Changing Connecticut's Dairy Regulations: Implications for Performance in the Northeast Dairy Industry

by
Ronald W. Cotterill
and
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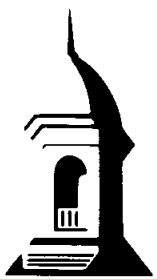
Food Marketing Policy Center
Research Report No. 6
September, 1989



The University of Connecticut
Department of Agricultural Economics
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Acknowledgements

This research report and Food Marketing Policy Center Research Report No. 7, "An Examination of the Connecticut Dairy Inspection Program" by Professor Gary Johnson jointly analyze federal and state quality regulation in New York and Southern New England and develop alternative regulatory reform options. In tandem they constitute the final report to Kenneth B. Andersen, Commissioner of Agriculture, State of Connecticut for research that was funded by the Connecticut Department of Agriculture. The Food Marketing Policy Center, and the Storrs Agricultural Experiment Station, University of Connecticut have also supported this research. The authors would particularly like to thank Paul Gothelf, Chief of the Dairy Division, Connecticut Department of Agriculture for cooperation and encouragement, Gary Johnson for review and comments, and Dorine Nagy for typing and secretarial services. Responsibility for the facts and interpretations presented in this report remains solely with the authors. This report is Storrs Agricultural Experiment Station Scientific Contribution No. 1311.

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Table of Contents

List of Figures

List of Tables

Executive Summary

The State of Connecticut currently requires that all farms selling fluid milk in the state be inspected on a regular basis by a Connecticut health inspector. Farms are routinely inspected twice a year and those with health problems more often. In order for a fluid milk plant to obtain a license to sell milk in Connecticut, all farms supplying that plant must be inspected. Even if the plant and its suppliers are out-of-state; Connecticut inspection must be performed. The State of Connecticut does not currently participate in reciprocal agreements with other states; and, thus, Connecticut inspection is over and above any inspection routine enforced by supplying states.

Connecticut and Massachusetts are the only states in the nation that do not participate in some sort of reciprocal inspection program. This fact alone suggests that reasons other than securing a safe supply of milk may explain the persistence of total milkshed regulation by Connecticut and Massachusetts. Other reasons for the persistence of nonreciprocal inspection by Connecticut and Massachusetts may include regulatory inertia. The laws are old and there is inertia, possibly even fear, to changing a system that has functioned in an acceptable fashion. Alternatively, many opponents and some proponents of the existing Connecticut milk regulatory system argue that they are a barrier to entry of milk from out-of-state producers and processors into Connecticut. This barrier ostensibly provides farmers and processors selling milk in Connecticut with higher prices at the expense of Connecticut consumers.

For this to be the case, however, the regulations must not only be a barrier to entry, they must be the only barrier to entry. If there are other entry barriers, then 1) those barriers may be responsible for the low level of entry in New England by processors from outside of New England, and 2) moving to full reciprocity may have little impact on the structure, conduct, and, ultimately, the performance of the New England milk marketing system.

In this report we therefore take an innovative approach to the analysis of the impact of the alleged restraint of trade associated with the Connecticut milk inspection system. Rather than ask whether inspection practices do or do not restrain trade we analyze the marketing system to identify and evaluate the impact of other industry and product based barriers to entry of milk into New England/Connecticut. Specifically, we analyze the milk

supply system including the federal order structure, transportation costs of raw and processed milk products, the competitive position and conduct of milk processors, and retail milk prices in selected New York and New England cities.

This approach allows us to identify those Southern New England product and geographic markets where entry barriers are low and other market conditions, such as ready access from New York, plants make entry quite feasible. If Connecticut regulatory practices are restrictive and become less restrictive in the future, these markets are most likely to be affected.

In this report we focus upon what could be described as the impact case scenario. We assume that Connecticut regulation poses a barrier to entry prior to regulatory change and that it creates no barrier *ex post*. Two other cases are feasible. If, in fact, the regulations do not *ex ante* and *ex post* create entry barriers, then changing the regulations will have no competitive impact on participants in the marketing system. Similarly, if there are *ex ante* and *ex post* entry barriers, then there will be no competitive impact. Thus, the case analyzed is the interesting case.

A companion report, Food Marketing Policy Center Research Report No. 7 (Johnson), examines the current Connecticut Milk Inspection Program and evaluates the extent that it, in fact, has acted as a barrier to trade.

Based upon our analysis of entry conditions in the third part of this report, we conclude that there are substantial barriers to entry into New England if processors seek to enter by building new plants (*de novo* entry). These barriers dominate any changes in the Connecticut regulatory system. Entry by expansion of distribution routes from existing processing plants in New York is the most likely type of entry, yet our work shows that New York firms have somewhat higher processing costs and Connecticut/Boston milk prices are the same or lower than New York City/lower Hudson Valley prices. In the short run there may be exceptions due to capacity utilization based cost advantages, but in the long run entering Connecticut by route expansion does not appear to be a viable strategy for New York processors.

One exception to this long run conclusion may be the consolidation of milk accounts of large chain supermarkets that have operations in New York and Connecticut. The transaction cost reductions that a supermarket chain can realize from consolidating its milk orders with New York processors may offset the estimated 2.7 cents/gallon processing cost disadvantage of New

York processors and any need to lower price to match low Connecticut retail milk prices.

If entry by supermarket account consolidation does occur, very little of the transaction cost savings will be passed back to farmers. The higher processing costs of New York firms are due to higher labor and utility costs, not higher price paid to farmers for milk. Thus, the higher prices supermarkets are willing to pay for account consolidation go to those factors of production, not milk producers.

Entry into Southern New England via account consolidation would most likely occur in New Haven and Fairfield counties. Plants located in metropolitan New York could easily serve these counties without incurring disadvantage in shipping costs. Of the supermarket chains operating in these two counties, Grand Union, Shop Rite, Path Mark, and Gristedes are either headquartered in New York or New Jersey/or are served by buying offices in those states. (Other chains, such as A & P and Waldbaum, operate stores in Connecticut, New Jersey, and New York, but the Connecticut stores are supported by offices within New England.)

We estimate that these four chains had 1988 milk sales in Connecticut totalling 73 million pounds. Using the blend price elasticity model developed in the second part of this report one can analyze the impact of entry of 73 million pounds of milk upon the Order 1 blend price, Connecticut and total Order I dairy farm revenue. This is our best prediction of the magnitude of entry. However, prediction of this type of economic change is very conjectural. Actual entry occurs over time and undoubtedly, will be more or less than 73 million pounds. Five years after the regulatory change, for example, New York processed fluid milk sold in Connecticut may total 37 million pounds or 150 million pounds. If one halves or doubles our estimate, the costs and benefits estimated below are halved or doubled. In our opinion, however, it is very unlikely that entry of fluid milk into Connecticut for distribution through any channel (supermarket accounts, small stores, restaurants and institutions) will exceed 150 million pounds annually five years after any regulatory change.

With entry at the 73 million pound level, Order 1 blend prices will most likely drop 3.3 cents per hundredweight. This decline in the blend price received by Order 1 farmers due to lower Class I utilization produces an estimated revenue loss of $479/year for the average sized Connecticut dairy farm (14,500 cwt./year). In the aggregate this amounts to a loss of about $185 thousand for

dairy farmers in Connecticut. Since all farmers in Order I, including many New York farmers, receive the blend price, the aggregate annual loss for Order I is approximately $1,689,000. New York farmers shipping into Order 1 lose $430,620, more than twice the amount lost by Connecticut farmers.

In the aggregate Order 2 producers gain $1,689,000 because their utilization increases. Farmers selling milk in Federal Order 2, however, will experience only a slight increase in their utilization rate and blend price. This is because the Order 2 pool is twice as large as the Order 1 pool, the elasticity of the blend price is lower, and the initial utilization ratio is lower. The blend price in Order 2 will increase one cent. The increase in income to an individual New York farmer selling 14,500 cwt/year in Order 2 would be about $138.

From the standpoint of processors, the shifting of 73 million pounds of milk is less than ten percent of sales in Connecticut and less than two percent of Order 1 sales of fluid milk. In the aggregate this does not produce a major shift in competitive positions of dairy processors in the Northeast. Specific plants of specific processors, however, may be significantly affected.

The general supposition that eliminating barriers to entry will benefit consumers through increased competition among processors and ultimately lower retail milk prices is not valid for this regulatory change. New England consumers, including consumers in southwestern Connecticut, will see virtually no change in the retail price of milk. Changes in utilization have no impact on the prices processors pay for milk. Thus, due to the federal order pricing system this change in regulation would not produce any changes in processors' costs that might be passed forward to consumers. Moreover, it is extremely unlikely that cost savings due to account consolidation by supermarket chains would be passed forward to consumers. To achieve account consolidation they must, in all likelihood, be passed back to New York processors to cover the higher non-milk processing costs.

In any report that attempts to predict the future the standard caveat holds. This is our best estimate of the future path of the northeast dairy industry if Connecticut inspection currently is an entry barrier to account consolidation and regulatory changes eliminate that barrier. Actual experience will vary from this estimate for a number of reasons. First, we analyzed the impact case scenario. If either of the other two cases holds the impact will be less than our estimates. Second, even if the impact case scenario is essentially correct, we have used average estimates for

the cost of processing. They provide reliable estimates of long run conditions. However, in the short run there may be one or more New York firms that can effectively compete in Connecticut. Increases in capacity utilization may lower unit costs and thus, enhance entry into lower priced Connecticut markets. Even if Connecticut prices cannot cover the total average cost of distributing milk, the lower Connecticut price may be sufficient to cover incremental costs. Incremental costs (average variable costs at the margin) are significantly less than total costs. Price in excess of incremental costs does contribute to covering fixed overhead costs in the short run. Third, this study does not analyze the marketing of specialty fluid milk products that are relatively high in value and may be shipped greater distances. These products, however, account for a very small share of fluid milk sales. Finally, the milk marketing system is in a constant state of flux due to changes in a great variety of factors that affect its structure, conduct, and performance. As external conditions not analyzed in this report change, the impact of a modification in regulations will change.

1. Introduction

1.1 The Problem

The State of Connecticut currently requires that all farms selling fluid milk in the state be inspected on a regular basis by a Connecticut health inspector. Farms are routinely inspected twice a year and those with health problems more often. In order for a fluid milk plant to obtain a license to sell milk in Connecticut, all farms supplying that plant must be inspected. Even if the plant and its suppliers are out-of-state, Connecticut inspection must be performed. The State of Connecticut does not currently participate in reciprocal agreements with other states; and, thus, Connecticut inspection is over and above any inspection routine enforced by supplying states.

Connecticut and Massachusetts are the only states in the nation that do not participate in some sort of reciprocal inspection program. This fact alone suggests that reasons other than securing a safe supply of milk may explain the persistence of total milkshed regulation by Connecticut and Massachusetts. Other reasons for the persistence of nonreciprocal inspection by Connecticut and Massachusetts may include regulatory inertia. The laws are old and there is inertia, possibly even fear, to changing a system that has functioned in an acceptable fashion. Alternatively, many opponents and some proponents of the existing Connecticut milk regulatory system argue that they are a barrier to entry of milk from out-of-state producers and processors into Connecticut. This barrier ostensibly provides farmers and processors selling milk in Connecticut with higher prices at the expense of Connecticut consumers.

For this to be the case, however, the regulations must not only be a barrier to entry, they must be the only barrier to entry. If there are other entry barriers, then 1) those barriers may be responsible for the low level of entry in New England by processors from outside of New England, and 2) moving to full reciprocity may have little impact on the structure, conduct, and performance of the New England milk marketing system.

In this report we therefore take an innovative approach to the analysis of the impact of the alleged restraint of trade associated with the Connecticut milk inspection system. Rather than ask whether inspection practices do or do not restrain trade, we analyze the marketing system to identify and evaluate the impact

of other industry and product based barriers to entry of milk into New England/Connecticut. Specifically, we analyze the milk supply system including the federal order structure, transportation costs of raw and processed milk products, the competitive position and conduct of milk processors, and retail milk prices in selected New York and New England cities.

This approach allows us to identify those Southern New England product and geographic markets where entry barriers are low and other market conditions, such as ready access from New York plants, make entry quite feasible. If Connecticut regulatory practices are restrictive and become less restrictive in the future, these markets are most likely to be affected.

In this report we focus what could be described as the impact case scenario. We assume that Connecticut regulation poses a barrier to entry prior to regulatory change and that it creates no barrier *ex post*. Two other cases are feasible. If, in fact, the regulations do not *ex ante* and *ex post* create entry barriers, then changing the regulations will have no competitive impact on participants in the marketing system. Similarly, if there are *ex ante* and *ex post* entry barriers, then there will be no competitive impact. Thus, the case analyzed is the interesting case.

A companion report, Food Marketing Policy Center Research Report No. 7, examines the current Connecticut Milk Inspection Program and evaluates the extent that it, in fact, has acted as a barrier to trade.

The next section offers some definitions used in this report. In the second part we examine the market for raw milk, with a description of the market structure and pricing systems, followed by an analysis of the impact of changes in the utilization rate in Federal Order I on blend prices paid to Connecticut farmers. In part three, the structure of the milk processing industry in the Northeast and retail milk prices in New York, Connecticut and Boston are analyzed. This provides direct evidence on the magnitude of barriers to entry in the industry and the attractiveness of entry into particular New England market areas. The final part of the report synthesizes the primary results from the second and third parts to evaluate the impact of regulatory changes on farmers, processors, and consumers. It also contains a summary statement for the report.

1.2 Some Definitions

In the dairy industry, a jargon has developed that may be unfamiliar and confusing to readers outside the industry. Even within dairy circles, meanings of terms may not be consistent. The following terms and definitions will be used in this report.

Raw milk
Milk from the farm that has not been processed or earmarked for a particular use.

Class I or Fluid milk
Milk used for direct human consumption, usually in the form of whole homogenized milk or lowfat milk. This definition does not include cream, cultured products, ice cream, cheese, or condensed or dry milk. Milk classes are specified and defined by the Federal Milk Marketing Orders (see below). This is the class of milk subject to the Connecticut inspection rule, and the market for it is the subject of this report.

Class II milk
Milk used in the manufacture of cultured products, cheese, and other non-fluid uses.

Utilization
This term refers to the total disposition of raw milk used as either Class I or II. It is often used to indicate the percent of all milk going into Class I use.

Processor
In this report, the term "processor" will refer to firms engaged in the pasteurization, packaging, and distribution of fluid milk.

Handler
Any firm that handles raw milk, either a pool plant, manufacturer, or processor. A **pool plant** is a facility that assembles raw milk for subsequent distribution to other handlers.

