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Geographic Price Relationships Under Federal Milk Marketing Orders

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Introduction

Following a period of contentious debate which pitted the Upper Midwest dairy industry against most of the rest of the dairy industry in the U.S. in 1990, the Secretary of Agriculture agreed to conduct a national hearing on major features of federal milk marketing orders. The 1990 national hearing on federal milk marketing orders was held between Labor Day and Thanksgiving Day. More than 10,000 pages of testimony were taken from 195 witnesses who provided 233 exhibits during 43 days of hearings held in six locations across the eastern half of the U.S. Without a doubt the key issue listed by the Secretary in his invitation for proposals and in the hearing notice was the large and fundamental issue of "the appropriate class I differential for each order" (Advance Notice of Proposed Rulemaking). The summary to the Notice of Public Hearing on Proposed Rulemaking states that the proposals being considered "concern how class I milk prices are established..." among other items, and it identifies class I pricing as an issue of "particular significance."

In this paper we review the historical basis for regional differences in class I milk prices and demonstrate that the shadow prices associated with the class I processing locations in a highly disaggregated spatial model of the U.S. dairy industry follow patterns somewhat similar to those observed under current regulation. The analysis reveals areas where class I milk may be undervalued or overvalued under present regulations.

Organization

The paper is organized into four major parts, which are briefly outlined in this section.

First, we wish to review what we believe to be the underlying motivations for many of the proposals related to class I pricing. In other words, why was a hearing of such large dimensions called? Our purpose here is to show that the fundamental issues and motivating factors leading to most proposals stem primarily from three distinct concerns and that these concerns relate only in part to Federal Order policy, per se. These three concerns are Dairy Price Support Policy, where manufactured milk products are made, and attitudes toward deregulation.

Much of the criticism of present FMMO prices hinges on assertions that they have led to regionally distorted production incentives and excessive production in some regions. Thus, our second objective is to present statistical evidence on relationships between prices and marketings in federal order areas from 1985 to 1987.

Third, we will discuss the historical record to review the origin of regional price relationships and the philosophy that has evolved to guide FMMO pricing policy as it relates to class I differentials. The objective is to illustrate that class I differentials evolved from historical patterns that reflected market conditions and an economics that predates administered pricing. We also stress the notion of a location value of milk that is distinct from cost of production and other such factors.

Fourth, we will introduce results of research using a mathematical model of dairy markets across the U.S. to measure what the appropriate geographic relationship between class I prices might be.

Underlying Factors Leading to Proposals for Changing Class I Differentials

Dairy Price Support Program Issues

From 1975 to 1983 milk production increased 21% whereas commercial disappearance increased less than 8%. As a result, net removals under the Dairy Price Support Program (DPSP) rose from a modest 2.0 billion pounds to the record amount of 16.8 billion pounds (milk equivalent). The net cost of the DPSP rose from $319 million in FY1975 to $2.6 billion in FY1983. These sorts of changes in dairy markets help illuminate why certain policy choices were made and illustrate the overall consequences of policy decisions. USDA data on national milk supply, utilization, and prices from 1980 to 1989 are provided in Table 1.

By 1980 or 1981 it was becoming quite clear that the surplus situation was serious and worsening; however it proved to be extremely difficult for Congress, the administration, and dairy industry members to find and agree on the appropriate solution.

Table 1. U.S. Supply and Utilization of Milk, 1980-1990

(Bil. Lbs.)	1980*	1981	1982	1983	1984*	1985	1986	1987	1988*	1989	1990
Production	128.4	132.8	135.5	139.6	135.4	143.0	143.1	142.7	145.2	144.3	*148.5*
Farm Use	2.3	2.3	2.4	2.4	2.9	2.4	2.4	2.3	2.2	2.2	*2.2*
Marketings	126.1	130.5	133.1	137.2	132.5	140.6	140.7	140.4	143.0	142.1	*146.3*
Beg. C Stks	5.4	5.8	5.4	4.6	5.2	4.9	4.6	4.2	4.6	4.3	*4.1*
Imports	2.1	2.2	2.5	2.6	2.7	2.8	2.7	2.5	2.4	2.5	*2.4*
Total Supply	133.6	138.5	141.0	144.4	140.4	148.3	148.0	147.1	150.0	148.9	*152.8*
Comm. Dis.	119.0	120.2	122.1	122.4	126.9	130.5	133.2	135.8	136.8	135.8	*140.7*
End. Comm. Stks	5.8	5.4	4.6	5.2	4.9	4.6	4.2	4.6	4.3	4.1	*4.4*
Net Removals	8.8	12.9	14.3	16.8	8.6	13.2	10.6	6.7	8.9	9.0	*7.7*
Total Use	133.6	138.5	141.0	144.4	140.4	148.3	148.0	147.1	150.0	148.9	*152.8*

*leap year

U.S. Farm Prices

($/cwt)	1980	1981	1982	1983	1984	1985	1986	1987	1988*	1989	*1990*
Support (3.5%)	12.04	12.82	12.80	12.76	12.31	11.69	11.31	11.00	10.33	10.47	*9.89*
M-W (3.5%)	11.88	12.57	12.49	12.49	12.29	11.48	11.30	11.23	11.03	12.37	*12.16*
All Milk (3.67%)	13.05	13.77	13.61	13.58	13.46	12.76	12.51	12.54	12.26	13.56	*13.66*
Assessment	-	-	0.40	0.48	0.50	0.13	0.36	0.19	0.03	-	*0.01*
Ration Value	7.42	8.02	7.45	7.88	8.16	7.35	7.00	6.81	7.75	8.22	*8.10*
Milk:Ration	1.76	1.72	1.83	1.72	1.65	1.74	1.79	1.84	1.58	1.65	*1.69*
Milk+Ass't:Ration	1.76	1.72	1.77	1.66	1.59	1.72	1.74	1.81	1.58	1.65	*1.69*

Source: USDA, "Dairy Situation and Outlook," 1990 Estimated by A. Novakovic

In April 1981, the semiannual adjustment of the support price to 80% of parity was rescinded, indicating that Congress had finally recognized that large, frequent price increases could not be justified. In the Agriculture and Food Act signed in December 1981, Congress severed the support price for milk from the parity standard but still required small increases in the support price. With the ink hardly dry on the 1981 farm bill, Congressional budget committees pushed through the Omnibus Budget Reconciliation Act of 1982. This bill included language to freeze the support price at the level it had been since October 1980 and begin a new program of collecting assessments from dairy farmers to offset DPSP costs. The collecting of assessments was held up by court action, but in April 1983, the USDA began what it called the Dairy Collection Program.

The assessment program galvanized the dairy community and Congressional agriculture committees, and the policy imperative became one of doing anything but assessments. In November 1983 a four-point plan was adopted which contained each of the major proposals that had been proposed by various parties. The Dairy Production Stabilization Act of 1983 (DPSA) combined price cuts, a mandatory assessment to cover DPSP costs, a mandatory promotion program funded by another farmer assessment, and a Milk Diversion Program (MDP). The newly-created National Dairy Promotion and Research Board is authorized until such time as dairy farmers or the Secretary of Agriculture withdraw support for it. The other features of the DPSA would expire at the end of 1985, to be replaced with a new farm bill.

Disorderly Marketing Conditions Created by the MDP

The MDP was successful in reducing production in 1984, and net removals were cut in half as a result. Unfortunately (but predictably), as soon as the MDP expired, milk production and net removals quickly rebounded. Considerable increases in commercial disappearance helped but were not enough to balance markets (see Table 1). As Congress came closer to packaging a new farm bill in 1985, it was clear that additional measures would be needed to reduce government support costs and balance markets. As with the 1983 bill, the final agreement contained a combination of price cuts, assessments, and special supply control measures, but there were some additional considerations now. Because production rebounded so rapidly after the expiration of the MDP, it was easily decided that this program would not be repeated. Nevertheless many members of Congress and the dairy industry were still very much attracted by the concept of using special programs, above and beyond price cuts, to cut production and reduce the surplus. However, any new program would have to have longer lasting results. From this thinking the buyout or Dairy Termination Program (DTP) emerged. As the early discussions of a new supply control program evolved it was clear that it would have to avoid several defects in the old approach. One of these related to the regional impact of the MDP.

In a paper by Novakovic and Boynton, USDA estimates of 1983 milk production and data provided by participants in the MDP were used to estimate the state by state implications of the MDP for 1984.[1] The estimates of how much would be "diverted" as a percentage of 1983 actual production ranged from a low of 1.3% in Rhode Island to a high of 12.8% in Florida; the U.S. average was 4.2% By these estimates, the most affected states were in the South, including Florida, Georgia, Alabama, Tennessee, Kentucky, Arkansas, Oklahoma, and Texas. Just to the north, Missouri, Kansas, Nebraska, Illinois, and Iowa also had relatively large projected effects. The major milk producing states in the Northeast and Upper Midwest were projected to be affected the least of any area. Projected effects in the big western dairy states of California and

[1] R.D. Boynton and A.M. Novakovic, The Impact of the Milk Diversion Program on U.S. Milk Production, A.E. Ext.84-4, Dept. of Agr. Econ., Cornell University, March 1984, pp. 15-16.

Washington were also below average. The net effects of production changes by producers who did not participate in the MDP were not considered.

USDA estimates of milk marketed by producers in 1983 and 1984, as shown in Table 2, reveal what actually happened. Nationally, marketings declined 3.5%. Four states marketed more milk in 1984 than in 1983. The greatest increase, 7.2%, occurred in New Mexico. California increased 3.7%. The other major dairy state on the Pacific coast, Washington, declined a modest 0.4%, placing it fifth in the ranking of states by changes in marketings relative to 1983. Although New England declined 6.7%, New York and Pennsylvania declined much less—1.6% and 1.0%, respectively. In total, the decline throughout the Northeast was below average, about 2.4%. Likewise, the impact in the Upper Midwest was fairly small in total, but each state was affected quite differently. Wisconsin declined only 1.5%, but nearby Illinois, Minnesota, Iowa, and South Dakota declined 6.5% to 8.5%. The states showing the greatest declines were Kentucky (-15.1%), Nebraska (-14.8%), Missouri (-12.3%), Kansas (-11.8), Utah (-11.5%), and Florida (-10.5%).

Thus, three of the largest milk producing areas showed the least effect, i.e. Wisconsin, New York-Pennsylvania, and

Table 2. Milk Marketed By Producers, 1983 and 1984.

State	1983	1984	84/83	State	84/83
AL	570	528	-7.37%	NM	7.24%
AZ	1230	1215	-1.22%	CA	3.72%
AR	823	778	-5.47%	NV	3.60%
CA	14688	15235	3.72%	WV	1.13%
CO	932	903	-3.11%	WA	-0.41%
CT	645	601	-6.82%	PA	-1.01%
DE	135	130	-3.70%	AZ	-1.22%
FL	2099	1879	-10.48%	WI	-1.47%
GA	1380	1260	-8.70%	WY	-1.55%
ID	2250	2144	-4.71%	NY	-1.62%
IL	2675	2502	-6.47%	OR	-2.12%
IN	2330	2233	-4.16%	RI	-2.33%
IA	3924	3611	-7.98%	OH	-2.64%
KS	1357	1197	-11.79%	CO	-3.11%
KY	2330	1979	-15.06%	MI	-3.37%
LA	932	869	-6.76%	US	-3.50%
ME	722	682	-5.54%	TX	-3.61%
MD	1592	1516	-4.77%	DE	-3.70%
MA	603	563	-6.63%	ND	-3.79%
MI	5428	5245	-3.37%	NC	-3.86%
MN	10835	10065	-7.11%	IN	-4.16%
MS	873	830	-4.93%	ID	-4.71%
MO	3055	2680	-12.27%	MD	-4.77%
MT	336	319	-5.06%	MS	-4.93%
NE	1385	1180	-14.80%	MT	-5.06%
NV	222	230	3.60%	NH	-5.11%
NH	372	353	-5.11%	OK	-5.20%
NJ	492	465	-5.49%	VA	-5.37%
NM	926	993	7.24%	AR	-5.47%
NY	11388	11203	-1.62%	NJ	-5.49%
NC	1656	1592	-3.86%	ME	-5.54%
ND	1055	1015	-3.79%	SC	-5.70%
OH	4704	4580	-2.64%	IL	-6.47%
OK	1153	1093	-5.20%	MA	-6.63%
OR	1321	1293	-2.12%	LA	-6.76%
PA	9367	9272	-1.01%	CT	-6.82%
RI	43	42	-2.33%	MN	-7.11%
SC	561	529	-5.70%	TN	-7.34%
SD	1752	1604	-8.45%	VT	-7.35%
TN	2166	2007	-7.34%	AL	-7.37%
TX	3937	3795	-3.61%	IA	-7.98%
UT	1148	1016	-11.50%	SD	-8.45%
VT	2448	2268	-7.35%	GA	-8.70%
VA	2050	1940	-5.37%	FL	-10.48%
WA	3455	3441	-0.41%	UT	-11.50%
WV	355	359	1.13%	KS	-11.79%
WI	23243	22901	-1.47%	MO	-12.27%
WY	129	127	-1.55%	NE	-14.80%
				KY	-15.06%
US	137228	132421	-3.50%		

Source: "Milk-Final Estimates, 1983-1987, USDA

California. The South, Corn Belt, and Northern Plains states were most affected. The area that probably had the hardest time coping with these changes is the Southeast. This is an area that chronically must seek supplemental milk supplies to satisfy just the fluid milk demands of its local population. Other areas that saw similarly large reductions in marketings did not have that added factor to contend with. Southern cooperatives found themselves hard pressed to fulfill their supply commitments to local handlers.[2]

Changing Federal Orders to Offset Disorderly Marketing Conditions that Might be Created by the DTP

Having gone through these difficulties in 1984, it is not surprising that Southern cooperatives were not as enthusiastic as their Northern counterparts about a new supply control program for the 1985 farm bill. Dairy marketing cooperatives finally agreed on a proposal for the 1985 farm bill that they would take to Congress. The agreement included supply control measures, but it also contained two provisions related to federal orders. One was to increase class I differentials on an order by order basis, with the increase being greatest in the South and smallest in the Upper Midwest.[3] The second legislative change was to enable federal orders to be amended in ways that would allow handlers who provided marketwide services to be compensated from pool receipts. The law did not require payments; rather it modified permanent law to permit orders to be amended so as to include such payments. It was believed that these two measures would help Southerners and others mitigate the disruptive local effects that otherwise might occur with a new national supply control program.

