

Food Marketing Policy

Issue Paper

No. 21

May 2001

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May 2, 2001

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This research was supported by USDA CSRS Research Grant No. 99-34178-7572, the Storrs Agricultural Experiment Station, and the University of Connecticut. The authors are Director of the Food Marketing Policy Center and undergraduate student in the Department of Agricultural and Resource Economics. We acknowledge the secretarial assistance of Lorraine Knight. Responsibility for content and conclusions remains with the authors.

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I. Introduction

The prices that consumers pay for fluid milk, and the profit margin that retailers and processors capture, depend on the market structure and price conduct in local market areas. Fluid milk processing plants are located near the cities that they supply, and competition at the retail level for consumer traffic occurs at the city level and within smaller market areas. This study uses Information Resources Inc. (IRI) scanner data to examine farm price trends, retail price trends, the relationship between farm and retail level prices, and the farm-to-retail marketing margin for five U.S. cities. Cotterill and Franklin (2001) analyzed in detail the four New England and New York City IRI markets. In conjunction with that more comprehensive effort this study gives insight on milk pricing throughout the continental United States.

Our method is visual and preliminary. We present graphs of supermarket milk prices and the price that processors pay for raw fluid milk, what we call the farm price, for IRI quad-week periods (13 per year) from the period ending 3/3/96 through the period ending 7/16/00. There are 58 observations in total. The supermarket retail prices are IRI averages for all supermarkets in each city market area.¹

In this study the adage, a picture (graph) is worth a thousand words is true. By stating this, we do not mean to declare that further more detailed quantitative analysis of milk pricing in these markets is superfluous. To the contrary, more precise measurement

that incorporates changes in the costs of market channel inputs other than milk, analysis of milk prices at the supermarket chain level and at the brand level within each chain is needed to measure market wide effects more precisely and to identify exactly who is, or is not, competing on price in particular markets. Our IRI data base has chain and brand level data, so such research is feasible. In the remaining sections of this paper we examine the pricing conduct for San Francisco, Seattle, Chicago, Miami, and Dallas-Forth Worth respectively. We supplement this IRI data based analysis with the results of a computer search for newspaper stories on milk pricing in these cities. In fact we find the most stories in the three markets where we find non-competitive pricing, and their content buttresses our analysis. Our qualitative analysis indicates that San Francisco may be competitive. Severe competitive problems exist in Seattle and Chicago. Miami price trends are too ambiguous to identify competitive or non-competitive price conduct. Dallas-Fort Worth provides an interesting case of non-competitive pricing that explodes into an all-out price war. These results demonstrate that the noncompetitive pricing that Cotterill and Franklin(2001) document in the New England markets is by no means unique.

II. San Francisco

San Francisco is an excellent benchmark case for this study because it provides a “text-book” example of how farm and retail prices behave in a competitive market. Note in Figure 1 that changes in the farm price generate commensurate changes in the retail price series. When the farm price goes up, retail prices also increase. When farm price

¹ See appendix A for maps of each IRI market area. They are substantially larger than Census metropolitan statistical

drops, retail prices decrease. The farm-to-retail margin over the entire period seems roughly constant because the retail and farm price series seem to have effectively flat price trends.² In comparison to markets that follow, this market seems competitive; however, note that retail price is uniformly above \$3 per gallon (Figure 1), the highest in our five city sample. One can't rule out the possibility that the market margin is uniformly wider through this four-year period than it would be in a competitive market.

III. Seattle

The price trends for Seattle contrast sharply to those in San Francisco. At best retail prices respond in a direct fashion to farm price changes only in 1996 and 1997. From April 1998 through July 2000, retail prices simply do not drop when farm prices decrease. Retail pricing is asymmetric. Farm price increases are passed on to consumers but farm price decreases are not. Consequently, the farm-to-retail margin widens, and does so in a very dramatic fashion in 1999 and 2000. At the beginning of this period (in 1996) the marketing margin is approximately \$1.23 per gallon. At the end of the period (January through July 2000) the farm price per gallon is lower than it was in 1996 (\$1.13 vs. \$1.34) and retail price per gallon is dramatically higher (\$3.20 vs. \$2.57). The marketing margin increases 60 percent from \$1.29 in 1996 to \$2.07 in 2000. This increase is well above the amount needed to cover increases in non-milk costs. Seattle does not have a competitive milk-marketing channel.

² Again, we stress that one could and should statistically verify and precisely measure these trend lines and the size of the margin over time. This paper is only a qualitative analysis. Nevertheless what we can see is enough to rule out non-competitive margin-widening price relationships in San Francisco.

High retail milk prices have not gone unnoticed in the Seattle press. The Seattle Post-Intelligencer reported that the area had relatively high milk prices in 1997, in an article titled “Holy Cow! Seattle Leads The Nation In Price Of Milk” (Staff 4/20/98). The staff writes, “If you got it in Seattle, you paid the nation’s highest average store price for milk last year, at \$3.15 a gallon.” Although our data in Figure 2 show that the average supermarket price in Seattle was closer to the national average of \$2.60 during 1997, the price broke \$3.00 at the beginning of 1999.