Federal Milk Marketing Order (FMO)
A FMO is a set of regulations that establishes minimum prices for milk. FMOs function under the jurisdiction of the Agricultural Marketing Service, U. S. Department of Agriculture. Handlers are required to pay at least the FMO minimum price to farmers, depending on location, end use, and other factors. FMOs have been established in many regions of the country, known as

been established in many regions of the country, known as **marketing areas.** The **Market Administrator** oversees the Order. The FMO system will be described in more detail in subsequent sections, but for a better understanding the reader is referred to the vast literature on the subject.

1.3 The Milk Marketing System and Market Definitions.

This section provides a brief description of the milk marketing and distribution system, from the farm gate to the consumer. The marketing channels for milk are illustrated in Figure 1. The percentages associated with the different points in the flow chart reflect national data for 1978 and may have changed since then. The figure is presented to offer a general picture of the marketing system. The left side of the figure shows the interaction between producers and processors; raw milk is shipped to cooperative or proprietary processors, or to manufacturing plants. Once processed, the product is distributed to various outlets.

In order to better understand the system, two facts about dairying should be kept in mind: first, cows must be milked at least twice a day every day of the year; and second, milk must be processed, sold, and consumed in a matter of days after milking. As a direct result, the market for milk from farms is regional in nature; generally speaking, milk in the raw form does not travel great distances to the processing point, due to perishability and to the high cost of shipping over long distances. Thus, transportation costs are a major determinant of how milk is marketed.

There are no recent studies on raw milk transportation costs; Moede (1971. p. 13) estimated that the total cost per hundredweight of transporting milk 400 miles was 229 percent higher than the cost of shipping it 100 miles. Industry sources currently estimate the over-the-road cost of shipping raw milk to be $1.00 to $2.50 per loaded mile (50,000 pounds), averaging around $1.25[1]. A 200 mile round trip would cost about 50 cents per

[1]Conversations on raw and packaged milk shipping were held with Richard Stammer and Robert Gilchrist of Agrimark, Kenneth Aldrich of Idlenot Dairy, Alexander Guida of Guida-Seibert Dairy, and one other source who asked not to be identified.

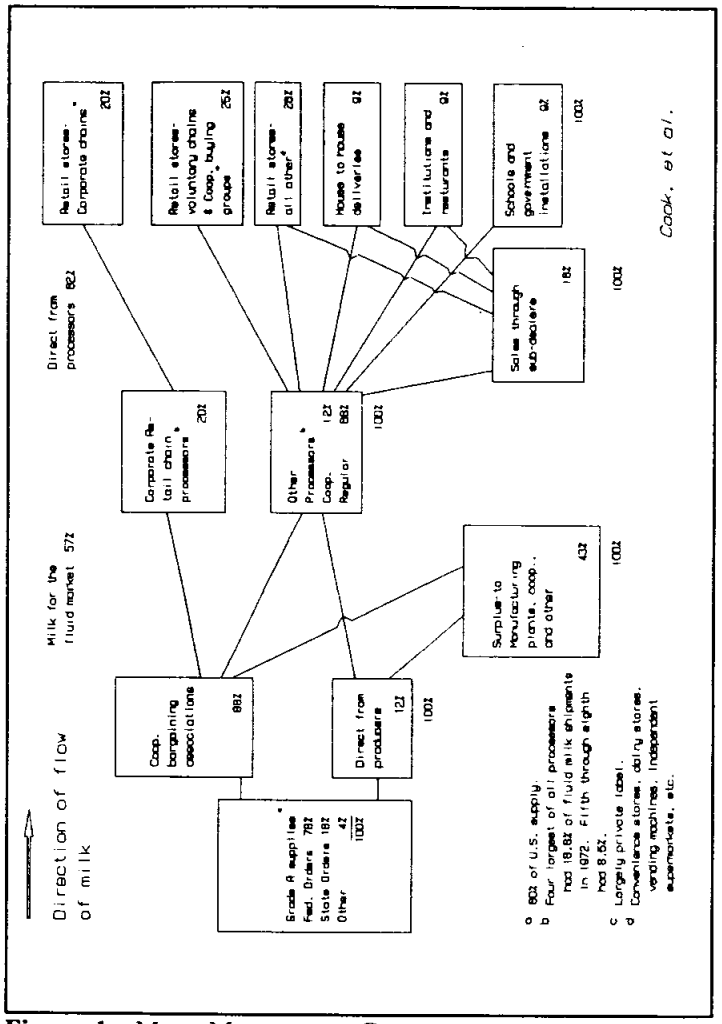

Figure 1. MILK MARKETING CHANNELS

cwt., or about 3.6 percent of a $14.00 Class I price. Alternatively, a 400 mile round trip would cost $1.20 per cwt, or nine percent of the Class I price.

In New England, virtually all raw milk is produced on farms within the region and in New York State. Recently however, raw milk has been brought into New England from as far away as Maryland, due to tight supplies in the region. Raw milk is shipped daily in bulk tankers from the farm directly to the processing plant, or to a pool supply plant where it is later

directed to a processing facility, shipped to a coop-owned processor, or sold to a proprietary handler. Processors pasteurize and bottle the milk for consumption at the retail and institutional level, and may also be engaged in the production of soft dairy products such as cottage cheese and yogurt. The milk is then sold to distributors or retail outlets, although some retail companies have integrated backward and operate their own plants.

The market for packaged milk is also regional in nature. Processed milk is purchased by retailers, wholesalers, restaurants and motels, schools, government institutions, and home accounts. Generally, shipping costs are included in the delivered price from the plant to the customer.

Few plants have a shipping radius greater than 200 miles. Again, this is due to the perishable nature of milk and to the high cost of shipping over long distances. Metzger (1982, p. 20) estimated that in the Northeast the minimum cost of shipping a gallon of milk 100 miles was about two cents in 1980; shipping the same milk 500 miles cost about twelve cents. Today, industry sources estimate packaged milk shipping costs to be eight to ten cents per gallon for a 200 mile round trip (see footnote 1). This represents four to five percent of a typical retail price of $2.20 per gallon. If the milk is shipped on a 400 mile round trip, the cost is eight percent of the retail price.

Of course, shipping costs will differ for direct plant-to-store shipments and for indirect shipping through warehouses and bobtailers. Generally, one loaded trailer hauling 4000 gallons will make at least three or four stops, and more if the stores on the route are small. In some cases, the milk is shipped via trailer from the plant to a warehouse or transfer depot where it is loaded onto straight trucks for delivery to surrounding stores. This is often the case when there are numerous small customers, or when the plant has a wide geographic distribution area. Thus, we can expect that metropolitan plants distributing to stores in the surrounding area will have lower shipping costs than plants supplying smaller cities and rural areas.

In the investigation of economic markets a researcher is often limited to an analysis of available data, which may not coincide with the location of actual markets. Data availability allows an examination of the dairy industry in two regimes: at the state level and at the Federal Market Order level. In the Northeast, there are three marketing orders. The New England marketing area covers Connecticut, Rhode Island, most of Massachusetts,

southern Vermont and New Hampshire, and falls under the auspices of Federal Order No. 1. The metropolitan New York-New Jersey area is covered under Federal Order No. 2. Federal Order No. 4 covers the metropolitan middle Atlantic region between Philadelphia and Washington, D.C. With regard to the farm level supply of milk to service each of these marketing areas, there is significant interaction between Orders 1 and 2 and between Orders 2 and 4. In other words, the milksheds for these pairs overlap. The milksheds for Orders 1 and 4 do not overlap. The milkshed for This report is primarily concerned with the interaction between Orders 1 and 2.

The Administrator collects data on prices, receipts, and shipments for the relevant area, and makes these data available at an aggregate level; information on individual farms or plants is proprietary and is generally not released to the public. In some cases, the plant is publicly held and financial information may be available. In other cases, the plant may be a subsidiary of a larger publicly held firm. Of the major plants in New England, Hood is a subsidiary of a larger cooperative organization. Weeks Dairy was recently acquired by Crowley Foods, a large upstate New York bottler, which is itself a subsidiary of a Dutch company, Wessanen USA. Stop and Shop, Cumberland Farms, and Dairy Mart are publicly owned retailers that operate milk plants. The other major milk plants are privately owned. Garelick, for example, is privately held and operates one of the largest plants in the country. In New York-New Jersey, Labatts, a publicly held Canadian firm owns several of the largest plants in the Order. These plants are operated by two Labatts subsidiaries: Johanna Farms and Tuscan Dairies. Most of the other New York plants are privately owned.

State administrative and regulatory agencies also collect data. In some cases, these data are a subset of the Federal Order data, but marketing areas do not always encompass all of a state's boundaries. Again, the data are reported to the public in aggregates. The function of state dairy divisions is usually related to health inspection and licensing. Pennsylvania and Maine are also engaged in the regulation of milk prices throughout the marketing system, from the farm to the retail store.

Elzinga and Hogarty (1973) suggest the use of firm market share and shipment data in an effort to define geographic markets in terms of competition among alternative suppliers and consumers of a product. However, plant and firm level data have been generally unavailable for the purposes of this report as

explained above. Certainly, the area of New England, or Connecticut, may not correctly define a geographic market for milk. Also, an appropriate geographic definition of the market for producer milk may not be consistent with the market for packaged milk. Constrained by available information, raw milk markets in this report are defined as the milkshed for the Market Order. Geographic markets for packaged milk used in this report include metropolitan New York, the lower Hudson River Valley, eastern Massachusetts, the State of Connecticut, and southwestern Connecticut (New Haven and Fairfield Counties).

2. The Market for Raw Milk

2.1 Production and Milk Supplies

Milk supplies in New England and the Northeast have generally been regarded as "tight" over the past few years, unlike in much of the nation where farmers are suffering from a milk glut. Two separate national policies are largely responsible for this situation. In 1984, the Milk Diversion Program offered payments to farmers for reducing total milk production. Nationwide production dropped dramatically in that year, but the program was not continued so that in the following year production exceeded that in 1983 (see Figure 2). In 1986, the Dairy Termination Program, or "whole herd buy-out", resulted in a large reduction in the number of dairy cows on farms. In the U.S., the average number of cows on farms dropped 4.4 percent in 1987. Milk production, however, dropped only one percent due to technology advancements leading to increased production per cow. In Connecticut and New England, the termination program was far more effective. The number of cows in Connecticut dropped nine percent in 1987, while milk production declined 5.5 percent. For the six New England states, the total number of cows declined about eight percent; production declined 4.2 percent.

Table 1 and Figure 2[2] illustrate relative milk production patterns for Connecticut, New England, New York, and the U.S. In Figure 2 the data were indexed so that production equals 100 units in 1980 for each area. The effects of the diversion program

[2]Both Figures 2 and 3 are from Table 1.

in 1984 and the termination program in 1987 are obvious. It should be noted that total production in Connecticut was declining before the inception of the termination program. Per capita production is not shown but generally follows the same pattern as total production.

Figure 3 illustrates New England production by state. Vermont is the largest producer of raw milk in the region; it was the 14th largest producer nationally, producing 2410 million pounds in 1987. Maine is the next largest producer, followed by Connecticut, Massachusetts, New Hampshire, and Rhode Island. The largest producing state in the U.S. is Wisconsin, which produces 24,800 million pounds annually.

New England's neighbor to the west, New York, is the third largest producer of milk in the U.S., after Wisconsin and California. Its production of 11,362 million pounds in 1987 dwarfs New England's total production of 4515 million pounds. Although New England is in many ways a separate market with distinct supply and demand characteristics and policy directives,

Table 1. MILK PRODUCTION BY STATE, 1982-1986, IN MILLION POUNDS.

STATE	1982	1983	1984	1985	1986	1987
Maine	727	741	694	673	694	671
N. Hamp.	365	381	361	363	373	323
Vermont	385	2412	2311	2397	2448	2410
Mass.	602	611	573	585	559	504
Connecticut	644	654	611	620	600	567
Rhode Isl.	46	46	44	44	41	40
N. England	4769	4845	4594	4682	4715	4515
New York	11097	11691	11442	11746	11723	11362
New Jersey	492	500	474	487	479	432
Pennsylvania	9264	9510	9423	9983	10152	10183
Tri State	20853	21701	21339	22216	22354	21977
Northeast	25622	26546	25933	26898	27069	26492

Source: *Milk Production*, USDA NASS various years.

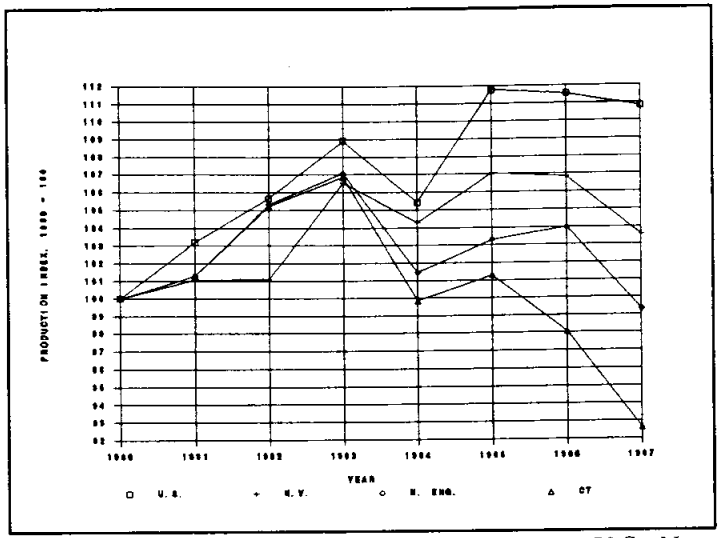

Figure 2. INDEX OF DAIRY PRODUCTION IN THE U.S., NEW YORK, NEW ENGLAND, AND CONNECTICUT. 1980 = 100.

one cannot analyze the regional milk market or the market in any of its states without considering New York's influence.

The most obvious influence New York has on the New England market is an influence over supply. In Figure 4, each state's contribution to Order 1 supply is shown over several years. With the exception of Maine, which has a state marketing order, about 90 percent of New England state production goes into the Order 1 pool. In 1987, about 25.4 percent of Order 1 milk came from farms in New York, representing about nine percent of state production. Although New York is covered by Federal Order 2, farms shipping into New England are considered part of the Order 1 milkshed, so that part of New York is considered to be in the milkshed for both Orders.

