Economic Analysis:
Proposed Merger of the Southeast and Appalachian
Federal Milk Marketing Orders

I. Statement of Need for the Recommended Action

A. Statutory Directive

A formal hearing was held by the Agricultural Marketing Service (AMS) on February 23-26, 2004, in Atlanta, Georgia, to consider proposals submitted by the industry to merge the Appalachian (Order 5) and the Southeast (Order 7) milk marketing areas into a single area, to expand the proposed merged order to include certain currently unregulated counties and cities in the State of Virginia, and to create a "Mississippi Valley" milk marketing area by breaking the Southeast order into two orders.

The purpose of the *Economic Analysis for the Partial Recommended Decision on the Appalachian and Southeast Marketing Areas* is to evaluate the impacts, the costs and benefits of merging the Appalachian and the Southeast milk marketing areas. The analysis is limited to the proposed merger of the Appalachian and Southeast orders as they currently exist.

B. Analysis

The decision recommends maintaining the Appalachian and the Southeast milk marketing areas as separate areas, and to not merge them. Merging the areas would combine the two separate revenue pools into a single pool, from which producers would receive a uniform price for qualified milk marketings into the combined single market. Minimum prices paid by processors for milk would not change. Thus, the issue at hand is the effects of a merger on the distribution of pool revenues to producers marketing milk in the Appalachian and Southeast milk marketing areas. In summary, the 2005-09 average uniform price would be reduced by about 7 cents per hundredweight (cwt.) for Appalachian order producers and would be increased by about 7 cents per cwt. for Southeast order producers.

1. Baseline

Impacts were measured as changes from the model baseline as adapted from the 2005 USDA Agricultural Baseline Projections (*USDA Agricultural Baseline Projections to 2014*, OCE 2005-01). The USDA baseline is a national, fiscal-year

projection of the supply-demand-price situation for agricultural products. Baseline assumptions for dairy are: (1) the price support program will continue at $9.90 per cwt. (3.67 percent butterfat); (2) the Dairy Export Incentive Program will be fully utilized, subsequent to the 2004-05 marketing year; (3) the Federal Milk Marketing Order Program will continue as reformed on January 1, 2000, and as amended April 1, 2003; and (4) the Milk Income Loss Contract program will make payments to dairy farmers through September 2005 when the Class I price in Boston is less than $16.94 per cwt. The five-year analytical period runs from 2005 through 2009.

2. Analysis Assumptions and Relationships

This analysis focuses on impacts on milk marketed under two Federal milk marketing orders, the Appalachian order, and the Southeast order. Dairy Programs' baseline model is used to generate milk and dairy product prices and quantities consistent with the baseline. This set of prices is the foundation underlying the Order 5-7 model that was estimated to analyze the proposed merger.

a. Econometric Models

Dairy Programs' baseline econometric model used in this analysis includes all milk marketed in the U.S. Demands for fluid milk and the major manufactured dairy products are included. The model generates estimates for the annual average National Agricultural Statistical Service (NASS) wholesale prices for American cheese (weighted average for blocks and barrels), butter, nonfat dry milk, and dry whey. The Federal order pricing formulas are driven by the NASS prices. The model is calibrated to be consistent with the 2004 USDA baseline. Baseline variables are presented in the Appendix.

The baseline model variables used in this analysis include the system-wide average Federal Uniform Price at 3.5 percent butterfat, U.S. milk production, U.S. fluid milk use, and U.S. Class II use.[1] Fiscal USDA baseline projections are first converted to annual projections based on weighted averages. They are then converted to monthly projections based upon historical patterns. These monthly projections and are used to estimate variables for Orders 5 and 7, as described below.

A separate econometric model (Order 5-7 model), using monthly data, is developed specifically for this analysis to

[1] U.S. Class II Use is defined as the milk equivalent of total milk solids in the U.S. used in products defined as Class II in the Federal order system.

estimate producer receipts, class utilization of milk, and uniform prices for Orders 5 and 7 alone and combined. The Order 5-7 model is in turn calibrated to be consistent with the U.S. baseline. For each order the model includes the demand for raw milk by processors in the four use classes and milk receipts from producers. Given the minimum prices and the milk uses in each order, an order uniform price is calculated. Producer milk receipts for each order depend upon the uniform prices, along with other explanatory variables including U.S. milk production. Uses of milk in Class I and Class II in each order are estimated as functions of U.S. Class I and Class II uses and trend-type variables. Estimated uses of milk in Class III and Class IV depend on history and milk available after Class I and Class II uses have been met. The projection period for the analysis spans from 2005 through 2009. The general pattern of the projections are consistent the USDA Agricultural Baseline Projections. See Appendix for details on the Order 5-7 model.

b. Analytical Procedure

The Order 5-7 model is used to first analyze the effects on uniform prices, producer receipts, and Class III and IV uses with the orders separate, and then with the orders merged. No Federal order class prices change under the scenario. Therefore, no change takes place in consumer demands for Class I and Class II products. It follows that the demand by plants for milk in these uses will not change. The change in the uniform price from a merger would be positive for producers on the existing Southeast Order (7), and would be negative for producers on the existing Appalachian Order (5). It turns out that the changes in milk production in the two orders are very close to the same magnitude.

II. Results of the Analysis

The Order 5-7 model is used to project impacts of the proposed merger of the Appalachian (Order 5) and the Southeast (Order 7) Federal Milk Marketing Orders. The projection period for the analysis spans from 2005 through 2009. Two scenarios are examined: a status quo scenario with the orders remaining separate versus a proposed merger scenario.

Milk receipts, use, and price information for the 2000-2004 historic period and the 2005-2009 projection period are presented in Table 1. [2] Over the 2000-2004 period, Order 5

[2] Uniform prices vary by location within each order area due to variations in Class I differentials. Uniform prices used in this

uniform prices exceeded Order 7 uniform prices by an average of $0.20 per cwt. The difference peak was $0.36 in 2000 and declined steadily to $0.08 for 2004. If the first year under Federal order reform is taken out of the average, the difference averages $0.16 per cwt. from 2001 to 2004. Notable differences in the markets are the 4 percentage point higher Class I and Class II utilizations in Order 5 and the 10 percentage point higher Class III utilization in Order 7.