Thus the new differentials were proposed by dairy cooperatives to make supply controls more palatable to the Southeast, from both a political and economic perspective. Likewise, the possibility of amending an order so as to include payments for marketwide services also provided a tool to help mitigate the procurement and balancing difficulties that might be created by a new supply control program. It is also true that there were quite a few voices in the dairy industry that thought increasing differentials and providing for marketwide service payments were sensible things to do whether there was going to be a new supply control program or not.

In the case of marketwide service payments, Congress permanently amended federal order legislation but did not require any particular provisions or payments. Perhaps this indicates that Congress thought this was a reasonable practice in principle but did not feel comfortable in requiring a specific implementation. In the case of the differentials, Congress required certain changes and made them stay in effect for two years, or about as long as it would take to phase in the DTP. This indicates that Congress saw the two as linked. Insofar as Congress did not automatically rescind the differentials after two years this is an indication that they were persuaded that a permanent change might be warranted and that a decision either way should be left to more normal administrative processes.

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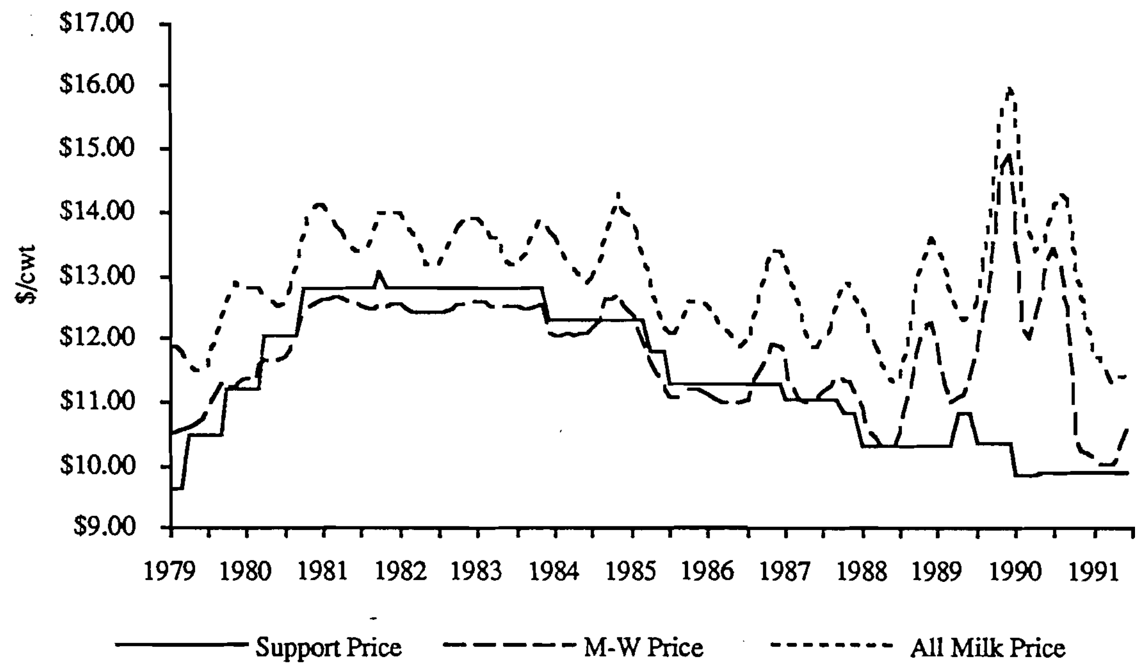
[2] New England was affected in ways very similar to the Southeast. Although the production-consumption balance is not as tight, New England cooperatives found it difficult to adjust to the rather large and sudden declines in production by their members. This would affect how New England viewed future dairy policies, including federal orders.

[3] This might be viewed as an increase in the implicit transportation differential component of the class I differential, although it should be noted that the increase was not on a strict distance relationship and differentials were increased much less to the east of Wisconsin and more to the south.

Declining Market Prices Led to Regionalism

Farmers everywhere were affected by the cuts in the support price which began on December 1, 1983. From November 1983 to January 1990, the support price fell $3.00 per cwt or 23%. Actual market prices for milk generally followed the downward trend, but they have also been affected by the MDP, the DTP, and economic conditions largely related to the 1988 drought. These patterns are illustrated in Figure 1, which shows the support price, M-W price, and all milk price from 1979 to 1990.

Figure 1. M-W Support, All Milk Prices
($/cwt @ 3.5% bf; All Milk at avg fat)



Two basic points will be drawn from the fact that milk prices have been declining. The first has to do with the extent to which individual states showed similar price declines. The second relates to how farmers reacted to these price declines.

Using data on the annual average grade A milk prices reported by USDA for 1983 to 1989, the correlation of changes in each state's average price with the U.S. average was calculated, as reported in Table 3.[4] Fifteen states have a calculated correlation coefficient of 99%. Eleven fall in a range from 95% to 98%. Ten are in the range 90% to 94%. Prices in these 36 states could be said to follow the national average price extremely closely. Seven are in a range from 80% to 89%, still a very close relationship. Four are in the range from 70% to 79%. One state, Florida,

[4] These are Pearson correlation coefficients, measuring the linear association of or relationship between two variables. In this case, perfect correlation would occur if a change in the national average price equal to X was always matched by a change of Y¢ in a state's price. In other words, the change need not be identical (Y does not have to equal X).

has a weak correlation of 33%. This illustrates that the vast majority of states saw grade A prices move in nearly identical fashion from 1983 to 1989. This includes states in which nearly all of the milk produced is priced under a federal order, such as New York, and states such as California in which none of the milk is priced under a federal order.

Table 3. Correlation of State Average Grade A Milk Prices with U.S. Average, 1983-1989

State	Correlation	State	Correlation
IA	0.997	OK	0.958
MO	0.996	NV	0.948
VT	0.996	TN	0.941
WV	0.995	CA	0.929
SD	0.995	MD	0.927
IL	0.993	MS	0.925
NH	0.992	NY	0.918
CO	0.991	DE	0.915
WA	0.990	MT	0.912
MI	0.988	AL	0.912
CT	0.988	ID	0.905
AZ	0.988	PA	0.902
KY	0.987	VA	0.888
MN	0.986	AR	0.877
IN	0.986	NM	0.870
TX	0.983	LA	0.854
ND	0.982	NE	0.835
MA	0.982	KS	0.834
RI	0.975	WY	0.816
WI	0.975	SC	0.779
OH	0.973	NJ	0.775
UT	0.973	GA	0.737
ME	0.969	NC	0.707
OR	0.966	FL	0.332

For the most part, there is no apparent regional pattern to the states which are most closely correlated with the national average. If one focuses on the top ten dairy states, four exhibit the highest correlation of 99%. These are Iowa, Michigan, Minnesota, and Washington. Obviously three of the four are in the Upper Midwest; however Wisconsin is not in this group, and, because Washington is, one cannot draw any strong conclusions based on region. If one excludes 1989, when prices moved sharply upward, national milk prices declined on a downward trend of about 28¢ per year from 1983 to 1988. The trend rate decline for Iowa, Michigan, Minnesota, and Washington was about 32¢, 28¢, 28¢, and 25¢ respectively. This illustrates that even with equally high correlations, the linear trend rates can be a bit different from one state to the next.

The second highest group includes Texas (98%), Wisconsin (97.5%), and Ohio (97%). The only thing interesting about this regionally disparate group is the fact that Wisconsin and Texas prices are about equally correlated with the national average price, despite the fact that class I differentials in Texas were increased much more than in the orders affecting Wisconsin. The trend rate decline for Texas, Wisconsin, and Ohio was about 23¢, 27¢, and 31¢ respectively. As with the earlier group, the trend rate declines are not identical to the national average, but they are very similar.

California, New York, and Pennsylvania are in the third highest group. Possibly, this reveals some relationship between states that are heavily populated with both cows and people. The trend rate decline for California, New York, and Pennsylvania was about 41¢, 22¢, and 19¢ respectively. In this group we start to see bigger differences in trend rate declines relative to the national average. California's price decline was much steeper than that in the Northeast.

The states whose prices have been most poorly correlated with the national average are Florida, North Carolina, Georgia, New Jersey, and South Carolina. Florida stands in a class by itself. With the obvious exception of New Jersey, all of these states are in the extreme southeastern U.S. The trend rate decline for Florida, North Carolina, Georgia, New Jersey, and South Carolina was about 18¢, 7¢, 6¢, 15¢, and 14¢ respectively. Thus, prices for this group declined at a substantially lower rate than the national average. It may be interesting to note that although Florida prices showed far and away the poorest correlation, the trend rate decline was closer to the national average than the next four states in this group.

Closer examination of the data indicates that the primary way in which state prices deviated from the national average is that some states showed larger price increases in 1987, whereas the national average increased only trivially. Some states showed deviations in 1985 or 1988. In the case of Florida, the major departure from the national trend occurred in 1985. Thus, one might guess that local effects created by the MDP or the DTP explain most of the departure from the national trend. One might note that there are no apparent effects from the change in class I differentials, which took effect in 1986. (This will be examined more carefully in the next major section.)

All of this is simply to say that changes in grade A prices across states from 1983 to 1989 are more similar than they are different. Moreover, the basic trend in prices either nationally or in states seems to be influenced much more by changes in price support policy than by changes in federal order policy.

As indicated earlier, there is a second point to looking at these price trends. It has to do with how farmers reacted to declining prices. In the early 1980s, the clarion call for dairy farmers was national unity. With each new cut in the support price, farmers everywhere began to think more about whose fault these cuts were. Over time it became more common for farmers in one area to wonder who was creating this troublesome surplus that was reducing "their" prices. The "we're all in this together" mentality gave way to a feeling that "its not my fault." Each region could point to a characteristic that would exonerate it as the region causing the surplus.[5] In addition, it became common for each region to propose solutions to the surplus problem that were clearly targeted against one region or another. This phenomenon came to be called regionalism.

Farmers in the Southeast could point to the fact that their markets are clearly the most deficit of any region and sales to the CCC are almost non-existent. In the Northeast, production was increasing slowly and price support sales to the CCC were very low. California farmers have the lowest grade A prices in the country and are obviously among the lowest cost milk producers in the U.S.; because of this they didn't think that their large production increases and sales to the CCC should be held against them. In the Upper Midwest, primarily Wisconsin and Minnesota, criticisms of large sales to the CCC were countered by charges that federal order provisions, in one fashion or another, prevented them from marketing their products in the South and elsewhere. Their argument was that they wouldn't have to sell so much to the CCC if federal orders didn't cause too much milk to be produced elsewhere.

Another factor that seems to have influenced this sort of regional thinking is an apparent belief that cuts in the support price affect prices for milk used in manufacturing more so than prices for milk used in fluid products. In other words, the Upper Midwest, as the largest milk manufacturing region, bears the brunt of price support cuts, but other markets which are more

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[5] Many of these regional factors are reviewed in the following paper: Andrew M. Novakovic and Maura Keniston, Regional Differences in the Dairy Industry and Their Use in Evaluating Dairy Surpluses, A.E. Ext. 89-3, Dept. of Agr. Econ., Cornell University, January 1989.

oriented toward fluid product sales are protected by federal orders. Inasmuch as federal orders do emphasize fluid markets and the price support program deals directly with manufactured products, this interpretation is perhaps understandable. It is, nevertheless, an incorrect analysis. As the state price analysis above indicates, all milk prices move together quite closely. Inasmuch as all federal order class prices are tied to the M-W price, this should be no surprise.

Congress has firmly resisted all suggestions that price support policy be changed in ways that would clearly target effects on certain regions; simply because what is ultimately a national body is not inclined to pass national policies that purposefully favor or penalize one region over another. Because the nub of the Upper Midwestern response to surplus problems involves federal orders, their suggestions can be heard in a different venue. In this case, Congress doesn't have to judge these regionally motivated proposals, they can pass the responsibility to the Secretary of Agriculture. Inasmuch as federal orders are much more complex than the DPSP, it is well that Congress did not attempt to address these important issues legislatively.

It is quite possible that the single most important motivation for Midwestern proposals to reduce class I differentials in regions removed from the Upper Midwest stems from their views with respect to how they have fared relative to other regions as price supports have declined. Furthermore, it is a virtual certainty that the national hearing would not have been held had the dairy industry been able to avoid the surplus problem and price cuts of the 1980s. This suggests to us that the fundamental problem facing the dairy industry has been a dairy price support policy problem, not a federal order policy problem. This conclusion is further bolstered by the several proposals offered to the hearing which would mix the support price and the class III price by putting a floor under the class III price. The use of FMMO pricing policy solely for the purpose of "correcting" or "counteracting" what are basically consequences of DPSP policy is ill-advised and confuses the legitimate purposes of FMMOs.

