Federal Milk Marketing Orders: A Review of Research on Their Economic Consequences

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by

AAEA Policy Task Force on Dairy Marketing Orders*

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I. Introduction

In establishing the Policy Task Force on Dairy Marketing Orders, the 1981/82 President of the American Agricultural Economics Association (AAEA), G. Edward Schuh stated that our task was "to bring together what we know about the consequences of milk marketing orders so that policy-makers and those concerned with policy can make informed judgments about it," but "not to make policy recommendations".[1]

During more than 50 years of research on dairy marketing, agricultural economists have disagreed widely on judgments about the characteristics of milk production and dairy marketing, and on appropriate dairy policy. But they have come to a general agreement on some analytical issues. Most important is a consensus view that supply-demand models, appropriately elaborated, are suitable analytical instruments for the study of dairy policy efforts and other topics in milk marketing. This consensus is stronger today than it was even 20 years ago, when the analytical scepticism of the Nourse Report[2] seems to have had more support.

Despite an increased conformity of general outlook, what "we" know has proven difficult for the Task Force to determine. Different researchers have used different approaches within the broad supply-demand paradigm, and have reached different conclusions. A few of the conclusions reached have been contradictory. The range of quantitative estimates of key parameters is large, so much so that it is unhelpful simply to aggregate the findings of the various economists who have studied the dairy sector. Consequently, we have been selective and critical in our review of the literature. We present the findings that, in our judgment, constitute the best available evidence on the effects of marketing orders. Since there are serious chances of error in even the best work available, we emphasize weak points in the analyses and

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[1]Memorandum from G. Edward Schuh, June 18, 1982 (underlining in original).

[2]Federal Milk Order Study Committee, "Report to the Secretary of Agriculture, published by U.S. Department of Agriculture, USGPO, Washington, D.C., April 1962; referred to hereafter by the name of its Chairman, Edwin G. Nourse.

the tentative nature of many of the conclusions reached. This leads to a final element of our charge, "the identification of areas in which additional research is needed."[3]

Our procedures were as follows. First we drew up a list of issues in the form of questions about the effects of marketing orders. These included the effects on:

1. Prices
    a. received by farmers for milk on average
    b. class I/II and Grade A/B differentials
    c. paid by customers for dairy products on average
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6. Interaction with milk price support program and other farm policies.
7. Milk producers' income and handlers' profits.

Second, each task force member had the opportunity to provide a critique of the literature that he believed most pertinent for each question. To ensure that some consideration was given to all the available literature, the agricultural economics journals, general economics journals, Experiment Station publications, and governmental publications were surveyed for all relevant material. (The bibliography is at the end of this report.)

Third, the Task Force met in May 1983 to discuss the approach to take in this report, how to organize our critiques, and the extent to which consensus could be reached on conclusions.

Fourth, a partial draft report was discussed by four of the Task Force members at a meeting at Purdue University in August 1983.

Fifth, a more complete draft report was circulated to Task Force members and commented upon in October 1983.

Sixth, a full draft report was circulated in January, 1984, to selected dairy experts as well as the Task Force members. Those who provided written comments were: Emerson Babb, Purdue; Leo Blakley, Oklahoma State; Boyd Buxton, Minnesota; Roger Dahlgran, Iowa State; Bill Dobson, Purdue; Dick Heifner, USDA-ERS; Peter Helmberger, Wisconsin; Ed Karpov, USDA-ERS; Andy Novakovic, USDAERS (Cornell); Tanya Roberts, USDA-ERS; Alden Manchester, USDA-ERS; Felix Spinelli, USDA-ERS.

Seventh, a revised draft was discussed at a meeting of the Task Force in June, 1984.

Eighth, a draft final report was circulated in July 1984 and discussed by four task force members at a meeting at Cornell University in August 1984. Revisions in this draft resulted in the report as it now stands, submitted to the AAEA Board in fulfillment of our charge.

[3]Ibid.

II. Purposes of Marketing Orders

A long and complex legislative and regulatory history, from 1933 to the present, underlies Federal Marketing Orders for milk. The key developments were in the agricultural legislation of 1933, 1935, and 1937, with the Agricultural Marketing Agreement Act of 1937 providing the essential legal framework that persists today. A key statement of purpose in the 1937 Act is probably the declaration of the orginal intent of Congress "to establish and maintain such orderly marketing conditions for agricultural commodities in interstate commerce as will establish, as the price to farmers, parity prices..."[1]

Though the development of dairy price supports established by CCC purchases of dairy products has supplemented the marketing-order system as a price stabilization program, the rationale for marketing orders still involves orderly marketing as the key ingredient. But what is the goal to be achieved through orderly marketing? Does it mean anything apart from a moderately improved economic environment for farmers i.e., more bargaining power and higher farm prices? (The qualification "moderately" reflects the stated intention of Congress to protect consumers against "undue" price enhancement.) What is the economic content of the crucial term "orderly"? By what criteria do we distinguish the orderly from the disorderly? On these matters, the legislation is silent.

One of the most comprehensive studies of marketing orders for milk, the Nourse Report, devoted considerable effort to the concept of orderly marketing and the role of marketing orders in achieving that goal. It concludes that the goal of orderly marketing in early (pre-1933) cooperatives was primarily local, seeking to avoid severe swings from surplus to shortage within the year and from peak to bottom of a production cycle. This is also the conclusion of Manchester (1983, p.235 ff.). But under the market orders, "the ideal of orderly marketing has been given a more precise meaning and a broader frame of reference ...a positive rationale of producer incomes and handler prices skillfully engineered through a blending of economic principle and market strategy."[2] The Nourse Report does not give a really precise definition, but makes clear that what producers objected to in unregulated conditions was low receipts for their milk and that what they hoped to attain through marketing orders was higher receipts.

The 1937 Act, however, states an intent "to protect the interests of consumers by (a) approaching the level of prices which it is declared to be the policy of Congress to establish..." and by authorizing no action to attain prices higher than this level.[3] How prices are to be established to the benefit of consumers and producers simultaneously is not spelled out by Congress but is implicitly a consequence of orderly marketing. It is implicit in the view that unregulated markets would exhibit "market failure", in economists' jargon, corresponding to disorderly markets in some way.

The Nourse Report begins its discussion of the concept of orderly marketing by stating: "The classical doctrine that unregulated competition would act as an automatic adjuster of both price and production had merit in its day of small-scale business operators. But as the investment required for an improved herd and for better physical facilities has grown, and as the managerial training of the modern dairy farmer has expanded, it has become less useful and indeed impractical."[4]

The view taken by the Nourse Report, in short, is that federal marketing orders are intended to increase the well-being of both producers and consumers by

[1] 7 USC 602

[2] Nourse Report, p. III-11.

[3] 7 USC 602.

[4] Nourse Report, p. I-14.

correcting a situation of disorderly markets. However, in the end little is provided to give economic content to the concept of orderly marketing. For example, we still do not have the criteria for determining when a situation of disorder has arisen, or know how to rank markets or episodes in markets according to their disorderliness. However, for the concept to be usable in economic analysis, it is necessary to specify disorder in terms that have a specific economic meaning. The most obvious candidate is price, leading to some measure of price variability or variability in farmers' returns as a measure of disorder. But the 1937 Act, the Nourse Report, and most other discussions of marketing orders indicate that this is not the meaning of disorder. Prices and returns can vary without being disorderly. Prices and returns can even vary randomly, unpredictably, without being an indicator of disorderly marketing.

Manchester (1983, Ch. 8) follows a different line of development of the concept of orderly markets. He identifies order under classified-use plans for fluid milk markets with suitably regulated markets in the time, space, and competitive dimensions. Disorderly marketing is thus broadened in concept to incorporate a wide range of deviations, in an unregulated market, from the situation that optimal economic regulation could achieve.

In practice, the definition of disorder has been implicitly created in decisions in regulatory and legal proceedings, when a finding of disorder is relevant to the establishment of a marketing order. A few such proceedings are described below. What they and other discussions add up to is that only certain kinds of variability constitute disorder, and that the relevant variability results from the strategic behavior of handlers of milk beyond the farm gate. But disorder is not just a matter of imperfect competition in the marketing sector, either. It is the manifestation of handlers' market power in ways that lead to variability in farmers' returns that makes farmers worse off. This definition is not in the literature as such (as far as we know) but is implied by its overall tenor. This definition suggests a remedy -- the negation of handlers' market power -- but raises many questions calling for more precision and analysis. For example, can this disorder be a consequence of any well developed models of imperfect competition?

Our purpose here is not to resolve the issue of the meaning and implications of the disorderly marketing concept. It is to point out an ambiguity at the core of attempts to understand the goals of marketing orders. This ambiguity has had practical consequences, causing a recent legal history of the 1937 Act to begin by stating that "this Act is one of the most difficult of federal statutes to comprehend."[5]

Apart from vagueness of intent, the difficulty stems also from the vagueness of the legal language, which has been tuned to tiptoe among legal minefields that had stymied earlier legislation in the 1930s. This legal history further identifies a fundamental internal conflict in the 1937 Act's "supposition that a classified price and pooling program regulating the handling of milk is consonant with the free movement of milk."[6] This, among other ambiguities relating to pricing within orders, boundaries of orders, and variations in milk classification schemes, has generated a long administrative record, still evolving, which supports our current milk marketing institutions. Before discussing the evidence on the consequences of milk marketing orders, it is necessary to describe the key administrative features of the marketing order system.

[5]Milk Industry Foundation, Legal Reference Series, Vol. II, Washington, D.C.: Milk Industry Foundation, 1972, Part 4, p. 1.

[6]Ibid., p. 2. The "supposition" is apparent in that the same section of the Act

III. Description of Milk Market Orders

In this section we first present some background material on the geographical extent of milk marketing orders and some procedures for establishing them. We then discuss the key substantive provisions of the orders: classified pricing, pooling to determine producer prices, locational price differentials, and protective devices (such as "down allocation" and "compensation payment")[1] regulating the geographical flow of milk.

Extent of Regulation

The 1937 Act mandates differential pricing of milk for different uses. This is accomplished administratively through classified pricing. Since 1937, the federal milk order program has continuously expanded the application of classified pricing in the U.S. dairy industry. By 1947 there were 29 federal milk orders that priced 21 percent of the nation's milk supply (Table 1). The number of individual orders reached a maximum of 83 in 1962, but declined thereafter through consolidation as marketing areas expanded. Other orders were expanded to include more fluid distribution areas, and additional milk supplies and a few additional orders were promulgated. In 1982, 69 percent of all milk sold to plants and dealers in the U.S. was regulated under federal orders. This regulated milk accounted for 81 percent of all fluid grade milk.[2]

Orders are established or changed through standard administrative procedures of the federal government. Interested parties, usually producers or their cooperatives, petition the Secretary of Agriculture for an order or a change in an order. If the marketing situation for milk appears to meet the requirements for establishment of an order or change, administrative hearings are scheduled to receive evidence on need for the order, proposals for order provisions, and potential impacts of regulation. All parties to be affected by the regulation -- producers, cooperatives, handlers, the government and consumers -- can present evidence at the hearing. The Dairy Division of the Agricultural Marketing Service of the USDA, on the basis of the hearing record, drafts a recommended decision and then a final decision on the order. To become effective, it must be approved by at least two-thirds of the producers for market-wide pool and three-fourths of producers in individual handler pool markets that sell milk to regulated handlers.