With the status quo scenario, the Order 5 uniform price is projected to be $0.14 per cwt. more than the Order 7 uniform price on average for the 2005-2009 projection period. While depooling is reflected in the 2003 and 2004, it is assumed that no Order 5 or 7 depooling occurs in the 2005-2009 period. Figure 1 displays the uniform prices for both orders, the uniform prices for all Federal milk marketing orders combined, and the U.S. all milk price for milk at 3.5% butterfat. All four milk prices follow similar patterns in the projection period, and they maintain the basic relative relationships that existed in the 2000-04 historic period. To varying degrees in each order, producer receipts of milk, and uses of milk in all four classes are projected to decline slightly from 2000-04 levels. Both orders remain predominantly Class I markets, as class utilization as a percentage of producer receipts is expected to change very little. Appalachian Class I utilization increases from 68.1 percent in 2000-04 to 69.1 percent in 2005-09, while Southeast Class I utilization increases from 63.5 percent in 2000-04 to 63.9 percent in 2005-09. For manufacturing uses, Order 5 has the greater percentage of milk in Class II, 14.5 as compared to 10.8. Order 7 has the greater percentage of milk in Class III, 17.3 as compared to 7.3. As overall producer receipts decline, a smaller percentage of milk is expected to be available for manufacturing uses (Table 1, Figures 2 & 3).

Under the proposed merger, existing Order 5 producers lose Federal order pool revenue due to both a decrease in the uniform price and a decrease in receipts of producer milk. For the merged area, these effects are about equally offset by Federal order pool revenue gains to existing Order 7 producers. Under the proposed merger, existing Order 5 producers experience an average $0.07 per cwt. reduction in the uniform price over the projection period, while existing Order 7 producers experience an average $0.07 per cwt. gain. In response to the price changes, receipts of producer milk attributable to existing Order 5 fall by 11 million pounds, while existing Order 7 milk receipts rise by 11 million pounds. Gross pool revenue falls by $6.6 million per year

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analysis are for each order's principal pricing point: Mecklenburg County, NC for Order 5 and Fulton County, GA for Order 7.

for existing Order 5 producers and increases by $6.5 million per year for existing Order 7 producers (Table 2).

For the proposed merger, the class utilization percentages are expected to average 66.3 percent for Class I, 12.2 percent for Class II, 12.2 percent for Class III, and 9.3 percent for Class IV (Table 3 and Figure 5). While producer receipts for the merged order remain virtually unchanged from the total receipts of the separate orders under the status quo, projected Class III and IV usages change slightly—an average 3 million pound-per-year gain in Class III and an average 4 million pound-per-year reduction in Class IV. This is attributable to the fact that Class IV utilization is greater than Class III utilization for Order 5 while the situation is vice versa for Order 7. For the existing Order 5, annual average Class III and IV utilizations fall by 6 million pounds and 5 million pounds respectively. For the current Order 7, annual average Class III and IV receipts increase by 9 million pounds and 2 million pounds respectively (Table 4).

Slight changes in the inter-order alignment of uniform prices would be caused by the proposed merger. The uniform price increase of $0.07 for existing Order 7 would increase the incentives for milk currently flowing from the Southwest and Central orders into existing Order 7. Such increased flows into the merged order would have further uniform price reducing effects for existing Order 5 producers. Uniform price decreases for existing Order 5 producers would give incentives for producers in areas north of the Appalachian order area to shift milk marketings from the merged order into the Mideast and Northeast orders. Thus, there would be a slight positive pressure on Southwest and Central order uniform prices, and a slight negative pressure on Mideast and Northeast order uniform prices. Mitigating these effects is the fact that the major cooperatives involved in Orders 5 and 7 are major milk suppliers in the other orders as well. Moreover, the inter-order alignment of producer pay prices depends, as well, upon over-order payments negotiated between cooperatives and processors, and distributed to producers.

Consumers are not expected to be affected by the proposed merger. Small changes in receipts of producer milk would not affect the availability of any products that result in higher prices at retail.

Figure 1. Milk Prices for Appalachian Order Uniform, Southeast Order Uniform, All Federal Milk Marketing Orders Uniform, and U.S. All Milk Price