Regional Production of Manufactured Dairy Products

The second major factor motivating proposals to change class I differentials derives from concerns about regional changes in the production of manufactured dairy products. These concerns are closely related to concerns that federal order pricing distorts milk production incentives. One Midwest advocate expressed this point of view well in his testimony. He stated:

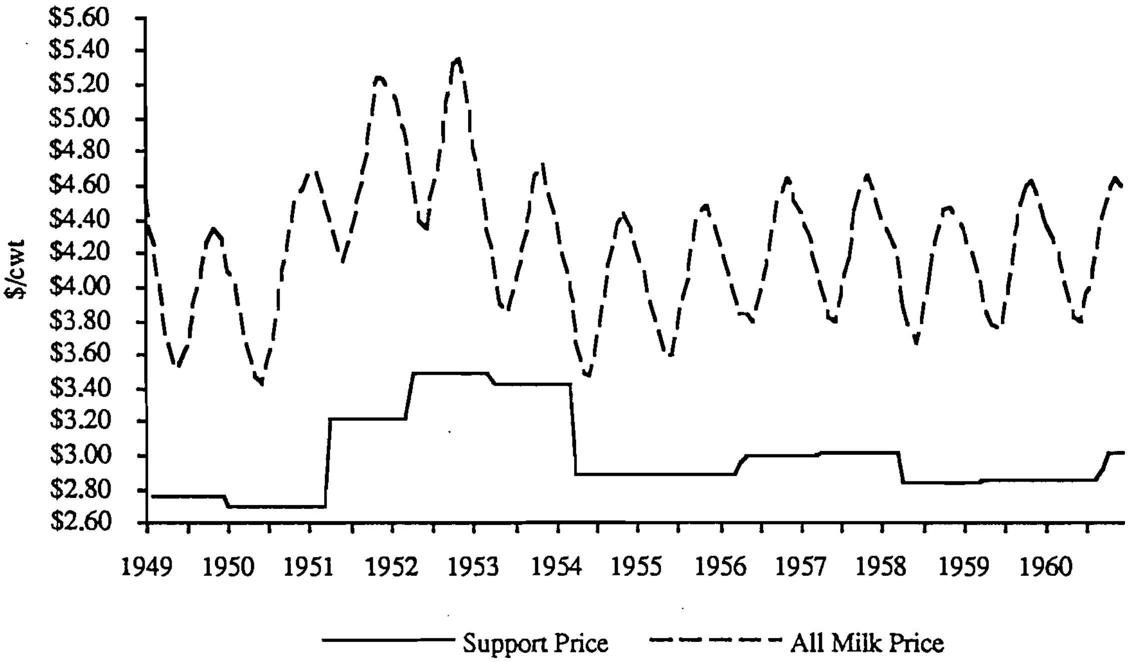
> *"Class prices and producer prices for milk in all markets and changes in them are of consequence to the entire U.S. milk industry, regardless of the amount of milk that moves between markets in fluid form. These impacts result largely because the market for products in the lowest use class of federal orders, the manufactured dairy products market, is a national market which is impacted anytime that changes in milk production and consumption (of either fluid or manufactured products) occur anywhere in the U.S."*

He proceeds to offer an example of how an increase in the class I differential in all "South Atlantic" orders would result in increased milk production in that area, all of which would go into class III. This would in turn depress "the national manufacturing milk price," implying lower prices for everyone else.

This argument has deep historical roots. Dairy markets during the decade of the 1950s bear a striking similarity to what we saw in the 1980s. In 1949, the support price was pegged at 90% of parity. USDA purchased some dairy products that year and decided it should reduce supports to

81% of parity in 1951. Markets tightened up in 1951. Consequently, the support price was returned to 90% of parity. In terms of dollars per cwt, it increased 17% in 1951 and another 8% in 1952. Between FY1952-53 and FY1953-54, net removals jumped from 3.6 to 11.3 billion pounds. At the beginning of FY1954-55, the Secretary of Agriculture exercised his authority to reduce the support price to 75% of parity, which lowered the price by 59¢/cwt or 16%. Net removals were cut in half that year. For the rest of the 1950s the support price was pegged between 75% and 85% of parity. The average market price of milk fell substantially from 1952 to 1955 and was relatively flat for the rest of the 1950s; in fact milk prices would not again reach the level they had attained in 1952 until 1967. The support price and the average national price for all milk during the 1950s is illustrated in Figure 2.

Figure 2. Support and All Milk Prices
($/cwt @ 3.5% bf; All Milk at avg fat)



Just as the difficult farm prices of the 1980s have led to regional infighting, a dispute broke out between the Upper Midwest and the Northeast in the late 1950s. One of the Invited Papers sessions at the 1960 annual meeting of the American Farm Economics Association was entitled "The Midwest-Eastern Seaboard Conflict of Interest in the Production and Distribution of Milk." Several papers were presented and discussed in this session. Two of them illustrate the parallel between the situations in 1960 and 1990. Dubov and Downen of the University of Tennessee presented their views, largely in defense of the Northeast.[6] After reviewing some production statistics since 1950, they state:

[6] Irving Dubov and M. Lloyd Downen, "The Midwest-Eastern Seaboard Conflict of Interest in the Production and Distribution of Milk: The Role of Market Structures and Other Institutional Arrangements," Journal of Farm Economics, Vol. 42, no. 5, December 1960, pp. 1313-1327.

"So it would seem that Midwest dairy farmers, especially those in Wisconsin and Minnesota, have expanded production considerably over the past ten years, and apparently are producing more milk at existing prices than is required in the immediate area; and they would like to sell some of this "extra" milk in regulated markets in other areas, including the Eastern Seaboard....so, what is the conflict of interest between producers in the two areas?...The answer is simply that Midwest producers would like to increase their total returns from the sale of milk produced for fluid uses and feel that if they could sell some of their milk in Eastern markets, they could do so." (p. 1322).

After reviewing regional differences in prices and transportation costs, the authors conclude that Midwestern producers cannot feasibly serve Northeastern markets. They offer the following advice to Midwesterners who are dissatisfied with their prices:

"we submit that the relevant area of concern for improving the market power position of Midwest producers is not the conflict of interest between them and Eastern Seaboard producers. Rather, it is the conflict of interest between Midwest producers and the Midwest handlers to whom they sell their milk. To obtain higher returns for their fluid milk, Midwest producers should take the direct approach of altering market power institutions within their own marketing areas, rather than pursuing the illusory benefits of sales in seemingly lucrative Eastern Seaboard markets." (p.1327).[7]

Today the focus is perhaps more on fluid markets and prices in the Southeast than the Northeast, and on production in the Southwest and Far West rather than the Midwest. Nevertheless, the similarity between the views of Dubov and Downen in 1960 and those expressed by "Easterners" today should be obvious.

Juers of the Wisconsin Council of Agriculture Cooperatives responded to the paper by Dubov and Downen.[8] He challenges their analysis by saying that they focused on the wrong issue:

"The authors seem to have confined their concept of the conflict situation to the production and marketing of fluid milk. By so doing I think they have excluded the major contention of competitive interest being expounded by the Midwest. An earlier phase of the conflict possibly did center on Midwestern desires to ship additional supplies of fluid milk to the higher priced markets of the East. Interest of this nature, however, seems to have subsided as the feasibility of making such shipments has been challenged if not disproved repeatedly by various research efforts....At present the conflict seems to center more on the effect of surplus [manufactured] products from fluid milk markets as they contribute to generally low prices for manufactured milk and the inability of Midwestern producers to manifest such comparative advantage as they might have in the production of manufactured dairy products due to the rigors of the varied regulatory institutions affecting milk pricing and marketing. This competitive advantage may lie entirely in the production of milk for manufactured products, in which case the

[7] With the advent of the Central Milk Producers Cooperative and other individual but large regional cooperatives in the Midwest, it is interesting to note that in some sense this prescription has been followed.
[8] Linley E. Juers, "Discussion: The Role of Market Structures and Other Institutional Arrangements," Journal of Farm Economics, Vol. 42, no. 5, December 1960, pp. 1327-1331.

point of interest is not the exclusion of these products from markets but the protective umbrella which the classified pricing system places over the competitors which Midwestern producers face in the product markets." (pp. 1328-29).

In other words, the Midwestern concern of 1960 and 1990 is that their manufactured product competitors in distant markets have an unfair advantage because their competitors' blend prices are bolstered by pooled class I differentials. These distorted blend prices create additional milk supplies and manufactured dairy products that otherwise would not exist. The net result is displaced Midwestern manufactured products and even lower prices. This concern was focused on the Northeast in 1960. Today it extends to much of the South, especially Texas. The much publicized construction of a cheese plant in Stephenville, Texas, following a period of very rapid and large growth in milk production in that area, did much to convince Wisconsin farmers of the validity of this line of reasoning.

The disputes of the late 1950s did lead to some changes in federal orders. During the 1960s, prices for the so-called surplus classes of federal orders were standardized across orders. This ultimately led to the M-W price being used as the basic formula price in all orders.[9] At about the same time, the rationale for establishing class I differentials became more systematized. This will be discussed further in the third section of this testimony.

Deregulation Objectives

The third factor which led to the 1990 hearing is very different from the other two, which is probably not surprising because it comes mostly from outside of the dairy industry. One of the key features of the Reagan era is deregulation—the dismantling or reduction of government regulations on economic activity. The ongoing legacy of the deregulation mentality is driven at least in part by budget requirements, but the original motivation was surely more ideological.

Some proposals were made at the hearing to eliminate class I differentials and thereby begin the dismantling of federal orders. The details of these proposals indicate a heavy reliance on free market doctrine and a lack of understanding about why federal orders were created and why they might be justified today. Inasmuch as federal orders were created to correct the inherent anti-competitive characteristics of dairy markets, it is ironic that the Antitrust Division of the U.S. Department of Justice was the leading proponent of dismantling federal orders. The inherent oligopsonistic structure of dairy markets may well still be a valid justification for federal orders.[10] The intent of these proposals should not be confused with other proposals which seek a new alignment of class I prices. It is one thing to tune federal orders; it is quite another to turn them off.

Factors Affecting Regional Changes in Milk Production

As indicated above, proponents of proposals to reduce class I differentials outside of the Upper Midwest assert that federal orders have led to excessive production in certain other re-

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[9] For further information on the M-W price as the basic formula price, one can refer to: Andrew Novakovic, "Alternatives to the M-W Price as the Basis for Setting Prices Under Federal Milk Marketing Orders," Leaflet 25, Dairy Policy Issues and Options for the 1990 Farm Bill, Dept. of Agr. Econ., Cornell University, 1990.

[10] Andrew M. Novakovic and Robert D. Boynton, "Do Changes in Farmer-First Handler Exchange Eliminate the Need for Government Intervention," American Journal of Agricultural Economics, Vol. 66, no. 5, December 1984, pp. 769-775.

gions, to the detriment of Upper Midwestern producers. Testimony was offered which purports to demonstrate that the increases in class I differentials in 1986 led to directly correlated increases in producer deliveries. In this section, results of statistical analyses of relationships implied by these assertions are examined.

The Use of Federal Order Data to Estimate Milk Supply

Economic theory of supply, and common sense, indicate that production is affected by price. For economists, the term supply denotes a relationship between price and quantity, i.e. how much of a product is supplied at different price levels. Thus, supply is, strictly speaking, not the same as quantity supplied or production. In this case, we are talking about the production of milk by dairy farmers and, presumably, the price that dairy farmers receive. As simple and obvious as this may seem, when we are trying to describe milk supply relationships it should be recognized that federal order producer receipts are not the same as production and that federal order prices are not the same as the market prices farmers receive. What this means is that when we use federal order data to talk about milk supply, we are using data that do not correspond perfectly to the variables in the economic theory of supply.

The closest thing to production in federal order data is "producer deliveries of milk to handlers" or what is typically referred to as "producer receipts." This differs from production in two ways. First, it is the amount of milk a producer markets, not how much he produces. National data indicate that about 1.5% of the milk produced stays on farms for farm use and thus is not part of farm marketings (cf. Table 1). Marketings do not differ greatly from production on most farms, but there can be variations over time or across farms.

Second, and more importantly, producer receipts measure the marketings of milk to handlers regulated under a particular federal order. Thus, producer receipts for any particular order can vary from time to time because farmers are producing different amounts of milk or because there are fewer or more farmer's associated with that order. The latter occurs when farmers go out of business and when a farmer's milk is moved from a handler regulated under one order to a handler regulated under another order. Similar changes also occur when a handler changes its sales patterns and becomes regulated under a different order, and takes its producers to the new order with it. It is difficult, if not impossible, from the quantity data normally published by AMS to ascertain the extent to which producer receipts are affected by producer milk shifting from one order to another; however it is well known that this occurs and occasionally leads to significant changes in the producer receipts reported for an order.

Likewise, federal order prices are not the prices farmers actually receive. Certainly, class I differentials, and class prices are not prices farmers actually receive. Moreover, the minimum federal order blend price is generally not the price farmers receive. Farmers may receive more or, in some cases, less than the blend price. Farmers receive more when processors or cooperatives pay them premiums. Farmers receive less when their cooperative must "reblend" by withholding part of the minimum price to cover extraordinary expenses. Special federal assessments, subsidized hauling, cooperative dividends, and other special factors can and do cause what farmers see as their price to look different from federal order minimum blend prices. At best, federal order blend prices are an approximate measure of farm prices; they may be a very poor measure of the milk prices on which farmers base their production decisions.

Mailbox Prices

Evidence of this is provided by a study of so-called mailbox prices conducted by various Market Administrators.[11] The study calculated a mailbox price as the blend price at a particular zone or location plus premiums minus cooperative reblends minus hauling deductions minus cooperative deductions. Data were collected for the following order locations: Chicago Regional Zone 4 (an area mostly serving class I handlers), Chicago Regional Zone 16 (an area mostly serving class III handlers), the Southwest Region (Central Arkansas, Wichita, Tulsa, Southwest Plains, and Texas Panhandle), and Texas (Dallas). The following months were used to compare relationships before and after class I differentials were changed and during different seasons of the year: May 1985, October 1985, May 1987, and October 1987.

Key results of the study are summarized in Table 4. In general, they reveal that changes in prices actually received by farmers can be a little different or a lot different from that implied by changes in blend prices. For example, from 1985 to 1987 the spread between blend prices in the Chicago Order (Zone 4 and 16) and the average blend prices in the several orders grouped in the Southwest Region (mostly north of Texas) increased 11¢ in the flush season (May) and 37¢ in the tight Fall season (October). (This reflects the greater effect of higher Fall class I utilization in a higher class I market.) However, the mailbox prices indicate that the spread between milk prices actually decreased 15¢ to 23¢ in May and 13¢ to 22¢ in October. In the case of Texas, the spread between both blend prices and mailbox prices increased, but the spread between mailbox prices increased less. Blend prices in Texas were 15¢ higher in May and 59¢ higher in October. Mailbox prices were 3¢ to 5¢ higher in May and 27¢ to 36¢ higher in October.