Each federal order contains two basic sets of provisions. One fixes the minimum prices that must be paid by milk handlers according to the use made of the milk (classified pricing). The second set specifies how returns for selling milk according to use is to be distributed to producers. All other features of the orders, such as location differentials for fluid use and producer prices, seasonal pricing and distribution plans, allocation provisions and butterfat differentials, are complementary or necessary for operation of the basic provisions. For example, methods of accounting for milk from producers not regulated by the order must be specified,

[6](cont.) which mandates minimum prices for "use classifications" and market-order regulations also states that "no marketing agreement or order applicable to milk or its products in any marketing area shall prohibit or in any matter limit, in the case of products of milk, the marketing in that area any milk or product thereof produced in any production area in the U.S." (7 USC 608 c). For detailed discussion, see Hutt (1960)

[1]Defined below on p. 11.

[2]A number of states where federal orders do not exist have state administered pricing programs similar to the federal programs. Approximately 85 percent of all U.S. milk marketings are regulated by state or federal classified pricing systems.

Table 1. Growth of Federal Milk Order Regulation in the U. S. 1947-82.

Year	Number of Markets 1/	Population of Federal Milk Marketing areas 2/	Number of Producers 3/	Producer deliveries	Percentage of Producer deliveries used in Class I	Receipts as % of all milk sold to plants & dealers
	Number	1,000	Number	Million pounds	Percent	Percent
1947	29	*	135,830	14,980	65.5	21
1950	39	*	156,584	18,660	58.9	25
1955	63	46,963	188,611	28,948	62.3	32
1956	68	48,575	183,830	31,380	62.5	33
1957	68	57,297	182,551	33,455	63.8	34
1958	74	60,717	186,155	36,356	64.1	36
1959	77	67,720	187,576	40,149	65.4	40
1960	80	88,818	189,816	44,812	64.2	43
1961	81	93,727	192,947	48,803	61.2	45
1962	83	97,353	186,468	51,648	61.2	47
1963	82	100,083	176,477	52,860	62.4	48
1964	77	99,333	167,503	54,447	62.4	48
1965	73	102,351	158,077	54,444	63.5	48
1966	71	98,307	145,964	53,012	65.7	48
1967	74	103,566	140,657	53,761	64.0	49
1968	67	117,013	141,623	56,444	64.6	52
1969	67	122,319	144,275	61,026	64.3	56
1970	62	125,781	143,411	65,104	61.5	59
1971	62	142,934	141,347	67,872	59.3	60
1972	62	142,934	136,881	68,719	59.6	60
1973	61	141,472	131,565	66,229	61.2	60
1974	61	141,546	126,805	67,778	58.0	61
1975	56	144,467	123,855	69,249	57.9	63
1976	50	143,493	122,675	74,586	54.9	65
1977	47	150,093	122,755	77,947	52.8	66
1978	47	150,131	119,326	78,091	52.7	67
1979	47	150,131	116,447	79,436	51.6	67
1980	47	164,908	117,490	83,998	48.9	67
1981	48	165,459	119,323	87,989	46.3	68
1982	49	169,770	120,751	91,611	44.5	69

* Data not available.
1/ End of year. (Date on which pricing provisions became effective.)
2/ End of year. 1951-59, 1960-70, 1971-79, 1980-1982 according to 1950, 1960, 1970, and 1980 U. S. census, respectively.
3/ Average for year.
4/ Prices are simple averages for 1947-61 and weighted averages for 1962-82.
Source: U. S. Department of Agriculture, Agricultural Marketing Service

because the establishment of higher prices for fluid milk than for milk in non-regulation markets may provide incentives for arbitrage without controls, because of which the Class I/Class II and geographical price differences could not be maintained as established.

Classified Prices

Each federal order establishes classified prices that must be paid by handlers that distribute milk on routes in the defined marketing area. In all orders the highest use price is established for milk used in Class I products, beverage fluid milk products. Another lower price is fixed for milk used in Class II or III products, hard manufactured dairy products such as butter, nonfat dry milk and cheese. Most orders fix a special intermediate price for milk used in soft manufactured dairy products such as ice cream, cottage cheese, and yogurt. Regardless of the way it is used, all milk within each federal order must meet the local or state health agencies' standards for beverage use milk.

Class I (fluid use) milk prices in all order markets are currently established at fixed differentials above the manufacturing grade milk prices paid in non-federal order markets in Minnesota and Wisconsin. The price differentials are designed to (1) attract necessary fluid eligible milk supplies to the fluid consuming markets, (2) to cover any costs of extra production standards that are required for selling milk for fluid uses, and (3) to increase producer revenue by price discrimination between the fluid and manufacturing segments of the milk market. A nonregulated market would generate the first two components of the differential. The third element could not exist in the absence of control of the markets by sellers.

The basic mover of the Class I price is the price paid in nonregulated manufacturing milk markets. A special price series is the Minnesota-Wisconsin (M-W) manufacturing milk price, reported each month for manufacturing grade milk plants. The M-W price is essentially determined by the support price when production exceeds commercial demand at the support price. Any change in the M-W price adjusts all Class I prices in federal orders by exactly the same amount. One rationale for the manufacturing milk price base is that manufactured products absorb all milk under federal orders that is not used for fluid purposes. Thus, price adjustments for milk in manufacturing uses represents supply and demand adjustments for all milk. Tying Class I prices to this base assures that fluid prices as well as manufacturing market prices adjust to changes in supply and demand. Note that this procedure also means that the price support program places an effective floor under Class I prices as well as manufacturing milk price.

Throughout much of the post-World period the Dairy Division of the Agricultural Marketing Service of USDA has followed a single basing point system in Class I prices in federal order markets. The differentials, until the late 1960's, were established such that Class I prices in each market exceeded Class I prices in western Wisconsin by approximately the cost of transporting fluid milk from western Wisconsin to each of those markets. Since then, the Dairy Division has held the differentials steady although milk transport costs have increased substantially. The increasing differentials with distance from Eau Claire, Wisconsin, still persist, however (see Table 2). Note that Class I differentials increase from $1.12 in the Upper Midwest market to $3.15 in southeastern Florida.

The price for manufacturing use milk, Class II or Class III, is currently established for all federal orders at the

Table 2. Class I Differentials for Federal Order Milk Markets, January 1, 1979.

Marketing Area	Addition to Minnesota. Wisconsin Milk Price to Obtain Class I Price	Marketing Area	Addition to Minnesota. Wisconsin Milk Price to Obtain Class I Price
	$/cwt.		$/cwt.
Black Hills	$1.95	Red River Valley	$2.20
Central Arizona	$2.56	Rio Grande Valley	$2.35
Central Arkansas	$1.94	St.Louis Ozarks	$1.60
Central Illinois	$1.39	Southeastern Florida	$3.15
Chicago Regional	$1.26	Southern Illinois	$1.53
Eastern Colorado	$2.30	Southern Michigan	$1.60
Eastern Ohio W.Pa.	$1.85	Tampa Bay	$2.95
Eastern South Dakota	$1.40	Tennessee Valley	$2.10
		Texas	$2.32
Fort Smith	$1.95		
Georgia	$2.30	Texas Panhandle	$2.25
Great Basin	$1.90	Upper Florida	$2.85
Great Kansas City	$1.74	Upper Midwest	$1.12
Greater Louisiana	$2.47	Western Colorado	$2.00
		Wesketa	$1.80
Indiana	$1.47		
Inland Empire	$1.95		
Iowa	$1.40		
Lake Mead	$1.60		
Louie.-Lex.-Evan.	$1.70		
Lubbock-Plainview	$2.42		
Memphis	$1.94		
Michigan Upper Penn.	$1.35		
Middle Atlantic	$2.78		
Nashville	$1.85		
Nebraska-W. Iowa	$1.60		
Neosho Valley	$1.54		
New England	$2.42		
New Orleans-Miss.	$2.85		
New York-New Jersey	$2.25		
Ohio Valley	$1.70		
Oklahoma Metropolitan	$1.98		
Oregon-Washington	$1.95		
Paducah	$1.70		
Puget Sound	$1.85		

Source: "Summary of Major Provisions in Federal Milk Marketing Orders - January 1, 1979," Dairy Division, Agricultural Marketing Service, U. S. Department of Agriculture, Washington, D. C., February 1979, pp. 55-56.

Minnesota-Wisconsin manufacturing milk price. The rationale for this price is that manufacturing milk plants in regulated markets should be neither competitively advantaged or disadvantaged relative to nonregulated manufacturing plants in the purchase of milk. The Minnesota-Wisconsin milk price is widely considered to reflect an equitable price for federal order plants. However, processors and firms in federal order markets do not universally accept this rationale. It is sometimes argued that prices for Class III use should be reduced in some federal orders because of greater variability of milk supplies for local manufacturing plants operating primarily on milk surplus to Class I needs. During months of short production, manufacturing surplus may entirely disappear. Processing costs per pound of milk handled are thus increased as compared to plants with a more stable supply. Consequently, it is argued that prices charged for manufacturing use milk should be less than for plants in nonregulated areas which have more regular supplies of milk. Recently, some of the southern federal order markets have petitioned USDA for reduced manufacturing use milk prices. The high cost situation probably exists for some plants. It is not clear, however, that the problem can be best resolved by generally reducing the Class II or III prices in these markets.

Producer Prices

The prices paid to producers in federal order markets are determined by a pooling procedure. In all but three federal order markets, a marketwide pooling procedure is used. This procedure involves computation of the total value of all milk sold to all regulated handlers at the respective class price. The total value is divided by the total number of hundredweights of producer milk to arrive at the uniform producer blend price. Each producer is paid the uniform price with adjustments for butterfat content of the milk and location of the plant to which the milk is shipped. The uniform price is then determined by the class prices and the marketwide utilization of all milk in the various classes. The higher the Class I price, the higher the blend price for any given level of utilization. The higher the Class I utilization for any given class prices, the higher the blend price.

A producer settlement fund is operated by the market administrators in orders with marketwide pools. This is necessary because processors and handlers are obligated to pay the class prices for milk but producers are to receive the uniform blend price. For handlers who have a higher Class I utilization than the marketwide utilization, their average cost (and obligation) for milk is higher than the average price they must pay producers. Under the order, these buyers pay producers the blend price. The remaining balance of charges for milk is paid into the producer settlement fund. Buyers who have a low Class I use relative to the market average have a lower average milk cost than the uniform blend price. These buyers pay their producers the uniform blend price. They then draw payments from the producer settlement fund such that their net milk cost is consistent with their individual milk use at the class prices. In total, all payments of handlers into the settlement fund equal all collections from the fund.

Individual handler pool markets, currently three of the 49 federal order markets, pay producers according to the utilization rate of the handler (buyer) to whom they sell their milk. This procedure obviates the need for a producer settlement fund. It usually results in each handler paying a different price to its producers. All handlers would pay the same price to producers only if they had identical class utilization percentages.