In January 1999, the farm price in Seattle peaked at \$1.66 and was predicted to drop dramatically in the following months. Janelle Carter, writing in The Seattle Post-Intelligencer, reported that record-high farm prices would deflate dramatically. Her article was titled “Expect a Big Drop In Milk Prices Over The Next Month” (Carter 3/6/99). USDA government sources cited by Carter state that the raw milk price would drop more in one month than ever before.

The data in Figure 2 shows this event quite clearly. From the end of March to the end of April 1999, the farm level price for fluid milk dropped from \$1.57 to \$1.10, a 30% decline. Carter pointed out that economists expected processors and retailers to pass on most of this raw milk cost saving to consumers in the form of lower retail prices for fluid milk and other dairy products. In a second article published a day later in The Vancouver Columbian (3/7/99), Carter states “A plunge in milk prices over the next month could spell economic turmoil for some dairy producers, but consumers will reap benefits of lower-priced milk, cheese and butter.” Carter and the industry sources she cites are obviously convinced that the market is competitive and efficient. They expect that lower costs to processors will result in lower prices to retailers, and lower prices to consumers.

As nice as this sounds, the data shows that for Seattle this is, in fact, not the case. In April 1999, the retail price drops slightly, from \$3.11 to \$3.02, in response to the change in farm prices which plummeted from \$1.57 to \$1.10. The 9 cent drop at retail is a far cry from the \$0.47 drop in the farm price. For the next year, retail prices in Seattle did not fall below \$3.00.

One year later, after not seeing any relief in retail prices, Philip Brasher of The Seattle Times comes back to this same issue in an article titled “Got milk? Yes, and cost should be less” (Brasher, 1/23/200). He states that, “Consumers should benefit soon from a steep drop in the prices dairy farmers are receiving for their milk.” In fact, the farm price decreased from \$1.54 in October to \$1.15 in December 1999. Brasher’s call for lower retail price, however, is only met with very marginal results. The retail price falls from its peak in November 1999, \$3.25 per gallon, to \$3.09 in February 2000. Thereafter, retail prices in Seattle increase each month through July 2000. In summer 2000, The Seattle Times published an article titled “No crying here: Dairy farmers dump excess milk”(Bloomberg News, 7/16/00) referring to a surplus of fluid milk in Wisconsin. That article explains “The \$24 billion milk industry is having its worst slump in two decades...As the cost of milk falls to processors, there’s no sign that processors are passing the lower cost on to consumers.” This most certainly has been the case in Seattle. Asymmetric pricing in this market indicates that severe competitive problems do exist in Seattle. The Seattle newspapers have clearly considered high milk prices to be a very news worthy issue.

IV. Chicago

From a competition policy perspective, Chicago does not appear as questionable as Seattle prior to 1999. However, price conduct in 1999 and 2000 raises equally serious questions. Note that retail prices do not drop as much as farm prices when the latter plummet in the spring of 1999. This may be due to increases in costs other than milk. Retail price conduct in 2000, however, is clearly anti-competitive. When farm prices plummet after a short-lived price spike, retail prices that rode the spike up remain stuck on a very high price plateau. As in Seattle, one clearly sees asymmetric pricing that widens the farm-to-retail margin. From December 1999 through July 2000 consumers pay an average retail price at \$3.20 per gallon. The farm cooperative pay price per gallon for the same period averaged only \$1.28³. Therefore the marketing margin in Chicago was \$1.92 per gallon for the time period.

Media sources in the Chicago area noticed the farm price drop and anti-competitive nature of the retail milk market. Mike Kenyon writes in the Chicago Daily Herald:

“Milk price plummets... Midwestern dairy farmers are experiencing the lowest milk price in more than 20 years...The lack of profit for dairy farmers has resulted in 10,519 Wisconsin farmers quitting the business over the last three years. This is almost 10 each day. As I see it, we have two problems – an inability to resolve differences between producers, and milk bottlers who fail to pass savings along to consumers in the form of reduced prices. Hopefully, reducing the price would increase consumption.” (Kenyon 3/26/2000).

³ The farm cooperative pay price is somewhat higher than the Federal Market order price because it covers added services provided by the cooperative and possibly an over-order premium for quality or farm income enhancement. The spread from the class I price remains roughly constant throughout this entire time period.