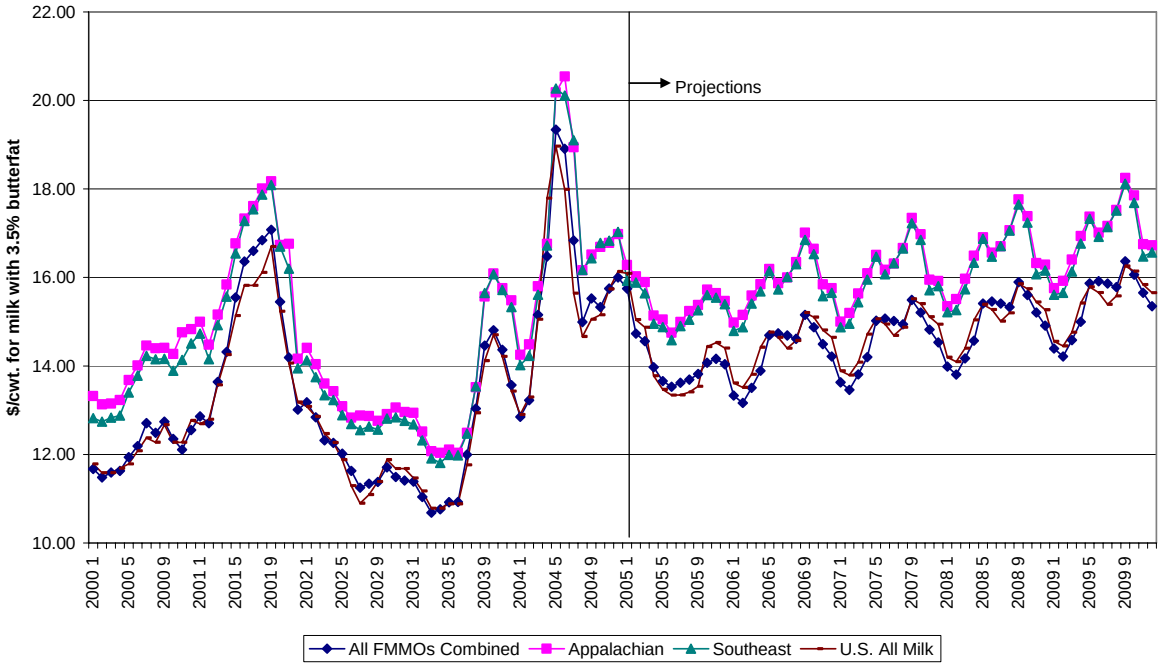


Table 1. Status-quo Projections for Appalachian and Southeast Orders

	Units	Historic Values						Projection Period					
		2000	2001	2002	2003	2004	Avg. '00-'04	2005	2006	2007	2008	2009	Avg. '05-'09
Appalachian (Order 5)													
Receipts of producer milk	mil. lbs.	6,318	6,673	6,706	6,315	6,202	6,443	6,305	6,366	6,337	6,283	6,193	6,297
Uniform Price	$/cwt.	13.950	16.306	13.253	13.522	17.000	14.806	15.463	15.928	16.139	16.517	16.963	16.202
Gross F.O. minimum revenue	mil. $	881.4	1,088.1	888.7	853.9	1,054.3	953.3	974.9	1,013.9	1,022.6	1,037.7	1,050.6	1,020.0
Class I Utlization	mil. lbs.	4,343	4,352	4,449	4,443	4,325	4,382	4,377	4,375	4,362	4,343	4,295	4,351
	%	68.8	65.2	66.3	70.4	69.7	68.1	69.4	68.7	68.8	69.1	69.3	69.1
Class II Utilization	mil. lbs.	889	980	954	910	933	933	933	912	885	856	826	883
	%	14.1	14.7	14.2	14.4	15.1	14.5	14.8	14.3	14.0	13.6	13.3	14.0
Class III Utilization	mil. lbs.	406	632	543	449	344	475	376	440	446	444	438	429
	%	6.4	9.5	8.1	7.1	5.5	7.3	6.0	6.9	7.0	7.1	7.1	6.8
Class IV Utilization	mil. lbs.	680	709	760	513	600	652	619	639	643	639	634	635
	%	10.8	10.6	11.3	8.1	9.7	10.1	9.8	10.0	10.1	10.2	10.2	10.1
Southeast (Order 7)													
Receipts of producer milk	mil. lbs.	7,487	7,769	7,927	7,071	7,164	7,484	7,301	7,196	7,215	7,248	7,283	7,249
Uniform Price	$/cwt.	13.590	16.069	13.046	13.428	16.916	14.610	15.301	15.787	16.016	16.385	16.812	16.060
Gross F.O. minimum revenue	mil. $	1,017.5	1,248.4	1,034.2	949.5	1,211.8	1,092.3	1,117.1	1,136.1	1,155.5	1,187.6	1,224.4	1,164.1
Class I Utlization	mil. lbs.	4,867	4,805	4,767	4,629	4,640	4,742	4,616	4,622	4,629	4,642	4,632	4,628
	%	65.0	61.9	60.1	65.5	64.8	63.5	63.2	64.2	64.2	64.0	63.6	63.9
Class II Utilization	mil. lbs.	801	891	796	705	843	807	819	788	772	754	736	774
	%	10.7	11.5	10.0	10.0	11.8	10.8	11.2	10.9	10.7	10.4	10.1	10.7
Class III Utilization	mil. lbs.	1,222	1,449	1,638	1,258	920	1,297	1,204	1,166	1,194	1,228	1,279	1,214
	%	16.3	18.6	20.7	17.8	12.8	17.3	16.5	16.2	16.5	16.9	17.6	16.7
Class IV Utilization	mil. lbs.	597	624	725	479	761	637	662	621	620	625	635	633
	%	8.0	8.0	9.2	6.8	10.6	8.5	9.1	8.6	8.6	8.6	8.7	8.7
Difference in uniform prices	$/cwt.	0.36	0.24	0.21	0.09	0.08	0.20	0.16	0.14	0.12	0.13	0.15	0.14
Both orders													
Receipts of producer milk	mil. lbs.	13,805	14,442	14,633	13,386	13,366	13,926	13,606	13,562	13,551	13,531	13,476	13,545
Gross F.O. minimum revenue	mil. $	1,898.8	2,336.5	1,922.9	1,803.5	2,266.2	2,045.6	2,092.0	2,150.1	2,178.2	2,225.3	2,275.0	2,184.1

Source for historic values: USDA-AMS Dairy Programs, *Federal Milk Order Statistics*