The pooling procedures of classified pricing plans can and do lead to some significant problems for the regulation. Marketwide pooling, for example, may

result in difficulties for fluid bottlers in obtaining sufficient fluid milk supplies to meet fluid milk demands. This occurs usually in those markets that have substantially more milk than can be used in fluid products. The marketwide pooling provides incentives for any plant receiving Grade A milk to want to become associated with an order market. A plant that utilizes all its Grade A milk in manufactured dairy products, if included in the pool, can collect funds from the producer settlement fund in order to pay the order blend price to its producers. Yet, its cost for milk is still the manufacturing use milk price. This gives the plant a competitive advantage over many non-regulated manufacturing milk plants in the purchase of milk from producers. Furthermore, in almost all federal order markets, the marginal value of additional milk in federal order markets is the manufacturing milk price, but the producer's marginal return is the higher order blend price. Thus, the blend price with marketwide pooling attracts milk to fluid milk markets even though it is not needed to cover the total fluid milk needs of the market.

A corollary problem in the above situations, and an ironic one in view of the attraction of milk to markets with marketwide pooling, is the difficulty for fluid bottlers in obtaining enough milk to meet the demand for fluid milk. Grade A milk assemblers who are frequently producing manufactured dairy products may not be willing to make milk available for fluid uses if they are making a good return on manufactured dairy products. In fact, releasing milk from their plants can increase the average manufacturing costs on the remaining milk in their plants. The marketwide pool permits them to collect from the equalization fund to pay their producers. Thus, the classified pricing with marketwide pooling often generates more than adequate milk production for fluid use, but without additional control it does not assure that it will be channelled to fluid uses. This practice by plants, called 'pool riding', has led to pooling requirements for federal order milk markets. The requirement to qualify the plant for pooling under the order specifies that a certain percentage of total milk receipts must be shipped to fluid milk plants or distributed on fluid milk routes. Unfortunately, this requirement occasionally leads to unnecessary hauling of milk to bottling plants so that the shipping plants can continue to maintain an association with the order. Some of this milk is then shipped back to the original plant for processing into manufactured dairy products.

Location Differentials

Orders also provided for intra-order location differentials for milk prices. In most markets this adjustment applies to both the Class I and the producer blend price. In most orders the Class I price declines 1.5 cents per hundredweight for each 10 miles from the metropolitan area (or basing point). The original purpose of the Class I location adjustments was to generate a rational supply-area structure for each fluid market and permit each fluid processor in the market to obtain milk supplies at the same price, not counting transport costs. If the location adjustment equals transport costs for fluid milk, it permits all handlers in a fluid consuming market to buy milk at the same at-market price net of transport cost regardless of the location of the milk in the supply area. It established location price differences similar to those that would have existed over space in a purely competitive market.

Determination of location differentials has important consequences for marketing efficiency (Bressler, 1958). Setting the differential higher than effective transport costs will tend to expand the fluid supply area. Milk supplies near the fluid market will be skipped over by buyers in order to obtain distant milk at lower net cost. The nearby milk is used in manufactured dairy products. Because milk is much more

costly to move in fluid form than in the form of manufactured dairy products, the total cost of milk movements in the market is increased. Marketing efficiency is reduced and so is total welfare.

Setting the Class I location differentials too low can lead to competitive problems and inequities. To reduce net milk costs, fluid bottlers will attempt to obtain supplies as near to the consuming market as possible. If the federal orders prevail, processors that must obtain the more distant sup- plies will have a higher net milk price than those obtaining nearby supplies.

Location differentials for the producer blend price are applied to reflect the declining Class I price with distance from the consuming market. They place a limit on the market supply area. They provide for reduction in prices such that at some specified distance from the market there is a boundary, beyond which there is no price incentive for plants and producers to be associated with that market.

Protective Devices to Regulate Milk Flow between Markets

Without some protective mechanisms, most classified pricing systems could not be maintained. As we will describe subsequently, most orders generate higher prices than could be maintained in the absence of regulation. Regulated processors would therefore buy milk from non-order areas or from other order areas at near manufacturing use prices for use in fluid products. The other order or non-regulated milk is, by definition, not priced under the given order. In calculating a handler's obligation for local producer milk, this other-order source is deducted from each handler's total milk use. Without restrictions the handler would prefer to deduct the other use milk from its Class I use and pay for locally produced milk at the Class II or III prices. The allocation provisions of orders require milk from other federal order areas to be deducted from each class on a pro rata basis according to its total utilization rates. Thus other order milk is effectively priced to the importing handler at the same price as locally purchased milk.

If milk is purchased from a non-federally regulated handler, or if a handler buys milk concentrates to produce reconstituted milk, down-allocation is required and compensatory charges may be imposed. In computing a handler's charges for milk, this other source milk is first deducted from the handler's lowest class use of milk. Thus a federal order market first allocates all locally produced milk of a handler to higher valued uses. If any Class I use remains, the handler can then deduct non-regulated milk from those higher valued uses. However, to the extent that the importing handler has imported milk that has been deducted from its Class I use of regulated milk, a compensatory payment is imposed on those imports. This charge per hundredweight of milk is the difference between the order's Class I and the producer blend price or, for reconstituted milk, the difference between the Class I and the lowest class price. In southeastern Florida it would be approximately $3.00 per hundredweight. In those markets that often encounter deficits in milk for fluid uses, these provisions most heavily penalize the lowest-cost method of obtaining supplemental supplies. These two provisions have been frequently called unnecessary restrictive devices in the federal orders.

IV. Our Knowledge of the Effects of Marketing Orders

The effects are difficult to discover, because we are asking a counterfactual question: what would have occurred if the existing set of institutions had not existed? Obviously, we cannot observe an alternative that does not exist, and our answer must moreover depend on exactly what alternative institutions we have in mind.

The alternative situation that most analysts appear to have in mind is one in which apart from bona fide health-related restrictions there are no regulations bearing on the shipment of milk from one area to another, manufacturing milk can be used for fluid purposes at handlers' discretion, and prices are determined by individual contracts between handlers and farmers (or cooperatives representing them). The relevant policy experiment is: repeal the Agricultural Marketing Agreement Act of 1937 and its implementary Federal Regulations, but leave intact the dairy price support programs, state and local health and regulatory bodies, the Capper-Volstead Act, and other rule-making affecting cooperatives.

In the literature on the topic by agricultural economists, there are three approaches that should be distinguished:

(1) legal and economic analysis of statements of intent in the legislative record;

(2) building a model of the dairy economy, incorporating marketing orders into the model, and then studying the behavior of the model when market orders are omitted (the simulation approach).

(3) comparing situations in which marketing orders exist with actual situations in which they do not.

The first approach can suggest what sorts of effects to look for, what hypotheses to test, but in itself provides no evidence as to effects. Nonetheless, the stated intention of the government to accomplish some particular objective complements evidence that policy has caused outcomes consistent with that objective.

The third approach is closest to the spirit of experimental science, and the least practised by agricultural economists. We have few controlled experiments -- contrasts between two situations known (or believed with confidence) to be identical, except for the presence of marketing orders in one and their absence in the other. Attempts in the literature to draw conclusions from events observed with changes in marketing orders include the following:

Dobson and Buxton (1977) studied two cases in which federal milk orders had been terminated and then reinstated. In 1973 the Mississippi milk order was terminated, until in 1976 64 counties in Mississippi were added to the New Orleans order. Dobson and Buxton find the following points suggested by testimony that led to the reestablishment of the marketing order for this area. First, the Class I differential tended to be replaced by "flat pricing" when the order was eliminated. Second, substantially more price variation emerged in the absence of the order. Third, there were apparently gainers and losers, but no overall tendency for farmers to be made either better or worse off without the order.

In 1966 a regulatory proceeding resulted in the termination of the Chicago Milk Order, after it had been in operation for nearly 27 years. Two years later the Chicago Order was restored, expanded and merged with neighboring orders. The two-year period of deregulation was not complete because many of the plants which had been regulated under the Chicago Order came under the Milwaukee Order in the absence of the Chicago Order. The Chicago experience was somewhat different from Mississippi. Dobson and Buxton conclude that "there was less instability of the type that emerged when the Mississippi Order was terminated." They find that there was little erosion of the negotiated Class I prices, little loss of market to outside handlers or producers, and little indication that other cooperatives ended up carrying a substantially larger share of the reserve milk supply.

Overall, these two cases seem to have been too short in duration, and too

transitory in terms of producers', handlers' and cooperatives' expectations that one could get any clear picture from them about how milk markets would operate in the absence of Marketing Order regulation. The evidence, such as it is, is mixed even within the limitations of this experiment.

Kessel (1967) made a number of comparisons between situations in which milk orders did and did not exist. With respect to the price of Class I milk, Kessel compared average prices in 24 markets that were unregulated and 76 that had Federal Orders in the period July 1960-June 1961. Holding distance from Eau Claire, Wisconsin, constant, he found higher prices in the Federal Order markets. However, he does not report a statistically significant quantitative estimate of the difference made by being in a Federal Order market. Using data generated by Lasley (1965), Kessel compared regulated with unregulated markets in 1964-65 and again found a positive but statistically weak relationship between orders and the Class I price. Kessel also considers the effects of milk orders on output. Using data developed by Spencer (1965) he finds that "the growth rate of farm sales of whole milk delivered to order markets was, on an annual basis, greater than it was for the output of whole milk delivered to all markets" (Kessel, p. 62). However, Kessel does not give any indication of the statistical significance of this finding. With respect to consumer interests, Kessel draws his main conclusion from examination of milk prices in central Illinois, finding that "the behavior of milk prices in central Illinois, before the advent of regulation, constitutes an important piece of evidence that market forces, in the absence of federal state and private controls, can provide the consumer with a steady supply of fresh milk at prices as low or lower than the prices that would have existed under federal controls" (p. 60).

Generally, the kind of factual evidence that would seem most pertinent to examining the effects of Federal Orders would compare what happened in the same locations before and after their implementation. However, no comprehensive studies along this line have been undertaken to our knowledge. One problem is that many of the basic institutions were set up in the 1930s, when prices had been unusually depressed for several years for many commodities. Therefore, one would have to be very careful in attributing the subsequent price gains to marketing orders as opposed to the general economic recovery that took place following the mid-1930s. Similarly, as orders expanded in the post-war period, it is plausible that they were introduced in particularly low price circumstances, so that price gains again would be ambiguous as to their cause. They could have been in part a cyclical response that would have occurred in an unregulated market. Nonetheless, an extension on a more systematic basis of the kind of comparison that Kessel did could provide stronger evidence than he was able to generate as to the effects of orders. Another problem, however, is the existence of cooperatives and classified pricing in periods when federal orders did not exist. This occurred during the short term absence of orders that Dobson and Buxton studied, and generally occurred in the preorder period of the 1920's and early 1930's. Cassels (1937) found evidence that cooperatives with classified pricing had some effect in increasing prices of fluid milk even before marketing orders existed.

Let us now consider the second approach listed above, which involves building a model of the dairy economy and then incorporating marketing orders into that model. This is the approach that has proven by far the most popular among agricultural economists. Two types of modeling are prevalent in the literature. The first is spatial equilibrium modeling, usually involving mathematical programming, which attempts to understand the geographical pricing of milk. The second approach uses the model of discriminatory pricing from the industrial

organization literature. This approach has been successively refined by Kessel (1967), Kwoka (1977), and Ippolito and Masson (1978), but its essential features are laid out in Gaumnitz and Reed (1937) and Harris (1950). The basic features of this second approach are illustrated in figure 1 (as taken from Harris, p. 71). The line labelled D_f is the demand by handlers for milk for fluid use, and the line D_s is the demand for milk for surplus uses, which we can interpret under an effective price support system as the support price for milk. The line S represents the quantities of milk that would be offered for sale at different prices "after a sufficient time had elapsed to elicit a complete response to any new price situation" (Harris, p. 72). The distance QP is the price at which producers sell milk to handlers when it is sold at a single price without classified pricing. The quality of milk sold is OQ. With the introduction of classified pricing, the Class I price is set at a higher level. Its optimal level is assumed by Harris to be Q'P', with the quantity of fluid milk sold at this price OQ'.