Abdon Pallasch, of The Chicago Sun-Times, documents a class action lawsuit filed on behalf of consumers. It alleges that two dominant supermarket chains, Jewel and Dominicks, have fixed the retail price of fluid milk in violation of the Sherman Antitrust Act.(August 24, 2000). Jewel and Dominick’s Food Stores allegedly have conspired to maintain the retail price of fluid milk \$1 per gallon higher in Chicago than in the rest of the country. Former state Senate President Philip Rock’s law firm, leading the suit, surveyed 30 Jewel (owned by Albertson’s Inc.) and Dominick’s (owned by Safeway Inc.) stores in the area and found that all but one were charging \$3.69 for Deans and Dominick’s brands respectively. Across brands, evidence shows that prices matched perfectly between the two firms, which could be the result of alleged secret pricing meetings held between company executives . Since Jewel and Dominick’s control 62% of the market, and the nearest competitor only has 4.6% (Market Scope. 2000, pp. 318-9), any price agreement between these firms would have major impacts on average market prices. As stated earlier, the average marketing margin in Chicago for December 1999 through July 2000 was \$1.92. This compares to an average marketing margin for 1996 at \$1.17, a 64 percent increase over the three year period. Non-milk costs have not increased this much between 1996 and 2000. At least since December 1999, supermarket milk prices in Chicago reflect a substantial market power premium.

V. Miami

Pricing in Miami is somewhat similar to Chicago; however, the retail price trend is flatter and some price “twitches” occur in late 1998 and 2000. Prior to the sustained farm

price run up in the fall of 1998 retail prices track farm price moves quite well.⁴ Retail prices respond to the fall 1998 run, however, there is an episodic retail price drop in November 1998 before resuming price increases that peak in early 1999. Thereafter, retail pricing is asymmetric. Retail prices do not fall as much as farm prices do in the spring of 1999. Again this may be due to the need to cover increases in other costs. At the peak of the late 1999 farm price spike, retail prices that have increased in response to farm prices, briefly drop a small amount when farm prices plummet. Then they twitch up to the peak retail price level for two months before falling back to the somewhat lower price plateau. From December 1999 through July 2000 retail price per gallon averages \$3.49. During that same period, farm cooperative price per gallon dropped to an average of \$1.59, essentially equal to early summer 1999 levels, \$1.56. The average market margin in the December 1999 to July 2000 period, \$1.90 per gallon, increased 12 percent over the margin in the early summer (April to July) 1999 period, \$1.69. Cost increases, such as diesel fuel, may explain this downward price stickiness. Our graphic qualitative analysis is ambiguous. More precise quantitative analysis is needed to determine whether Miami price conduct is cost justified.

IV. Dallas-Fort Worth

From a pricing perspective, the Dallas-Fort Worth market is interesting because non-competitive price conduct degenerates into a price war. First note that retail prices increase throughout 1996 in response to steady increases in the farm price. When farm

⁴ The farm cooperative pay price is somewhat higher than the Federal Market order price because it covers added services provided by the cooperative and possibly an over-order premium for quality or farm income enhancement. It remains roughly constant throughout this entire time period.

prices plummet in December 1996 and January 1997, retail prices do not budge. They remain flat at \$2.62 per gallon from December 1996 through May 1997. After a very modest recovery, farm prices drop again in June and July 1997. This time retail prices break and fall by more than the corresponding drop in farm prices. When farm prices again stage a modest comeback in the fall of 1997, retail prices skyrocket to a new high and stable level around \$2.80 per gallon. When farm prices drop back during the spring 1998 flush season, retail prices do not budge, remaining stable at \$2.80 per gallon. Market channel firms appear to be exercising market power from October 1997 through at least October 1998.

In the fall of 1998, farm prices move up dramatically. Retail prices follow in a similar strong move peaking at \$3.21 per gallon (in January 1999). When compared to 1996, milk market channel firms substantially widened the market margin in 1997 and 1998 (\$1.38 in '97/'98 vs. \$1.06 in '96, a 30% increase).

What comes next is a major price war. In April 1999 farm prices plummet from \$1.68 per gallon to \$1.21 per gallon. This triggers complete collapse of the non-competitive oligopolistic price consensus that had widened the market margin over the prior three years. From February 1999 to July 1999, retail prices drop from \$3.21 to \$1.85 per gallon. This truly is an example of milk is being sold below cost. In the fall of 1999 when farm prices spike, the retailers relent and raise retail prices towards what may be a break-even level. Then they do not drop retail prices back to price war levels when farm prices fall back to their prior level. At roughly twice the farm price, retail milk prices may be effectively competitive during the February to July 2000 period.

The Dallas- Fort Worth Star- Telegram reported the events leading up to the 1999 fluid milk price war. Worth Wren, in an article titled “Surplus of cheese may burst bubble for dairy farmers” predicted a 30 to 40 percent crash of farm milk prices(Wren 1/29/99). The data in Figure 5 shows that raw fluid milk prices do indeed reach a peak shortly thereafter, and then crash. On March 11, Nelson Antosh of The Houston Chronicle in an article titled “A curdled market; Milk’s fall sours farm prospects” writes:

“Texas dairy farmers, who were riding high last fall, are experiencing the worst single decline ever in the price of raw milk. Last Friday, the federal government, which sets a floor price for raw milk based on the price of Wisconsin cheese, told dairy farmers the new price would be 37 percent lower than the previous month’s... With the widely criticized federal dairy support program almost gone, small changes in supply make for a dramatic swing in price... In the mid- 1980’s, it was rare to see price swings of more than 20 or 30 cents from month to month, according to Cain (director of membership for Dairy Farmers of America). ‘Now we see \$6 (per 100 pounds of milk) in one month,’ Cain said. This instability provides impetus for legislation to allow Texas to join 11 other states in a newly created Southern Dairy Compact... The Southern compact would partially decouple Texas from the volatile federal formula by placing a price floor under raw milk used for bottling.” (Antosh, 3/11/99)

Associated Press writer Stefani Kopenec in Dallas reports “Grocery store chain launches milk price war” in June 1999 (Kopenec, 6/16/99). According to the data in Figure 5, this is about a month after retail prices plummeted to slightly above \$2.00 per gallon. Kopenec states that the market leader, Kroger, with a market share of 24%, cut price at stores in the Dallas- Fort Worth area and in areas the east of the Metroplex to 99 cents per gallon. Albertsons and Tom Thumb grocers, with market shares of 24.8% and 18.1% respectively, followed suit also slashing prices in area stores to \$0.99 per gallon. Worth Wren published an article ten days later in The Fort Worth Star- Telegram under the banner, “Milk Prices Drop to 79 Cents at Some Texas Stores” (Wren, 6/26/99). According to Wren, both Kroger’s private label and Tom Thumb’s Value Time were

indeed selling for \$0.79 per gallon, but Albertson's was lagging in reducing its price. Wren reports Richard Flemming (the Dallas- based regional milk market administrator for the Agriculture Dept.) as saying "the milk price war has gone far beyond farm-level impact and even beyond the Metroplex grocery trade's tradition of using milk as a 'loss leader'".

What triggered this price war? We could not find a definite answer, but we suspect it may be Wal-Mart's aggressive expansion. Wal-Mart operated 8 stores and captured 4.1 percent of the supermarket sales market in 1996. By 2000, Wal-Mart had tripled its store numbers to 24, but only doubled its market share to 8.3 percent. The bulk of Wal-Mart's expansion occurred in 1999 and 2000 (Progressive Grocer Market Scope, annual issues 1997- 2001). The milk price war can be seen as a very strategic move by established firms to keep consumers from trying the new Wal-Mart Supercenters. The fact that the number of supercenters tripled but their sales only doubled is consistent with this interpretation.

VII. Conclusions

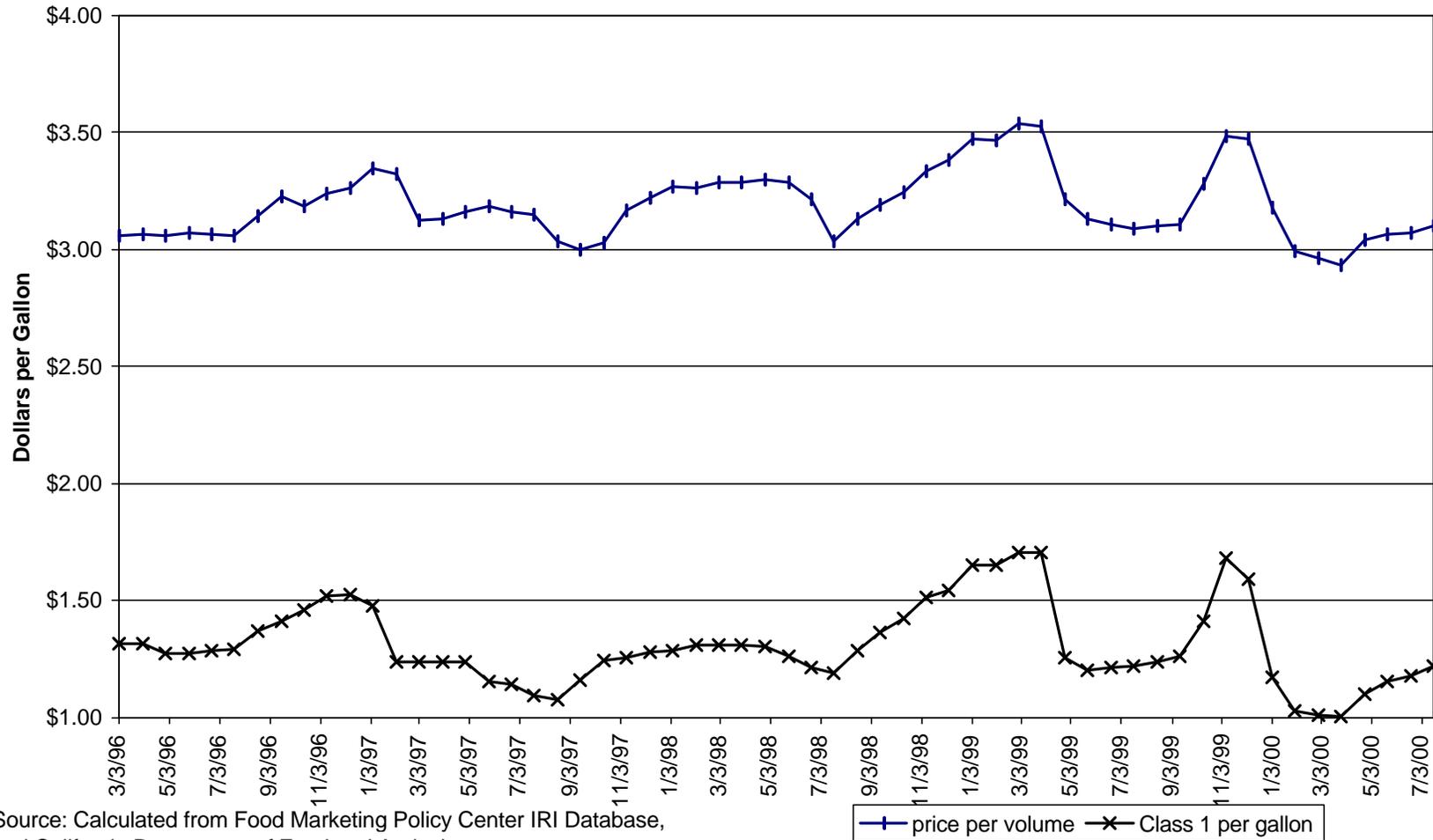
The conclusions from this brief graphic excursion into fluid milk pricing are as follows: First, milk pricing does vary from local market to local market. Second, some markets most notably Seattle and Chicago in this study, do have periods of non-competitive pricing. Third, an oligopoly market such as Dallas-Fort Worth, may serve up extended periods of non-competitive pricing and then explode in a price war possibly due to the entry or expansion of a significant competitor such as Wal Mart. Fourth, some markets, such as San Francisco and possibly Miami, may be effectively competitive for