Table 4. Differences Between Blend and Mailbox Prices in Wisconsin and the Southwest ($/cwt).

	Blend			Mailbox		
	1985	1987	87-85	1985	1987	87-85
October						
Zone 4-Zone 16	.27	.27	0	.06	-.03	-.09
Southwest - Zone 4	.80	1.17	.37	.40	.27	-.13
Southwest - Zone 16	1.07	1.44	.37	.46	.24	-.22
Texas - Zone 4	1.25	1.84	.59	.94	1.30	.36
Texas - Zone 16	1.52	2.11	.59	1.00	1.27	.27
May						
Zone 4 - Zone 16	.27	.27	0	.05	-.03	-.08
Southwest -Zone 4	.90	1.01	.11	.17	.02	-.15
Southwest - Zone 16	1.17	1.28	.11	.22	-.01	-.23
Texas - Zone 4	1.48	1.63	.15	.97	1.00	.03
Texas - Zone 16	1.75	1.90	.15	1.02	.97	.05

[11] A series of articles under the title "Study of the Chicago Regional Mailbox Price (Zone 4 and Zone 16) Compared to Other Federal Orders" were published in the following issues of the Reporter, the monthly publication of the Market Administrator's Office for the Chicago Regional and Indiana Marketing Areas: "Part One," September 1988, pp. 5-8; "Part Two," October 1988, pp. 5-7; "Parts Three and Four," December 1988, pp. 5-12; "Part Five," January 1989, pp. 7-10; and February 1989, pp. 5-8.

The major reason for these seemingly perverse results is that producers in the Chicago Regional Order area had higher over-order premiums in 1987. Net premiums in the Southwest Region Order areas and the Texas Order area declined from 1985 to 1987. It is unclear how much of any of these changes were caused by the increase in differentials. It seems reasonable to hypothesize that the increase in differentials in the Southwest Region and Texas tended to take pressure off for competitive premiums and may have even had the opposite effect in the Chicago Regional area.

Estimates of Price and Quantity Relationships

Because they do not conform well to actual farm prices and production, federal order data would not normally be used to estimate milk supply relationships (i.e. how production is affected by changes in price).[12] If they must be used, a careful study would try to determine if any of the individual order data reflected changes in where producer milk was marketed. For supply analysis, it is important to know when producer receipts declined because a set of farms produced less milk versus a decline caused by some farms marketing their milk under another order.

In the next two sections we will show the statistical relationships between 1)various measures of federal order and farm prices and 2)various measures of price and producer receipts or production. In all cases the data are for the years 1985 and 1987 and are either Agricultural Marketing Service (AMS) data on individual federal orders or National Agricultural Statistics Service (NASS) data on states which most closely correspond to each federal order milkshed. The following federal order data are used: blend prices, class I prices, class I differentials, and producer receipts (all prices are measured at 3.5% milkfat). Class I prices announced by cooperatives (3.5% milkfat), as reported by AMS in Dairy Market News, are also used. The data from NASS are: state average grade A prices at 3.67% milkfat and total production. All data are expressed as the percentage change from 1985 to 1987 (1987 minus 1985, divided by 1985, times 100). This allows us to compare the effects of price changes across orders (or states) that have very different levels of producer receipts (production).[13] The two years of 1985 and 1987 are chosen simply because the are the first full years on either side of the change in class I differentials.

The procedure used to estimate the relationships reported below is ordinary least squares. The quality or strength of the estimated relationship is indicated by two statistics—the r^2 and the t-value. The r^2 is a measure of how accurately an equation predicts a particular variable; a value of 1 is perfect; a value of 0 is the worst it could be. The t-value provides an indication of how accurate the measure of a particular explanatory variable's effect on the dependant variable is. Theoretically, the t-value could range from 0 to infinity. Generally speaking, a t-value over 2 is considered fairly good in economic research.

How Changes in Differentials Affected Prices

Four combinations of prices were studied. In each case the 1985 to 1987 percentage change of one price is used to "explain" or estimate the percentage change in another price. The estimated equations are as follows:

[12] Another reason why federal order data is not used to estimate milk supply behavior is that supply models typically include variables such as feed and other input prices, measures of technology, prices of alternative uses of farm resources (e.g. beef prices for cull cattle or returns from alternative enterprises). Such data are not available on a federal order basis.

[13] Scaling is not a problem when comparing prices across different orders. Regressions on price data were also done using the absolute change in prices. The results are qualitatively and substantively identical for all practical purposes.

$$\%PI = -2.87 + 0.16 * \%DIFFI \quad r^2 = .91$$
$$t = 44.4$$

$$\%Blend = -0.20 + 0.78 * \%PI \quad r^2 = .91$$
$$t = 20.3$$

$$\%COOPI = -0.24 + 0.66 * \%PI \quad r^2 = .60$$
$$t = 5.6$$

$$\%PA = -1.00 + 0.54 * \%Blend \quad r^2 = .29$$
$$t = 4.0$$

where,

PI = the class I price for each order
Blend = the blend price for each order
COOPI = the class I price announced by cooperatives
PA = the average grade A price for each state
'%' denotes the percentage change from 1985 to 1987

These equations can be translated in the following fashion. For example, the first equation says that every 1% increase in the class I differential is associated with a 0.16% increase in the class I price. The r^2 for this equation says that, for 1985 to 1987, the percentage change in the class I differential provides a very good estimate of the percentage change in class I prices. The t-value says that the specific impact of 0.16 points for every one percent change in the class I differential is very accurate or precise.

Examination of each equation indicates that percentage change in the class I differential provides a good indication of the percentage change in the class I price and the percentage change in class I price provides an equally good measure of the percentage change in the blend price, across all orders. From this we might state, as a general conclusion, that if we know the change in one federal order price, we can probably guess fairly accurately what will be the change in another minimum price for the same order.

However, the percentage change in the class I price is not a very good measure of the percentage change in the class I prices cooperatives announced that they were actually charging for milk. In addition, the percentage change in the blend price provides a rather poor estimate of the percentage change in the grade A price of the state most closely corresponding to each federal order. Because the data don't correspond to the same farms, the latter is a problematic equation. Nonetheless, the third and fourth equations imply that percentage changes in federal order minimum prices were not reliable indicators of what happened to prices we might characterize as more accurately reflecting actual market prices.

How Changes in Prices Correspond to Changes in Production

Similar regression analyses were also conducted using different measures of quantities as a function of different prices. The following results were obtained:

$$\%RECT = 1.67 - 0.02 * \%DIFFI \quad r^2 = .0007$$
$$t = 0.12$$

$$\%RECT = 1.29 - 0.03 * \%PI \quad r^2 = .0001$$
$$t = 0.03$$

$$\%RECT = 3.04 - 0.59 * \%Blend \quad r^2 = .009$$
$$t = 0.6$$

$$\%PROD = 1.37 - 0.05 * \%DIFFI \quad r^2 = .02$$
$$t = 0.8$$

$$\%PROD = 0.49 - 0.1 * \%PI \quad r^2 = .002$$
$$t = 0.26$$

$$\%PROD = 0.45 - 0.3 * \%Blend \quad r^2 = .01$$
$$t = 0.7$$

$$\%PROD = -0.29 - 0.72 * \%PA \; r^2 = .07$$
$$t = 0.4$$

where,

RECT = producer deliveries of milk used by handlers, by order
PROD = grade A milk production, by state

and all other variables are as defined earlier.

The interpretation of these results follows the same logic as for the earlier results. For example, the first equation says that a 1% increase in the class I differential is associated with a 0.02 point decrease in the percentage change of producer receipts. The r^2 of almost zero indicates that percentage change in class I differential is an extremely poor indicator of relative changes in producer receipts. The very low t-value indicates that whatever statistical relationship exists between these two variables, the parameter value of -0.16 is a rough approximation at best.

All equations are characterized by negative parameter estimates (higher prices are associated with lower production and vice versa). At face value, this means that the way to increase quantities supplied in an area is to lower price. These perverse relationships are all quite meaningless insofar as the equation statistics all indicate that the quality of these estimates are exceedingly poor. Whether we look at the effect of an order price on producer receipts or the effect of state average prices on state milk production, there is no statistical evidence here to even remotely support a claim that changes in production or producer receipts, over this time period and for these orders and states, can be accurately predicted from contemporaneous changes in the various alternative price variables.

These results are not offered as a repudiation of the economic theory of supply. In fact one could argue just the opposite. Economic theory says that production of an item is affected by more than just the selling price of that item. The analysis done above falls apart for several reasons. In some cases the price used to predict quantity changes is only partially related to the selling prices that actually apply to farmers. Even where the price and quantity variables correspond rather closely to the farm level variables consistent with theory, the equations leave out all the other variables that affect production, such as the price of inputs used to produce milk, the value of alternative uses of farm resources, changes in farm productivity, and so on. Just as Boynton and Novakovic were only partly correct in forecasting the effects of the MDP on a state by state basis, so forecasts of changes in producer marketings will be only partly correct if they are based on changes in federal order prices. In fact, such forecasts may be extremely inaccurate. Similarly, any forecast of the effects of proposed changes in class I differentials which does not take into account the complexities of local supply (and demand) situations will be equally flawed. Simple analyses may be useful as a way to get a ballpark idea of what might happen, but they can be misleading. Inasmuch as it is extremely difficult to deal with these complexities, in our opinion any analysis of the effect of proposed changes in class I differentials on marketings in a particular area must be considered a rough approximation at best.

It is not our purpose to enter a lengthy discussion of what other factors may have influenced production growth in the past or how they might affect future growth. Growth trends on a state by state basis have been discussed and analyzed elsewhere.[14] We did not attempt to analyze causal factors in that study, but it is obvious from it that states which have very similar prices have had very different patterns of growth.

It may be useful to note that the two states that have increased milk production (total volume) the most over the long term (since 1960) are the two largest milk producing states—California and Wisconsin. These increases obviously occurred in spite of or regardless of any federal order policies. Moreover the states that have shown the most rapid percentage growth in milk production are primarily the states in the West which either do not have federal orders (California) or in which class I differentials were not altered by the 1985 Food Security Act (FSA) and are generally fairly low (New Mexico, Arizona, Nevada, Utah, Washington, and Idaho). Of the states which saw increases in differentials, only two have experienced large percentage growth over the longer term; these are Texas and Florida. Growth in Florida has been occurring for many years. The more recent very rapid growth in Texas production does appear to coincide with changes in class I differentials. Nonetheless, any relationship between the two is likely to be more coincidental than causal. The fact that growth in Texas has substantially abated in 1990 and 1991 is a further indication that production changes are the result of many factors.

Changes in Differentials and Class I Utilization

Testimony presented at the hearing included a table which compared, on an order by order basis, changes in the class I differential and class I utilization from 1985 to 1988. Upon referring to this table, the author stated: "The statistical relationship between utilization change and differential change is negative and significant." He offers no statistical analysis to substantiate this statement. We used the data presented in his table to calculate the following equation, using ordinary least squares regression analysis:

$$\text{Class I Utilization} = \underset{t = 1.5}{1.64 - 4.44 * \text{DIFFI}} \qquad r^2 = .07$$

where,

Class I Utilization	= the change in class I utilization from 1985 to 1988, in percents
DIFFI	= the change in class I differentials from 1985 to 1988, in dollars per cwt

According to this equation, every $0.10 increase in the class I differential was associated with a decline in class I utilization 0.44 points. Thus, the relationship is negative. The rather low t-statistic indicates that the -4.44 parameter estimate is not very precise. In fact, there is about a

[14] Andrew Novakovic, Kevin Jack, and Maura Keniston, National and State Trends in Milk Production, 1991, A.E. Ext. 91-20, Dept. of Agr. Econ., Cornell University, August 1991.

15% chance that the real parameter value is zero. In either case, the exact value of this relationship is somewhat moot. The extremely low r^2 indicates that changes in the class I differential provide only a very poor and unreliable prediction of changes in class I utilization.

As with the price and quantity analysis offered earlier, this analysis illustrates that what may seem logical or look reasonable or significant based on a cursory analysis does not necessarily hold up under more rigorous analysis. In the specific case of class I differentials and class I utilization, we cannot say that the relationship between changes in the two from 1985 to 1988 is statistically significant; in fact the relationships we've studied are extremely weak.

The Evolution of Class I Differentials

For many years the simple fact that there are differences in class I and blend prices across regions, was generally accepted. In the last few years this general acceptance has given way to a heated debate about the justification for regional price differences or at least price differences of the present magnitude. The purpose of this section is to review how this pricing system evolved. We begin with a discussion of price bargaining and cooperative pricing plans prior to federal orders and continue with a discussion of the rationale that has guided federal order pricing to this day.

Classified Pricing Existed Before Federal Orders

The first classified pricing plan in the U.S., as far as we know, was used in the Boston market from about 1880 to 1901.[15] The plan was replaced with what was called a base-rating plan, which is a scheme for allocating prices to producers somewhat akin to what we would call a class I base plan today. Classified pricing was restored as the dominant pricing system in the Boston market from May 1918 to September 1932.[16] Cassels states that for the fifteen major Northeastern and Midwestern milk markets he studied in the 1930s, in all but one (Minneapolis) "price plans of one sort or another have been in effect more or less continuously since the end of the World War [I]" (p. 67). Gaumnitz and Reed state that by 1932 some 68 markets operated under a classified pricing plan (p. 31).[17]

Horner explains that in many areas flat pricing was tried before cooperatives moved to classified pricing.