Surplus milk is sold at the price OD_s. The curve P'B is constructed to represent the blend prices under a market-wide pooling system. This function maps the blend price received by producers for any total quantity of milk, with a higher price for milk sold for fluid use, and the remainder sold at the surplus-use price. The long run equilibrium position is reached where the curve P'B crosses the long run supply curve S. Thus Q"P" is the long run equilibrium blend price received by farmers, equal to the industry's marginal cost of production. The result of classified pricing with unrestricted production is that both the average price of milk and the output of milk are increased. But less is consumed in fluid form and more is used in surplus uses than would have been the case in the absence of classified pricing.

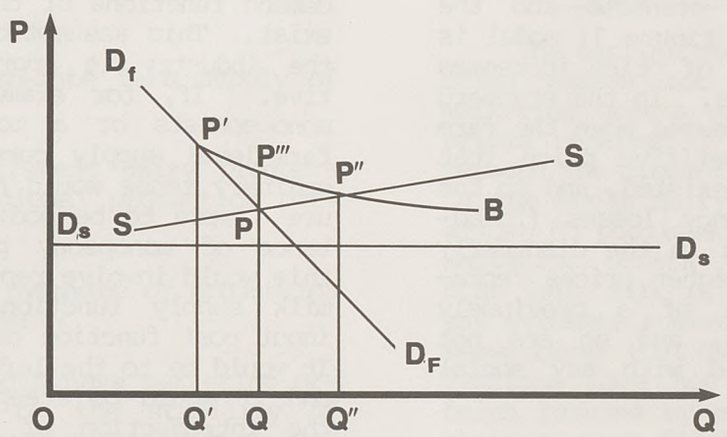
Almost the same diagrammatic analysis is presented in Kessel (p. 59), and with a few refinements, in later papers by Ippolito and Masson, Kwoka, and several others.[1] The main improvement that becomes standard following Ippolito and Masson's paper is the relaxation of the assumed perfectly elastic demand for manufacturing milk. However, this assumption had already been relaxed in the first published version of the price-discrimination model, by Sorenson and Cassels (1936).

Acceptance of any of these price discriminatory models with unrestricted production implies that federal milk orders must have increased the average price of milk received by farmers in federal order markets, and increased milk production. The only empirical issues are how much. The quantitative question turns on the elasticity of long run supply of milk and the difference in elasticities between the demand for manufacturing milk and fluid milk. Before discussing the quantitative estimates, however, we must consider some arguments against the general approach to modeling the effects of market orders. This approach has not been universally accepted.

The main line of argument against the model of figure 1 is that it presumes that in the absence of marketing orders we would in fact be at the competitive equilibrium position where supply and demand cross. Many have argued that the dairy markets would not be at such a position. This is the view of the Nourse Report, as the earlier quotation from it indicates, as well as Gaumnitz and Reed (1937). What we would then need for modeling purposes is to specify what the unregulated market for dairy products would look like in an analytical framework, and then consider the effects of classified pricing in that situation. What we need is an analytical depiction of the situation of disorderly marketing. Then we would be able to judge how the

[1]See Bibliography for full references.

Figure 1



situation with marketing orders should be expected to compare with it.

Under almost any depiction, say random errors in production and demand together with monopsonistic middlemen (handlers), we would expect to see higher prices under marketing orders. The reason is that in even the most disorderly descriptions of disorderly markets for milk, the salient feature is farmers' chronic lack of bargaining power when compared to the handlers. Therefore, since marketing orders increase farmers' bargaining power, marketing orders should be expected to result in a better situation for farmers, i.e., higher milk prices. The key difference between the disorderly marketing scenario and the standard competitive (figure 1) model is the normative meaning of price increases under marketing orders. In the standard model, the price increases move the farm price above the competitive price that would otherwise have existed, and so the orders cause efficiency losses ("deadweight" losses). But in the disorderly marketing view, the higher prices represent the improvement of a previously inefficient situation, and so are not necessarily associated with any social losses.

The purpose of the Task Force is not to reach an agreement on normative issues. The orderly marketing issues do have a strong positive or scientific component, however. The issues concern the underlying instability of the milk and dairy products markets, and the extent of departure from competition in these markets. Highly localized markets for farmers' milk in the 1930s and earlier are suggestive of monopsony power by handlers. The view of Christ (1980) is typical of many in the dairy industry: "Classified pricing does not conform to the competitive norm. Neither does the oligopsonistic form of market organization that characterized many fluid milk markets prior to the adoption of federal milk markets. It is probable that the price-enhancing effects of classified pricing brought producer prices closer to the competitive norm than before." However, we do not have evidence from studies of milk plant profit rates, or from regional farm milk price differentials related to regional concentration of handlers, that would support a finding that these plants were able to extract monopsony rents from farmers prior to marketing orders. Such market power as exists locally due to fewness of handlers would seem sufficiently countervailed by the existing legislation promoting cooperative marketing by farmers, without the federal price-regulatory authority of marketing orders. Moreover, all empirical work on milk and dairy products has proceeded on the basis that supply and demand functions of the standard type do exist. This assumption is valid only if the industry is approximately competitive. If, for example, handlers were monopsonists or a monopsony cartel, a farm-level supply curve for milk in the ordinary sense would not exist. If figure 1 were to be modified for the existence of monopsony power by handlers, this would involve replacing the farmers' milk supply function by the marginal input cost function of milk to handlers. It would be to the left of S in figure 1, and it would be steeper. Consequently, the introduction of classified pricing might be expected to increase the average farm price of milk more under monopsony than under competition. Therefore, while the normative and structural interpretations of what is occurring may vary, there is an unambiguous prediction from both points of view about the nature of unregulated milk markets (competitive or monopsonistic), that federal marketing orders should cause higher average milk prices in a given order area.

Estimates of Marketing Order Effects

Although many general issues concerning appropriate theoretical modeling and statistical estimating methods for the U.S. dairy sector remain, these are most productively treated in the context of specific estimates made by agricultural economists. Therefore, we turn

next to a consideration of answers to key questions that are available in the literature. Following the list of topics on p. 2 above, the questions are:

1. What effects have marketing orders had on the prices
   a) received by farmers (on average, or blend)?
   b) for different grades and classes of milk?
   c) for different regions of the country?
2. What effects have marketing orders had on the output of dairy products
   a) on aggregate farm supply of milk?
   b) of different dairy products and regional production patterns?
   c) on the dynamics of production adjustment?
3. What effects have marketing orders had on the stability of farm and consumer milk prices?
4. What effects have marketing orders had on the structure of the dairy industry,
   a) on farms by size?
   b) on the concentration and organization of handling and processing?
   c) on cooperatives?
5. Other issues, such as: What effects have marketing orders had on international trade in dairy products? What impact has the market-order system had on other aspects of dairy policy, particularly the support price for milk? What effects have marketing orders had on farmers' income and handlers' profits?

The answer to many of these questions cannot be considered in isolation, e.g., the price effects under (1) are mutually determined with output effects under (2), the answers under both (1) and (2) are necessary to consider effects on farm income under (5). Nonetheless, in an effort to make an orderly presentation, we attempt to break our review of literature into categories along these lines.

1. Effects on prices

a) Average farm price

The earlier general discussion indicated reason for wide agreement that marketing orders would tend to increase prices received by farmers. Indeed, in perhaps the closest approach to unanimity in the whole dairy literature, we found almost no published work concluding that marketing orders have reduced average U.S. farm milk prices. And apart from any evidence addressed by economists, it seems clear that farmers and farm organizations have not seen milk prices as being reduced by marketing orders, else their support for this institution would have evaporated long ago.

On the question of <u>how much</u> milk prices have been raised, there is wide disagreement. The issue turns on the level of blend prices under orders compared to average farm prices that would exist without them. Some have argued that reallocation of milk to manufactured from fluid uses has increased the average price substantially, while others have expressed doubt that there has been any quantitatively significant price increase, arguing that on most occasions, any profits created by orders will necessarily be dissipated by entry into the dairy business. Analytically, the former

argument implies a large difference in elasticity of demand between Class I and Class II or III milk, and the latter a high elasticity of supply of milk at the farm level.

The estimate implied by the parameter values to which Buxton (1977) and Ippolito and Masson (1978) give most emphasis is that the average U.S. farm price of milk is increased by 4 percent because of classified pricing under federal orders (Buxton, p. 528, Ippolito and Masson, p. 54). Kwoka's (1977) estimate is about twice as large -- a 9 percent average increase as of 1960. Dahlgran (1980) estimates an average price decrease for the whole U.S. of less than 1 percent. The overall U.S. average (including both order and non-order markets) price can decrease because farm receipts might fall more in the grade B areas than rise in the Federal Order markets. This would tend to occur if supply is much less elastic in the grade B markets than in the Federal Order markets.

Heien (1976) and Hutton and Helmberger (1982) provide estimates based upon aggregate econometric models fit to historical data for the purpose of investigating policy effects. Heien's estimate is expressed in terms of an average $175 million increase in the consumer cost of all milk products over the 1949-73 period, which amounts to about a 3 percent average milk price increase at the farm level. Hutton and Helmberger, using 1950-1977 data, also estimate a 3 percent blend price increase due to marketing orders in 1977.

Song and Hallberg (1982) conclude that federal marketing orders increased the average price of milk by 21 cents per hundredweight (about 2 percent) above the competitive equilibrium price in 1979, using a quadratic programming model for the 1960-79 period. LaFrance and de Gorter (1982) estimate a dynamic econometric model of dairy policy, but do not separate their estimates of price effects of the CCC price support program from the marketing order program. However their long-run elasticities suggest market-order effects of no more than 1-2 percent on the U.S. average farm price of milk over the 1950-1980 period. Dobson and Buxton (1977) also do not provide explicit estimates of overall price effects, but their results imply about a 2 percent increase in the 17 order areas that they considered. Stitts and Hammond (1970), in an earlier study of six federal order markets, find somewhat higher price effects.

All authors recognize the tentativeness of their estimates, and most provide ranges of estimates depending on alternative assumptions about the elasticity of supply of milk. Perhaps most surprising in the estimates cited is that despite the range of elasticities considered, no one concludes that federal marketing orders have increased the U.S. average producer milk prices by more than 10 percent, with a strong central tendency of estimates in the 2 to 5 percent range for the 1970s. Two additional factors should be kept in mind when examining the estimates of price impacts: (1) none of the studies has attempted to measure any of the long-run supply curve shifts due to order-induced price certainty and (2) the relative amounts of price discrimination have probably decreased since these studies were made.