extended periods of time. Fifth, one cannot uncritically assume that farm prices and farm-to-retail price transmission models accurately predict retail prices in a local market. As a corollary, analysis of aggregate regional, or national farm and retail price series, is a completely unreliable indicator of the status of competition in local food industries. Finally, more detailed quantitative analysis of market level price conduct, and detailed analysis of the individual supermarket and brand level price conduct, especially in Seattle, Chicago and Dallas is clearly in order.

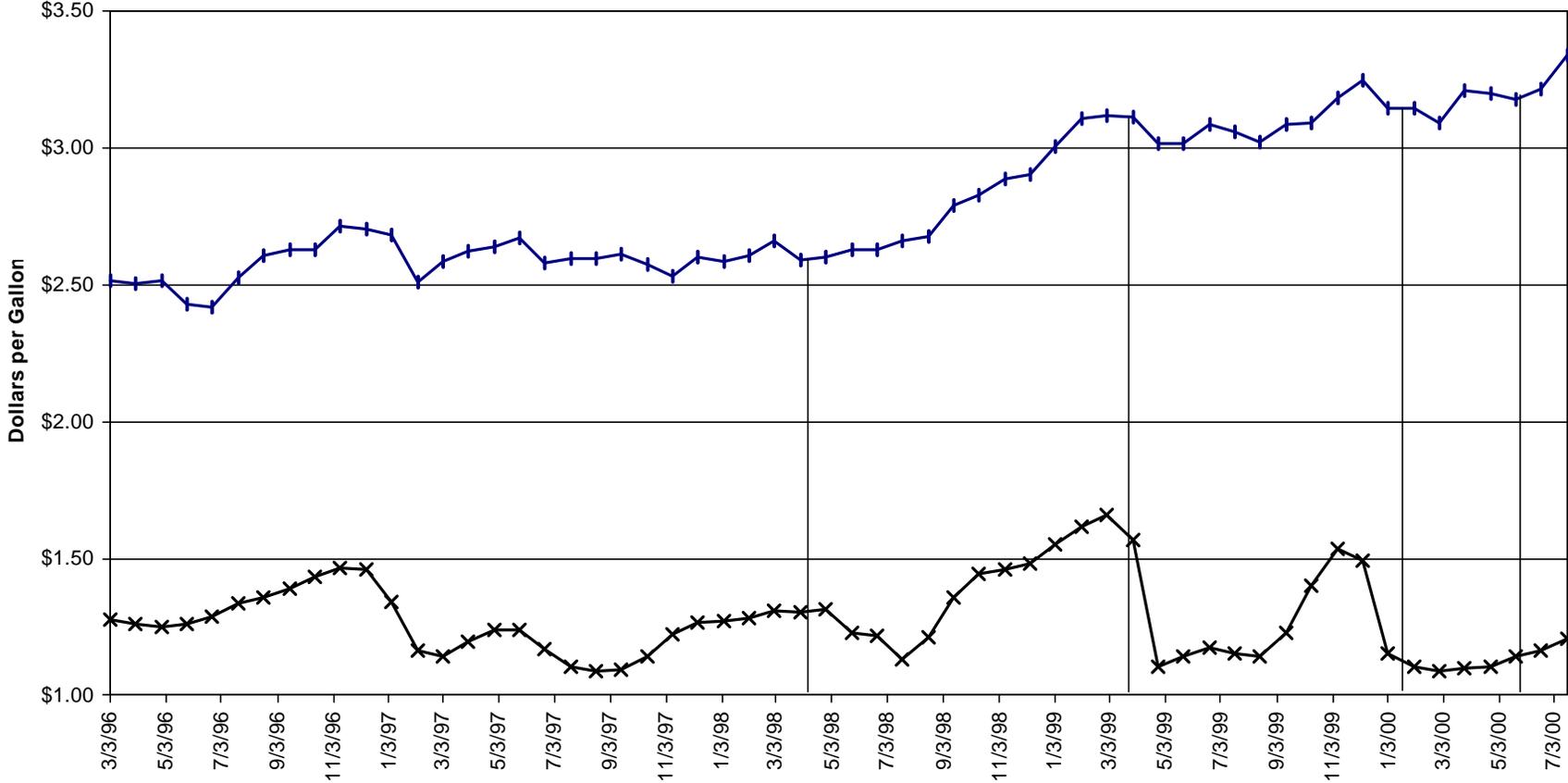
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**Figure 1. Retail vs Farm Level Milk Price, San Francisco
March 1996 - July 2000**