Quite naturally the flat price was first used because farmers were not familiar with the conditions of the market. It was when distributors began to ask for a lower price because of large amounts of surplus that the producers saw the equity of a use price basis (p.24).[18]

Metzger provides further insight:

[15] The historical information in this paragraph is taken from the classic study by John M. Cassels: A Study of Fluid Milk Prices, Cambridge, MA, Harvard University Press, 1937.
[16] Ibid, p. 58.
[17] E.W. Gaumnitz and O.M. Reed, Some Problems Involved in Establishing Milk Prices, DM-2, Marketing Information Series, Agricultural Adjustment Administration, U.S. Department of Agriculture, September 1937.
[18] J.T. Horner, "A Comparative Study of Various Fluid Milk Marketing Plans," American Cooperation, Vol II, 1926.

With the coming of the cooperative association to represent the producers, the distributor continued to use the same argument for lower prices that he had used for years: That there was so much surplus he could not profitably dispose of the milk unless the buying price was low. In many markets it was felt that this was often used as an argument to place prices lower than they should be. It was proposed that the distributor show the producers exactly the quantity he sold for different uses, and that a basis of payment be arranged according to the quantities of milk sold in each of these classes. (p. 48)[19]

Cassels states that, in the beginning, federal law assisted in the development of these pricing plans only insofar as they permitted and encouraged collective bargaining by cooperatives.

"The work of the Federal Food Administration during the War and the passage in 1922 of the Capper-Volstead Act gave a great impetus to cooperative organization among the fluid milk producers of the United States. The growing strength of these organizations seems to have been largely responsible for the widespread adoption during this period of the various price plans here discussed...Today it is unusual to find an important market in this country without a price plan." (p. 67)

Cassels' book involves an extensive analysis of dairy markets and competitive conditions, much of which still has relevance today. The following summary comments highlight his thoughts on how and why classified pricing worked prior to its formalized use in federal orders.

But from the empirical evidence analyzed in the later chapters of the book it has been found that, although the assumed conditions of perfect competition are closely approximated in the wholesale markets for butter, cheese, and condensed milk, the farmers themselves are often much slower than 'economic men' should be in making the adjustments called for in their disposal responses, and that in the marketing of fluid milk in the larger urban markets important elements of monopolistic control are commonly present.

The appearance of these monopolistic elements seems to be accounted for, on the one hand, by the tempting opportunity presented in a fluid milk market for the profitable practice of discriminative marketing, and, on the other hand, by the encouragement given to the farmers during and immediately after the War to adopt collective bargaining methods in the selling of their produce. The opportunity for discriminative marketing is particularly favorable because of the inelastic character of the Class I demand and the elastic character of the Class II demand...This fact made it possible for the newly organized bargaining cooperatives to obtain substantial price gains for their members during the period from 1920 to 1932. (pp. 205-206)

The Beginnings of Public Regulation of Milk Prices

Mortenson's classic book on treating fluid milk distribution as a public utility discusses how cooperative bargaining failed in the face of the Great Depression and how this led to further thoughts about government intervention.[20]

[19] Hutzel Metzger, Cooperative Marketing of Fluid Milk, Technical Bulletin No.179, U.S. Department of Agriculture.
[20] W.P. Mortenson, Milk Distribution as a Public Utility, Chicago, The University of Chicago Press, 1940.

As the severity of the depression increased, large numbers of individuals as well as business and industrial concerns began to clamor for public control.... (p.4)

In the fluid milk business regulation involving health and sanitation had been common for at least three decades, but it was not until the 1930's that price regulation also made its impression upon the industry. The pressure for this type of control came mainly from milk producers but also somewhat from milk distributors. Legislation by several states and by the federal government brought forth a new type of control in the field of milk production and distribution. (pp. 4-5)

One of the main reasons why farm prices of milk for fluid uses remained relatively more stable than the prices of other farm products was due to the organization of producers in fluid-milk markets....As a general rule, these prices were noticeably above those paid for milk used for manufacturing purposes....However, in 1931 and 1932, when prices of manufactured dairy products reached the lowest point within a quarter-century, the situation became more difficult to control. (pp. 5-6)

Mortenson saw the inability of farmers to bargain effectively for a fair milk price and the first state and federal price regulations as only the beginning. He argued that government intervention should extend to treating fluid milk distributors as a public utility.

Although Mortenson was not alone in thinking about the dairy industry as a public utility, a more conservative approach better describes what actually occurred. The history in the New York milkshed provides an example. Following a decade of on-again off-again successes by the fledgling Dairymen's League in price bargaining with milk handlers, several attempts were made to study the situation and recommend state action. This is discussed at some length in the 1984 article by Novakovic and Boynton:

The essence of the recommendations of the Wicks Committee (1917) was that government could and should play a more aggressive role in assisting cooperative efforts by providing them with up-to-date information, analyses, and other assistance. The Ten Eyck Committee (1927) pressed for greater unity among competing cooperatives and saw little role for government beyond facilitating that goal. The Pitcher Committee (1933) recommended bolstering of cooperatives as a long-run solution. However, they also suggested direct government intervention in the short run....Spencer writes that the Pitcher Committee did not even contemplate public price fixing when they began their work in May 1932. It gained support as the situation worsened. (p. 772)[21]

What eventually evolved in the 1930s was government regulation that was patterned after what cooperatives had tried to do on their own but were unable to maintain. Commenting on the marketing agreement and licensing provisions of the Agricultural Adjustment Act of 1933, Black writes:

These appealed to the milk producers' associations, particularly as they seemed to provide that the government would come to the support of their arrangements with dealers in the matter of prices, buying plans, and the like, and put an end to

[21] Novakovic and Boynton, December 1984, op. cit.

the price cutting and other alleged evils which were said to be 'demoralizing' the milk markets. (p. 23)[22]

Thus, the classified pricing system used in federal orders has its roots in pricing mechanisms and procedures developed by cooperatives. This is a simple but very important point to keep in mind; because it reveals that classified pricing was not a system devised by bureaucrats and theorists but by sellers and buyers in the marketplace for farm milk. Indeed, this is the major point of this section of our paper.

The Evolution of a Theory of Classified Pricing

Gaumnitz and Reed in 1937 and Harris in 1958[23] provide extremely comprehensive reviews of the conceptual basis for classified pricing and pooling and the economic effects of classified pricing in a geographic marketing area. Both papers were written at a time when classified pricing was being questioned. For Gaumnitz and Reed, the issue of the day was whether or not the federal government should make classified pricing part of public regulation. As stated earlier, federal orders came under fire in the 1950s as a new generation began to question the logic of this system.

Neither of these landmark studies directly dealt with the issue of intermarket price alignment, which was the largest issue at the hearings. To our knowledge, the first study of that question was a USDA study led by Harry Trelogan and Louis Herrmann and published in 1955.[24]

For the last 30 years or so it has generally been taken for granted that federal order class I prices are aligned across geographic markets east of the Rocky Mountains according to transportation costs from the Upper Midwest. In discussions today, it seems that many federal order analysts and critics believe that the concept of setting class I prices according to a constant 'grade A differential' component and a variable 'transportation differential' component was part of the original design of federal orders. This is not the case, in fact the whole concept of thinking of a class I differential in terms of two component parts is the invention of economic analysts who were trying to understand and rationalize a class I price pattern that evolved naturally over a period of 20 years or more.

At their inception in the late 1930s and 1940s, federal orders specified minimum class prices according to conditions in local markets. As late as 1950 the still fledgling FMMO system consisted of 39 rather small orders whose milk receipts equaled 16% of U.S. production. At this time it would have been like the tail wagging the dog to think that federal orders were responsible for aligning prices across the U.S.; however it was deemed very important and logical for federal order prices to be aligned with prices for nearby unregulated milk supplies. Like dominoes falling one after the other, interregional price relationships evolved. As FMMOs grew in size and importance and as marketing technologies advanced to facilitate transporting milk and milk products over longer and longer distances, interregional price relationships became more important.

[22] John D. Black, The Dairy Industry and the AAA, Washington, D.C., The Brookings Institution, 1935.
[23] Edmund S. Harris, Classified Pricing of Milk—Some Theoretical Aspects, Technical Bulletin No. 1184, Agricultural Marketing Service, U.S. Department of Agriculture, April 1958.
[24] Regulations Affecting the Movement and Merchandising of Milk, Marketing Research Report No. 98, Agricultural Marketing Service, U.S. Department of Agriculture, June 1955.

The landmark 1955 USDA study sheds light on the origin of the current regional pricing structure and even speaks to some of the issues being discussed today. As mentioned earlier, during the 1953-1954 fiscal year, the federal government purchased the equivalent of over 9% of the U.S. milk supply in the form of surplus dairy products. This is a level not much less than the worst years of the 1980s. As stated in the report: "The study...was undertaken to supply a need for information on regulatory impediments to increased consumption of milk...To expand the consumption of fluid milk seemed the best way to reduce [government] stocks and bring satisfactory returns to producers" (p. iii). (Obviously a similar logic was used in 1985 when the National Dairy Board was created by Congress.) The researchers examined sanitary regulations, state farm and resale price controls, highway road limits, and federal order provisions.

Many of the issues they identified as impeding the free flow of milk and dairy products, such as differences in state sanitary and pricing regulations, have been all but totally eliminated today. Many of the federal order provisions they looked at seem more familiar. In evaluating federal orders, they focused on provisions that "may be so written as to be unduly restrictive. Among the latter are terms establishing the basis on which plants may participate in market-wide pools; fixing the rate of compensatory payment on unpooled milk; and fixing the differential in price for plants at a distance from market" (p. viii).

Much of the study was devoted to comparing existing price relationships with a theoretical norm. The authors state: "The basis for price analysis was the assumption that, if milk could be moved freely, prices could not differ among markets by much more than the cost of transportation" (p. ix). This rationale eventually came to be accepted as the model for federal order pricing across regions. The following excerpts from the study show how researchers approached the study and how their assumptions and analysis have become part of what is now taken as the accepted design of federal orders:

First came the notion that market prices could be explained by a base point pricing concept.

> *...it would be expected that dealers' buying prices of milk for fluid use would be related among markets in a logical pattern. A geographic price surface describing such a pattern would include one or more areas of lowest prices where more milk is produced than consumed. Prices would be expected to increase with distance from these areas toward large consuming centers. Even the possibility of moving milk from one market to another would tend to keep prices in line. Prices would differ among markets by the amount of transfer costs, of which the largest element is the cost of transportation.*
>
> *As a first approximation, it was assumed that dealers' buying prices would be related to prices in the area of greatest surplus grade A production centering in Wisconsin....Eau Claire was selected among several Wisconsin points which could have been used with equal validity to represent the area. (p. 88)*

Two subtle points should be noted. First, the authors do not state that they used class I price data; rather they used a price series that estimated the prices that fluid milk dealers paid for milk. This price series no longer exists, but in 1955 it reflected the fact that class I prices were not the norm. Thus the study compared regulated and unregulated markets. Second, Eau Claire, Wisconsin was not chosen as the point from which all federal order class I prices should be based. Rather, existing fluid or class I prices, which had evolved without an overt, administrative design were studied to see if they had a logical geographic relationship to distance from Wisconsin. Eau Claire was chosen as one of several possible specific points partly because it was a reasonable choice and partly because it was convenient to get pre-measured distances from Eau Claire to other locations.

Milk prices paid by dealers for fluid milk from July 1953 to June 1954 were plotted on maps to examine the geographic relationships.

> *Preliminary graphic analysis indicated a relationship between class I prices and distances of markets from a Wisconsin point. Another major region of low prices appeared in Northern New England and Upstate New York, and a third in the western United States, beyond the Rocky Mountains.*

Thus, visual inspection of the mapped price data revealed that the concept of a single base point in Wisconsin was consistent with prices throughout most of the U.S., but the Northeast and West didn't quite fit the pattern.

> *Prices in all of the far-western States were substantially below those which would be indicated by the price-distance relationship from Wisconsin. Furthermore, the geographic pattern of dealers' buying prices in the West was not related to any single area....Prices in markets west of the Rockies were excluded from the analysis of prices in relation to distance from Wisconsin, because they were far below the level which would be necessary to stimulate imports of milk for the Midwest. (p. 89)*

They concluded that Western prices could not be correlated to a Wisconsin base point. They could not find evidence of a specific, discrete western base point, but they essentially suggest that the pattern of national fluid milk prices is consistent with model having at least a two base points.

They came to a somewhat different conclusion about fluid milk prices in the Northeast.

> *Though prices in Vermont and Upstate New York were unusually low in relation to prices indicated by the price-distance relationship analysis, they are not prices at which milk is available for movement to other markets with classified pricing systems. They are the prices at which local dealers can induce producers to shift to the local market from pool plants. (pp.89-90)*
>
> *Supply-demand conditions within the northeastern region might dictate a class I price lower than that indicated by relationships with the Midwest. However, the Northeast has been in a deficit position with respect to fluid milk at times in the past decade. The relationship to Midwest prices plus transfer costs is of some practical significance, establishing a ceiling which prices in Eastern markets could not exceed without restrictive regulations. (p. 90)*

Thus, Northeastern markets were used in their analysis, but they could see that prices followed a different pattern going east of Wisconsin than they did going south.

Having identified the markets they would use in their statistical analysis:

> *Dealers' buying prices for fluid milk in 143 markets located east of the Rocky Mountains were related to distance from a Wisconsin point by straightline regression analysis....The regression of price on distance indicates a price of $3.54 at*

Eau Claire. This [estimate] is one cent less than the average class I price established in the Eau Claire zone by the Chicago order....The analysis shows that dealers' buying price for fluid milk increased an average of 1.92 cents per hundredweight per 10 miles increase in distance from the Wisconsin point....The estimate of 1.92 cents agrees approximately with information from a limited number of schedules of rates actually charged by firms specializing in the tanking of milk between markets. (p. 90-91)

Thus, researchers hypothesized that class I and blend prices across order areas had evolved and were related in a way that could be explained by distance or transportation costs from the Upper Midwest. The hypothesis tested in the 1950s research proved valid, and transportation based pricing from the Upper Midwest has since evolved into the rationale for the geographic structure of class I prices, and to some extent blend prices.