In absolute terms the amount of Order 1 milk coming from New York has not changed significantly over the past decade although there has been some increase in the last few years. Production declines in most New England states have been largely compensated for by increases in Vermont production and to a lesser degree increases in shipments from New York over the past three years. Perhaps of greater interest is the westward shift in location of New York milk coming into New England. In the past, the border counties in the Hudson River Valley represented the largest source of New England's New York

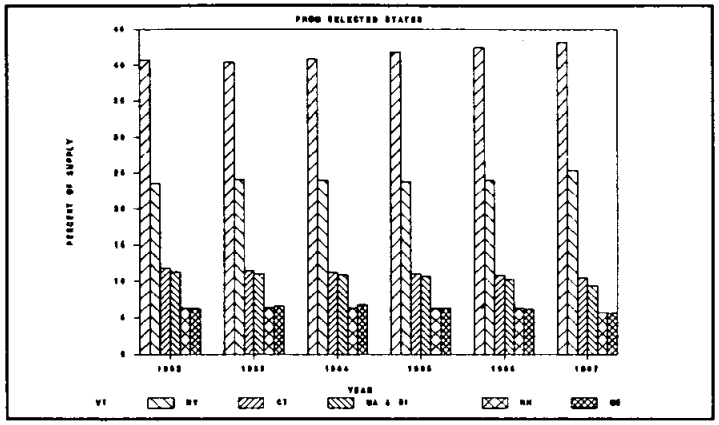

Figure 3. SOURCES OF NEW ENGLAND MARKET ORDER SUPPLY, PERCENTAGES FROM STATES, 1980 - 1986. SOURCE: NEW ENGLAND MILK MARKET ADMINISTRATOR.

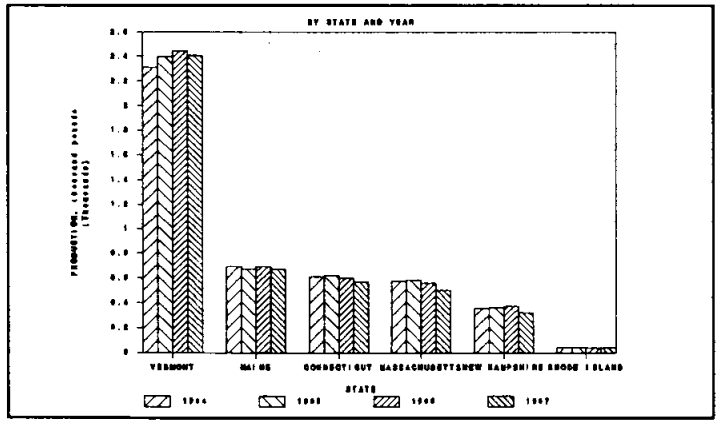

Figure 4. NEW ENGLAND DAIRY PRODUCTION, BY STATE AND YEAR.

supply. Over the past ten years supply from New York has been coming from farther afield, as shown in Figures 5 and 6. In 1982, the top five New York counties shipping in- to New England were border counties. At present, Otsego and Delaware counties are the second and third largest shippers.

There may be several reasons for this westward shift. These counties are no further from the metropolitan Boston fluid plants

than the highly productive northern Vermont counties, but the opening of a major interstate highway through Otsego and Delaware counties in the late 1970s made them considerably more accessible. Also, as supplies have grown short and as buyers in both orders compete more for contracts with producers, Order 1 processors have found it necessary to go further afield for supply.

2.2 *Market Structure*

Like many agricultural markets, dairy farming is characterized by a large number of small farms selling milk to a small number of large processing companies. In the early part of this century, the absence of large coops and bargaining associations meant that the balance of market power was in the favor of buyers. In the 1920s and 1930s, dairy cooperatives were formed in order to provide some countervailing power so that a more competitive market would evolve.

Currently, in New England one cooperative handles about 45 percent of all milk produced in the region. The top four first handlers hold a 75 to 80 percent market share. (As we shall see, the farm price of milk depends on the location of the plant that handles the milk first). Three of these firms are cooperatives: Agrimark, St. Albans, and Cabot. Such high concentration indicates that these first handlers may hold market power themselves, allowing them to bargain for prices in excess of mandated minimums (as discussed in the next section).

The situation is very different in the New York - New Jersey marketing area. Cooperatives in total represent only 40 percent of producer milk. Western New York is, however, an exception. Upstate and Niagara Coops represent up to 90 percent of the farmers in the Rochester and Buffalo state market order areas. Recently, coop market structure in Order 2 has become more fragmented, and, generally, acts as a bargaining agent, not an operator or first handler[3]. Clearly, cooperatives in Order 2 are not as strong as they are in Order 1. In Order 1 cooperatives dominate the first handler market. In Order 2 the largest first

[3]Information on New York coops was obtained from the NY-NJ Market Administrator's Office and a discussion with Brian Henrehan of Cornell University.

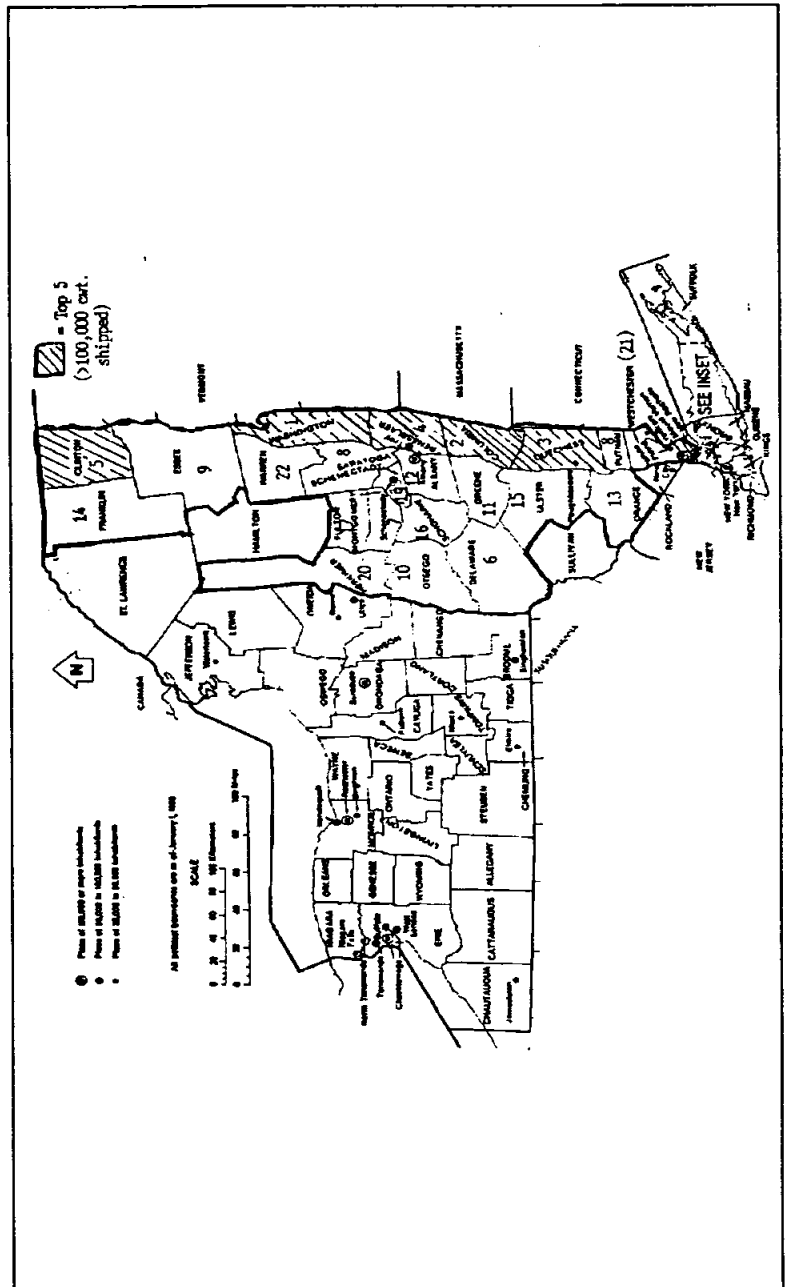

Figure 5. ORDER 1 MILK FROM NEW YORK COUNTIES, MAY 1982.

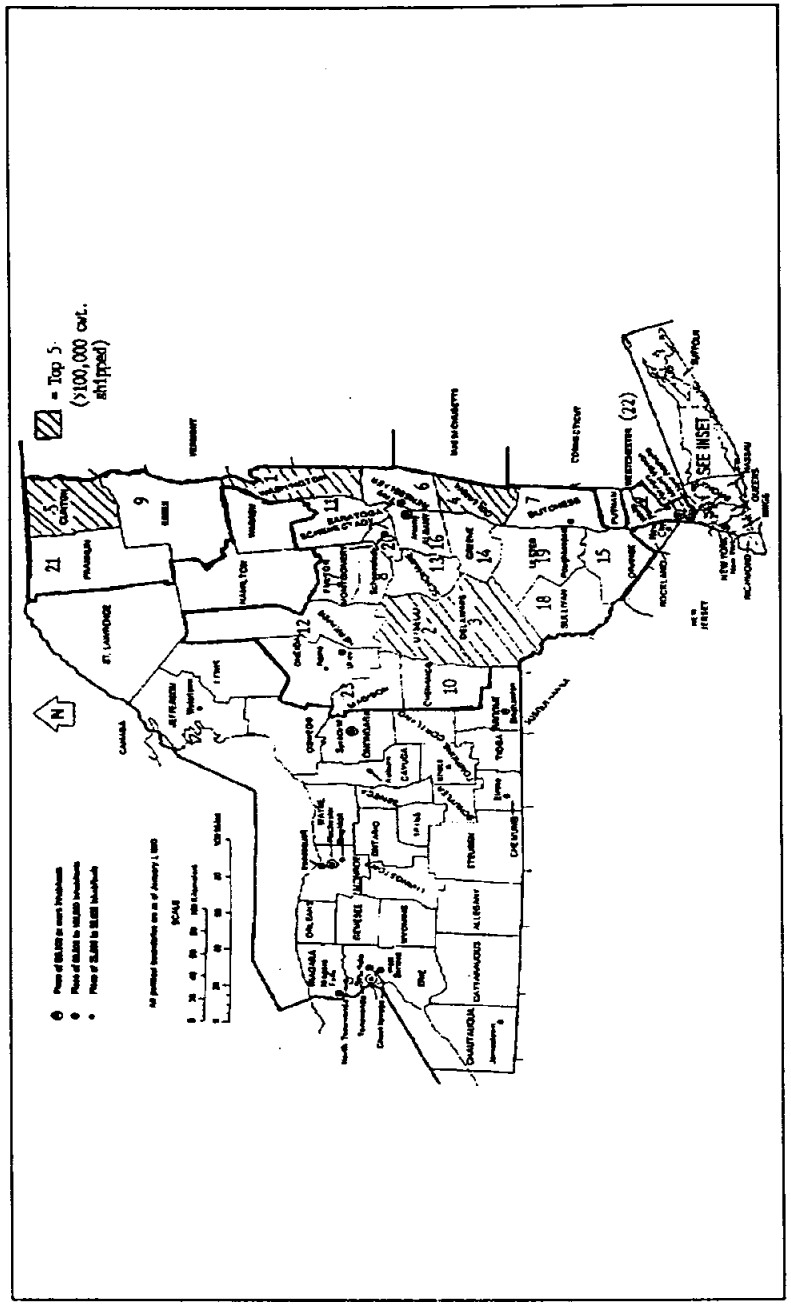

Figure 6. ORDER 1 MILK FROM NEW YORK COUNTIES, MAY 1988.

handlers are not cooperatives but proprietary firms; the Labatt group, formed by Labatt's acquisition of the region's major processing firms, controls a major portion of the market. In Order 2, first-handlers and sellers of processed product are often the same firm.

2.3 The Federal Order Pricing System.

The purpose of the Federal Marketing Orders is to stabilize milk prices at the farm level; minimum farm-level prices are established and are based on geography and usage. Handlers of milk (processors and pool supply plants) are required to pay minimum Class prices set by the Market Administrator. Class prices are established monthly; the price for Class II milk (used for manufactured products) reflects the market price for grade B milk in Minnesota and Wisconsin (the "M-W" price). The Class I price is set at an amount above the Class II price to reflect the higher value placed on the fluid product. Currently, the Class I price in New England is set at $2.52 per cwt (hundredweight) above the Class II price for the second preceding month, adjusted for location. In addition, there are seasonal incentives and supply premiums set by the Market Administrator that result in higher Class I prices. Handlers pay a price for milk that reflects their use of the product. Thus, a plant that only bottles Class I fluid milk and does not manufacture any Class II product will pay the Class I price.

Producers (farmers), on the other hand, receive a price known as the "blend" price, which is the average of prices set for Class I and II, weighted by the Class utilization of milk in the region. Figure 7 illustrates blend prices for Zone 1 in the New England market area (New England Market Statistics, Annual Report, various years). The obvious seasonal variation is due to the biological nature of milk production: cows produce more milk in the spring and the price is adjusted to reflect the flush supply. If the producer sells milk to a Class I plant (or a plant that uses more than the regional Class I utilization), he or she still receives the blend price. In this case, the difference between the price paid by the plant and the blend price received by the farmer goes into the pool and is credited to handlers who use less than the regional Class I utilization. In other words, the price to producers is uniform throughout the region (adjusted for location) and is based on regional Class utilization. The price to handlers

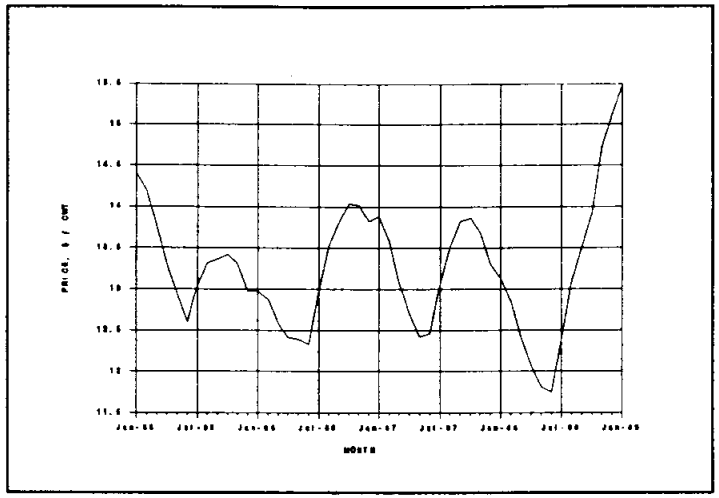

Figure 7. BLEND PRICE AT ZONE 1, NEW ENGLAND MARKET, $ PER CWT. SOURCE: NEW ENGLAND MILK MARKET ADMINISTRATOR

reflects Class utilization at the plant level. The pricing system set up by the Federal Orders suggests that this is a relevant market for discussion of raw milk supplies.