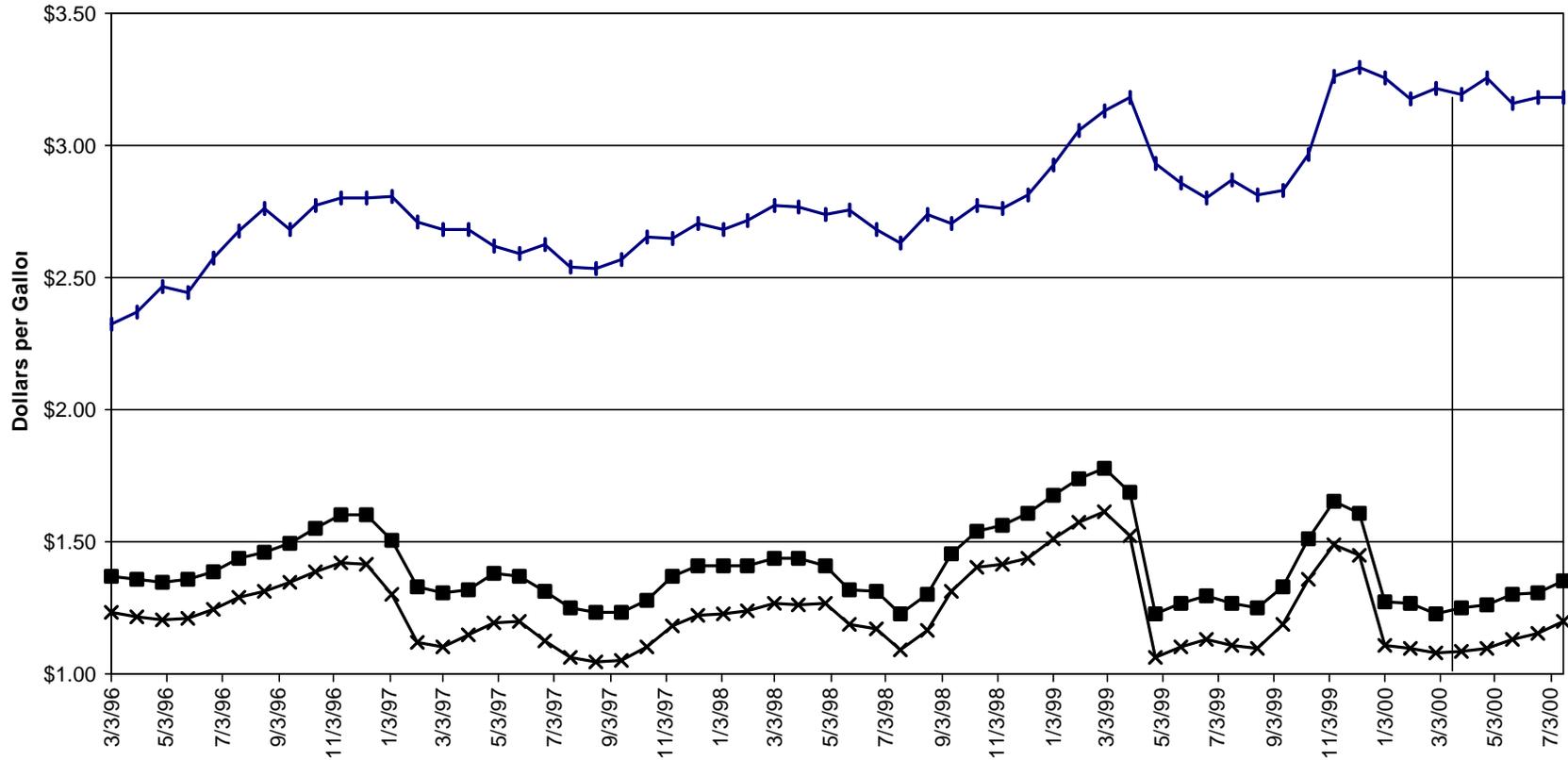
**Figure 2. Retail vs Farm Level Milk Price, Seattle
March 1996 - July 2000**