One other piece of evidence on the tendency of federal orders to raise producers' milk prices is the amount by which milk supplies in federal order markets exceed the quantity necessary to meet fluid use in the market. If balancing fluid demand and supply is an objective of the program, then it would be expected that milk supplies in each market should be just sufficient to cover fluid needs plus a necessary operating reserve to meet seasonal and unpredictable imbalances between supply and demand. There is disagreement on the necessary reserve. Most estimates are that 15 to 25 percent amount of fluid use is adequate or that fluid utilization of all milk should range from 80 to 91 percent of total

supplies. Utilization ratios from most markets are in excess of them (see Table 3). For 1982, they range from 16.0 percent in the upper Midwest market to 91.4 in southeastern Florida. The 40 market average was 44.4 percent. These utilization rates support the hypothesis that classified prices in federal orders are used to exploit the difference in demand elasticity between fluid and manufacturing use milk demands, i.e., revenue enhancing price discrimination.

b) Prices of Fluid vs. Manufacturing Milk

The estimated effects on classes of milk are larger than on farm-level blend prices. Ippolito and Masson (1978) estimate that marketing orders increased the U.S. average price of fluid (Class I) milk by 9 percent, while reducing the price of manufacturing (Class II and non-order) milk by 6 percent. Dahlgran (1980), despite his small estimate of the overall farm price effect, estimates that marketing orders increased fluid milk prices by 8 percent, while reducing manufacturing milk prices by 9 percent. Generally, these results are found in all the papers cited in the preceding section. The reason is that all the analyses presume that the way in which marketing orders raise the average farm price is by diverting milk from fluid toward manufacturing uses. This increases revenue per pound of milk so long as the demand for fluid milk is less elastic than the demand for manufacturing milk.

Elimination of federal orders would not eliminate price differences between fluid and manufacturing milk. It is difficult, however, to estimate the no-order price differential. The most common procedure is to identify these categories with grade A and grade B milk, respectively, and to look at the producer's costs necessary to qualify for grade A delivery. This figure is placed at 15 cents per hundredweight by Ippolito and Masson (p. 37), citing Bartlett (1972). Dahlgran uses 15 cents also. Manchester (1978, 1980) argues that the appropriate competitive price differential also includes the extra costs of marketing raw milk for use in fluid milk products, and places these costs at 50 cents per hundredweight, citing Christensen, Patterson, and Swainston (1979). Dobson and Buxton (1977 pp. 30-31) discuss differences between fluid and manufacturing milk prices that would exist in the absence of marketing orders, mainly reflecting locational differences in production with higher transportation costs for fluid milk. But they state that in equilibrium at a particular location, the price differential would "reflect only the higher cost of producing grade A milk" (p. 31). Citing Frank and Peterson (1976) they place the relevant production cost differential at 23 to 32 cents per 100 pounds. Cummings (1978), using USDA cost estimates, finds no significant difference between Grade A and Grade B production costs.

The analytical issues in question are how to measure the production cost differential appropriately, and what if any costs beyond production-cost differentials would be included in a fluid/-manufacturing price differential absent marketing orders.

On the measurement issue, we want the cost differences to reflect grade A and B production for the same farm resource situation, changing only the requirements to move to grade A. The Cummings (1978) finding of no difference must be due in part to larger scale and perhaps managerial and other inputs on the average grade A farm, and so understates that the added costs were from current grade B producers actually switching to grade A. The Task Force believes that the evidence overall, especially for grade B to A conversions in recent years in the upper Midwest, points to production-cost differences of no more than 15 cents per hundredweight, and probably less.

On the issue of marketing-cost differentials, it is crucial to identify the location and stage of handling at which

Table 3. Class I (fluid use) Milk as Percentage of Total Producers Milk Deliveries by Federal Order Milk Market, 1982.

Region and Federal Order Marketing Area	Class I as % of Total Marketings %
North Atlantic	
New England	52.6
New York-New Jersey	40.8
Middle Atlantic	46.2
South Atlantic	
Georgia	74.7
Alabama-W. Florida	85.0
Upper Florida	88.2
Tampa Bay	87.4
Southeastern Florida	89.3
East North Central	
Michigan, Upper Penn.	51.3
Southern Michigan	42.2
E. Ohio-W Penn.	55.7
Ohio Valley	57.7
Indiana	64.6
Chicago Regional	22.4
Central Illinois	61.0
Southern Illinois	60.6
Louis.- Lex.- Evans	57.3
West North Central	
Upper Midwest	14.9
E. South Dakota	36.1
Black Hills	69.5
Iowa	30.0
Neb. - W. Iowa	38.4
Kansas City	46.7
St. Louis-Ozarks	52.9
Neosha Valley	N.A.
Wichita	69.8
East-South Central	
Tennessee Valley	65.3
Nashville	56.4
Paducah	83.2
Memphis	76.3
West South Central	
Central Arkansas - Ft. Smith	82.6
Oklahoma Metro	56.1
Red River Valley	74.6
Texas Panhandle	77.0
Lubbock-Plainview	86.5
Texas	69.1
Greater Louisiana	83.7
New Orleans	65.7
Mountain	
Eastern Colorado	68.6
Western Colorado	79.6
S.W. Idaho-E. Oregon	18.5
Great Basin	51.4
Lake Mead	73.6
Central Arizona	56.7
Rio Grande Valley	64.5
Pacific	
Puget Sound	34.9
Inland Empire	40.6
Oregon-Washington	47.6
All Market Average	44.4

Source: "Federal Milk Order Statistics, 1982 Annual Summary." Statistical Bulletin 698, Agricultural Marketing Service, U. S. Department of Agriculture, Washington, D. C., August 1983 pp. 46-47.

prices are quoted. The class differentials that the USDA data provide are at the plant. Consequently, in considering how much these quoted differentials would be reduced in the absence of marketing orders, the extra costs of hauling Grade A milk from an "average" farm to its plant must be included in the no-program price difference. These costs -- involving less stringent cooling and frequency of pickup requirements -- are nonetheless expected to be quite small and indeed disappearing as grade B standards approach grade A. More importantly quantitatively, and more difficult to assess, is the component of costs attributed to the "reserve pool" of grade A milk. The idea is that since consumption of fluid milk is stable over time compared to production, because of both seasonal and random day-to-day output fluctuations, it is efficient to aim at producing more grade A milk than is actually required for fluid consumption. Then even when output is down, fluid consumption will not have to be reduced (which would probably generate substantial retail price jumps due to inelastic short-run demand); and when production is at or above the expected level, the excess can be used in manufactured products. This is fundamentally a stabilization issue, and as such will be discussed below. It is crucial to the question of whether some form of classified pricing would persist even in the absence of marketing orders.

For the present discussion, the relevance of this point is that on an average day some grade A milk will be used for manufacturing purposes, and that this would be the case with absent marketing orders as well as under the current marketing institutions. This means that if the differential were paid only on grade A milk going into fluid uses, the differential would have to be greater than the grade A production cost differential in order to actually return that differential to grade A compared to grade B producers. Dobson and Buxton estimate that for Eau Claire, Wisconsin, this roughly doubles the differential required.

In order to assess the implications for comparisons of no marketing orders to current institutions, we need to know the U.S. average size of reserve pool, and whether the size of reserve pools would remain the same absent the orders. Overall, while the issues here are far from resolved, the Task Force believes that 15 to 20 cents per hundredweight (with a large standard error) is about the order of magnitude difference between milk for fluid manufacturing purposes that the research to date suggests. Moreover, regardless of the marketing cost issues that have been discussed, only farm production cost differences would be expected to exist at the farm level under competition.

c) Locational Structure of Farm Prices

Analytical work on marketing orders has uniformly treated changes in locational price differentials as a key result. The locational effects arise because the higher percentage of milk in fluid uses in urban order areas increases the blend price in those areas, and because the minimum Class I price established by the orders varies by location, generally increasing with distance from the center of the Minnesota-Wisconsin grade B milk producing area (conventionally placed at Eau Claire, Wisconsin). The net result is a tendency for a higher blend price the further from Eau Claire and the fewer the dairy cows per capita in an area. In Grade B areas, the price received by farmers is reduced because of the result found by every attempt at estimation that the federal order system reduces manufacturing milk prices. Thus, the marketing order system redistributes income between producers in different areas, with the upper Midwest the primary loser (Dobson and Buxton, 1977).

Several researchers, notably Hallberg et al (1978), Fallert and Buxton (1978) and Buxton (1979) have considered whether pricing based on distance from Eau Claire is appropriate. There might

well be milk exported from areas besides the Upper Midwest, or at least other areas which are self-sufficient. These studies indicate the existence of pockets of surplus milk outside the upper Midwest. This implies that more than one basing point is now appropriate for establishing minimum Class I prices. The fact that federal order pricing ignores the complications of surplus-milk location indicates that policy is distorting prices and production patterns geographically when compared to an efficient spatial allocation of production as examined by Babb. However, we do not have quantitative estimates of the deadweight losses involved.

Location has also been important in determining price differentials between milk classes. The average U.S. fluid/-manufacturing milk price differential has been based on the average distance of fluid milk production from the grade B area. Thus, the estimates given in the preceding section contain implicit judgments on locational pricing absent marketing orders. A full assessment of this situation requires predicting what quantities would be produced in different locations, a topic to be considered later.

Since World War II there has been a trend toward lower real differentials between manufacturing and fluid milk prices. This appears to reflect a reduction in difference between fluid and manufacturing product demand elasticities within order areas (Song and Hallberg, 1982), although LaFrance and de Gorter (1982) estimate that while demand elasticities have increased since 1952 for both fluid and manufactured milk, the difference between the elasticities has declined. Two other causes of the narrowing price differentials between classes and grades of milk are declining real transportation costs and reduced cost differences between producing fluid-eligible and manufacturing grade milk. In any event, average Class I prices would fall less today in the absence of marketing orders than was formerly the case.

The major element that could impact on the geographic structure of fluid milk prices is reconstituted milk. This technology, which has been available for years, increases storability of milk and reduces costs of shipping milk by removing water from milk at the sending location and producing "reconstituted" milk at the receiving end. Some have argued that it is the potential for this means of shipping "fluid" milk, largely precluded under the current marketing order system and special state regulations, that could be the main source of marketing order price effects today. Estimates available suggest that the elimination of all restriction of use of reconstituted milk would reduce U.S. average fluid milk prices by about as much as the fluid milk price effects cited above (Roberts, 1980; Novakovic, 1981, 1982.)

d) Consumer Prices of Dairy Products

These prices should be affected by marketing orders in the same direction and magnitude as farm prices, except insofar as marketing margins of handlers and processors are changed. Two issues here are (i) the imperfectly competitive structure of the milk marketing system and (ii) the increased complexity of milk handling caused by marketing orders.

i. Monopoly and Monopsony Power.

Ippolito and Masson (1978), following up on earlier investigations by the U.S. Department of Justice and Federal Trade Commission, attribute the prices negotiated for Class I milk above the minimum Class I price in each marketing order (the "over-order premium") to monopoly power of cooperatives. Of course, there is no monopoly in the classical sense, in that there are thousands of dairy producers in each market. Further, any association among them cannot constitute a cartel in the classical sense of an output-controlling combination of firms since there is no ability to control or allocate output by producers. However,

it is still possible for over-order premia to increase blend prices, so long as the supply curve of milk is upward sloping. Recognition of this ability goes back to Gaumnitz and Reed (1937), who analyze the results of classified pricing under cooperatives, but without marketing orders, by means of a diagram almost identical to figure 1 above. Thus, Ippolito and Masson are considering the over-order premia in the same light as Gaumnitz and Reed considered the whole structure of classified pricing before marketing orders. Ippolito and Masson estimate the over-order premium on a U.S. average basis to increase the price of fluid milk by about as much again as the marketing orders accomplish. Recently the over-order premia have been substantially less, presumably owing to the generally large supplies of milk since 1979.