Figure 2. Appalachian Order Class Utilization Projections

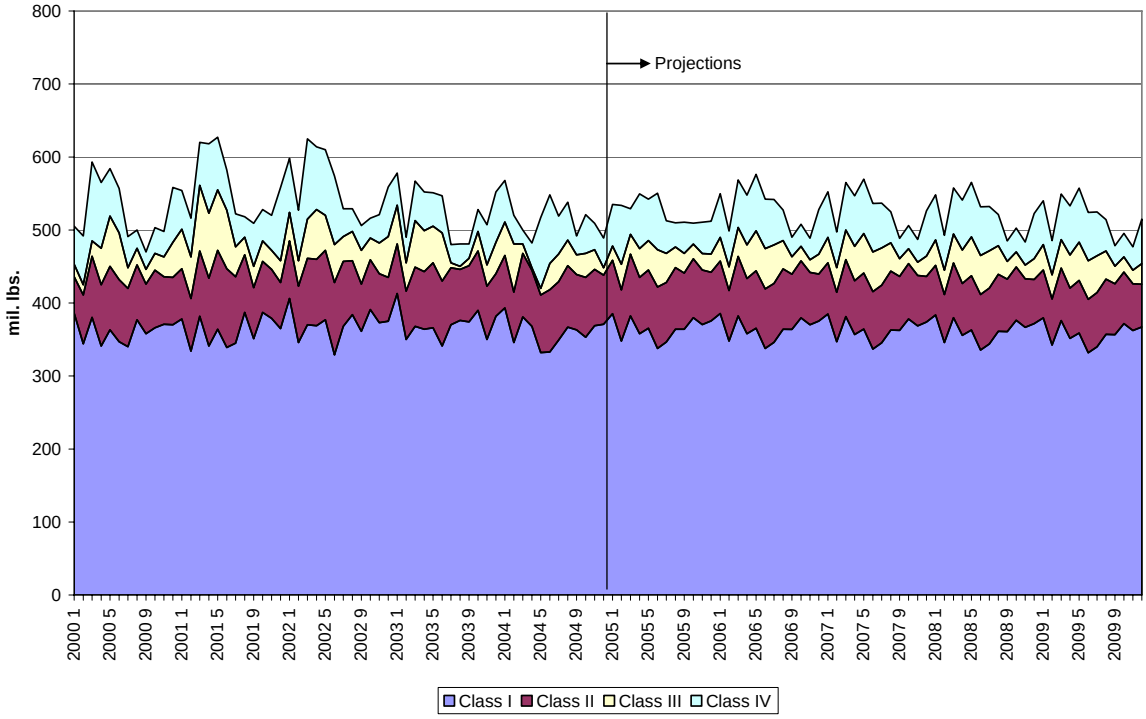


Figure 3. Southeast Order Class Utilization Projections

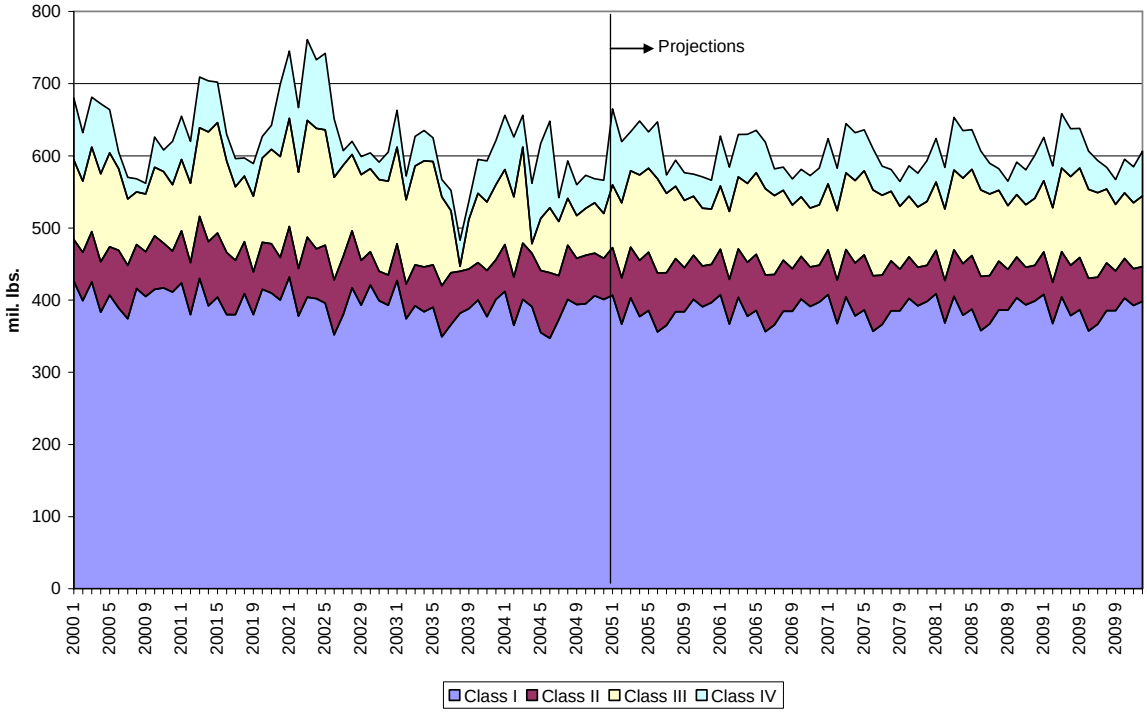


Table 2. Projected Impact of Proposed Southeast-Appalachian Proposed Merger on Receipts of Producer Milk, Uniform Prices, and Gross Federal Order Minimum Revenue

	Units	Projection Period					
		2005	2006	2007	2008	2009	Avg. '05-'09
Status Quo							
Appalachian (Order 5)							
Receipts of producer milk	mil. lbs.	6,305	6,366	6,337	6,283	6,193	6,297
Uniform Price	$/cwt.	15.46	15.93	16.14	16.52	16.96	16.20
Gross F.O. minimum revenue	mil. $	974.9	1,013.9	1,022.6	1,037.7	1,050.6	1,020.0
Southeast (Order 7)							
Receipts of producer milk	mil. lbs.	7,301	7,196	7,215	7,248	7,283	7,249
Uniform Price	$/cwt.	15.30	15.79	16.02	16.39	16.81	16.06
Gross F.O. minimum revenue	mil. $	1,117.1	1,136.1	1,155.5	1,187.6	1,224.4	1,164.1
Producer receipts both orders		13,606	13,562	13,551	13,531	13,476	13,545
Gross min. rev. both orders	mil. $	2,092.0	2,150.1	2,178.2	2,225.3	2,275.0	2,184.1
Impact of Proposed Merger							
Order 5 current market area							
Receipts of Producer Milk	mil. lbs.	6,293	6,355	6,325	6,272	6,182	6,285
Change in producer receipts	mil. lbs.	-12	-11	-11	-11	-12	-11
Change in uniform price	$/cwt.	-0.09	-0.07	-0.06	-0.07	-0.08	-0.07
Gross min. revenue	mil. $	967.7	1,007.5	1,016.8	1,031.5	1,043.6	1,013.4
Change in gross F.O. minimum revenue	mil. $	-7.2	-6.5	-5.9	-6.2	-7.0	-6.6
Order 7 current market area							
Receipts of Producer Milk	mil. lbs.	7,307	7,207	7,226	7,260	7,295	7,259
Change in producer receipts	mil. lbs.	6	11	12	12	12	11
Change in uniform price	$/cwt.	0.08	0.07	0.06	0.06	0.07	0.07
Gross min. revenue	mil. $	1,123.6	1,142.7	1,161.6	1,194.0	1,231.5	1,170.7
Change in gross F.O. minimum revenue	mil. $	6.5	6.5	6.1	6.4	7.2	6.5
Merged market area							
Receipts of producer milk	mil. lbs.	13,600	13,562	13,552	13,532	13,476	13,544
Change--receipts of prod. milk	mil. lbs.	-6	0	1	1	0	-1
Uniform Price	$/cwt.	15.38	15.85	16.07	16.45	16.88	16.13
Gross min. rev.	mil. $	2,091.3	2,150.1	2,178.4	2,225.5	2,275.1	2,184.1
Change in gross F.O. minimum revenue	mil. $	-0.7	0.1	0.2	0.2	0.1	0.0