Geographic price relationships have been studied more recently by Lasley and by Babb. Lasley published several studies, culminating in his 1977 report.[25] In this report he states:

In 1975, wholesale [dealers' buying] prices increased an average of 17.5 cents per 100 pounds of milk for fluid use with each 100-mile increase in distance from Eau Claire, Wisconsin. This compares with an increase per 100 miles of 18.2 cents in 1964-65, 18.7 cents in 1960-61, 21.8 cents in 1957-58, and 19.2 cents in 1953-54. This general downtrend has occurred despite recent increases in transportation costs.

Fluid milk prices have tended to increase by an almost uniform amount in the areas east of the Rockies, so that the general pattern of differences in milk prices has remained very much the same as in previous years, but at a higher price level. Even so, because of the lower initial price level, the increase in the Upper Midwest prices during the past 11 years has been proportionately greater than in the more distant markets....Thus, where the price differentials have not kept pace with actual transfer costs, milk from the Upper Midwest is more costly than local milk for Southern and Eastern buyers....

Although distance from Eau Claire was the dominant factor and explained about 77 percent of the differences in prices, the actual prices paid by dealers do deviate from the calculated price line in response to local market conditions. However, these prices paid by local dealers do not necessarily represent the price at which large volumes of milk would be available for shipment to other markets, nor the price at which dealers would be willing to absorb large volumes from other markets....

Since the 1964-65 study, several changes have borne directly upon the geographic alignment of prices. The most important of these changes are merger of various Federal order markets, discontinuance of local supply-demand price adjusters, and establishment of a Class I differential increasing about 15 cents per each 100 miles distance from the basing point in Wisconsin. (p.iii)

As we can see, the notion of a single base point in Wisconsin and a constant distance differential had become accepted doctrine a generation after these pricing patterns were first discovered.

[25] Floyd Lasley, Geographic Structure of Milk Prices, 1975, Agricultural Economic Report No. 387, Economic Research Service, U.S. Department of Agriculture, October 1977.

Even so, Lasley clearly recognized that transportation differentials and single base points only explained part of the pattern of regional prices.

Regional Price Patterns Disaggregated

An interesting question was posed during the course of cross-examination in the hearing, to wit: do milk price patterns increase equally in all directions from Wisconsin? Using the post-FSA class I differentials, we separated federal orders into four groups, each of which appeared to have similar distance relationships with respect to Wisconsin. The results are summarized in Table 5.

Using data for all federal orders east of the Rockies results in an equation with parameters that seem to correspond well to the notion of a gradeA differential (90¢) and a transportation differential (20.5¢ per 100 miles). However, when this is broken down into regions having similar distance relationships; we can see that there are substantial regional differences.

First, the groupings may be somewhat different than anticipated. It would appear that the main division is not so much east and south as it is north and south.

Table 5. Interregional Relationships Between Class I Differentials and Distance from Eau Claire

	Intercept	Transportation Differential	R^2
Pre-FSA (east of Rockies)	.86	1.51	.94
Pre-FSA (all orders)	1.21	.94	2.05
Post FSA (east of Rockies)	.90	2.05	.88
Post FSA (all orders)	1.51	1.05	.34
Post FSA	-		
Northern Tier	.92	1.88	.95
Southern Tier	1.30	1.84	.91
Pacific	-.87	1.59	.94
Southwest	.58	1.16	.83

Second, it may be something of a surprise to see that the values of both of the two components of the price relationship change from region to region. The northern and southern tier groups have very similar transportation differentials; however class I prices are 30 to 40 cents higher in the South due to an apparent difference in the constant component. Class I prices in the Southwest and Northwest have a somewhat lower transportation differential component and a much lower constant. In this case, the transportation differential explains the intraregional price alignment more so than any alignment with Wisconsin. The constant component is very low or even negative, indicating that prices in the two western regions are well below what one would determine on the basis of distance from Wisconsin.

This little exercise reveals that the notion of a grade A differential and a transportation differential logic behind class I differentials should not be taken too literally. Prices have not evolved identically in all regions, even in the areas strictly east of the Rockies.

The Appropriate Level for Class I Differentials

In asking for testimony on the "appropriate" level of differentials, the Secretary raised a thorny issue. How does one identify or define what is or is not appropriate? Ultimately, this requires us to think about the economics of dairy markets and the purposes of federal milk marketing orders. It is no surprise that different individuals or organizations have different viewpoints on these fundamental questions.

We have studied the question of appropriate regional class I price relationships with a mathematical model that looks at the pattern of milk production and consumption across the U.S. and asks: given transportation and processing costs, milk supplies, and dairy product consumption, what would an extra hundred pounds of milk for class I purposes be worth in each area?[26]

In one sense this model is quite simple. As implied above, it takes production and consumption as a given and decides where milk should move and be processed so as to satisfy consumption requirements for all dairy products at the minimum marketing cost. In another sense this model is quite sophisticated. Unlike other regional models which may contain ten or fewer regions, our model represents the U.S. dairy economy as 240 supply locations, 234 demand locations, and 436 potential sites for processing any of five product types. This highly disaggregated spatial model permits us to look at relationships across areas that are the size of federal order areas and smaller.

As is true of any optimization model, i.e. a model that derives its results by maximizing or minimizing some function (e.g. maximizing profit or minimizing cost), it is possible to calculate the marginal benefit of adding additional units of some scarce item. In this case we can determine what the marginal value is of an additional one hundred pounds of milk at any given location. As we would expect, the model results indicate that the value of an additional one hundred pounds of milk for manufacturing does not vary much from one location to the next. However, the value of class I milk does vary across locations. The model results on class I values do not correspond exactly to federal order class I differentials. More or less, they reflect the so-called transportation differential component but do not include a constant grade A differential component. To create numbers that more closely correspond to the more familiar class I differentials, we add a constant to the transportation values taken from the model. The constant is chosen so as to result in a price at Minneapolis that is equal to the current Upper Midwest Order differential.

In the next section, we report our estimates of the interregional relationships of these class I values under several scenarios. Scenario one is a baseline using 1985 data on production, consumption, and marketing costs. Production and consumption, of course, are different in each location. We assume that transportation and processing costs are the same everywhere. Four other scenarios are studied to determine the effect of regional changes in production and consumption.

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[26] James E. Pratt, Andrew M. Novakovic, and Maura M. Keniston, The U.S. Dairy Sector Simulator: A Tool for Spatial Analysis of the Dairy Industry, A.E. Res., forthcoming, Dept. of Agr. Econ., Cornell University, 1990.

Scenario two uses data from 1970 to recalibrate regional shares of production and consumption. Actual production data are used to calculate regional shares, as shown in Figure 3. Population data are used to calculate consumption shares for each region, as illustrated in Figure 4. This period is chosen because it is prior to much of the large regional changes in production and population. With this scenario we can compare the implicit class I price surface relevant to the 1980s with what it would be under 1970 conditions.

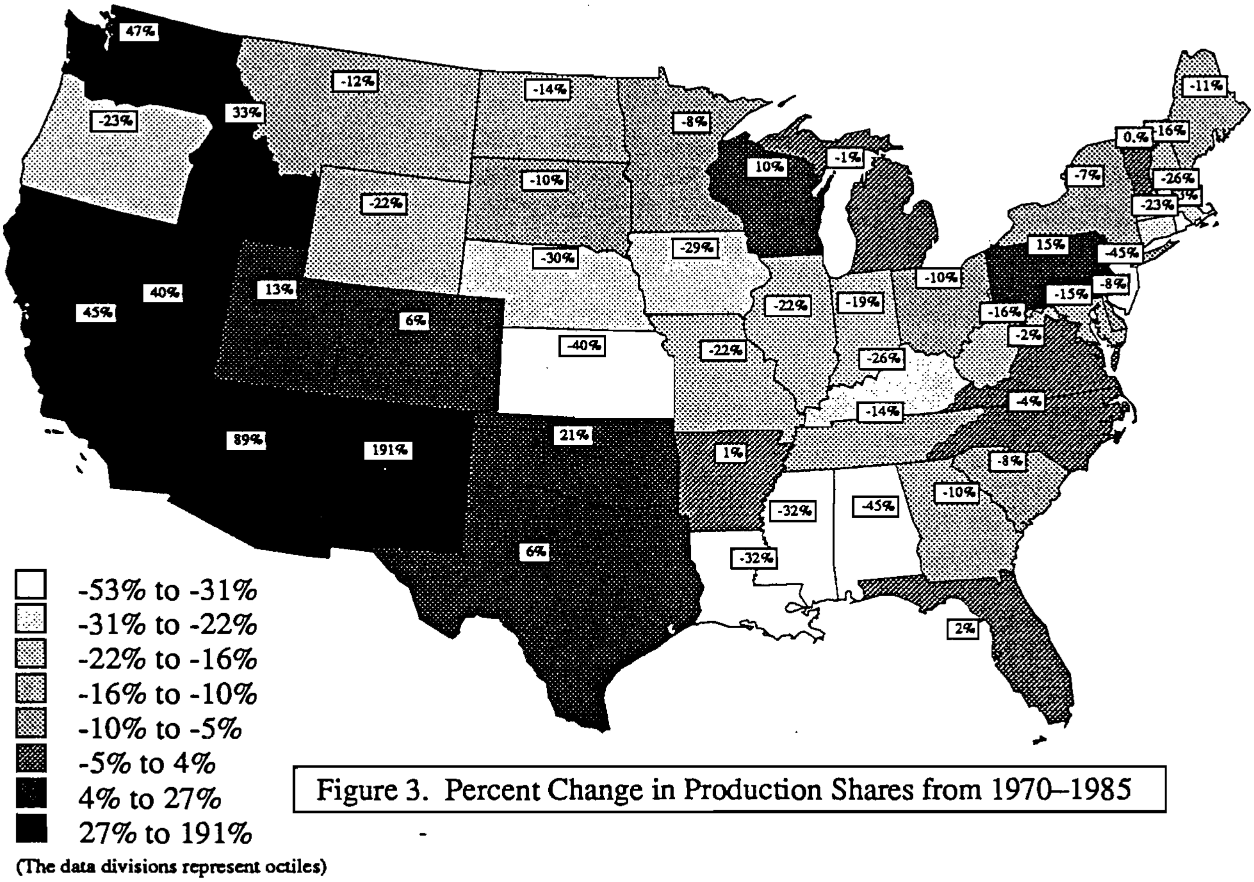

Figure 3. Percent Change in Production Shares from 1970–1985

Results for scenarios one and two will be different; hence we might ask whether the changes in implicit class I values are driven primarily by regional changes in production or by changes in population and demand. To answer that question, we construct scenario three, which uses 1970 regional production shares and 1985 population shares, which in turn determines quantity demanded. In this way we can see the impact of changing consumption patterns while holding production patterns constant.

Scenario four attempts to represent what production and consumption shares might be in 2000. We use Bureau of Census forecasts of population shifts to alter the geographic shares of consumption, as illustrated by Figure 5. Production trends are extrapolated to obtain new geographic production shares, as shown in Figure 6. The extrapolations are based on the trend analyses and USDA production data reported by Novakovic et al. elsewhere.[27]

[27] Novakovic, Jack, and Keniston, op. cit.