Source: Calculated from Food Marketing Policy Center IRI Database, and Agricultural Marketing Service, USDA

Vertical lines indicate press release events sited in the text.

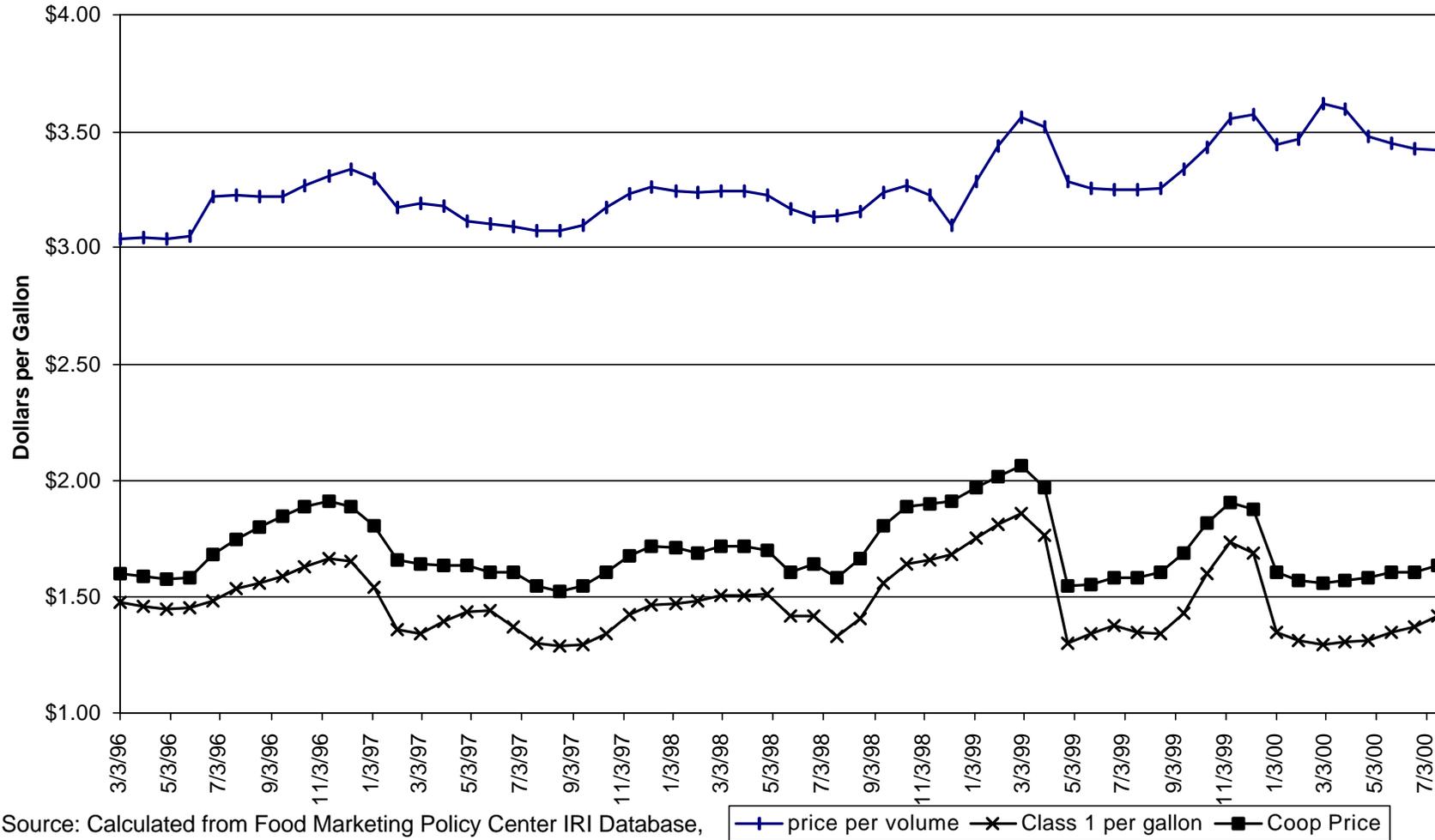
**Figure 3. Retail vs Farm Level Milk Price, Chicago
March 1993 - July 2000**



Source: Calculated from Food Marketing Policy Center IRI Database, and Agricultural Marketing Service, USDA
Vertical lines indicate press events cited in the text.