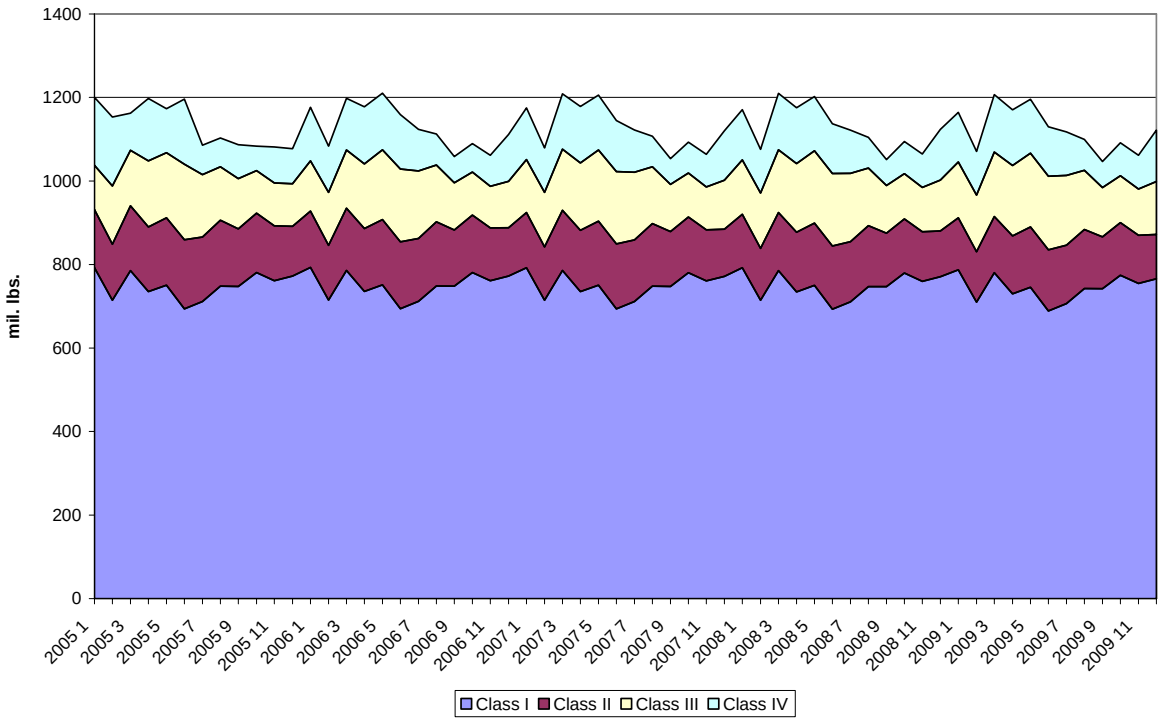
Table 3. Projected Impact of Proposed Merger on Class Utilization for Merged Market Area

	Units	Projection Period					
		2005	2006	2007	2008	2009	Avg. 2005-09
Status quo for both orders							
Receipts of Producer Milk	mil. lbs.	13,606	13,562	13,551	13,531	13,476	13,545
Class I Utlization	mil. lbs.	8,993	8,998	8,992	8,985	8,927	8,979
	%	66.1	66.3	66.4	66.4	66.2	66.3
Class II Utilization	mil. lbs.	1,753	1,699	1,657	1,610	1,562	1,656
	%	12.9	12.5	12.2	11.9	11.6	12.2
Class III Utilization	mil. lbs.	1,580	1,606	1,640	1,671	1,718	1,643
	%	11.6	11.8	12.1	12.4	12.7	12.1
Class IV Utilization	mil. lbs.	1,281	1,260	1,263	1,265	1,269	1,267
	%	9.4	9.3	9.3	9.3	9.4	9.4
Impact of Proposed Merger							
Merged Market Area							
Receipts of Producer Milk	mil. lbs.	13,600	13,562	13,552	13,532	13,476	13,544
Class I Utlization	mil. lbs.	8,993	8,998	8,992	8,985	8,927	8,979
	%	66.1	66.3	66.4	66.4	66.2	66.3
Class II Utilization	mil. lbs.	1,753	1,699	1,657	1,610	1,562	1,656
	%	12.9	12.5	12.2	11.9	11.6	12.2
Class III Utilization	mil. lbs.	1,578	1,609	1,644	1,675	1,722	1,646
	%	11.6	11.9	12.1	12.4	12.8	12.2
Class IV Utilization	mil. lbs.	1,276	1,256	1,259	1,261	1,265	1,264
	%	9.4	9.3	9.3	9.3	9.4	9.3
Merged market area changes							
Receipts of Producer Milk	mil. lbs.	-6	0	1	1	0	-1
Class I Utlization	mil. lbs.	0	0	0	0	0	0
	%	0.0	0.0	0.0	0.0	0.0	0.0
Class II Utilization	mil. lbs.	0	0	0	0	0	0
	%	0.0	0.0	0.0	0.0	0.0	0.0
Class III Utilization	mil. lbs.	-2	3	4	4	4	3
	%	0.0	0.0	0.0	0.0	0.0	0.0
Class IV Utilization	mil. lbs.	-4	-3	-4	-4	-4	-4
	%	0.0	0.0	0.0	0.0	0.0	0.0

Table 4. Projected Class Utilization Impact of Proposed Southeast-Appalachian Proposed Merger on Current Market Areas

Order 5 current market area							
Receipts of Producer Milk	mil. lbs.	6,293	6,355	6,325	6,272	6,182	6,285
Class I Utlization	mil. lbs.	4,377	4,375	4,362	4,343	4,295	4,351
	%	69.6	68.9	69.0	69.3	69.5	69.2
Class II Utilization	mil. lbs.	933	912	885	856	826	883
	%	14.8	14.3	14.0	13.7	13.4	14.0
Class III Utilization	mil. lbs.	370	434	440	438	432	423
	%	5.9	6.8	7.0	7.0	7.0	6.7
Class IV Utilization	mil. lbs.	612	634	638	634	628	629
	%	9.7	10.0	10.1	10.1	10.2	10.0
Order 5 market area changes							
Receipts of Producer Milk	mil. lbs.	-12	-11	-11	-11	-12	-11
Class I Utlization	mil. lbs.	0	0	0	0	0	0
	%	0.1	0.1	0.1	0.1	0.1	0.1
Class II Utilization	mil. lbs.	0	0	0	0	0	0
	%	0	0.0	0.0	0.0	0.0	0.0
Class III Utilization	mil. lbs.	-6	-6	-6	-6	-6	-6
	%	0	-0.1	-0.1	-0.1	-0.1	-0.1
Class IV Utilization	mil. lbs.	-6	-5	-5	-5	-6	-5
	%	0	-0.1	-0.1	-0.1	-0.1	-0.1
Order 7 current market area							
Receipts of Producer Milk	mil. lbs.	7,307	7,207	7,226	7,260	7,295	7,259
Class I Utlization	mil. lbs.	4,616	4,622	4,629	4,642	4,632	4,628
	%	63.2	64.1	64.1	63.9	63.5	63.8
Class II Utilization	mil. lbs.	819	788	772	754	736	774
	%	11.2	10.9	10.7	10.4	10.1	10.7
Class III Utilization	mil. lbs.	1,208	1,175	1,204	1,238	1,290	1,223
	%	16.5	16.3	16.7	17.0	17.7	16.8
Class IV Utilization	mil. lbs.	664	622	622	627	637	634
	%	9.1	8.6	8.6	8.6	8.7	8.7
Order 7 market area changes							
Receipts of Producer Milk	mil. lbs.	6	11	12	12	12	11
Class I Utlization	mil. lbs.	0	0	0	0	0	0
	%	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
Class II Utilization	mil. lbs.	0	0	0	0	0	0
	%	0.0	0.0	0.0	0.0	0.0	0.0
Class III Utilization	mil. lbs.	4	9	10	10	11	9
	%	0.0	0.1	0.1	0.1	0.1	0.1
Class IV Utilization	mil. lbs.	2	2	2	2	2	2
	%	0.0	0.0	0.0	0.0	0.0	0.0