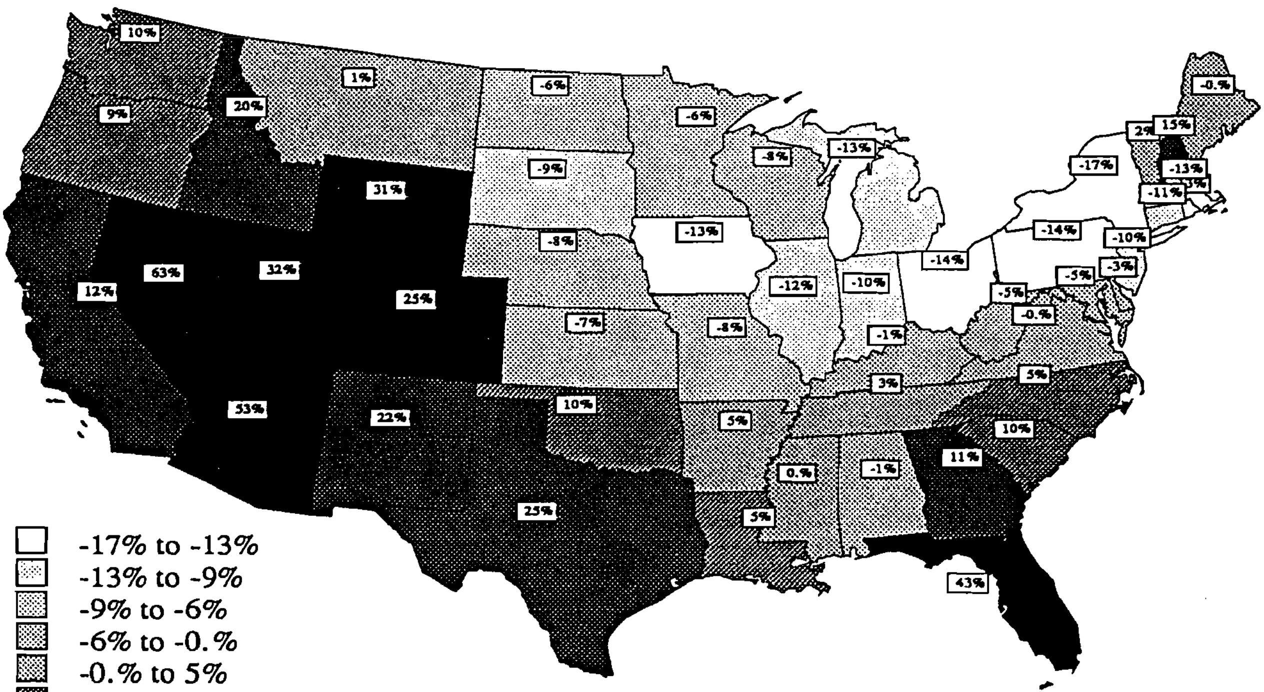

Figure 4. Percent Change in Population Shares from 1970–1985

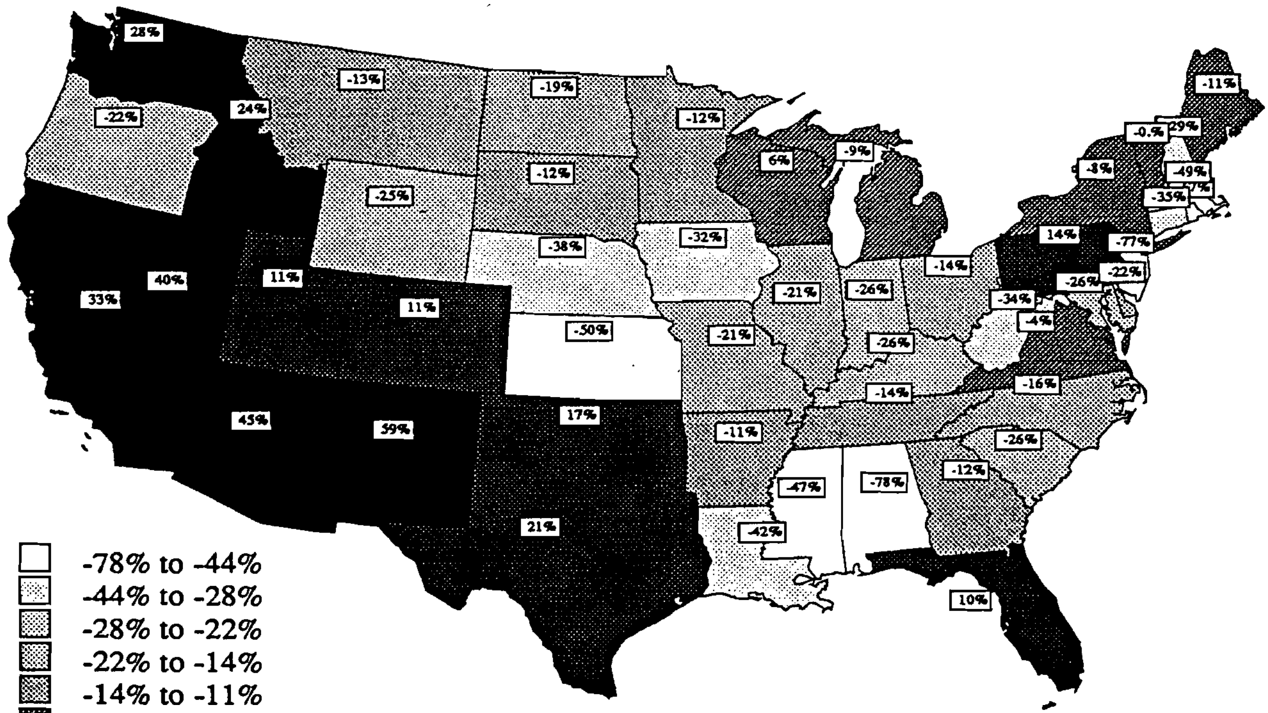

Figure 5. Percent Change in Production Shares from 1985–2000

Table 6. Estimated Class I Values, 1970 to 1985

City	State	Class I Differential Pre-FSA	Scenario 1 (1985)	Scenario 2 (1970)	Scenario 3 (1970 Prod) (1985 Cons)
BIRMINGHAM	AL	230	284	240	245
PHOENIX	AZ	252	215	279	459
LITTLE ROCK	AR	194	261	220	247
FRESNO	CA	137	137	234	317
LOS ANGELES	CA	177	190	304	389
SAN DIEGO	CA	177	208	322	407
SAN FRANCISCO	CA	153	177	276	359
REDDING	CA	153	179	262	355
DENVER	CO	230	204	194	267
GRAND JUNCTION	CO	200	145	157	313
MIAMI	FL	315	434	297	405
JACKSONVILLE	FL	285	380	246	351
TAMPA	FL	295	436	302	407
ATLANTA	GA	230	298	249	281
BOISE	ID	150	120	167	250
CHICAGO	IL	126	172	171	164
PEORIA	IL	139	185	182	179
INDIANAPOLIS	IN	153	199	198	187
DES MOINES	IA	140	168	156	160
KANSAS CITY	KS	174	188	162	185
LOUISVILLE	KY	170	191	183	179
SHREVEPORT	LA	247	300	222	282
NEW ORLEANS	LA	285	330	242	276
MONROE	LA	247	327	257	291
BALTIMORE	MD	278	198	220	183
BOSTON	MA	300	261	285	243
MARQUETTE	MI	135	150	150	150
DETROIT	MI	160	181	187	171
MINNEAPOLIS	MN	112	120	120	120
SPRINGFIELD	MO	160	177	149	171
OMAHA	NE	160	175	150	180
LAS VEGAS	NV	160	252	321	396
ALBUQUERQUE	NM	235	213	310	385
NEW YORK CITY	NY	284	243	272	227
CLEVELAND	OH	193	200	209	186
COLUMBUS	OH	170	200	209	186
CINCINNATI	OH	170	191	192	180
OKLAHOMA CITY	OK	198	229	171	218
PORTLAND	OR	195	136	200	296
PITTSBURGH	PA	195	191	213	181
PHILADELPHIA	PA	278	218	242	203
SIOUX FALLS	SD	140	124	120	140
NASHVILLE	TN	185	223	214	216
KNOXVILLE	TN	210	242	232	226
MEMPHIS	TN	194	274	212	235
DALLAS	TX	232	291	213	280
EL PASO	TX	235	204	251	416
HOUSTON	TX	268	358	280	347
LUBBOCK	TX	242	232	262	321
AMARILLO	TX	225	234	230	279
SALT LAKE CITY	UT	190	156	205	279
SEATTLE	WA	185	141	194	290
MILWAUKEE	WI	117	142	141	136

Notes for Table 6:

Areas in which class I values declined from 1970 to 1985 but would have increased had not production increased at a faster rate than consumption:

San Diego, Los Angeles, San Francisco, Fresno, Albuquerque, Redding, Las Vegas, Phoenix, Portland, Seattle, Salt Lake City, El Paso, Boise, Lubbock, Grand Junction

Areas in which class I values declined from 1970 to 1985 because of declines in consumption but the decline was moderated because production also declined:

New York City, Philadelphia, Boston, Pittsburgh, Baltimore, Cleveland, Columbus, Detroit, Cincinnati

Areas in which class I values were unaffected by either consumption or production changes:

Minneapolis, Marquette

Areas in which class I values increased but would have decreased due to declines in consumption had not production declined even more:

Knoxville, Louisville, Peoria, Indianapolis, Chicago, Milwaukee

Areas in which class I values increased and would have increased more due to increases in consumption had there not been some growth in production as well:

Amarillo, Sioux Falls, Denver, Omaha

Areas in which class I values increased due to increases in consumption and increase even more due to declining shares of milk production:

Miami, Jacksonville, Tampa, New Orleans, Shreveport, Dallas, Houston, Monroe, Memphis, Oklahoma City, Atlanta, Birmingham, Little Rock, Springfield, Kansas City, Des Moines, Nashville

Table 7. Estimated Class I Values, 1985 to 2000

City	State	Class I Differential Post-FSA	Scenario 1 (1985)	Scenario 4 (2000)	Scenario 5 (1985 Prod) (2000 Cons)
BIRMINGHAM	AL	308	284	354	282
PHOENIX	AZ	252	215	164	248
LITTLE ROCK	AR	277	261	269	260
FRESNO	CA	137	137	110	176
LOS ANGELES	CA	177	190	142	243
SAN DIEGO	CA	177	208	160	261
SAN FRANCISCO	CA	153	177	145	217
REDDING	CA	153	179	154	206
DENVER	CO	273	204	202	208
GRAND JUNCTION	CO	200	145	138	174
MIAMI	FL	418	434	505	527
JACKSONVILLE	FL	358	380	451	399
TAMPA	FL	388	436	507	455
ATLANTA	GA	308	298	364	307
BOISE	ID	150	120	113	145
CHICAGO	IL	140	172	172	168
PEORIA	IL	161	185	186	182
INDIANAPOLIS	IN	200	199	205	191
DES MOINES	IA	155	168	186	163
KANSAS CITY	KS	192	188	206	187
LOUISVILLE	KY	211	191	229	183
SHREVEPORT	LA	328	300	297	308
NEW ORLEANS	LA	385	330	395	327
MONROE	LA	328	327	332	335
BALTIMORE	MD	303	198	215	186
BOSTON	MA	324	261	267	245
MARQUETTE	MI	135	150	150	150
DETROIT	MI	175	181	186	169
MINNEAPOLIS	MN	120	120	120	120
SPRINGFIELD	MO	219	177	187	176
OMAHA	NE	175	175	179	175
LAS VEGAS	NV	160	252	212	290
ALBUQUERQUE	NM	235	213	127	279
NEW YORK CITY	NY	314	243	251	227
CLEVELAND	OH	195	200	208	186
COLUMBUS	OH	204	200	208	186
CINCINNATI	OH	211	191	206	184
OKLAHOMA CITY	OK	277	229	240	237
PORTLAND	OR	195	136	128	151
PITTSBURGH	PA	195	191	196	177
PHILADELPHIA	PA	303	218	224	203
SIOUX FALLS	SD	150	124	128	124
NASHVILLE	TN	252	223	289	232
KNOXVILLE	TN	277	242	292	246
MEMPHIS	TN	277	274	289	272
DALLAS	TX	328	291	276	302
EL PASO	TX	235	204	177	220
HOUSTON	TX	382	358	343	369
LUBBOCK	TX	249	232	192	240
AMARILLO	TX	249	234	194	242
SALT LAKE CITY	UT	190	156	149	179
SEATTLE	WA	185	141	127	148
MILWAUKEE	WI	131	142	143	139

Notes for Table 7:

'*' denotes that this location is in a different group than it was for the 1985 to 1970 comparisons.

Areas in which class I values declined from 1985 to 2000 but would have increased had not production increased at a faster rate than consumption:

Albuquerque, Phoenix, Los Angeles, San Diego, Las Vegas, Amarillo, Lubbock, San Francisco, Fresno, El Paso, Redding, Dallas*, Houston*, Seattle, Portland, Grand Junction, Boise, Salt Lake City, Shreveport**

Areas in which class I values declined from 1985 to 2000 because of declines in consumption but the decline was moderated because production also declined:

none

Areas in which class I values increased but would have decreased due to declines in consumption had not production declined even more:

Birmingham, New Orleans*, Louisville, Des Moines*, Kansas City*, Baltimore*, Cincinnati*, Memphis*, Springfield*, New York City*, Columbus*, Cleveland*, Little Rock*, Boston*, Philadelphia, Indianapolis, Pittsburgh*, Detroit*, Milwaukee, Peoria, Chicago,*

Areas in which class I values increased and would have increased more due to increases in consumption had there not been some growth in production as well:

Denver, Monroe, Miami**

Areas in which class I values increased due to increases in consumption and increase even more due to declining shares of milk production:

Tampa, Jacksonville, Nashville, Atlanta, Knoxville, Oklahoma City*

Areas in which class I values were unaffected by consumption changes and increased entirely due to declining shares of milk production:

Minneapolis, Marquette*, Sioux Falls*, Omaha**

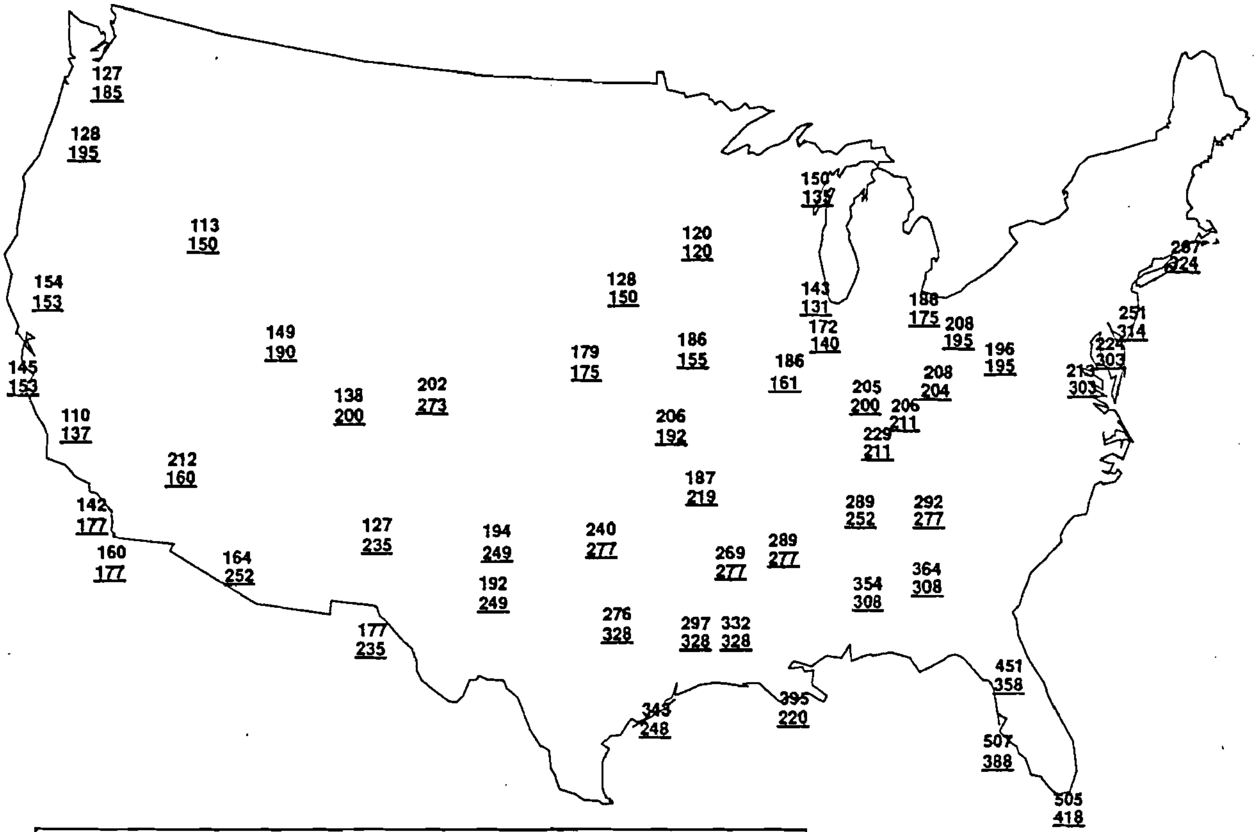

Figure 7. Post FSA Class I Differentials and Estimated Values, Scenario 1

Thus, these result indicate that the general pattern of current class I milk prices makes some sense, given existing production and consumption patterns. Changing production and/or consumption patterns will result in different class I values. Increasing consumption or decreasing production will result in higher class I values. Changes in transportation or processing costs would also affect class I values. We have not attempted to evaluate the latter, but we have studied the effects of changing regional patterns of production and consumption. The generally small changes that might occur from one year to the next do not substantially alter class I values. Hence, we have focused on the kinds of value changes that result from longer term changes in production and consumption.