In New England, farmers receive a blend price that depends on the location of the plant of first receipt (the first handler). Each plant is assigned a "zone"; plants in zone 1 are close to Boston. Zone 26 is assigned to the plants farthest away. The closer the plant is to the Boston area, the higher the price, representing differential shipping costs throughout the region. For example, a farm near St. Albans, VT, that shipped milk to the St. Albans Creamery plant in that city (in zone 25) received $12.69 per hundredweight (cwt) in September, 1988. Had that milk been shipped to the Hood plant in Charlestown, MA, the price would have been $13.51. The difference reflects the cost of shipping the milk between the two plants. In theory, the farmer should be indifferent to where the milk is shipped.

In the New York-New Jersey region, the minimum price is determined by location of the farm, not the plant. Farms further away from New York City receive lower prices, regardless of where the milk is sold, as long as it is sold within the Order 2 marketing area. Price differentials are set up in 10-mile concentric radii from New York City. For example, farms near Albany,

New York, received a blend price of 12.14 per cwt. in August, 1988 if the milk was sold to a handler in the marketing area. A farm in White Plains, a New York City suburb, would have received 12.59 per cwt (Order 2 Market Administrator).

Zone 21 in New England and Zone 200-210 in New York are the zones from which base prices are established for each Order. Differentials are applied to this base in setting prices at other zones. These zones are often used in comparing prices between the Orders. They do not actually meet, however. Zone 21 in New England borders New York near Lake Champlain, while zone 200-210 borders New England at Washington County, N.Y., which is south of Lake Champlain.

Class prices between the orders differ by small amounts, but do vary depending on farm and plant location. In recent years, the Class I price in New England has been about three cents less per cwt. than the price in New York at zones 21 and 200-210. Order 1's zone 1 price is ten cents higher than the comparable zone in Order 2. There is no difference in Class II price.

Blend prices, however, can vary greatly between the Orders because of the difference in Class I and II utilization for the two regions. In New England, a little over fifty percent of milk went into Class I use in 1987. In New York-New Jersey, Class I utilization was under 40 percent. The difference in blend prices, based on August 1988 data, ranged from $0.35 to $1.00 per cwt. between farms in the upper Hudson River Valley and plants in New England zones 1 through 6, which cover Connecticut, Rhode Island, and most of Massachusetts. For example, a farm located 151-160 miles north of New York City (near Albany) received $12.14 per cwt. in that month as long as the milk was sold in Order 2. Shipping charges, which increase with distance, would lower the farmer's price, so if the milk were sold in New York City, the farmer would be charged for shipping the 150 miles. However, if the milk were shipped to an Order 1 Zone 6 plant (Hood Agawam, for example), the price would have been $12.97 per cwt, less shipping charges for the 70 miles.

Based on blend price differentials alone, there are obvious incentives for New York farmers in the overlap area (in both Order 1 and Order 2 milksheds) to ship to New England. There may be other incentives as well, such over-order premiums and reduced handling charges. In 1987, over 25 percent (1,314 million pounds) of the raw milk received by New England plants was produced on farms in New York. In recent years, negotiated

premiums have been added to the blend price. The Regional Cooperative Marketing Agency has been able to negotiate a premium of $0.75 per cwt. above the Class I price; that is, Class I plants buying from RCMA members pay 75 cents over the Federal Order minimum. After pooling, this represents a payout of about 25 to 30 cents per cwt. to the farmer, depending on utilization. In addition, Agrimark customers pay 60 cents over Class I and II milk. This is distributed to farmers in a variety of ways that encourage quality, farm size, and growth, in addition to a basic premium. The average payout to Agrimark members, in addition to the RCMA premium, is 35 to 40 cents.

While the RCMA premium applies to milk sold throughout the northeast, private handlers in New England often pay even more to secure a supply. Short supplies have resulted in active solicitation by New England processors for New York milk. Handlers have offered premiums directly to farmers, in the form of higher milk prices or advantageous shipping rates, to encourage farmers to switch over. For example, an eastern Massachusetts bottler short of milk may solicit New York farmers and agree to pay premiums and hauling costs. Specific information on these private arrangements is not available.

In some cases, states have mandated additional premiums. Maine recently mandated a premium of $1.00 in addition to the RCMA premium. The Maine regulatory system ensures that Maine farmers are paid a price that "reflects the market price in Southern New England".

If New York handlers are to ensure supply, they must meet prices offered by their New England counterparts. This means that New York handlers buying milk from the overlap area that is part of both milksheds must pay higher prices for their milk. In other words, if New York farmers selling to processors in Boston and New York receive the same price for milk, then the price to New York handlers is higher by an amount that is at least the difference in the blend prices between the two orders. For example, if the Order 1 blend price available to the farmer is 13.00 per cwt., and the Order 2 price available is 12.80, then the New York handler must pay 20 cents over the Order 2 Class I price. Thus, in periods of short supply, New York farmers in the overlap area receive the same price as New England farmers, and the cost of raw milk to handlers is higher by that amount. Currently, Order 1 handlers are paying a blend price to New York farmers that is, on average, 30 to 35 cents higher than the blend price established for Order 2 handlers

(O'Brien). Order 2 handlers must meet this price in order to secure supplies from this part of New York.

In the third part of the report we will discuss the significance of this observation on competition between the two marketing areas.

2.4 Policy Alternatives and Impacts on Producer Welfare

A source of concern among dairy farmers regarding inspection reciprocity is that such a change in policy could result in a reduction in the blend price. Although farmers are currently receiving premiums above the blend price, its reduction would be directly reflected in the milk check. The argument is that under reciprocity, Class I milk from the New York-New Jersey marketing area would be allowed to displace Class I milk in Connecticut and, hence, in the New England marketing area. This would reduce Class I utilization in New England and would depress the blend price, because the blend price is the average of Class I and II prices weighted by utilization.

The following analysis was conducted in an attempt to measure the sensitivity of the blend price given a change in utilization. It provides a point "elasticity of blend price", or the percent change in blend price given a one percent change in Class I utilization.

The blend price is calculated as

$$P = I(x) - II(1 - x)$$

where

P	=	blend price,
I	=	class I price,
II	=	class II price, and
x	=	fraction of total milk utilized as Class I.

The Market Administrator calculates the blend price by dividing the total value of milk in the pool by the amount of milk in the pool, adjusted for transportation differentials and other accounting purposes.

This elasticity analysis uses average prices for 1988 in New England zone 21. Averages are taken from monthly data.

In 1988, the average Class I price in New England was $13.38/cwt; the average Class II price was $11.02/cwt. The average Class I utilization was 0.507; that is, 50.7 percent of the milk was used as Class I. Therefore, the average blend price was $12.22/cwt.

From the above equation and 1988 data, the elasticity of the blend price is calculated in the following way. The derivative of price with respect to utilization is:

$$dP/dx = I - II.$$

That is, the change in blend price given a change in x equals the difference in the class prices. In 1988, that difference averaged $2.36/cwt.

The elasticity is calculated as:

$$(dP/dx)(x/P) = (2.36)*(0.507/12.22) = 0.0979.$$

Thus, a one percent change in Class I utilization ratio (x) will yield about a 0.1 percent change in price P.

Of course, this point elasticity will change with different utilizations and Class prices which, in turn, affect the blend price. Table 2 shows elasticities for different assumptions about Class I utilization ratios, based on 1988 average Class prices (Class I = 13.38, Class II = 11.02).

In 1988, total utilization in Order 1 was 5,593 million pounds. Class I utilization was 2,833 million pounds, or 50.7 percent. Class II utilization was 2,760 million pounds, or 49.3 percent. As shown above, the blend price was $12.22/cwt.

Table 3 below illustrates two cases of what would happen if 175 million pounds of Class I milk from Order 2 plants (route sales) entered New England. 175 million pounds is 3.1 percent of total utilization for the region, and represents the annual output of an efficient size plant. It is also about 21 percent of Connecticut's annual consumption. The first column of Table 3 provides data taken from 1988 annual averages for Order 1.

In the first case, Order 2 milk entering New England lowers New England's Class I utilization, because the entering milk is pooled in Order 2. If demand for Class I milk is relatively constant, then the entering milk will displace Order 1 Class I milk into Class II use. Total utilization will not change, but the utilization ratio will drop because in this case the added Class I

milk is part of the Order 2 pool. The benefits of the increase in Order 2's Class I sales accrue to Order 2 farmers.

The middle column of the table indicates the price impact of this scenario. New England Class I utilization drops to 2658 million pounds, and the utilization ratio to 47.5 percent. This is a 6.31 percent change in the utilization ratio, and results in a 0.618 percent change in the blend price. The blend price drops about eight cents, causing a drop of about $1,160 in annual income for the average Connecticut farm.

In the second case, if the Order 2 plant sells over half of its milk in New England, then it will become an Order 1 plant, and the Class I sales will be pooled in Order 1. Consequently, there is an increase in total utilization in the Order. Assuming that Class I demand is constant, the added sales will go into Class II use; thus, there is still a drop in the utilization ratio, but not as severe as described in the first case.

Table 2. ELASTICITY OF BLEND PRICE GIVEN ALTERNATIVE UTILIZATION.

utilization	blend price $ / cwt	blend price elasticity
0.00	11.02	0.0000
0.05	11.15	0.0106
0.10	11.27	0.0209
0.15	11.38	0.0311
0.20	11.50	0.0410
0.25	11.62	0.0508
0.30	11.74	0.0603
0.35	11.86	0.0697
0.40	11.97	0.0788
0.45	12.09	0.0878
0.50	12.21	0.0966
0.55	12.33	0.1053
0.60	12.45	0.1138
0.65	12.56	0.1221
0.70	12.68	0.1303
0.75	12.80	0.1383
0.80	12.92	0.1462
0.85	13.04	0.1539
0.90	13.15	0.1615
0.95	13.27	0.1689
1.00	13.38	0.1763

The last column of Table 3 gives the result for this scenario: total utilization increases to 5,768 million pounds. Class I utilization remains at 2,833 million pounds, now 49.1 percent of total utilization. Class II increases to 2,935 million pounds, but is now 51.9 percent. Class I utilization has dropped 3.16 percent. This would cause about a 0.309 percent drop in the blend price. In this example, the blend price drops from $12.22 to $ 12.18, or about four cents. For the average size farm in Connecticut, this is a loss of revenue of about $580 per year.

If the sale of 175 million pounds from New York adds that much to Order 2's Class I utilization, then the price there would be expected to rise. However, because New York produces about two times the milk produced in New England, and because of lower initial Class I utilization and blend price elasticity, the price increase would be lower in magnitude than the price decrease in Order 1. If entry is pooled in Order 2, the price will increase 2.14 cents per cwt. If entry is pooled in Order 1, then the price will increase 1.66 cents per cwt.

Table 3. IMPACT OF ENTRY OF 175 MILLION POUNDS PER YEAR OF ORDER 2 MILK INTO NEW ENGLAND

	before entry into Order 1	entry into Order 1 pooled in Order 2	entry into Order 1 pooled in Order 1
Order 1 utilization (mil. pounds per year)	5593.00	5593.000	5768.0000
Class I utilization	2833.00	2658.000	2833.0000
Class II utilization	2760.00	2935.000	2935.0000
% Class I (x)	50.70	47.500	49.1000
% change in util.		6.310	3.1600
% change in b.p.		0.618	0.3093
blend price	12.22	12.150	12.1800
$ change in b.p. ($/cwt)		- 0.080	- 0.0400
revenue change, avg. CT farm (14,500 cwt/year)		**- $1160.000**	**-$580.0000**

If entry occurs as described above, farmer income will drop by the computed amounts shown in the table. Later in this paper, market conditions are examined to determine whether entry will occur, assuming that farm level inspections pose no barrier to entry.

3. The Fluid Milk Processing Industry

3.1 Retail Sales and Demand for Fluid Products.

Dairy product consumption has increased over the past ten years but has generally been outpaced by increases in production, giving rise to an oversupply at the national level. National milk surpluses peaked in 1983 and have since dropped as production control measures were enacted. Milk supply markets are regional in nature and the national milk glut is less meaningful at the state or federal order level. Consumption in the long run is less variable than production and less subject to seasonal variations within the year.

National per capita consumption of all dairy products (fluid, butter, cheese, condensed, yogurt, etc.) has been increasing over the years; consumption of fluid milk has declined slightly over the past decade. Whole milk has seen sharply decreasing consumption as consumer preferences have shifted to the more healthful perception of lowfat milk.

Figure 8 illustrates the shifts in national demand for whole and lowfat milk and cream. Note the slight decline in total consumption and the shift away from whole milk. Regional patterns, based on Market Order data, reflect the national trend. Table 4 provides total and per capita sales data for the New England and New York-New Jersey marketing areas. The data indicate generally higher per capita consumption of fluid products in New England, as shown in the last column. Also note the dramatic increases in lowfat consumption in the past few years, especially in New England.

The demand for fluid milk in Connecticut has also declined over the past few years but remains higher than the national or regional average. Per capita consumption in Connecticut averaged 316 pounds per person in 1984 and dropped to 255 pounds in 1987. (Connecticut Department of Agriculture, Dairy Division). Consumption in the state far

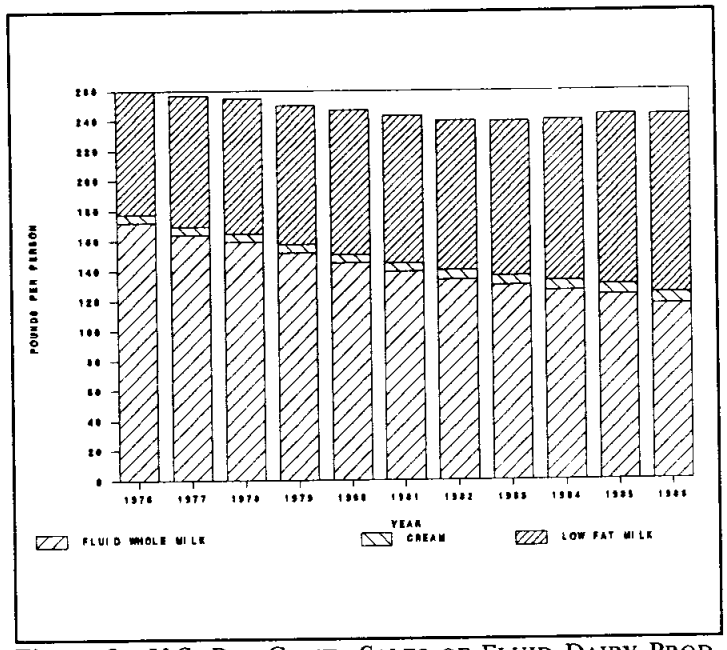

Figure 8. U.S. PER CAPITA SALES OF FLUID DAIRY PRODUCTS, 1976-1986. SOURCE: DAIRY SITUATION AND OUTLOOK YEARBOOK.

exceeds state production; of two strategic groups within the industry: one group is composed of the largest plants that provide large supermarket and convenience store chains and private label and branded milk; the other serves smaller and single-unit supermarkets and grocery stores, restaurants, and schools. In addition, there are a small number of producer-dealers in some rural and suburban communities, who specialize in home delivery and "old fashioned" service. Producer-dealers represent a very small fraction of sales.