Figure 5. Class Utilizations for Proposed Merged Order



Appendix

Baseline, and Order 5-7 Model Specification and Use

USDA-AMS Dairy Programs serves on the USDA Dairy Interagency Commodity Estimates Committee (ICEC). Each year, the committee projects fiscal-year baseline projections. Dairy Programs uses a comprehensive baseline econometric model (baseline model) to assist the committee with these projections. After a consensus has been reached by the committee, the model is calibrated to approximate the committee's projections. This analysis uses the USDA baseline published in February 2005 (*USDA Agricultural Baseline Projections to 2014*, OCE 2005-01). Appendix Table 1 presents the dairy baseline variables. For 2005, where possible, this analysis uses short-term projections consistent with the February 9, 2005 edition of USDA's *World Agricultural Supply and Demand Estimates*.

In contrast to the baseline model, which is based on fiscal-year time series, the Order 5-7 model is based on monthly time series due to the relatively short amount of time since order reform. In order to project uniform prices and class utilizations that are consistent with the USDA baseline and that correspond to Federal Milk Order Market Statistics, variables from the baseline model were first converted from fiscal to annual variables using weighted averages. For example:

milk production calendar year 2006 =
0.75 X milk production fiscal year ending Sept. 2006
+ 0.25 X milk production fiscal year ending Sept. 2007

Annual time series were then converted to monthly time series through the use of monthly seasonal indices based on historic values from 2000 through 2004. This gives projected variables from the baseline model the same average seasonal patterns as experienced from 2000 through 2004. These monthly projections from the converted baseline model variables are used as exogenous variables for the Order 5-7 model. The projection period begins January 1, 2005.

In any given month, there is likely to be at least some amount of milk in the Federal order system that is not pooled due to disadvantageous price relationships. This amount is usually small. For the period from 2000 through 2002, Dairy Programs estimates that on average 275 million pounds per month were not pooled for these reasons. In 2003 and 2004, the magnitude of depooled milk was much greater, an average of 1.3 billion pounds per month. For Orders 5 and 7, depooling of milk due to disadvantageous price relationships has been rare. Dairy Programs estimates that depooling was virtually non-existent for these orders in 2000 through 2002. Although Orders 5 and 7 had significant

depooling in 2003 and 2004, the magnitude was much less than for some of the other Federal orders. Although it is possible that depooling of the magnitudes of 2003 and 2004 could occur over the projection period, there is great uncertainty as to when and if such events could occur. For this reason, this analysis assumes depooling over the projection period at the 2000-02 levels: 275 million pounds per month for the Federal order system and none for Orders 5 and 7.

A two-stage least squares system of equations is used to project class utilizations and uniform prices for the Order 5-7 model (Table 5).[3] In both orders, producers and their cooperatives respond with a positive relationship to changes in uniform prices. Receipts of producer milk are estimated as function of each order's uniform price, U.S. milk production, depooled milk, and historic changes in producer receipts for the orders. Seasonal variables take depooled milk into account. For Order 5, a ratio of the order's uniform price to the uniform price for all Federal order markets combined is included. A similar variable was not statistically significant for Order 7.

The model gives priority of milk allocation to higher-valued Class I and II uses. Class I utilization for each order is estimated as a relationship to U.S. fluid use and trend. While population is found to be significant variable for Order 5 Class I utilization, a significant relationship between population and Class I utilization could not be estimated for Order 7. The apparent disconnect between Class I utilization and population growth could be caused by the fact that significant volumes of packaged fluid milk are brought in from plants regulated under other orders, including Order 5. (See discussion of the "lock-in" provision in Order 5 under which a plant located in the Order 5 marketing area would continue to be regulated under Order 5 even though a majority of its sales were in another order. Federal Register page 29411.) Class II utilization for each order is estimated as a function of estimated U.S. Class II utilization and historic changes in Class II utilization.

Class III and IV utilization combined is calculated as a residual:

Class III and IV utilization =
Receipts of producer milk
– Class I utilization – Class II utilization

Class III utilization is then estimated in relationship to the residual Class III and IV utilization and historic

[3] Software used for the parameter estimates and projections is the SAS, Version 8, PROC MODEL procedure.

changes in Class III utilization. Most depooled milk has been of Class III. This is taken into account in the Class III equations. Class IV milk utilization is finally calculated as a residual:

Class IV utilization = Class III and IV utilization
- Class III utilization

Precise calculations of uniform prices depend not only upon class uses and prices; they also depend upon the skim milk and butterfat proportions in the various classes of milk, overages, other source milk, and the producer settlement fund reserve. The Order 5-7 model does not explicitly estimate skim milk and butterfat utilizations or these other miscellaneous factors. However, given estimated weighted average blend prices computed by simply using class prices and class utilizations, corresponding uniform prices for each order are closely estimated with an R-square of about 0.99.

To compare the status quo scenario with the proposed merged order scenario, there are three model runs:

1. Status quo projections: A forecast run is performed using separate uniform prices for each order.

2. Model run to obtain merged order uniform price parameters: Since there is no historical data for a merged order uniform price, parameters cannot be estimated in the usual way. In order to obtain parameters for the merged uniform price equation, the status quo run is altered so that the parameters for the separate uniform price equation are equal. This provides parameter estimates for the merged price equation.

