order 7) | 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 | -3.5130 | 1.0163 | -3.46 | 0.0086 | |
| | * Dummy for years after 2005 | | | | | |
| | Dummy for year 2001 | 1.3109 | 0.4071 | 3.22 | 0.0122 | |
| log (Southeast Milk to Order 6 | Intercept | -2.3703 | 0.3672 | -6.45 | 0.0001 | 0.8773 |
| / Southeast Milk to Order 7) | lag (log (Order 6 Blend Price / CPI All)) | 0.1140 | 0.0455 | 2.50 | 0.0336 | |
| | * Dummy for years after 2004 | | | | | |
| | 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 | Intercept | -1.5289 | 0.1782 | -8.58 | <.0001 | 0.8546 |
| / Southeast Milk to Order 7) | 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 | Intercept | -5.8084 | 0.4335 | -13.40 | <.0001 | 0.8954 |
| / Southwest Milk to Order 126) | lag (log (Order 5 Blend Price / CPI All)) | 0.2089 | 0.0685 | 3.05 | 0.0138 | |
| | * Dummy for years after 2004 | | | | | |
| | 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 | Intercept | -2.3522 | 0.2138 | -11.00 | <.0001 | 0.8325 |
| / Southwest Milk to Order 126) | 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 | Intercept | -2.0873 | 0.2280 | -9.15 | <.0001 | 0.8288 |
| / Southwest Milk to Order 126) | 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 | Intercept | -0.9536 | 0.1015 | -9.40 | <.0001 | 0.8048 |
| / Southwest Milk to Order 126) | 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 | Intercept | -11.5029 | 0.1825 | -63.03 | <.0001 | 0.8876 |
| Order 126 | (Order 126 Blend Price / Order 131 Blend Price) | 5.7051 | 0.3465 | 16.47 | <.0001 | |
| / 1- Percentage of Arizona Milk to | * Dummy for years after 2002 | | | | | |
| Order 126) | 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 | Intercept | -5.6319 | 0.5493 | -10.25 | <.0001 | 0.8147 |
| Milk to Order 32 | lag (log (Order 32 Blend Price / Former Western Order | 12.7312 | 4.3720 | 2.91 | 0.0155 | |
| / 1 - Percentage of Former Western | All Milk Price)) | | | | | |
| Order Milk to Order 32) | 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 | Intercept | -4.7513 | 0.7836 | -6.06 | <.0001 | 0.9670 |
| Milk to Order 32 | 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 | Intercept | -3.4013 | 0.5325 | -6.39 | 0.0001 | 0.7539 |
| / California Milk used in California) | 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 | Intercept | -2.2569 | 0.3726 | -6.06 | 0.0001 | 0.9349 |
| / California Milk used in California) | 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 | -2.2671 | 0.4213 | -5.38 | 0.0003 | | |
| | * Population Under 5 Years Old | | | | | | |
| | 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 | | |