Results for scenarios 2 and 3, in which historical changes since 1970 are evaluated, are shown in Table 6. Calculated class I values for the 1970 data (Scenario 2) are also illustrated in Figure 8. Areas in the West and Northeast and Mideast had declining class I values from 1970 to 1985; however the reasons for the declines were starkly different from one coast to the other. In the West the decline was due to production growing faster than consumption. In the East the decline was due to consumption falling off even as production was falling off at a slower rate.

Class I values increased from 1970 to 1985 everywhere else, but again the reasons were different for three distinct situations. In the Upper Midwest and an area just to the south in Illinois, Indiana, and Kentucky declines in consumption would have led to lower differentials, but even greater declines in production pushed differentials in the other direction. In all of these areas the differences either way were very small.

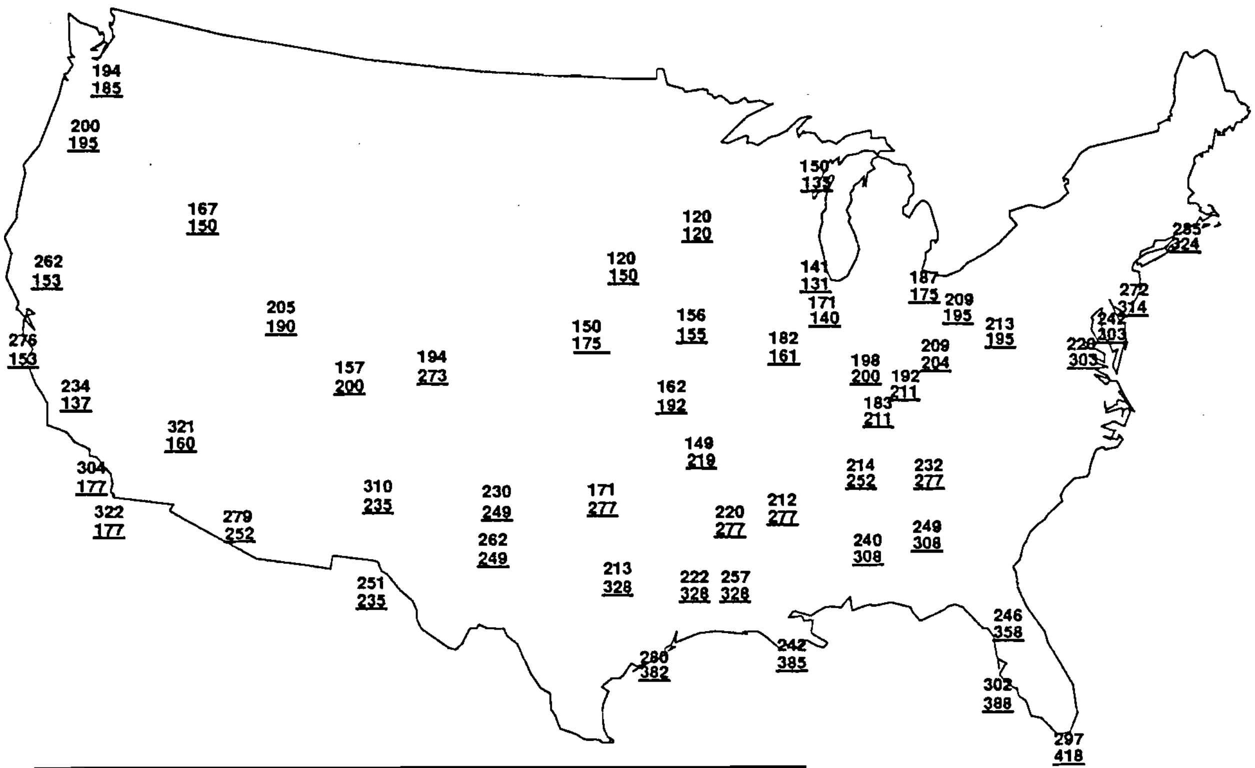

Figure 8. Post FSA Class I Differentials and Estimated Values, Scenario 2

In a broad area of the Plains states, stretching from Sioux Falls to Amarillo, class I values would have increased even more due to consumption increases had there not been an offsetting increase in production.

A large group of mostly southern locations had increased class I values coming from both increases in consumption and decreasing relative shares of production.

Results for scenarios four and five are shown in Table 7. Class I values given our projections for 2000 (Scenario 4) are shown in Figure 9. In this case, we try to illustrate the direction that regional class I value may take, if our projections of changes in the regional shares of production and consumption are reasonably accurate. Generally speaking, these results suggest that class I values will decline rather substantially in Western markets as production growth exceeds consumption growth. Slowly shrinking supplies in the Midwest and Northeast result in modest increases in class I values. A small number of markets primarily in the Southeast are associated with higher class I values brought about primarily by consumption growing faster than production.

The Importance of Pooling Criteria

The class I values shown above refer strictly to what we would call the value of class I milk. Left unanswered is the important question of how one values producer milk, i.e. what are the rules for pooling the higher class I values over a broader range of producers than just those

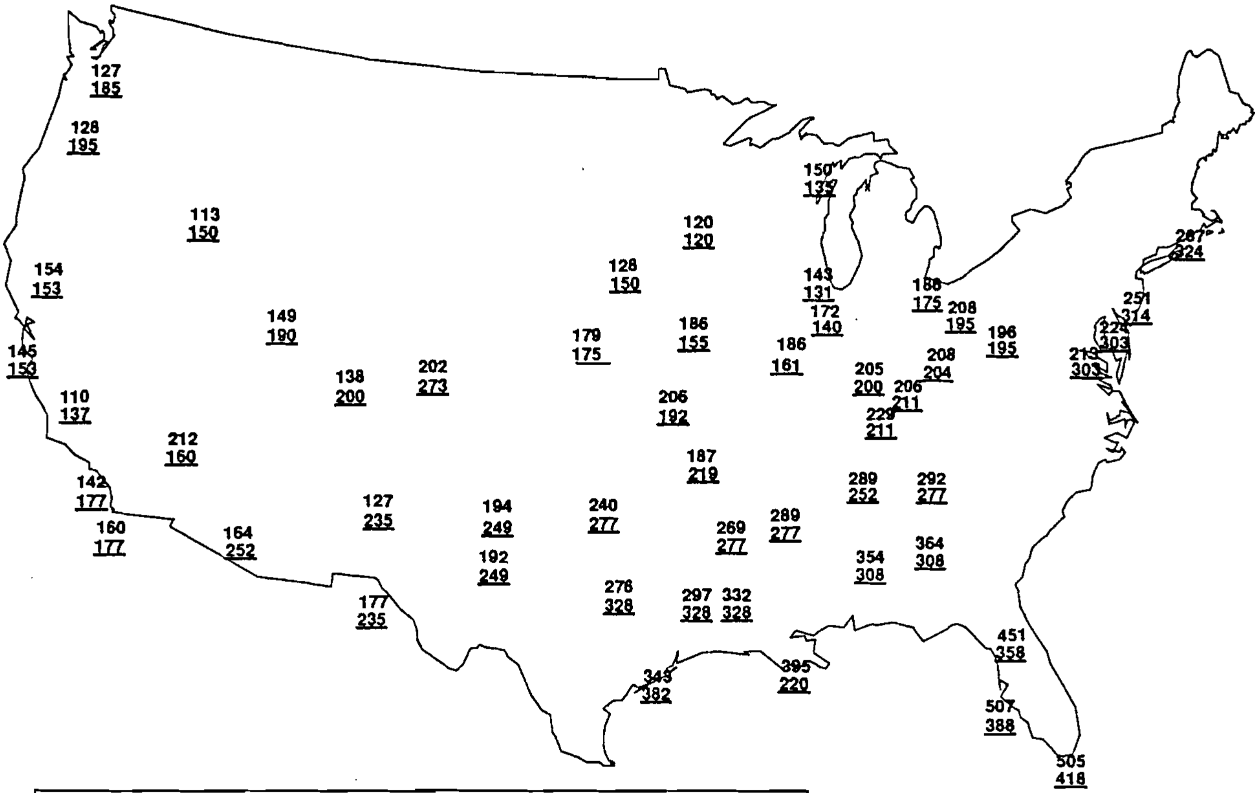

Figure 9. Post FSA Class I Differentials and Estimated Values, Scenario 4

directly shipping to class I handlers. In our opinion, pool qualification criteria and pooling provisions deserve much more studious attention than they have been given. In many respects the regional concerns that have been manifested at the 1990 hearing reflect different positions with respect to how class I differentials are or should be pooled. While we are convinced that pooling provisions should be an important part of the discussions that are presently taking place, we are doubtful that enough research has been done to understand all the ramifications of current or alternative provisions; consequently we are not adequately prepared to make appropriate decisions with respect to changes in pooling provisions.

Bibliography

1 R.D. Boynton and A.M. Novakovic, The Impact of the Milk Diversion Program on U.S. Milk Production, A.E. Ext.84-4, Dept. of Agr. Econ., Cornell University, March 1984, pp. 15-16.

2 Andrew M. Novakovic and Maura Keniston, Regional Differences in the Dairy Industry and Their Use in Evaluating Dairy Surpluses, A.E. Ext. 89-3, Dept. of Agr. Econ., Cornell University, January 1989.

3 Irving Dubov and M. Lloyd Downen, "The Midwest-Eastern Seaboard Conflict of Interest in the Production and Distribution of Milk: The Role of Market Structures and Other Institutional Arrangements," Journal of Farm Economics, Vol. 42, no. 5, December 1960, pp. 1313-1327.

4 Linley E. Juers, "Discussion: The Role of Market Structures and Other Institutional Arrangements," Journal of Farm Economics, Vol. 42, no. 5, December 1960, pp. 1327-1331.

5 Andrew Novakovic, "Alternatives to the M-W Price as the Basis for Setting Prices Under Federal Milk Marketing Orders," Leaflet 25, Dairy Policy Issues and Options for the 1990 Farm Bill, Dept. of Agr. Econ., Cornell University, 1990.

6 Andrew M. Novakovic and Robert D. Boynton, "Do Changes in Farmer-First Handler Exchange Eliminate the Need for Government Intervention," American Journal of Agricultural Economics, Vol. 66, no. 5, December 1984, pp. 769-775.

7 "Study of the Chicago Regional Mailbox Price (Zone 4 and Zone 16) Compared to Other Federal Orders" Reporter, the monthly publication of the Market Administrator's Office for the Chicago Regional and Indiana Marketing Areas: "Part One," September 1988, pp. 5-8; "Part Two," October 1988, pp. 5-7; "Parts Three and Four," December 1988, pp. 5-12; "Part Five," January 1989, pp. 7-10; and February 1989, pp. 5-8.

8 Novakovic, Andrew, Kevin Jack, and Maura Keniston. National and State Trends in Milk Production, 1991, A.E. Ext. 91-20, Dept. of Agr. Econ., Cornell University, August 1991.

9 Cassels, John M. A Study of Fluid Milk Prices, Harvard University Press: Cambridge, MA. 1937.

10 Gaumnitz, E.W. and O.M. Reed. Some Problems Involved in Establishing Milk Prices, DM-2, Marketing Information Series, Agricultural Adjustment Administration, U.S. Department of Agriculture, September 1937.

11 Horner, J.T. "A Comparative Study of Various Fluid Milk Marketing Plans," American Cooperation, Vol II, 1926.

12 Metzger, Hutzel. Cooperative Marketing of Fluid Milk, Technical Bulletin No.179, U.S. Department of Agriculture.

13 Mortenson, W.P. Milk Distribution as a Public Utility, Chicago, The University of Chicago Press, 1940.

14 Black, John D. The Dairy Industry and the AAA, Washington, D.C., The Brookings Institution, 1935.

15 Harris, Edmund S. Classified Pricing of Milk—Some Theoretical Aspects, Technical Bulletin No. 1184, Agricultural Marketing Service, U.S. Department of Agriculture, April 1958.

16 U.S. Department of Agriculture. Regulations Affecting the Movement and Merchandising of Milk, Marketing Research Report No. 98, Agricultural Marketing Service, U.S. Department of Agriculture, June 1955.

17 Lasley, Floyd. Geographic Structure of Milk Prices, 1975, Agricultural Economic Report No. 387, Economic Research Service, U.S. Department of Agriculture, October 1977.

18 Pratt, James E., Andrew M. Novakovic, and Maura M. Keniston. The U.S. Dairy Sector Simulator: A Tool for Spatial Analysis of the Dairy Industry, A.E. Res., forthcoming, Dept. of Agr. Econ., Cornell University, 1990.