3. Proposed merged order projections: Parameters estimated in Step 2 are used for the merged order uniform price equation. The merged order uniform price is substituted for each order's uniform price to project receipts of producer milk for each order area. For Order 5, the substitution begins with May 2005 since the uniform price ratio (individual order uniform price / Federal order-system uniform price) impacts receipts of producer milk with a 4-month lag. For Order 7, the substitution begins with July 2005 since the uniform price impacts receipts of producer milk with a 6-month lag.

Appendix Table 1. U.S. Dairy Baseline Projections

	Units	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	Average 2004/05 to 2009/10
Milk Production and Marketings									
Number of cows	Thous.	9,007	8,977	8,927	8,890	8,823	8,751	8,676	8,841
Milk per cow	Lb.	18,888	19,350	19,770	20,215	20,701	21,065	21,485	20,431
Milk production	Bil. Lb.	170.1	173.7	176.5	179.7	182.6	184.3	186.4	180.5
Fluid use	Mil. Lb.	54,526	54,886	55,225	55,462	55,873	55,966	55,914	55,554
Product prices									
Cheddar cheese	$/lb.	1.61	1.40	1.43	1.48	1.52	1.57	1.60	1.50
Butter	$/lb.	1.68	1.55	1.75	1.78	1.82	1.93	1.93	1.79
Nonfat dry milk	$/lb.	0.83	0.85	0.88	0.86	0.87	0.88	0.86	0.86
Dry whey	$/lb.	0.22	0.20	0.20	0.19	0.18	0.18	0.18	0.19
Mozzarella	$/lb.	2.10	1.92	2.16	2.27	2.34	2.36	2.40	2.24
Milk prices									
Class III price (3.5%BF)	$/cwt.	15.09	12.84	13.26	13.71	14.03	14.54	14.88	13.88
Class IV (3.5%BF)	$/cwt.	12.47	12.11	13.21	13.16	13.40	13.96	13.81	13.27
FO uniform price (3.5%BF)	$/cwt.	15.53	13.64	14.17	14.52	14.82	15.34	15.59	14.68
All-milk price at 3.5% BF	$/cwt.	15.29	13.78	14.38	14.68	14.97	15.40	15.64	14.81
All-milk price at test	$/cwt.	15.63	14.10	14.75	15.05	15.35	15.81	16.05	15.18
Real All-milk price	$/cwt.	8.27	7.27	7.41	7.38	7.34	7.37	7.30	7.34
Gross values									
American cheese	$/cwt.	18.01	15.70	16.11	16.57	16.90	17.41	17.76	16.74
Other cheese	$/cwt.	24.79	22.64	25.30	26.38	27.10	27.50	27.88	26.13
Butter/powder	$/cwt.	14.95	14.56	15.72	15.68	15.93	16.53	16.37	15.80
Ratios									
Milk-feed ratio		2.98	3.14	3.25	3.16	3.10	3.06	3.04	3.13
Milk-concentrate ratio		2.76	3.41	3.50	3.35	3.26	3.19	3.15	3.31

(table continued on next page)

Appendix Table 1 Continued. U.S. Dairy Baseline Projections Continued

	Units	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	Average 2004/05 to 2009/10
Supply and Use: Fat Basis									
Marketings	Bil. Lb.	169.1	172.7	175.6	178.8	181.8	183.5	185.7	179.7
Imports	Bil. Lb.	5.4	4.9	5.5	5.8	6.0	6.5	6.6	5.9
Allocation by marketing order classification									
Class I	Bil. Lb.	30.3	30.5	30.7	30.9	31.1	31.1	31.1	30.9
Class II	Bil. Lb.	38.0	41.2	40.8	41.3	41.5	41.2	41.5	41.3
Class III	Bil. Lb.	78.0	81.4	83.7	86.2	89.0	91.4	93.7	87.6
Class IV	Bil. Lb.	23.1	19.8	20.7	20.7	20.6	20.1	19.7	20.3
Total class use [1]	Bil. Lb.	169.4	173.0	175.9	179.1	182.1	183.8	186.0	180.0
Beginning comm. stocks	Bil. Lb.	11.0	9.9	9.3	9.9	10.3	10.8	11.2	10.2
Comm. supply	Bil. Lb.	185.5	187.6	190.4	194.4	198.2	200.8	203.5	195.8
Comm. use	Bil. Lb.	175.6	178.1	179.4	183.0	186.4	188.6	190.8	184.4
Domestic comm. use	Bil. Lb.	174.4	176.9	178.2	181.8	185.1	187.3	189.6	183.1
Ending comm. stocks	Bil. Lb.	9.9	9.3	9.9	10.3	10.8	11.2	11.6	10.5
Comm. exports	Bil. Lb.	1.2	1.2	1.2	1.2	1.3	1.2	1.2	1.2
Total utilization	Bil. Lb.	185.5	187.4	189.3	193.4	197.1	199.7	202.4	194.9
CCC Net Removals	Bil. Lb.	-0.1	0.1	1.1	1.1	1.1	1.1	1.1	0.9
Supply and Use: Skim Solids Basis									
Marketings	Bil. Lb.	169.1	172.7	175.6	178.8	181.8	183.5	185.7	179.7
Imports	Bil. Lb.	5.0	4.9	5.2	5.4	5.5	5.6	5.7	5.4
Allocation by marketing order classification									
Class I	Bil. Lb.	55.6	56.0	56.3	56.6	57.0	57.1	57.0	56.7
Class II	Bil. Lb.	15.6	17.5	17.2	17.5	17.5	17.4	17.6	17.5
Class III	Bil. Lb.	81.1	85.0	87.7	90.1	92.8	95.6	98.1	91.5
Class IV	Bil. Lb.	16.9	14.5	14.7	15.0	14.8	13.7	13.2	14.3
Total class use [1]	Bil. Lb.	169.2	172.9	175.9	179.1	182.1	183.8	186.0	180.0
Beginning comm. stocks	Bil. Lb.	8.4	9.4	8.4	9.2	9.5	10.1	10.3	9.5
Comm. supply	Bil. Lb.	182.4	187.0	189.2	193.4	196.9	199.2	201.7	194.6
Comm. use	Bil. Lb.	171.0	174.7	176.9	181.4	185.2	187.2	189.5	182.5
Domestic comm. use	Bil. Lb.	168.5	171.8	174.1	178.5	182.1	184.6	187.6	179.8
Ending comm. stocks	Bil. Lb.	9.4	8.4	9.2	9.5	10.1	10.3	10.5	9.7
Comm. exports	Bil. Lb.	2.6	2.9	2.8	2.8	3.0	2.6	1.9	2.7
Total utilization	Bil. Lb.	180.5	183.2	186.1	190.9	195.2	197.5	200.0	192.1
CCC net removals	Bil. Lb.	2.0	3.9	3.0	2.5	1.7	1.7	1.7	2.4