Over time fewer firms have gained larger shares of the fluid milk industry. Initially, this occurred as larger, more efficient plants were built and economies of size were exploited. Smaller firms were either acquired or went out of business. The shift from home delivery to retail store distribution also contributed to increases in concentration. As large firms became dominant, the resulting market power contributed to further concentration.

Concentration ratios are only available at the state and Federal Order level and, thus, may over-or understate concen-

Table 4. PACKAGED SALES OF WHOLE AND LOWFAT MILK PRODUCTS IN THE NEW ENGLAND AND NEW YORK-NEW JERSEY MARKETING AREAS, TOTAL AND PER CAPITA, 1980- 1987

year	popu-lation[a]	whole milk sales mil. lbs	per cap sales	lowfat sales mil. lbs	per cap sales	total per cap sales
NEW ENGLAND						
1980	10387107	2152.6	207.24	696.0	67.01	274.25
1981	10396005	2054.9	197.66	734.5	70.65	268.31
1982	10396005	1974.1	189.89	773.2	74.37	264.26
1983	10396005	1916.9	184.39	797.7	76.73	261.12
1984	10369005	1868.2	180.17	843.6	81.36	261.53
1985	10630860	1811.3	170.38	925.4	87.05	257.43
1986	10698369	1730.7	161.77	1020.2	95.36	257.13
1987	10771001	1657.5	153.89	1099.9	102.12	256.01
NEW YORK-NEW JERSEY						
1980	19926175	3523.0	176.80	808.2	40.56	217.36
1981	19934224	3569.6	179.14	991.8	49.77	228.91
1982	19934224	3482.9	174.79	NA	NA	NA
1983	19934224	3440.3	172.65	1047.5	52.57	225.22
1984	19934224	3408.3	171.05	1091.8	54.79	225.84
1985	20248195	3328.5	167.04	1206.3	60.54	227.58
1986	20461453	3218.9	161.54	1291.7	64.82	226.36
1987	20424926	2348.3	117.85	1013.7	50.87	168.72

Sources: Federal Milk Order Market Statistics, Annual Summary, USDA Agricultural Marketing Service, tables 4 and 50, 1980 - 1987.

[a] Population is based on actual 1980 census data for counties and other jurisdictions within the relevant marketing area. Estimates based on projected growth are provided for succeeding years.

tration in more narrowly defined markets, such as cities or Metropolitan Statistical Areas (MSAs). Concentration ratios for Federal Orders 1 and 2, Connecticut and New Jersey are shown in Table 5. In the New England marketing area, the fluid processing industry four-firm concentration ratio (CR_4) increased 13 percentage points from 43.8 percent in 1976 to 56.8 percent in 1987 (Overend). When the industry is considered as two distinct strategic groups, the CR_4 of the supermarket/private label group was 74.6 percent in 1985; the smaller wholesale and institutional group CR4 measured 46.9 percent.

The New York-New Jersey marketing area has seen dramatic increases in concentration in the past few years. Between 1985 and 1987, the Labatt Company of Ontario acquired Johanna Farms and Tuscan Industries, the two largest dairy handlers in New Jersey. Johanna serves both Federal Orders 2 and 4; Tuscan serves northern New Jersey and New York City. In Table 5 these two companies are considered separately; thus, the 1987 CR_5 can be interpreted as a four firm ratio. Similarly, New Jersey's 1987 CR_4 can be interpreted as CR_3.

Although direct comparison is difficult, the data suggest that Orders 1 and 2 have similar market structures, with Order 2 being slightly more concentrated.

Horizontal mergers between plants within markets have contributed to the observed increases in concentration. Recent acquisitions in Orders 1 and 2 are outlined below.

Order 1

Sept 86 Idlenot, VT—Billings Farm Dairy, VT

Idlenot, Vermont's largest dairy, acquired Billings with the intention of maintaining its brands and expanding the plant by 50 percent.

Dec 86 East Greenwich, RI—Browns Dairy, RI

The merger of Rhode Island's two leading dairies resulted in the shut-down of the East Greenwich plant. The company packs about 11 million pounds per month under both brand names.

Table 5. MARKET SHARES OF LEADING FIRMS, SELECTED MARKETS.

year	CR_4 New England	CR_5 New York New Jersey[b]	CR_4 Connecticut[c]	CR_4 New Jersey[d]
76	43.8	na	na	na
77	43.5	41.2	na	na
78	43.9	na	na	na
79	45.3	37.9	na	na
80	47.4	na	na	na
81	47.0	38.1	na	na
82	49.8	na	na	na
83	51.4	37.2	na	na
84	51.4	na	63.0	59.8
85	51.6	41.0	60.0	60.2
86	50.8	na	59.0	62.7
87	56.8	53.4	69.0	60.9[e]

[a] CR_4 measured as percent share of route distribution in the New England marketing area. Source: Overend.
[b] CR_5 measured as market share of packaged sales. Firms that are wholly owned subsidiaries are counted separately. By 1987, two of the largest firms had merged. The measure of concentration for this year can be considered to be a four-firm ratio if these firms are counted as one. Source: Market Administrator, Federal Order 2.
[c] Years measured from April to March; e.g., 87 indicates April 1987 to March 1988. Data does not include producer-dealers. Source: Connecticut Department of Agriculture, Dairy Division.
[d] Source: New Jersey Department of Agriculture, Division of Dairy Industries.
[e] CR_3

Jan 87 Hood, MA—Moser, CT

Hood bought the Moser milk business and shifted production to its Charlestown plant, an indication of excess capacity inHood's operations. The Moser plant is now used to pack juices.

Order 2

The John Labatt Company of London, Ontario has made numerous acquisitions in the Mid-Atlantic states. It has been estimated that they hold a 90 percent market share in Philadelphia,

a 50 percent share in northern New Jersey, and a 40 percent share in New York City (Milkweed).

Oct 86 Labatt, Ontario—Tuscan Farms, NJ

Tuscan serves metropolitan New York. The merger was horizontal in that Labatt owns Johanna Farms, a major milk processor in central New Jersey.

Apr 86 Johanna (Labatt), NY—Atlantic Processing, PA

API Coop was Johanna's major horizontal competitor.

May 86 Tuscan (Labatt), NY—Dairylea Woodside

June 87 Tuscan (Labatt), NJ—Queens Farm, NY

Tuscan subsequently closed this plant and shifted production to the newly refitted Woodside plant, indicating that neither plant was operating at capacity. Queens Farm Dairy was one of the largest plants in metropolitan New York.

Milk processing in Connecticut has also become more concentrated. In 1987 the milk business of the state's largest processor (Moser) was sold to Hood, who, until then, held the number three position in Connecticut. (Hood is the largest handler in New England). Concentration (CR_4) jumped from 59 percent in 1986 to 69 percent in that year.

In 1987, the two firms with the largest sales in Connecticut were based in the state, the other two were located in Massachusetts. Connecticut dealers buy more than 35 percent of their raw milk supplies from New York, and about 18.5 percent from in-state farms. Vermont and the other New England states supply the rest. Between April 1987 and March 1988, the top four firms selling milk in Connecticut held a market share of 66 percent; the top eight firms held a share of 91 percent (Connecticut Dept of Ag, Dairy Division). In recent years, almost all Connecticut milk has come from plants located in the New England marketing area; only one plant located outside the New England marketing area is licensed to sell class I milk in the state. Its market share is about one percent.

3.2 Market Conduct: the Dynamics of Potential Competition.

Now that we have described the fluid milk industry, we turn to an investigation of potential competition in the industry and entry into the New England market from New York and New Jersey. Entry can occur in three ways: *de novo* plant entry, acquisition of existing plants, and expansion of route distribution. In Order 2 most milk is processed in the New York City metropolitan area, and these plants lie in close proximity to Connecticut. Therefore, with regard to route expansion these plants probably are the most likely potential entrants into southern New England.

3.2.1 *De Novo* plant entry.

De novo entry involves the construction of a new plant and, other things equal, the addition of capacity to the market. A large capital investment is required and the entrant must take on risks associated with adding capacity without increases in demand. Such entry would be feasible if the new plant operates at significantly lower costs or offers significantly differentiated product and, thus, is able to take market share from existing firms. Considering the low demand elasticity and the ability of existing plants to upgrade technology, *de novo* entry seems the least likely strategy. In addition, cost and product differentiation barriers are high and less risky options are available.

Potential entrants will be those firms that operate plants of near minimum efficient size. Recent cost studies (Thraen, *et al.*, 1987) indicate that the long run average cost curve declines continuously so it is difficult to define minimum efficient size. Figure 9 indicates that plants obtain the largest cost reductions when operating at volumes over 1 million gallons (8.6 million pounds) per month. The largest New England plant has a monthly average volume of about 2.5 million gallons (21.6 million pounds) per month. Therefore, a potential entrant would need to be one of the larger plants in its market, operating at a capacity of over 1 million gallons per month.

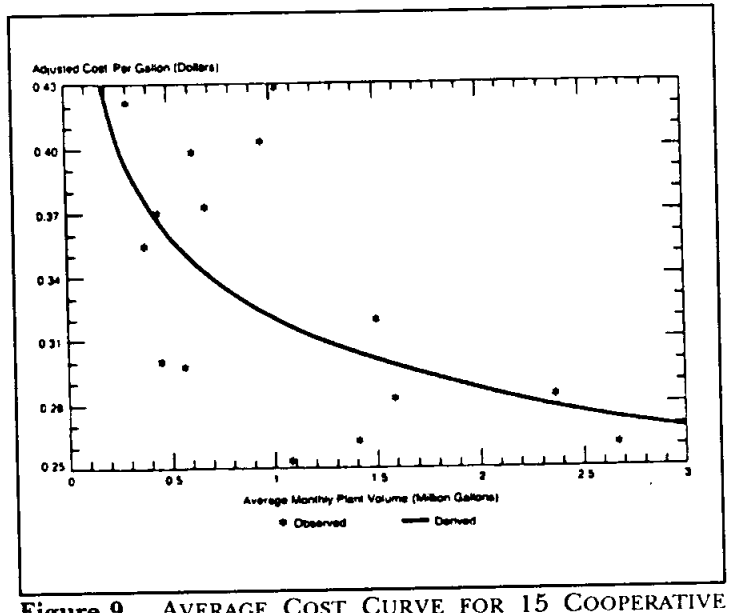

Figure 9. AVERAGE COST CURVE FOR 15 COOPERATIVE FLUID MILK PLANTS. SOURCE: THRAEN, ET AL., P. 53.

3.2.2 Acquisition of existing plants: entry by merger.

An outside firm can enter by acquiring a plant or distribution routes in the market. Such entry requires a large cash outlay or an ability to secure debt financing. But capacity is not added to the market, and the acquirer gains a toehold without having to initially compete for market share. Equilibrium in the short run is not upset, and Class utilizations between orders remains constant, assuming that raw milk procurement does not change. Equilibrium and market performance can be affected if the acquirer's strategy is to move out from his/her initial toe-hold position through increases in market share. This move would enhance competition if share gains come from market leaders.

Entry by merger has occurred less frequently than have horizontal mergers described in the previous section. Crowley's acquisition of Week's Dairy and Hood's acquisition of three Dairylea plants represent the extent of recent entry by merger, as described below.

July 85 Labatt, Ontario—Johanna Farms, NJ

This acquisition marked Labatt's entry into the northeastern U.S. milk market and was followed by several subsequent acquisitions. Johanna serves central and southern New Jersey and metropolitan Philadelphia.

Fall 88 Crowley, NY—Weeks Dairy, Concord, NH

This acquisition gives Crowley a toehold in Order 1. Weeks is one of the largest plants in New England and, since the merger, has actively sought to increase market share and expand distribution routes within the region.

October 88 Hood, Charlestown, MA—Dairylea Syracuse, NY

Hood acquired Dairylea's Syracuse fluid plant and, thus, entered the New York (Order 2) fluid market. Also acquired were the Oneida and Vernon manufacturing facilities. Dairylea farmers will continue to supply the plants and will remain Dairylea members. Dairylea's agreement to market some of its milk through Agrimark remains unchanged. Hood plans to ship UHT milk from the Oneida plant into New England, representing a small amount of business primarily to restaurant chains. Otherwise, no major movement of milk between the Orders is anticipated.

There are numerous economic reasons for mergers, including the pursuit of market power or cost efficiency or both. Reduction of excess capacity can contribute to both of these objectives, and it appears to be an outcome of recent mergers in New York and New England. Hood's acquisition of Moser Farms, at the time the largest fluid milk processor in Connecticut, is an example. Hood acquired Moser's milk business and the Moser plant shifted into juice packing. The plant's total milk volume was shifted to Hood's Charlestown plant, which had excess capacity. Similarly, when Tuscan acquired the Queens Farm plant in New York, the plant was "moth balled" and the capacity shifted over to the Tuscan's Woodside plant, which had just undergone a major re-investment in equipment and technology.

3.2.3 Expansion of route distribution

Plants from outside the marketing area can enter by expanding distribution. For example, plants in metropolitan New York can enter New England by selling milk in Connecticut, especially in the southwestern area of the state which is close to New York City. This form of entry requires entrants to offer lower prices or better services, but no major capital outlay is required relative to the other forms of entry. Data on capacity utilization are not available, but excess capacity is certainly evident given the merger activity described above. This suggests that processors have the capacity to back up expanded distribution.

Factors influencing this form of entry are outlined below. They include plant economies of size, capacity utilization, input costs, product differentiation, and relative retail prices. Recognizing that most potential entrants would be in the metropolitan New York area, costs comparisons are (as far as possible) based on New York City SMA data, Boston or Massachusetts data, and Connecticut data.