A structural issue is the extent to which price differences between fluid milk and manufacturing milk are properly regarded as a result of the marketing order system. To what extent does the market power of cooperatives derive from marketing orders? The fact that classified pricing existed before marketing orders, and indeed was analyzed before 1937 by Cassels and by Gaumnitz and Reed in a theoretical framework similar to that used later for marketing orders, suggests that marketing orders are not necessary for cooperatives to exercise market power. However, Gaumnitz and Reed and others in the 1930s were convinced that marketing orders established by the power of the state to enforce agreements were necessary to maintain sufficient classified pricing to generate net benefits to milk producers on a long-term basis. The reason is the erosion of fluid milk price differentials in the absence of market orders via (a) "free-riders" within a market area who could reach mutually beneficial agreements with bottlers to sell additional milk at less than the Class I price, and (b) importation of cheaper milk from outside the market area.

Even if it is granted that marketing orders create market power for cooperatives, we still cannot assess the effects on prices as compared to an unregulated supply-demand equilibrium without knowledge of the market structure that would characterize an unregulated milk market. However, no analytical topic has achieved less consensus among economists studying the dairy industry than the underlying structure and performance of middlemen handling milk. Gaumnitz and Reed (1937) ch. 4, in one of the first extended discussions of the issue, consider and reject all of the imperfect competition models systematized by Robinson.[1] Instead, they characterize the industry by the term "complex competition", which despite their efforts did not provide a lasting or empirically usable analytical contribution. To the present day, while agricultural marketing economists have hesitated to describe middlemen in dairy (or other farm products) as competitive, they are equally hesitant to apply imperfectly competitive models (see Rhodes, 1982; Purcell, 1980, or Kohls and Uhl, 1979).

Moreover, the situation in the industrial organization literature is similarly confused. In many sectors of our economy we see relatively few, price-setting, advertizing firms which at the same time do not earn apparent monopoly profits and are subject to intense competitive pressures. Some variant of monopolistic competition or its equivalent spatial competitive equilibrium seems to capture these essential characteristics. But for purposes of middlemen's ability to exploit farmers, these models are essentially like classical competition.

On the other hand, the model of a price discriminating cooperative with free entry has become the standard approach to describe the marketing order situation. Thus, comparison of the price

[1]Joan Robinson, The Economics of Imperfect Competition, London: MacMillan, 1932.

discrimination model with a postulated competitive equilibrium as the outcome of an unregulated milk market is perhaps not as farfetched as some agricultural economists have supposed. Some recent theorizing places emphasis on potential entry or "contestability" as the key feature in assessing the competitiveness of markets.[2] The relevance of this point of view for dairy marketing is double-edged. If correct, it suggests that lack of competition among handlers in an unregulated dairy market should not cause policy-relevant problems requiring anti-monopoly action by government. At the same time, it suggests that collective farmer bargaining or marketing cooperatives should not cause deviations from competitive pricing either, in the absence of government-enforced restrictions. Since federal marketing orders contain such restrictions, it is not surprising to find that they cause deviations from competitive pricing. But, from this point of view, it would be surprising to find monopoly rents in the over-order premia that cooperatives bargain for. While Ippolito and Masson (1978) do find monopoly elements in the over-order premia, as mentioned earlier, more recent work by Babb (1979), and Babb and Bessler (1983), finds that over-order premia are not significantly associated with variables that should measure monopoly power of the cooperatives.

ii. Marketing costs caused by federal orders. The rules under which uniform blend prices are paid to all producers within an area have generated incentives to ship milk from one place to another that do not always correspond to underlying demand and cost conditions. The institutional basis for this inefficiency is the rules for pooling of milk and the criteria by which a supplier, usually a cooperative, qualifies for and participates in the pool. These regulations were discussed earlier. Their economic effects have been described as follows (Buxton 1979, pp. 783-4):

> Once a cooperative which is manufacturing dairy products principally in plants located relatively close to a fluid market ships enough milk to qualify for the pool, the incentive to ship additional Grade A milk to the fluid market is greatly diminished. If it does ship additional milk to the fluid market, it will not pay its producers any more for their milk. There is an actual disadvantage in shipping milk to the fluid market since the cooperatives that have manufacturing facilities would want the largest volume of milk possible to lower unit costs in their own manufacturing operations. Negotiated Class I prices above federal order minimums help provide the incentive for such cooperatives to "give up" the milk in their own manufacturing operations and ship it to the fluid market. This means that increased Class I differentials still may not get the milk needed for fluid use.
>
> This situation creates a need to go further distances from the central market to obtain enough milk for fluid demand even though closer supplies exist. To the extent that this phenomenon exists, fluid handlers need to bring milk for fluid use from more distant areas than likely would be the case without regulation.

We do not, however, have empirical evidence on actual increases in transportation costs caused by these regulations.

[2] W. Baumol, J. C. Panzar, and R. D. Willig. Contestable Markets and The Theory of Industry Structure, New York: Harcourt Brace Jovanovich, 1982.

2. Effects on Dairy Production

a) Aggregate Supply of Milk

The models and analyses that imply a higher blend price of milk on a U.S. average basis imply larger U.S. milk production, assuming a non-negative elasticity of supply of milk for the U.S. a whole. How much larger the output is depends crucially on the magnitude of this elasticity. Assessments here must be conjectural, because of the uncertainty of estimates of this parameter. The situation is complicated for milk, as for all livestock products, by the dynamics introduced with the life-cycle and age structure of the stock of animals at any given time. The only plausibly defined supply elasticity is a long-run concept in which the population of cows is permitted full adjustment to a change in price expectations, averaged over any cycles caused by population dynamics of the U.S. dairy herd. The short-run supply elasticity depends crucially on whether enough time is allowed for changes in herd size, and if so, how much time. In addition, the extent to which cow numbers will respond depends on the age structure of the U.S. dairy herd at the time a price shock occurs, as well as price expectations in the feed and beef cattle sectors.

Ippolito and Masson use long-run supply elasticities in the range .4 to .9, citing Halvorson (1958) and Wilson and Thompson (1967). Actually, Halvorson, using a Nerlovian (lagged dependent variable) model on 1927-57 data, finds a range of long-run supply elasticities from .15 to .89, and summarizes his findings by placing the most likely value "near the upper end" of the .35 to .5 range (p. 1111). Wilson and Thompson give .52 as their "approximation of the long-run elasticity of supply of milk" (p. 369) based on 3-year lagged prices in 1947-63 data. Prato (1973) finds substantially smaller elasticities, however, and Hutton and Helmberger (1982) estimate the U.S. aggregate short-run elasticity of supply to be .08, with a long-run elasticity of .36. Buxton (1977) uses a value of .5, for which he provides no justification. Dahlgran (1980) uses separate supply elasticities for grade A and grade B milk for 16 different areas. He finds an average value of 1.74 for the elasticity of supply of grade A milk and 0.897 for grade B milk. Dahlgran does not describe these as either short-run or long-run. They are derived from monthly data, 1968-77, with equations holding the prices of cows and feed constant. Heien (1976), Fallert and Hallberg (1976), and Salathe, Price and Gadson (1982), provide the most complete available empirical models on the milk supply side, with equations for cow numbers, heifers, and milk yield per cow that reflect characteristics of the industry. None of these papers provides long-run elasticity estimates, but their impact experiments indicate short-run (one or two year adjustment) elasticities of less than .4. LaFrance and de Gorter (1982) pay great attention to dynamics and estimate a short run supply elasticity of .5 and long run of 4.8 in 1952, changing over time to a short run elasticity of .3 and long run of 8.0 as of 1980.

Overall, the supply elasticities estimated are quite sensitive to the time period covered and the method of estimation. One would expect that farmers would not change output very much in response to changes in current prices on a monthly, quarterly, or even annual basis, due to rigidities in the capital stock and cow-heifer populations. Indeed, all studies find that the short-run supply elasticity is quite low (although there is no evidence to support contentions that it is negative, so that a reduction in the producer price would generate more output). The long-run elasticity values used by Ippolito and Masson, Buxton, and Dahlgran, are all consistent with some available evidence if not one another. Generally, studies on more recent data are yielding higher long-run elasticities, especially that of LaFrance and de Gorter. A quite high long-run supply elasticity, say of more

than 2, makes a good deal of economic sense given modern dairy production methods. Milk production as an industry is likely to be close to a constant-cost industry since efficient-scale dairy operations can be replicated indefinitely. Rising long run supply price must come about through increasing scarcity of land, feed, labor availability of high quality animals, or management capacity. None of these appears to be as much a limiting constraint as in the past.

The relevance of a high elasticity of supply is that as it increases, it limits the overall price effect that classified pricing can have. Thus, Dahlgran obtains a lower price effect of marketing orders than Kwoka, Ippolito and Masson, or Buxton, primarily because his average supply elasticity is twice as high. With a long-run supply elasticity of 8, as LaFrance and de Gorter obtain for 1980, marketing orders could have only a negligible effect on U.S. average prices.

b. Output Effects by Region and Product

Dahlgran estimates separate supply elasticities for grade A and grade B milk, of 1.7 and 0.9 respectively for the average of the 16 markets he considers. This difference accounts for the unique results he obtained for the aggregate price effect -- that marketing orders reduce the U.S. average farm price of milk. This is a seemingly counter-intuitive result. How can classified pricing that increases revenue per unit output of milk under marketing orders reduce the farm price of milk? How can an increase in the output of milk be consistent with a lower price of milk when supply curves are upward sloping? It cannot, when there exists a well-defined U.S. aggregate supply curve. However, under marketing orders we cannot be sure that any approximation to such a curve makes sense. The reason is that different marketing areas will have different blend prices, which may not even move in the same direction when the fluid/manufacturing milk price differential is changed.

Figure 2 presents an example to illustrate the aggregation problem. For simplicity, ignore grade A/B cost differences and suppose that milk for all uses receives the same price in the absence of marketing orders. Market 1 is a high-cost area where only fluid milk is produced, and manufactured dairy products are imported from other markets. The introduction of a marketing order increases the fluid milk price to P_1* with excess milk now going for manufactured products where price is given by the import market from other regions. This increases the blend price, shifting the effective demand curve to D_b. However, long-run supply in market 1 is highly elastic (even though costs are relatively high) because at the margin producers simply bring in new herds, feed, laborers, etc., at almost constant cost. Therefore, the intro- duction of the marketing order increases production from Q_0 to Q_1 but does not appreciably increase the long-run equilibrium farm price in market 1. In market 2, milk is produced only for manufacturing use. The marketing order in market 1 results in more milk being produced for manufacturing purposes there, and reduces the demand for milk from market 2 as from D_2 to D'_2. Hence the farm price in market 2 falls (assuming we begin above the support-price level P_s). The result for average farm prices and output in the two markets aggregated is larger output and a lower price.[1]

[1]Simultaneous equilibrium in the two markets requires that the lower price in market 2 cause a reduction in the prices of manufactured products in market 1. This implies that D_b will not be so far to the right of D_1 as we would have calculated ignoring the shift in D_2. Thus, D_b should be derived from a total or quasi-general equilibrium demand curve for manufacturing milk in market 1.