[1] Total class use is greater than marketings due to the presence of imported ingredients used in the manufacturing of finished products

Appendix Table 2. Model Equations (two-stage least squares estimation)

Dependent Variable	Independent Variable	Parameter Estimate	t Value	Pr > |t|	R-square
Population, Ord. 5 Area					
	intercept	-1,855,239	-19.00	<.0001	
	U.S. Population	0.072	213.63	<.0001	
					0.9990
log (Receipts of producer milk Order 5)					
	intercept	-7.161	-4.98	<.0001	
	est. depooled milk, Ord. 5	-0.002	-5.89	<.0001	
	log (lag3 (uniform price at 3.5% BF, Ord. 5)	0.103	2.14	0.0380	
	log (U. S. milk production)	1.385	9.25	<.0001	
	log (lag4 (uniform price at 3.5% BF, Ord. 5) / uniform price at 3.5% BF, all FO mkts. comb.)	0.353	1.60	0.1172	
	trend	-0.002	-5.13	<.0001	
					0.8144
log (Receipts of producer milk Order 7)					
	intercept	-2.588	-1.09	0.2806	
	est. depooled milk, Ord. 7	-0.002	-3.42	0.0014	
	log (lag12 (receipts. of producer milk, ord. 7 + est. depooled milk ord. 7))	0.403	2.66	0.0111	
	log (lag6 (uniform price at 3.5% BF, ord. 7))	0.279	3.66	0.0007	
	log (U. S. milk production)	0.628	2.00	0.0523	
	log (trend)	-0.088	-3.75	0.0005	
					0.7244
log (Class I use, Ord. 5)					
	intercept	-286.895	-1.96	0.0569	
	log (U.S. fluid use)	1.062	12.21	<.0001	
	trend	-0.015	-1.92	0.0614	
	log (population, Ord. 5 area)	16.969	1.93	0.0596	
					0.7644
log (Class I use, Ord. 7)					
	intercept	-3.017	-5.34	<.0001	
	log (U.S. fluid use)	1.078	16.15	<.0001	
	log (trend)	-0.029	-4.36	<.0001	
					0.8627
log (Class II use, Ord. 5)					
	intercept	-0.471	-0.60	0.5531	
	log (trend)	-0.119	-3.72	0.0006	
	log (lag12 (Class II use, Ord. 5))	0.658	7.16	<.0001	
	log (estimated U.S. Class II Use)	0.335	2.95	0.0050	
					0.5915

(continued on next page)

Appendix Table 2 Continued. Model Equations (two-stage least squares estimation)

Dependent Variable	Independent Variable	Parameter Estimate	t Value	Pr > |t|	R-square
log (Class II use, Ord. 7)					
	intercept	-0.538	-0.48	0.6355	
	log (trend)	-0.197	-4.04	0.0002	
	log (estimated U. S. Class II Use)	0.763	4.55	<.0001	
	quarterly dummy, 2nd qtr.	0.134	2.31	0.0258	
	quarterly dummy, 4th qtr.	-0.122	-2.48	0.0172	
					0.6013
Class III & IV Use, Ord. 5	residual: (receipts of producer Milk - Class I Use - Class II Use) for Order 5	no estimated parameters			0.7372
Class III & IV Use, Ord. 7	residual: (receipts of producer Milk - Class I Use - Class II Use) for Order 7	no estimated parameters			0.6369
log (Class III use, Ord. 5)					
	intercept	-1.375	-2.10	0.0418	
	log (Class III & IV Use, Ord. 5)	0.794	4.68	<.0001	
	log (lag (Class III Use Ord. 5 + est. depooled milk, Ord. 5))	0.391	2.12	0.0397	
	est. depooled milk, Ord. 5	-0.025	-5.22	<.0001	
					0.5851
log (Class III use, Ord. 7)					
	intercept	-0.763	-2.08	0.0433	
	log (Class III & IV Use, Ord. 7)	0.543	5.97	<.0001	
	log (lag (Class III Use Ord. 7 + est. depooled milk, Ord. 7))	0.574	5.72	<.0001	
	est. depooled milk, Ord. 7	-0.024	-15.96	<.0001	
					0.5515
Class IV use, Ord. 5	residual: Class III & IV use, ord. 5 - Class III use, ord. 5	no estimated parameters			0.5527
Class IV use, Ord. 7	residual: Class III & IV use, ord. 7 - Class III use, ord. 7	no estimated parameters			0.3604

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Appendix Table 2 Continued. Model Equations (two-stage least squares estimation)

Dependent Variable	Independent Variable	Parameter Estimate	t Value	Pr > |t|	R-square
Uniform price at 3.5% BF, Order 5					
	intercept	0.433	1.77	0.0828	
	$\frac{\sum_{i=I}^{IV} ((\text{Class Use Ord.5})_i * (\text{Class Price Ord.5})_i)}{\sum_{i=I}^{IV} (\text{Class Use Ord.5})_i}$	0.985	60.46	<.0001	
					0.9878
Uniform price at 3.5% BF, Order 7					
	intercept	0.445	2.24	0.0302	
	$\frac{\sum_{i=I}^{IV} ((\text{Class Use Ord. 7})_i * (\text{Class Price Ord. 7})_i)}{\sum_{i=I}^{IV} (\text{Class Use Ord. 7})_i}$	0.986	73.36	<.0001	
					0.9892
Uniform price at 3.5% BF, Proposed Merged Order					
	intercept	0.441	2.89	0.0058	
	$\frac{\sum_{i=5,7} \sum_{j=I}^{IV} ((\text{Class Use Order i})_j * (\text{Class Price Order i})_j)}{\sum_{i=5,7} \sum_{j=I}^{IV} (\text{Class Use Order i})_j}$	0.986	96.00	<.0001	
	R-square fit of parameters when applied to for Order 5 historical data:				0.9877
	R-square fit of parameters when applied to for Order 7 historical data:				0.9822