3.2.3.1 **Economies of size**. As with *de novo* entrants, firms entering by route distribution will be those that operate plants of near minimum efficient size, which appears to be around 1 million gallons per month. Individual plant cost and output data are not available, but it is likely that several of the plants within a reasonable distribution distance from sub-markets within New England produce well over 1 million gallons per month. In short, using an economies of size criterion, potential entrants into the New England market do exist.

3.2.3.2 **Capacity utilization**. Plants operating at less than an efficient level of capacity by definition have higher short run costs. There are no recent studies examining the impact of capacity utilization on processor costs. Data on plant level capacity utilization are not available. Thraen's paper makes no adjustment or measurement of capacity for the 15 milk plants in the study.

It should be noted, however, that capacity utilization for Class I plants should be fairly stable, because demand is relatively constant with some minor seasonal variation. Milk needed to fill

Class I demand will be shunted from Class II uses. Thus, if excess capacity exists in fluid processing it is primarily because the industry has expanded faster than demand has grown, not because of tight supplies in the short run.

3.2.3.3 **Input costs**. If, due to regional differences, New York processors have higher costs than New England processors, then they will not be able to easily enter New England. Major costs of fluid milk processing and distribution include cost of raw milk, packaging materials, labor rates, energy, and shipping.

3.2.3.3.1 Cost of raw milk. If the Class I price is $14.00 per cwt, the cost of raw milk is about $1.20 per gallon. In Connecticut, milk usually retails for about $2.20 per gallon. Recall from the discussion in the second part of the report that in a competitive market, the farm gate price for milk will not be different for farms in the overlap milksheds, and that the cost of milk to Order 2 processors will be higher than the cost to the Order 1 processors by the difference in the farm gate prices. However, potential entrants from Order 2 have sources of supply other than the overlap milkshed. If processors average costs over all sources of supply, then costs to New England processors and to New York processors will be different. Due to the difficulty of establishing actual processor milk costs, we will assume that there are no premiums and that the cost of raw milk for each Order is the zone 1 Class I price.

3.2.3.3.2 Processing costs. Table 6 shows that the average processing cost for 15 plants used in Thraen's study was about $0.32 per gallon in 1986. Labor and packaging costs account for the largest share of total costs. Labor, energy, and shipping costs are those most likely to vary across regions.

Packaging costs account for about $0.14 per gallon (about 40 percent of processing costs, not including cost of milk) (Thraen). Although estimates of packaging costs for New York and New England plants are not available, it is not likely that they vary much across markets. The market for packaging materials is quite competitive and national in scope, so there is little reason to expect that the cost of cartons is higher in Boston than in New York.

Table 6. COSTS OF FLUID MILK PROCESSING FOR SELECTED ACCOUNT ITEMS, 154 MILLION POUNDS/YEAR.

	$/Gallon	percent of cost
Labor		
direct	0.072	24.8
supervisory	0.010	3.6
benefits	0.018	6.1
Total Labor	0.100	34.5
Energy		
Electricity	0.016	5.4
Fuel	0.008	2.9
Total Energy	0.024	8.3
Water & Sewer	0.004	1.6
Packaging	0.116	40.1
Supplies	0.010	3.6
Repairs	0.014	4.7
Depreciation	0.013	5.6
Taxes, Insurance	0.005	1.8
Other	0.003	0.9
Total Cost $ / Gallon	0.290	100.00

The greatest differences in packaging costs would be relative to plant size, but even this difference is small. Fischer's 1979 data indicates that the largest plants (20.8 million gallons per year) pay about $0.1031 per gallon for packaging materials; plants of half this capacity pay $0.1035 per gallon.

Energy costs account for about seven percent of costs, electricity being the major component. Table 7 provides average 1986 electricity costs for commercial users for selected states and the U.S. Note that the New York rate (10.37 cents/kWh) is almost 25 percent higher than the Connecticut rate (8.33 cents/kWh). We also obtained recent rate sheets from utility companies in New York City, Boston, and Hartford. They concur with the rates shown in Table 7.

Fisher's 1979 study indicates that a large fluid plant processing 20.8 million gallons (about 179 million pounds) of product annually, uses about 3.67 million kWh of electricity annually. Based on Table 7 prices, the cost to a Connecticut plant of this size would be about $305 thousand per year (about

$0.0147 per gallon—consistent with Thraen's estimate); a similar plant in New York would pay $380 thousand per year (about $0.0183 per gallon).

One could argue that plants in Connecticut have capacities lower than 20.8 million gallons. In this case, using Fisher's data for a plant producing 10.4 million gallons annually, the cost is slightly higher at $0.0153 per gallon or $159 thousand per year. Obviously, differences in electricity costs between New York and New England do not greatly affect this input's share of total cost. If anything, New York processors are at a slight disadvantage even if they operate larger plants.

Labor costs are the largest component of total costs, after packaging, accounting for about $0.10 per gallon, or 31 percent of costs. According to the 1982 Census of Manufacturers, labor cost for production workers in fluid milk processing in the New York City SMSA was $10.57 per hour (based on a 40 hour work week, 52 weeks per year). In Massachusetts, the rate was $8.86 per hour (no data was available for the Boston SMSA). In Connecticut, the rate was 7.85 per hour (Table 8). Unfortunately, 1987 Census data are not yet available. An adjustment can be made by multiplying the 1982 wages by the change in CPI for each area. This results in 1986 wages of $10.22 for Massachusetts, $8.95 for Connecticut, and $ 12.38 for New York City, as shown in Table 8.

Table 7. ELECTRICITY COSTS, PER KWH AND PER GALLON.

state	cents/kWh	$ / gallon, large plant
CT	8.33	0.0147
MA	7.75	0.0137
NY	10.37	0.0183
NJ	9.40	0.0166
US	7.26	0.0128

source: *Statistical Yearbook of the Electric Utility Industry, 1986.*

Table 8. HOURLY WAGE RATES AND LABOR COST PER GALLON.

region	wage rate $ per hour	$ per gallon
Connecticut	8.95	0.056
Massachusetts	10.22	0.064
New York City	12.38	0.078

source: U.S. Department of Commerce, Census of Manufacturers, 1982

Stronger unions and higher costs of living are responsible for the high wages in the New York area. All of the major metropolitan New York plants are organized by the Milk Driver's Association (Teamsters). The contract covers all production and transportation workers. Only one of the major New England plants is a union shop.

Using Thraen's data on labor requirements for various plant sizes (1987, p. 48) and the 1982 census data, and assuming constant labor productivity, plants producing about 17 million gallons per year require about 8920 hours of labor per month, or 107,040 hours a year. In Connecticut, labor costs would be about $.056 per gallon, in Massachusetts $.064 per gallon, and in New York, $0.078 per gallon. It is clear that New York processors are at a disadvantage relative to New England processors.

Metzger's 1980 study of packaged milk shipping costs in the Northeast found little difference in the per mile cost of shipping for different regions. He estimated the cost per cwt. per mile in 1980 to be about $.00335 in New England and about $.00354 per cwt. per mile in the mid-Atlantic states (NY, NJ, PA). He projected these rates for 1985 and 1990 using cost increases of about 10 percent per year. His cost projections for New England in 1985 was $.004884, and for the mid-Atlantic, $.005123 per cwt. per mile. For a 100 mile trip, this converts to about $0.042 per gallon for New England and about $0.044 for the mid-Atlantic states.

As with energy costs, transportation costs for New York City are generally considered higher than in the surrounding region. Unfortunately, transportation cost data for New York

City are not readily available. There is no reason to expect that they are lower than costs for New England.

3.2.3.3.3 Summary of processing cost differentials between New York and New England. Recognizing the diverse data sources for the above analysis, wholesale costs per gallon (not including processor's profit margin) are presented in Table 9. The cost of raw milk provided in the table is the Class I price at the appropriate zone. New York City processors' costs are about 3.5 percent higher than Connecticut processors' costs (not including cost of goods) and about three percent higher than processors in Massachusetts. Based on this criterion for ease of entry, New York processors cannot enter without sacrificing profit margins.

3.2.3.4 **Retail Prices**. 3.2.3.4.1 Boston-New York prices. Retail milk prices between Orders 1 and 2 can provide us with insight into the conduct of processors and will help us understand the strategic options available to processors as they assess the competitive environment. Retail milk prices from Boston and New York have been collected over many years by the International Association of Milk Control Agents (IAMCA). Figure 10 indicates that prices in New York are generally higher than prices in Boston. Time series data on Connecticut milk prices are not available.

Figure 10 provides a dramatic example of the effect of policy changes on prices and markets. Retail prices are shown for Boston and New York City for the last few years. In early 1987, the State of New York changed existing regulations that restricted licensing and had the effect of prohibiting entry into certain markets (See *Review of Dairy Regulations*, State of New York). Processors in New Jersey had previously not been allowed to sell milk in New York City. A price war broke out as soon as the restrictions were lifted, as indicated by the significant drop in price shown in the figure. Prices recovered somewhat a few months later but remain below the pre-change level.

Marketing margins also declined during this time, as seen in Figure 11, which shows the percentage difference in retail price and Class I prices. Retail margins on milk are generally quite low, so we can assume that processors sacrificed most during this period and passed price cuts on to retailers. The

Table 9. PROCESSOR COSTS, THREE REGIONS

item	cost. $ / gallon New York	Connecticut	Massachusetts
Cost of goods[a]	1.204	1.204	1.213
packaging	0.137	0.137	0.137
electric	0.018	0.015	0.014
labor	0.078	0.056	0.064
other[b]	0.064	0.064	0.064
shipping	0.044	0.042	0.042
total proc	0.341	0.314	0.321
total cost	1.545	1.518	1.534

[a]Does not include premiums, based on an average 1988 Class I zone 1-10 price of $14.00 per cwt. in New York, average zone 5 price of 14.00 per cwt. in Connecticut and a 1988 avenge zone 1 price of 14.10 per cwt. in Massachusetts.

[b]Additional costs from Thraen not included in the above analysis. Individually these costs are small and not expected to vary from region to region.

change in legislation invoked competition among processors, not among retailers. Class I prices did not change by more than the usual seasonal fluctuation during the price war.

We cannot assume that the price war and disequilibrium resulting from changes in New York laws would occur if Connecticut alters its laws. The New York City market is one of the largest in the world. Also, the nature and purpose of the legislation were different. At the time of the New York regulatory change, many processors in metropolitan New Jersey were champing at the bit to sell in Manhattan. While there certainly are processors in metropolitan New York that would like to expand into Connecticut, Connecticut is not the kind of market that New York City was to New Jersey processors.

3.2.3.4.2 Connecticut-New York Price Data. In February, 1989, the Food Marketing Policy Center collected retail milk prices from supermarkets and convenience stores throughout Connecticut and in Westchester and Duchess counties in New York State in order to gain a better understanding of the price relationships

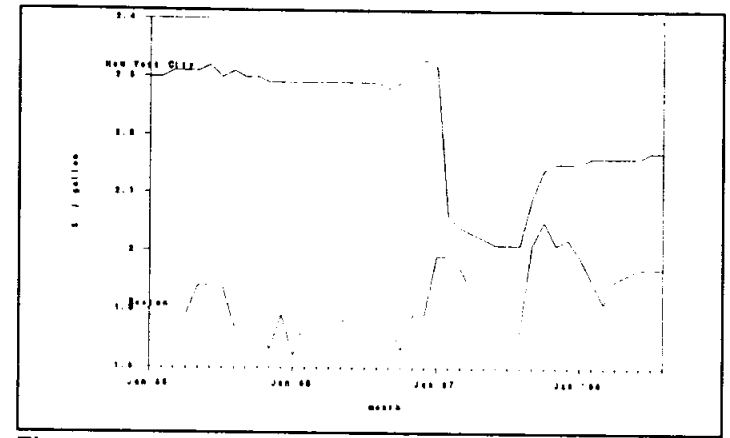

Figure 10. MILK PRICES IN NEW YORK CITY AND BOSTON, 1985-1988. SOURCE: IAMCA DATA; N.E. MILK MARKET ADMINISTRATOR.

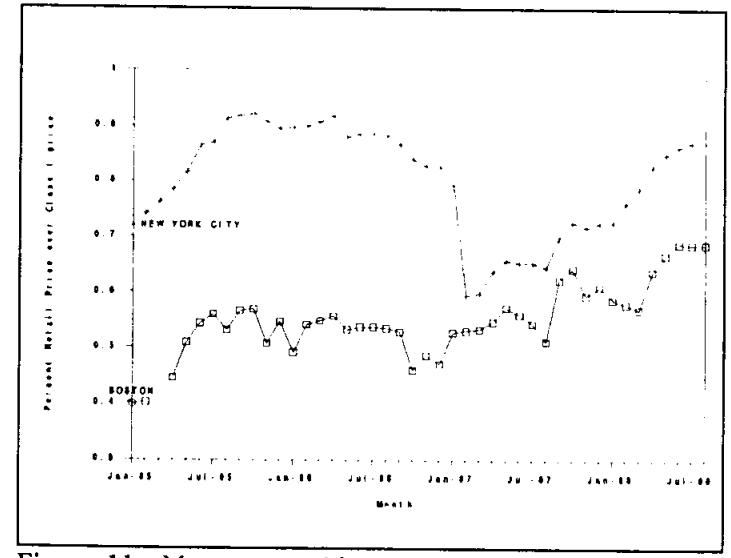

Figure 11. MARKETING MARGINS FOR NEW YORK AND BOSTON: PERCENT RETAIL PRICE OVER CLASS I PRICE. SOURCE: IAMCA DATA; N.E. MILK MARKET ADMINISTRATOR.

between the areas. If retail prices for milk are higher in Connecticut than in New York, then perhaps New York processors will have an incentive to ship into Connecticut. Table 10 lists average prices for different types of milk in Connecticut food stores (convenience stores and supermarkets). The price of whole milk in the state, for example, averaged $2.30 per gallon with the lowest price surveyed being $2.01 per gallon and the highest price being $2.65 per gallon, for a price range of 64 cents. One percent milk averaged $2.11/gal. and two percent, $2.20/gal. Taking a simple average of these prices results in an estimated price per gallon of $2.20. The average price of half gallons was $1.25.

Table 11 lists separate information for Connecticut supermarkets and convenience stores. In this sample there appears to be little difference in pricing between store type. One might expect higher prices in convenience stores; however, several of the convenience stores surveyed were operated by dairy companies such as Dairy Mart and Cumberland Farms.