This result occurs if: (a) the supply curves in high-cost marketing-order areas are sufficiently more elastic than in the no-order and manufacturing milk area, and (b) there is a large enough quantity of milk in the manufacturing area. The result does not require that any area be solely grade B, but only that the ratio of fluid to manufacturing uses of milk be sufficiently different in different markets and that shipments of milk or milk products between them occurs. On the other hand, if the elasticity of demand for manufacturing milk is high enough, for example, because the price is at the support level, then increasing the fluid milk price cannot reduce the blend price anywhere. The Task Force did not find it plausible that the required situation for a U.S. average milk price decline due to marketing orders actually exists.

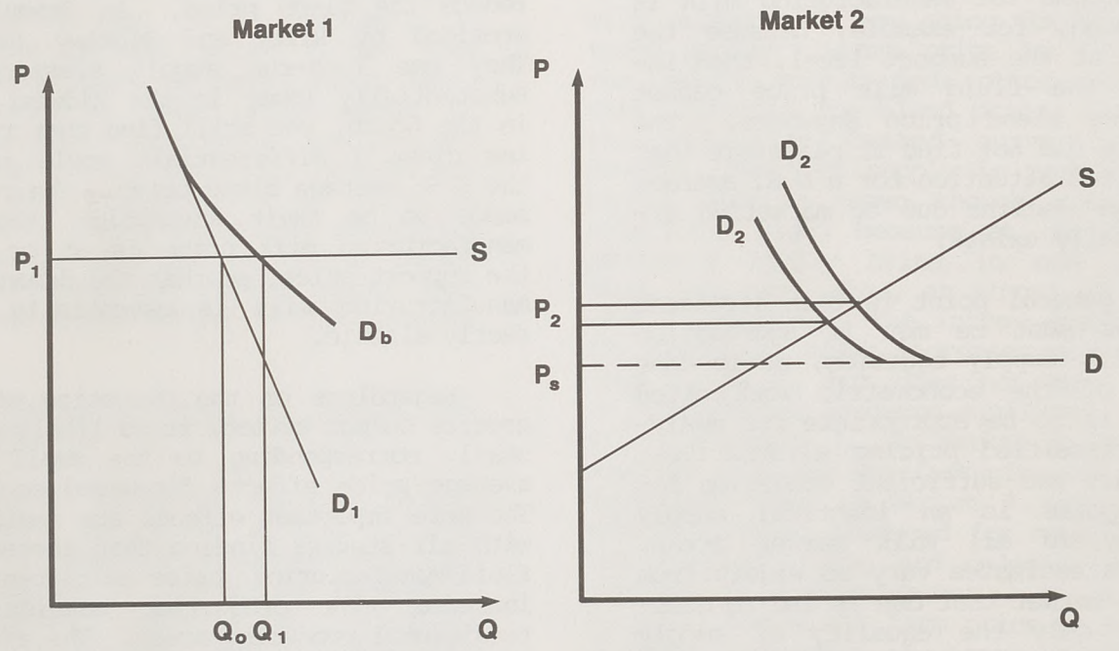
The general point is that stringent conditions must be met if aggregation into a U.S. supply equation, as is done in much of the econometric work cited earlier, is to be appropriate for analysis of classified pricing alternatives. A necessary and sufficient condition for most purposes is an identical supply elasticity in all milk market areas. Dahlgran's estimates vary so widely from market to market that one is led to question not only the equality of supply elasticities across milk markets, but the prospects for estimating which way any inequalities run. It is important to know as much as posible about the magnitudes of area-specific elasticities because it is not enough to asert that U.S. aggregate supply curves are inappropriate; we want also to know what sort of error or bias the use of an aggregate elasticity will cause. If the manufacturing-intensive milk areas have a lower elasticity of supply than fluid-intensive markets, then aggregation overstates the price effect of marketing orders. But if the fluid-milk intensive areas have a lower elasticity, then aggregation tends to understate the price effects of marketing orders. Halvorson's (1958) discussion of determinants of milk supply elasticity, emphasizing the opportunity costs of land and labor, suggests that areas where dairying is most important in the region's agriculture should have the lowest supply elasticities. These tend to be the grade B areas. This is consistent with Dahlgran's results.

On the other hand, lower supply elasticities in manufacturing milk areas is not sufficient for increases in manufacturing/fluid price differentials to reduce the blend price. An example is provided by Riley and Blakley (1975). They use long-run supply elasticities substantially lower in the Midwest than in the South, yet still find that reducing class I differentials would reduce the U.S. average blend price. The reason seems to be their assumption that the manufacturing milk price is at or near the support price, so that the demand for manufacturing milk is essentially perfectly elastic.

Regardless of the direction of aggregate output effect, it is likely to be small, corresponding to the small U.S. average price effects discussed earlier. The more important effects are regional, with all studies finding that increasing fluid/manufacturing price differentials increase milk production outside the traditional producing areas. The effects are least clear for the Northeast and West Coast markets.

With respect to products, however, the effects are demand-driven. Higher fluid milk prices reduce demand for and hence the output of milk for drinking, and the lower manufacturing prices increase demand for and hence the output of manufactured milk products. The extreme case occurs if milk supply is very elastic and the demand for manufacturing milk is also extremely elastic (at the support price). Then additional milk in quite large quantities can be generated by increasing the Class I price, only to be absorbed in CCC stocks.

Figure 2



Quantitative effects, even more than price, are location-specific. Rather than summarize results in the literature we refer the interested reader to Babb, et al (1977), or Fallert and Hallberg (1976), or Dahlgran (1980), and references cited in these studies.

3. Effects on Price Stability

The idea that milk markets would be disorderly absent marketing orders suggests that key evidence on their effects should concern instability of some kind. However, what aspects of price variation over time or space constitute disorderly conditions has never been precisely defined, much less measured. The conceptions of the subject by agricultural economists have been varied, one might even say disorderly. The issues were discussed briefly earlier in regard to criticisms of the price discrimatory model of figure 1.

Other elements of the picture, from the consumer side, can be introduced by the statement that "the curvature of the consumer demand schedule appears to be such that consumers lose when price instability of the type experienced for beef or grain in the 1970s is substituted for price stability" (Blakley, 1980, p. 298). This assertion applies to dairy a class of welfare economics models more stringent in its underlying assumptions and data requirements than the model of Harris (1950) and its successors. The evidence on curvature of dairy product demand functions is too weak to support any definitive judgment, the required condition involving not only linearity or nonlinearity, but the specific type of nonlinearity. Moreover, a given functional form can yield different results depending on the source of disturbances (demand vs. supply shifts) and whether they are multiplicative or additive. The state of the arts seems to be that "almost nothing can be determined on the basis of economic theory alone about which groups gain and which lose from price stabilization..."[1]

A more commonly broached argument on stability is that price stability induced farmers to produce more, hence tending to drive down prices (e.g., Manchester, 1978 p. 20, Christ (1980). On this assertion, Dahlgran (1980, p. 294) states: "While the existence of this phenomenon is open to investigation, there are two implicit assumptions; first, that dairy farmers are risk averse and second, regulation does indeed reduce the price variance." He finds no evidence to report on either assumption. Thraen and Hammond (1983), however, estimate a quite substantial rightward shift in supply due to price stabilization.

It is important to obtain the best possible evidence on supply shifts due to price stabilization because it would not take a large shift in supply to offset the price effects discussed earlier. With an elasticity of supply of 0.5 and an elasticity of total demand (from blend price line) of -1.0, a downward shift of 10 percent in supply would offset a 3 percent blend price effect as calculated above. The 10 percent supply shift means that owners of labor, capital and management would be willing to accept returns 10 percent less under the price-stability conditions caused by marketing orders as compared to a no-order price regime. (These consumer benefits do not occur when price-supports provide an effective infinitely elastic demand for milk by the CCC. In this case the 10 percent downward shift with a supply elasticity of 0.5, becomes simply a 5 percent production increase, all of which goes into CCC stocks at the support price. This is a situation where assessment of marketing order effects clearly requires consideration of the price-support program.)

[1] R. E. Just, D. L. Hueth, and A. Schmitz, Applied Welfare Economics, Prentice Hall, 1982, p. 263. See also the even more pessimistic conclusions in D.M.G. Newbery and J.E. Stiglitz, The Theory of Commodity Price Stabilization, Oxford, 1981.

The view of instability that seems most central to the orderly marketing issue is sufficiently different from the stochastic supply-demand literature developed with reference to grains that special analytical treatment is required. This concerns the instability of day-to-day, week-to-week, and seasonal milk production as contrasted to a stable but inelastic short-run demand for milk. In the case of grains, a similar situation with respect to annual crop production leads to carryover stocks as a stabilization device. Fluid milk of course is highly perishable. But an analogous stabilizing device is available in the form of manufactured dairy products. Why is this so different from stabilization or grain prices through storage? It is not the perishability of milk, nor its continuous production: these merely shorten the time over which stabilization mechanisms must operate. The crucial difference is the irreversibility of storage of milk in the form of manufactured products. If you make cheese from milk when supplies are large, you cannot subsequently pull milk out of storage by making milk from cheese when supplies are short. The only insurance against a shortfall in fluid milk production is an excess capacity to produce milk, the source of the "reserve pool" mentioned earlier.

Dairy economists have tended to suppose that this characteristic of the dairy industry implies that classified pricing of some kind is a natural, or socially efficient, arrangement that would arise spontaneously in a bargaining situation between milk producers and handlers. Indeed, as Gaumnitz and Reed (1937) and Cassels (1937) demonstrate, classified pricing has arisen in such bargaining when cooperatives act as bargaining agents for producers. What is the implication for policy? It reduces the grounds for criticizing classified pricing under marketing orders, because the alternative to classified pricing is mis-specified in studies like Dahlgran (1980), Ippolito and Masson (1978), et al. Thus one critic states: "This model of an unregulated milk market has a basic flaw in its structure because it fails to incorporate the requirement of a significant reserve of milk in excess of consumption needed to meet fluctuations in fluid milk demand" (Levedahl, 1979, p. 626).

The chief unresolved issue in the literature is the particular model of an unregulated milk market required to incorporate a reserve pool of milk.[1] Buxton (1978) provides a geographical/-seasonal model in which classified pricing solves the incentive problems of maintaining the reserve. Manchester (1983) emphasizes the the higher costs incurred by manufacturing milk plants whose supplies of raw milk are diverted to fluid use during low production periods. He states that "The price paid by these plants for milk for manufacturing must be below the price in the third ring (where all milk is always used in manufacturing) if these plants are to be viable" (p. 6). The spatial and temporal behavior of competitive equilibrium raw milk prices in this model has not yet fully analyzed (even theoretically, much less empirically). The main new element, compared to the Buxton model, is that the competitive equilibrium should involve locational rents not only to dairy farmers, but also to milk plants (unless the supply of milk manufacturing services is perfectly elastic).