Table 10. MILK PRICES AND PRICE RANGES IN CONNECTICUT FOOD STORES.

milk type	number observed	average price	minimum	maximum	range
GALLONS					
whole	80	$2.30	$2.01	$2.65	$0.64
1% lowfat	68	2.11	1.79	2.58	0.79
2% lowfat	72	2.20	1.79	2.64	0.85
HALF GALLONS					
whole	110	$1.29	$1.08	$1.48	$0.40
1% lowfat	79	1.23	0.99	1.53	0.54
2% lowfat	97	1.24	1.01	1.51	0.50

Source: FMPC Retail Milk Price Survey

Table 11. MILK PRICES IN CONNECTICUT SUPERMARKETS AND CONVENIENCE STORES

milk type	number observed	average price	minimum	maximum	range
SUPERMARKETS					
GALLONS					
whole	68	$2.31	$2.01	$2.65	$0.64
1% lowfat	58	2.12	1.89	2.58	0.69
2% lowfat	62	2.20	1.79	2.64	0.85
HALF GALLONS					
whole	98	$1.29	$1.08	$1.48	$0.40
1% lowfat	69	1.23	0.99	1.53	0.54
2% lowfat	87	1.24	1.01	1.51	0.50
CONVENIENCE STORES					
GALLONS					
whole	12	$2.30	$2.09	$2.49	$0.40
1% lowfat	10	2.03	1.79	2.30	0.51
2% lowfat	10	2.18	1.99	2.49	0.50
HALF GALLONS					
whole	12	$1.27	$1.09	$1.45	$0.36
1% lowfat	10	1.25	1.09	1.49	0.40
2% lowfat	10	1.25	1.09	1.49	0.40

Source: FMPC Retail Milk Price Survey

Table 12 gives prices for food stores in Westchester and Duchess counties in New York. There are fewer observations in New York than in Connecticut, and it appears that the price range in New York is lower. The average prices for gallons of whole milk, one percent, and two percent low fat milk were $2.37, $2.22, and $2.27, respectively. Half gallons averaged $1.29, $1.22, and $1.25 for whole, one percent and two percent milk. Table 13 provides information on supermarket and convenience store groups in New York. The presence of only three convenience store observations provides little information about pricing in these stores; however, they are lower than supermarket prices in this sample.

Table 12. MILK PRICES AND PRICE RANGES IN NEW YORK FOOD STORES.

milk type	number observed	average price	minimum	maximum	range
GALLONS					
whole	25	$2.37	$2.09	$2.59	$0.50
1% lowfat	17	2.22	1.89	2.49	0.60
2% lowfat	23	2.27	1.78	2.49	0.70
HALF GALLONS					
whole	25	$1.29	$1.09	$1.45	$0.36
1% lowfat	19	1.22	1.03	1.39	0.36
2% lowfat	19	1.25	1.05	1.39	0.34

Source: FMPC Retail Milk Price Survey

Average prices between the two states were compared and t-tests were used to test for differences in the means. The data suggest that gallon milk prices in New York are higher than Connecticut. As shown in Table 14, the average price of one percent gallons was $2.11 in Connecticut and $2.22 in New York, a difference of 11 cents that is significant at the five percent level. Two percent and whole milk gallon prices were six and seven cents higher, respectively, in New York. These differences are significant at the ten percent level. Half gallon prices, shown in the lower half of the table, however, demonstrated no statistically significant difference between the two states.

Table 14 does not control for whether the product is branded or is private label, and whether it is sold in a supermarket versus a convenience store. These factors may be contributing to regional price differences. The following regression model can be used to measure possible state price differences independent from these possible price determinants:

$$PRICE = \beta_0 + \beta_1(STATE) + \beta_2(PLBR) + \beta_4(TYPE)$$

where

PRICE = the retail price for WHOLE, ONE percent, or TWO percent milk,
STATE = 1 if Connecticut, 0 if New York,

Table 13. MILK PRICES IN NEW YORK SUPERMARKETS AND CONVENIENCE STORES

SUPERMARKETS

milk type	number observed	average price	minimum	maximum	range
GALLONS					
whole	22	$2.37	$2.15	$2.53	$0.38
1% lowfat	14	2.24	1.89	2.45	0.56
2% lowfat	20	2.27	1.79	2.45	0.66
HALF GALLONS					
whole	22	$1.30	$1.09	$1.45	$0.36
1% lowfat	17	1.23	1.03	1.39	0.36
2% lowfat	16	1.26	1.05	1.39	0.34

CONVENIENCE STORES

milk type	number observed	average price	minimum	maximum	range
GALLONS					
whole	3	$2.37	$2.09	$2.59	$0.50
1% lowfat	3	2.12	1.89	2.49	0.60
2% lowfat	3	2.26	1.99	2.49	0.50
HALF GALLONS					
whole	3	$1.24	$1.09	$1.35	$0.26
1% lowfat	2	1.15	1.05	1.25	0.20
2% lowfat	3	1.22	1.05	1.35	0.30

Source: FMPC Retail Milk Price Survey

PLBR = 1 if name brand, 0 if private label, and
TYPE = 1 if supermarket,0 if convenience store.

Regression results for this model for gallons and half gallons of whole, one and two percent milk are given in Table 15. For gallons of whole milk, the first two equations indicate that Connecticut prices are lower than New York prices, which is consistent with the observations made in Table 14. The coefficient -0.064 on the first equation is significant at the ten percent level. The coefficient in the second equation is not significant.

The coefficient on the PLBR variable in this equation (0.121) is significant, indicating that name brand milk is priced higher than private label milk. We shall return to the differences in branded versus private label pricing in the next section. The results for gallons of one percent milk are shown in equations 3 and 4. All coefficients are significant at the five percent level, indicating that prices are lower in Connecticut, and are higher for brand name products and for milk sold in supermarkets. As shown in equations 5 and 6, state and store type do not determine prices for gallons of two percent milk. These prices are affected only by whether it is a brand name or private label.

Equations 7 through 12 indicate that half gallon prices are affected only by branding; brand name milk is priced higher than private label milk. State and store type are not significant determinants of half gallon prices.

The regressions in Table 15 were run on the full Food Marketing Policy Center price survey sample; it includes Connecticut stores outside of New Haven and Fairfield counties where entry is less likely. In Appendix I the same regression models were run on the New York and New Haven-Fairfield part of the sample. The results indicate more robust evidence that gallon prices are higher in New York than in southwestern Connecticut, and that branded products are priced higher than private label products. Again, these results are less conclusive for half gallons.

3.2.3.5 **Brand Differentiation.** Milk is generally considered to be a commodity item with low product differentiation and low elasticity of demand. It is often, though, that consumers care little about brand identity and shop for freshest product and the lowest price. After all, processing and packaging between different plants are essentially the same, and except for some possible differences in butterfat content, cow's milk is cow's milk. Product differentiation in milk usually comes in the form of butterfat content: it is sold as whole milk (3.5 percent), one percent, or two percent butterfat. Some milk is fortified with extra protein or beneficial bacteria such as acidophilus, but brand differentiation is usually thought to be insignificant.[4]

[4]As mentioned in the previous section, strategic groups have been identified and firms generally serve some market niche. For example, some firms focus their business on a few large super-

Table 14. AVERAGE MILK PRICES IN NEW YORK AND CONNECTICUT, FEBRUARY, 1989

	whole $/gallon, N		one percent $/gallon, N		two percent $/gallon, N	
GALLONS						
sample	2.32	105	2.13	85	2.21	95
CT price	2.31	80	2.11	68	2.20	72
NY price	2.37	25	2.22	17	2.27	23
difference (NY-CT)	0.06		0.11		0.07	
t-statistic*	1.87[b]		2.35[a]		1.64[b]	
HALF GALLONS						
sample	1.29	135	1.23	98	1.25	116
CT price	1.29	110	1.23	79	1.24	97
NY price	1.29	25	1.22	19	1.25	19
difference (NY-CT)	0		-0.01		0.01	
t-statistic*	0.19		-0.26		0.42	

*assuming equal variance in Connecticut and New York samples
[a] Significant at the five percent level.
[b] Significant at the ten percent level.

The milk price survey conducted by the Food Marketing Policy Center provides evidence that product differentiation by brand does exist. As seen in Table 15 in the previous section, the price of milk is significantly higher for brand names than for private labels. Table 16 provides further evidence of brand that

market chain accounts, selling both a brand name and private label product. Others concentrate on small retail and restaurant accounts. But the existence of strategic groups does not necessarily imply that product differentiation has occurred: selling milk to a restaurant or a supermarket does not mean that the product is differentiated. However, if there is product differentiation, it may exist within a strategic group; for example, in large supermarkets one often finds both private label (store brand) and branded milk.

Table 15. MILK PRICE REGRESSION RESULTS: GALLONS.

No	DV	β_0	State	PLBR	Type	R^2/F
GALLONS						
1	WHOLE	2.359	-0.064		0.015	0.084
			(-1.850)***		(0.362)	1.808
2		2.292	-0.040	0.121	0.010	0.184
			(-1.240)	(4.310)*	(0.248)	7.60*
3	ONE	2.135	-0.112		0.102	0.106
			(-2.454)**		(2.007)**	4.03*
4		2.089	-0.104	0.091	0.108	0.170
			(-2.349)**	(2.498)**	(2.196)**	5.39*
5	TWO	2.25	-0.072		0.018	0.029
			(-1.630)		(0.332)	1.39
6		2.201	-0.061	0.091	0.013	0.089
			(-1.408)	(2.440)**	(0.237)	2.80*
HALF GALLONS						
7	WHOLE	1.266	-0.005		0.028	0.008
			(-0.208)		(0.983)	0.502
8		1.245	-0.027	0.114	0.005	0.226
			(-1.346)	(7.315)*	(0.198)	18.30*
9	ONE	1.228	0.008		0.005	0.001
			(0.260)		(0.141)	0.016
10		1.197	0.005	0.082	-0.018	0.119
			(0.180)	(3.541)*	(0.508)	4.21*
11	TWO	1.252	-0.011		0.003	0.002
			(-0.427)		(0.092)	0.098
12		1.240	-0.024	0.058	-0.012	0.073
			(-0.946)	(2.943)*	(-0.389)	2.59*

* significant at the one percent level, ** significant at the five percent level, *** significant at the ten percent level

is bottled in the same plant and most likely delivered on the same truck to Connecticut supermarkets. The price of branded gallons (1%, 2%, and whole milk) was, on average, 11 cents, or 5.1 percent, higher than the price of private label milk. Branded half gallons were, on average, 12 cents (10 percent) higher in price than the private label product. Part of the higher price may be due to advertising and marketing costs, but product differentiation. It gives prices for private label and branded milk differentiation is in evidence: consumers are willing to pay more for branded milk.

Table 17 shows price ranges for all brands, including private label, in Connecticut stores. It compares milk across all brands regardless of plant of origin. In this larger sample the in-store price range for whole milk averages 15 cents, for one percent it averages 14 cents, and for two percent it averages 21 cents.

The average price range for gallons was 7.7 percent of the average low price. Half gallons exhibit similar absolute price ranges, but the range was 11 percent of the average low price. Part of the range of observed prices may be due to higher processing and delivery costs, but a major portion is probably due to product differentiation.

Table 16. PRICES OF PRIVATE LABEL AND BRANDED MILK BOTTLED BY SAME PLANT IN INDIVIDUAL SUPERMARKETS.

type	store	private label price	brand price	range	range as a % of private label price
GALLONS					
Whole	1	$2.29	$2.39	$0.10	4.4%
	2	2.39	2.49	0.10	4.2
	3	2.05	2.23	0.18	8.8
	4	2.07	2.17	0.10	4.8
	5	2.25	2.35	0.10	4.4
	6	2.29	2.39	0.10	4.4
	7	2.29	2.39	0.10	4.4
	Average			0.11	5.1
1% Low	1	$1.99	$2.05	$0.06	3.0%
	2	2.35	2.45	0.10	4.3
	Average			0.08	3.7
2% Low	1	$2.25	$2.32	$0.07	3.1%
	2	2.01	2.25	0.24	11.9
	3	2.15	2.25	0.10	4.7
	4	2.29	2.39	0.10	4.4
	Average			0.13	6.0
Average of All Gallons				$0.11	5.1%

(continued)

Table 16 (CONTINUED).

type	store	private label price	brand price	range	range as a % of private label price
HALF GALLONS					
Whole	1	$1.25	$1.33	$0.08	6.4%
	2	1.31	1.39	0.08	6.1
	3	1.23	1.29	0.06	4.9
	4	1.24	1.35	0.11	8.9
	5	1.29	1.39	0.10	7.8
	6	1.19	1.35	0.16	13.4
	7	1.17	1.39	0.22	18.8
	8	1.38	1.47	0.09	6.5
	9	1.20	1.37	0.17	14.2
	10	1.12	1.30	0.18	16.1
	11	1.19	1.37	0.18	15.1
	12	1.17	1.45	0.28	23.9
	13	1.13	1.31	0.18	15.9
	14	1.08	1.28	0.20	18.5
	15	1.37	1.41	0.04	2.9
	16	1.17	1.33	0.16	13.7
	17	1.25	1.25	0.10	8.0
	Average			0.14	11.5
1% Low	1	$1.39	$1.41	$0.02	1.4%
	2	1.07	1.47	0.40	37.4
	3	1.14	1.24	0.10	8.8
	4	1.09	1.16	0.07	6.4
	5	1.23	1.30	0.07	5.7
	6	1.29	1.35	0.06	4.7
	7	1.12	1.22	0.10	8.9
	8	1.05	1.20	0.15	14.3
	9	1.25	1.35	0.10	8.0
	Average			0.12	10.1
2% Low	1	$1.35	$1.37	$0.02	1.5%
	2	1.13	1.23	0.10	8.8
	3	1.14	1.34	0.20	17.5
	4	1.18	1.23	0.05	4.2
	5	1.29	1.31	0.02	1.6
	6	1.20	1.21	0.01	0.8
	7	1.25	1.31	0.06	4.8
	8	1.20	1.30	0.10	8.3
	9	1.11	1.21	0.10	9.0
	10	1.07	1.17	0.10	9.3
	11	1.16	1.26	0.10	8.6
	12	1.21	1.31	0.10	8.3
	Average			0.08	6.7
Average of All Half Gallons				$0.12	10.0%

Table 17. AVERAGE PRICE RANGES FOR ALL BRANDS MILK IN INDIVIDUAL STORES.

type	no. of stores	avg. min. price	avg. range	avg. range as a % of avg. min price
GALLONS				
Whole	22	$2.25	$0.15	6.7 %
1%	10	2.08	0.14	6.6
2%	14	2.11	0.21	9.8
HALF GALLONS				
Whole	37	$1.22	$0.14	11.9 %
1%	16	1.17	0.13	11.5
2%	29	1.19	0.11	9.6

Familiar brands in New England include Hood, Garelick, Guida-Seibert, and Sealtest. Brand identity tends to be regional; Sealtest is the only brand in New England that could be considered national. The Sealtest trademark is owned by Kraft who sells the license to use it under franchise agreements. New England Dairies holds the license in Connecticut.