Manchester identifies a serious equity problem with competitive equilibrium in such markets, in that the costs

[1]A logically prior issue is whether a reserve pool is really required. It would be possible to have no reserve and simply let a rising price ration milk use in periods of short supply (as with fresh fruit and vegetables). Presumably this is not efficient and is not observed because the expected cost of holding a reserve of grade A production capacity is less than the expected gains from having this milk available when needed (which is not the case for fresh fruits and vegetables).

of seasonal variability are borne disproportionately by the fringe area producers (because the spatial price minimum will occur there, and be lower, the greater the seasonal variability, even though these producers have no particular role in causing the variability). However, the inequity does not seem qualitatively different from the unearned gains and losses that reguarly occur in other markets with random supply or demand. That is, there is no apparent special inequity that calls for special policies in dairy to redress the unearned gains and losses.

Moreover, it is not apparent that classified pricing is necessary or even the most efficient way to solve the incentive problem. As examples of alternatives, there could be contractual arrangements in which all grade A milk received a bonus in short-supply periods, or grade-A contracts with penalties for shortfalls, or transportation-cost subsidies or other special contracts specifically with grade-A fringe producers. Moreover, if classified pricing is indeed the efficient form of contracting, this does not seem fundamentally damaging to the models used earlier. What it means is that in considering the fluid/manufacturing milk price differential in an unregulated market, we should add to the grade A/grade B cost differential as discussed above an additional amount for maintaining the grade A reserve pool. This should be quite a small amount because the necessary incentive is not to maintain production per se in the fringe area, but only grade A as opposed to grade B production. Further complicating the stability issue, Gaumnitz and Reed (1937) cited as a problem with the imperfectly competitive situation before marketing orders that consumer prices were unduly stable because of price-setting in the industry. But they provide no empirical evidence.

Hallberg (1978) considered instability in the absence of CCC price-support activities, and found that it would increase. But classified pricing is not seen as a contributor to price stability. In addition, Hallberg finds no underlying instability in the dairy sector that produces long-term phenomena like the cattle cycle. Dobson and Salathe (1979) consider marketing orders in the 1930s and 1950s as directed in part at seasonal instability, following the Nourse Report. They find evidence that seasonal instability has in fact been reduced in the past 20 years, but it is not clear that marketing orders are responsible. It should be noted that orders have special "take-out and pay-back" and seasonal base plans that are specifically designed to reduce seasonality of production. Both these programs accentuate seasonality in average product price. With respect to disorderly markets as more transitory causes of instability, Dobson and Salathe review the evidence discussed earlier from Dobson and Buxton (1977) on what happened during lapses of marketing orders in Chicago and Mississippi. These episodes were too specfic to yield any general conclusions, but market participants did describe the non-order periods as disorderly.

4. Effects on structure of the dairy industry

a) Numbers of Producers and Concentration of Production

Statements concerning the structural impacts of removal of marketing orders are largely in the realm of informed speculation. They are generally rooted in experiences of pre-order days. A methodological approach that might be valuable in analyzing this issue is system simulation of a model containing appropriate locational and behavioral responses of micro units to a variety of market coordination schemes conceived as alternatives to marketing orders. We know of no such efforts in spite of the widespread call for structural analysis (of all agriculture, not just dairy) in recent years.

Speculation about the impact of marketing orders on structure is generally based on the premise that marketing orders impart long-term stability to the industry. Stability is imparted, so the argument goes, through market-wide coordination and classified pricing, and through order provisions for processor audits. This stability is judged to lead to lower costs of production for both producers and processors.

Such stability would lead naturally to reduced variation in producer income. To the extent that this is true, it is likely that marketing orders can be credited with keeping some of the smaller (more inefficient) producers in business at least longer than would otherwise be the case. If marketing orders do not raise the average level of milk prices, one might argue that they only serve to delay the inevitable for such producers. To the extent that marketing orders also raise the level of producer returns through their price discriminatory features, however, then they do more than delay the inevitable. The literature discussed earlier suggests that they have indeed raised the level of producer returns. However, the more important effect may be on relative producer prices regionally, with lower prices in the upper Midwest where farm sizes tend to be smaller. Nevertheless, considering the number of relatively small dairy units still in production, one must conclude that some institution or circumstance has served to keep small units in production. It is possible that optimum scale is relatively small for dairy farms in which summer pastures and corn silage feeding are important, and that economies of scale have not changed as much over time as for crop production or livestock feeding based more heavily on high-protein concentrates. Also, in the policy arena, CCC price supports, because they affect manufacturing milk prices directly, should be relatively more important in the smaller-scale dairy areas. Even though Class I prices are administered to move with the M-W price, over time the erosion of the real differential may in part be due to price supports. Overall, we are agnostic about marketing order effects on the structure of dairying.

With regard to cooperatives in dairy manufacturing, Manchester (1983) estimated dairy cooperatives' share of total output of butter at 75%, of natural cheese 50%, and of dry milk products 90%. Cooperatives have for a long time been active in these industries. Cheese has recently become more attractive to cooperatives as the demand for this product increased sharply in the 1960s. Cooperatives' share of dry milk products increased sharply at about the same time.

Cooperatives are believed to have such a large share of the processing market for two reasons: first, to dispose of the surplus milk in the market for which they assist with the fluid milk balancing function, and second, for use as a bargaining weapon when it comes to negotiating over-order premiums. The latter appear to be justified in most instances as payment for servicing the market, as discussed earlier.

It seems clear that marketing orders have provided the climate for cooperatives not only to perform the service function for the market, but to develop the processing capacity they currently own. Whether or not they would continue serving in this capacity without marketing orders is largely a matter of speculation. If it is true that coops are efficient processors of these manufactured products, they may well be expected to continue in operation. We are aware of no information with which to make such a judgment.

5. Other Issues

With respect to many other questions that have been raised about federal marketing orders, our knowledge is even less well developed than for structure. The effects on farm income, however, have been considered in some depth, with answers following from price and output

effects as discussed earlier. The implication of the findings that marketing orders have increased both the farm price and output of milk is that the returns to scarce resources in milk production must have been increased by orders. Song and Hallberg (1982) find explicitly that returns have been increased, but by less today than was the case 20 years ago.

Typical estimates discussed above are that federal marketing orders have raised the average farm price of milk about 4 percent in the post-World War II period, and with an elasticity of supply of milk .5 have increased output by about 2 percent. This would raise the aggregate rents (producers' surplus) in dairy farming by slightly more than 4 percent, and would imply that dairy farmers as a whole were better off by about $700 million per year (in 1982 dollars) on average.

An issue that has received study in recent years is the effects of marketing orders on innovation in milk marketing. Marketing orders have been particularly criticized for surpressing efficiency gains that could be realized by greater use of techniques of transporting milk from surplus milk areas to higher-cost areas, particularly reconstituted milk. Roberts (1979), Hammond, Thraen and Buxton (1979) Novakovic (1981, 1982) have found the efficiency losses due to marketing-order regulation of reconstituted milk to be substantial. These losses are particularly significant because they are not primarily transfers from consumers to farmers. There are real deadweight losses, with the gains to farmers in the high-cost milk areas largely offset by losses to farmers in the milk surplus areas.

Linkages of marketing orders to trade policy in dairy products and to the dairy price-support program seem likely to exist, but have not been systematically explored in the literature.

V. Implications for Future Research

The quantity of research and expository writing on marketing orders is large, and this work draws on an even larger body of published work on dairy marketing, farm-level dairy economics, and statistical supply-demand studies. Yet many issues remain unresolved, including some of the most fundamental. For example, although several authors utilize a price-discrimination model of marketing orders, this approach has been criticized for its strong assumptions about the nature of competitive equilibrium that would exist in the absence of marketing orders. As another example, several authors have argued that technical and structural changes in dairy production and marketing have resulted in a substantially different situation today than was the case 50 or even 25 years ago, when the marketing order idea was developed. Yet the exact nature and implications of these changes, and the identification of those changes which are really significant, is not well established either conceptually or empirically.

The most solidly based work on effects of dairy marketing orders has involved principally price and output effects for particular market order areas, national-average price and output effects, and relative price and output effects for different locations. Knowledge about instability and structural aspects of dairy farming and milk handling is not nearly as well established. There is controversy about the magnitude of effects and about the analytical appropriateness of methods used in even the most thoroughly studied issues.

The Task Force's view on where further research might most usefully be directed are as follows:

1. Underlying supply and demand elasticities are not as well measured as one might hope, given the effort devoted to their estimation; but since the full

arsenal of data and theory available has been applied already, the Task Force does not have specific recommendations for further work. Yet much of the published work on price and output effects is crucially dependent upon estimated own-price demand elasticities for fluid and manufacturing milk at the farm level, and on the own-price elasticity of supply of milk from farms. Therefore, we believe that continued efforts must be made to provide up-to-date measures, based on current data to the extent possible and precisely defined as to the length of run, assumptions made about price expectations formation (on the supply side), and the specification of endogenous and exogenous variables besides the price and quantity of milk products.

2. Direct before-and-after comparisons or cross-sectional comparisons of situations with and without federal marketing orders have been used only sporadically. Further consideration of historical evidence, using econometric techniques to estimate marketing order effects, might provide valuable evidence. Basically this involves extension and more detail in work such as reported by Kessel (1967) and by Dobson and Buxton (1977).

3. Economic estimation of location-specific supply relationships for milk and milk products needs further attention, perhaps along the lines initiated by Dahlgran (1980). Work has consisted primarily of estimation of costs of transportation and other costs differentiating Grade A and Grade B milk, and bulk milk at different locations. These costs, together with location-specific consumption and production data, have been used in regional simulation models to estimate effects of marketing orders that could not otherwise be analyzed. It would be valuable to have more direct econometric evidence on how dairy farmers respond to Grade A/B price differentials in the long run, on location-specific own-price elasticities of supply, and on how geographical milk shipments respond to price incentives. More generally, investigation should be undertaken of what economic purpose is served by the Grade A/B distinction today.

4. A general issue has been the kind of conceptual model most appropriate to the dairy marketing sector. Since the 1930s, agricultural economists have emphasized that some model beside pure competition is needed. But no one has yet proposed such a model in a form capable of generating comparative-statics results concerning the effects of marketing orders as compared to no orders; and once proposed such a model would need further work to make it amenable to econometric confrontation with dairy-industry data.

Short of developing a full-blown model, it would be useful to have a precise and empirically measureable concept of orderly marketing, one in which the Grade A reserve pool could be expressed in supply-demand terms and compared to contractual alternatives. Then it might be possible to make progress in estimating the effectiveness of marketing orders in meeting orderly-marketing goals.

5. Our current knowledge is so sketchy that almost any kind of scholarly study -- conceptual, econometric, or just a coherent, sustained discussion of the issues -- might be helpful in clarifying and assessing the effects of marketing orders on innovations in dairy marketing, on cooperatives, and on the structure of dairy farming.

Generally, we need better economic understanding of the causes and consequences of trends in the dairy sector. Examples include: a) changes in the seasonal pattern of milk output and production costs, b) larger geographical markets for milk and simultanconsly larger marketing cooperatives, c) changes in the structure of milk processing, distributions, and retailing, with traditional locally based but powerful bottlers replaced by regional or national firms, d) vertical integration by milk handlers and

by cooperatives, e) the development of substitutes for fluid milk products. Which of these changes are important and which leave the essential economics of dairy marketing unchanged? What are the implications for the role and operation of marketing orders?

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