Although brand prices are higher, there is some capital invested in establishing a brand name. This will affect the decisions of potential entrants to market a private label or branded product. Naturally, an entrant would choose to enter with a branded product if it commands a higher price. This is especially true if they are operating at higher costs of labor and shipping. But milk brand preference among consumers takes time and money to establish: a plant in New York entering with what may be a popular name in their established market would have a difficult time altering consumer preferences and the incumbent hierarchy of brand names in New England. Thus, the existence of brand product differentiation in New England acts as an entry barrier to outside firms.

3.2.3.6 **Other Factors Influencing Entry by Expansion of Route Distribution.** 3.2.3.6.1 Retail buying and contracts. Overend (1988) observed that supermarket buyers in New England hold more market power than processors. Buyers set the terms with processors and shift easily from one to another, generally not committing themselves to long term contracts. (The exception is private labeling, where commitments are required for packaging stock.) Processors may be able to offer lower prices if buyers are willing to commit their purchases for longer periods. Evidence of regional differences in the nature of contracts is not available.

3.2.3.6.2 Pull dates. In New York City, milk must be sold within 5 days of pasteurization. Plants are under a great deal of pressure to move milk as quickly as possible, and the resulting lack of flexibility regarding warehousing and storage would encourage New York plants to sell milk in Connecticut, where the pull date is 12 days.

3.2.3.6.3 Consolidation of Supermarket Chain Accounts. New York supermarket chains that operate units in Connecticut may be deterred by the farm inspection requirement from including those Connecticut stores in company wide milk contracts and shipping arrangements. Removal of barriers would enable these chains to consolidate sources of supply and possibly reduce transaction costs related to contracting. Since milk is delivered directly by the processors to supermarkets, there probably would not be significant gains in distributional efficiency when contracts are consolidated. If the major supplier for the chain is a New York plant, then the New England plants supplying the Connecticut units may lose the account.

3.3 Summary

In this part of the report we have examined the nature of demand for fluid milk products, the structure of the processing industry, and different scenarios for entry into the New England Market. Of the three methods of entry considered, entry by route expansion seems the most likely. Next, we examined the barriers to this type of entry, and found that New York processors have no cost advantage over New England processors and that retail prices in New York are higher than in New England. This suggests that there are little advantages to large scale entry into the New England market. However, some entry by route expansion into southwestern Connecticut near metropolitan New York may be likely. In the next section we forecast the amount of entry that is likely and evaluate its impact on producers, processors, and consumers.

4. Regulatory Impact Analysis and Conclusions

There are three basic components to evaluating the impact of a change in Connecticut milk inspection regulations: identifying the regulatory change, predicting the amount of entry that will result from the change and evaluating the impact of that entry on farmers, processors and consumers. Each of these is addressed below.

As explained in the introduction to this report we will evaluate an hypothetical impact case scenario. We assume that Connecticut regulation posed a barrier to entry prior to regulatory change and that it creates no barrier *ex post*. Two other cases are worth discussing. If, in fact, the regulations do not *ex ante* and *ex post* create entry barriers, then changing the regulations will have no economic impact on participants in the marketing system. Similarly, if there are *ex ante* and *ex post* entry barriers, then there will be no impact. Thus, the case analyzed is the interesting case.

Based upon our analysis of entry conditions in the third part of the report, we conclude that there are substantial barriers to entry into New England if processors seek to enter by building new plants (*de novo* entry). These barriers dominate any changes in the Connecticut regulatory system. Entry by expansion of distribution routes from existing processing plants in New York is the most likely type of entry, yet our work shows that New York firms have somewhat higher processing costs and Connecticut/Boston retail milk prices are the same or lower than New York City/lower Hudson Valley retail prices. In the short run there may be exceptions, but in the long run entering Connecticut by route expansion does not appear to be a viable strategy for New York processors.

One exception to this long run conclusion may be the consolidation of milk accounts of large chain supermarkets that have operations in New York and Connecticut. The transaction cost reductions that a supermarket chain can realize from consolidating its milk orders with New York processors may offset the estimated 2.7 cents/gallon processing cost disadvantage of New York processors and any need to lower price to compete in Connecticut markets.

If entry by supermarket account consolidation does occur, very little of the transaction cost savings will be passed back to farmers. The higher processing costs of New York firms are due to higher labor and utility costs, not higher price paid to farmers for milk. Thus, the higher prices supermarkets are willing to pay for account consolidation go to those factors of production, not milk.

Entry into Southern New England via account consolidation would most likely occur in New Haven and Fairfield counties. Plants located in metropolitan New York could easily serve these counties without incurring disadvantage in shipping costs. Of the supermarket chains operating in these two counties, Grand Union, Shop Rite, Path Mark, and Gristedes are either headquartered in New York or New Jersey or are served by buying offices in those states. (Other chains, such as A & P and Waldbaum, operate stores in Connecticut, New Jersey, and New York, but the Connecticut stores are supported by offices within New England.)

The question is how much milk do these chains sell? Table 18 shows that the 26 stores operated by these four chains have estimated sales of around $421 million, which is 11 percent of estimated food store sales in Connecticut (Griffen Report). Consumption of milk in Connecticut is about 820 million pounds (Connecticut Dairy Division). Of course, not all the 820 million pounds consumed in the state is bought in stores; recent figures indicate that about 46 percent of food expenditures are made away from home (Food Institute Report). Recognizing that food in restaurants is more expensive per unit than food in supermarkets, this figure must be adjusted downward. Lacking more detailed data, we assume that 20 percent of food consumption on a per unit basis is outside of the home. Thus, the 820 million pounds of total consumption is adjusted to 656 million pounds purchased from food stores.

As Table 18 demonstrates, chains account for 11 percent of food store sales in Connecticut. If we assume that eleven percent of

Table 18. MILK SALES BY NEW YORK OR NEW JERSEY - BASED SUPERMARKETS OPERATING IN NEW HAVEN AND FAIRFIELD COUNTIES, CONNECTICUT.

Company	no. stores	1987 annual sales
Fairfield County		
Grand Union	13	$168,376,000
Path Mark	4	115,000,000
Gristedes	2	10,400,000
New Haven County		
Path Mark	4	$100,000,000
Shop Rite	2	15,000,000
Grand Union	1	12,500,000
total sales		$421,276,000
CT estimated food sales		$3,765,157,000
CT sales made by above stores		11.19 percent
annual CT milk consumption		819,920,000 pounds
CT milk bought from food stores		655,936,000 pounds

the milk consumed in the state is bought from these stores, then they made annual milk sales in 1988 totalling 73 million pounds.

This is our best prediction of the magnitude of entry. However, prediction of this type of economic change is very conjectural. Actual entry occurs over time and, undoubtedly, will be more or less than 73 million pounds. Five years after the regulatory change, for example, New York processed fluid milk sold in Connecticut may total 37 million pounds or 150 million pounds. If one halves or doubles our estimate, the costs and benefits estimated below are halved or doubled. In our opinion, however, it is very unlikely that entry of fluid milk into Connecticut distribution through any channel (supermarket accounts, small stores, restaurants or institutions) will exceed 150 million pounds annually five years after any regulatory change.

The next step in the impact analysis is to use the blend price elasticity model developed in the second part of this report.

One can analyze the impact of entry of 73 million pounds of milk upon the Order 1 blend price, Connecticut and total Order 1 dairy farm revenue. Table 19 summarizes this computation. Order 1 blend prices will most likely drop 3.3 cents per hundredweight if the entering plant(s) remains in the Order 2 pool. If the plant(s) sells more than 50 percent of their output in Order 1, and thus, are pooled in Order 1, then the blend price declines only 1.7 cents.

The first case is more likely. One plant will probably not supply all four chains. The resulting volume for each plant will be considerably less than 73 million pounds per year. Thus it is very doubtful that any of these plants will sell more than 50 percent of their annual output in Order 1. The estimated 3.3 cent decline in the blend price received by Order 1 farmers due to lower Class I utilization produces an estimated revenue loss of $479/year for the average sized Connecticut dairy farm (14,500 cwt./year). In the aggregate this amounts to a loss of about $185 thousand for dairy farmers in Connecticut. Since all farmers in Order I, receive the blend price, the aggregate annual loss for Order I is approximately $1,689,000. New York farmers shipping to Order 1 (approximately one quarter of supply) will lose $433,620.

In the aggregate Order 2 producers gain this amount because their utilization increases. Farmers selling milk in Federal Order 2, however, will experience only a slight increase in their utilization rate and blend price. This is because the Order 2 pool is twice as large as the Order 1 pool, the elasticity of the blend price is lower, and the initial utilization ratio is lower. The blend price in Order 2 will increase one cent. The increase in income to an individual New York farmer selling 14,500 cwt/year in Order 2 would be about $138.

From the standpoint of processors, the shifting of 73 million pounds of milk is less than ten percent of sales in Connecticut and less than two percent of Order 1 sales of fluid milk. In the aggregate this does not produce a major shift in competitive positions of dairy processors in the Northeast. Specific plants of specific processors, however, may be significantly affected. The general supposition that eliminates barriers to entry will benefit consumers through increased competition among processors and ultimately lower retail milk prices is not valid. New England consumers, including consumers in southwestern Connecticut, will see virtually no change in the retail price of milk. Changes in utilization have no impact on the

Table 19. IMPACT OF ENTRY OF 175 MILLION POUNDS PER YEAR OF ORDER 2 MILK INTO NEW ENGLAND

	Before entry into Order 1	entry into Order 1 pooled into Order 2	entry into Order 1 pooled into Order 1
Order 1 utilization (10^6 lb./Yr)	5593.00	5593.000	5666.000
Class I utilization	2833.00	2760.000	2833.000
Class II utilization	2760.00	2833.000	2833.000
% Class I (x)	50.70	49.300	50.000
% change in util.		2.760	1.380
% change in b.p.		0.270	0.135
blend price	12.22	12.187	12.203
$ change in b.p. ($/cwt)		- 0.033	- 0.017
revenue change, avg. CT farm (4,500 cwt/year)		- $ 479.000	-$247.000

prices processors pay for milk. Therefore, this change in regulation would not, via the federal order pricing system, produce any changes in processors' costs that might be passed forward to consumers. Moreover, it is extremely unlikely that cost savings due to account consolidation by supermarket chains would be passed forward to consumers. To achieve account consolidation they must, in all likelihood, be passed back to New York processors to cover the higher processing costs.

Summarizing our results, we estimate that route expansion entry by New York processors will displace 73 million pounds of Order I milk annually. This magnitude of entry will result in transfer of revenue from Order I farmers to Order 2 farmers totalling approximately $1,689,000 per year through changes in the utilization rates and blend prices. The blend price in Order I will decline 3.3 cents/cwt and the average Connecticut farmer will lose $479/year. Because Order 2 is so much larger than Order I, the transferred revenue is spread over many more

units. Order 2 blend price increases only a cent. An Order 2 farm with production equal to the average Connecticut farmer gains $138 in revenue. These changes in the blend price do not affect consumer milk prices.

Transactions cost savings from account consolidation by supermarket chains that currently have divisions with operations in New York and Connecticut will not be passed forward to consumers as price reductions or back to farmers as price increases. If entry is to occur, they must be paid to New York processors who need them to cover higher labor and other non milk costs of operations.

In any report that attempts to predict the future the standard caveat holds. This is our best estimate of the future path of the northeast dairy industry if Connecticut inspection currently is an entry barrier to account consolidation and regulatory changes eliminate that barrier. Actual experience will vary from this estimate for a number of reasons. First, we analyzed the impact case scenario. If either of the other two cases holds the impacts will be less than our estimates. (Please see, Food Marketing Policy Center Research Report 7, for an evaluation of this possibility). Second, even if the impact case scenario is essentially correct, we have used average estimates for the cost of processing. They provide reliable estimates of long run conditions. However, in the short run there may be one or more New York firms that can effectively compete in Connecticut. Increases in capacity utilization may lower unit costs and, thus, enhance entry into lower priced Connecticut markets. Even if Connecticut prices cannot cover the total average cost of distributing milk, the lower Connecticut price may be sufficient to cover these incremental costs. Incremental costs (average variable costs at the margin) are significantly less than total costs. Price in excess of incremental costs does contribute to covering fixed overhead costs in the short run. Third, this study does not analyze the marketing of specialty fluid milk products that are relataively high in value and may be shipped greater distances. These products, however, account for a very small share of fluid milk sales. Finally, the milk marketing system is in a constant state of flux due to changes in a great variety of factors that affect its structure, conduct, and performance. As external conditions not analyzed in this report change, the impact of a modification in regulations will change.

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Appendix A. Milk Price Regression Results for Metro New York, and Fairfield and New Haven Counties, Connecticut.

No	DV	β_0	State	PLBR	Type	R^2/F
GALLONS						
1	WHOLE	2.435	-0.092 (-2.606)**		-0.071 (-1.529)	0.112 4.304**
2		2.367	-0.067 (-1.981)**	0.108 (3.362)*	-0.068 (-1.574)	0.241 7.073*
3	ONE	2.208	-0.149 (-3.223)*		0.013 (0.231)	0.170 5.207*
4		2.141	-0.148 (-3.436)*	0.120 (2.980)*	0.027 (0.494)	0.295 6.967*
5	TWO	2.319	-0.096 (-1.936)***		-0.059 (-0.399)	0.066 2.206
6		2.277	-0.091 (-1.829)***	0.068 (1.422)	-0.058 (-0.852)	0.096 2.169***
HALF GALLONS						
7	WHOLE	1.311	-0.007 (-0.292)		-0.023 (-0.721)	0.007 0.300
8		1.283	-0.025 (-1.269)	0.116 (6.414)*	-0.038 (-1.417)	0.336 14.010*
9	ONE	1.274	0.011 (0.340)		-0.056 (-1.310)	0.033 0.947
10		1.248	0.004 (0.137)	0.063 (2.144)**	-0.064 (-1.522)	0.107 2.204***
11	TWO	1.290	0.001 (0.028)		-0.041 (-1.169)	0.019 0.684
12		1.276	-0.012 (-0.465)	0.050 (2.079)**	-0.050 (-1.444)1	0.076 2.918

* significant at the one percent level, ** significant at the five percent level,

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