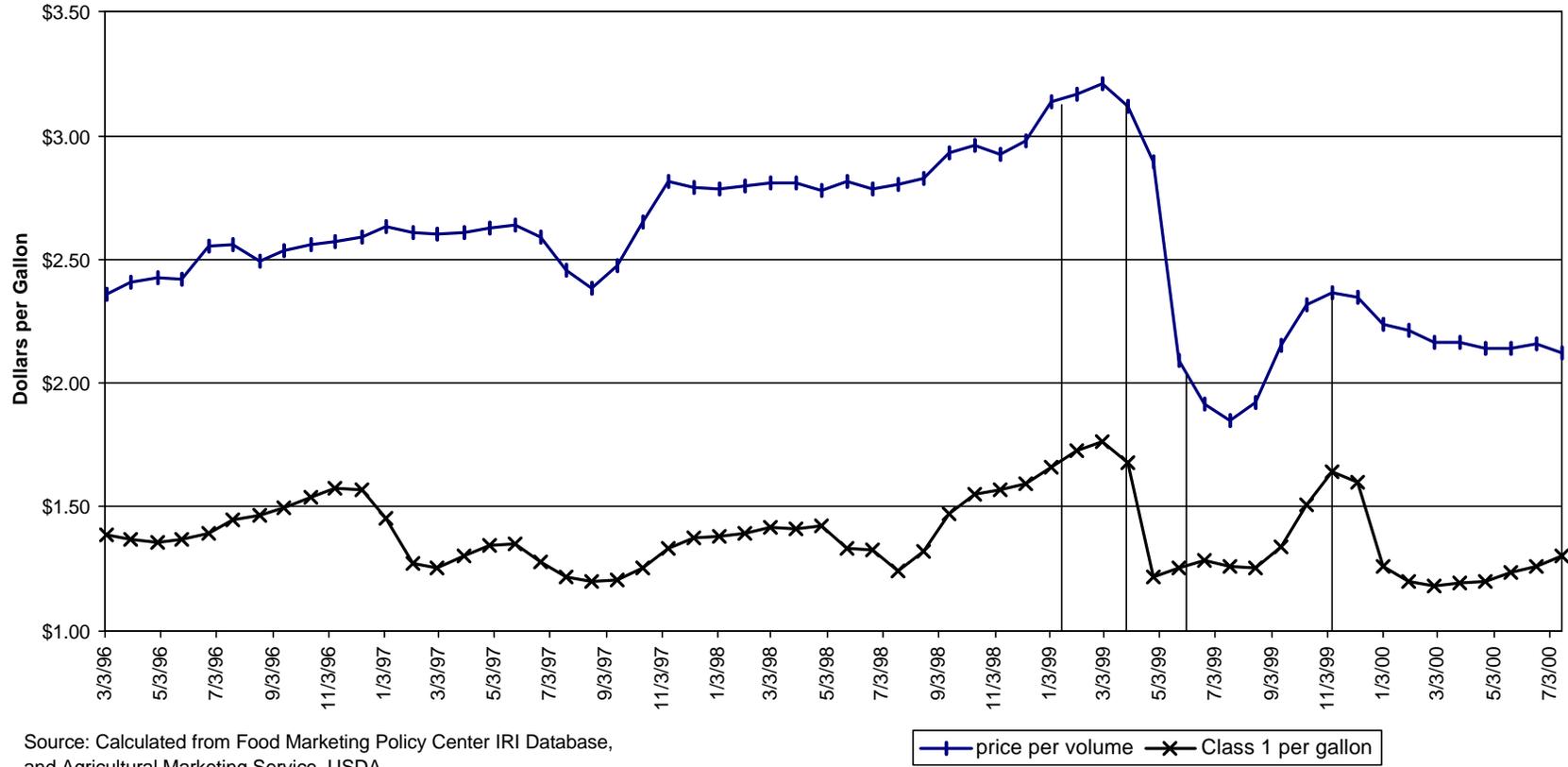
—+— price per volume —x— Class 1 per gallon —■— Coop per gallon

**Figure 4. Retail vs Farm Level Milk Price, Miami
March 1996 - July 2000**



Source: Calculated from Food Marketing Policy Center IRI Database, and Agricultural Marketing Service, USDA

**Figure 5. Retail vs Farm Level Milk Price, Dallas
March 1996 - July 2000**



Source: Calculated from Food Marketing Policy Center IRI Database, and Agricultural Marketing Service, USDA
Vertical lines indicate press events sited in the text.

Appendix A

Information Resources Inc. Database

Market Areas

The scanner data used in this analysis was obtained from Information Resources Inc. (IRI). IRI collects retail grocery product sales and merchandising data from a national sample of 12,080 supermarkets with annual sales greater than 2 million dollars. The data is a census enhanced database constructed from 100% of the representative key account stores (Stop & Shop, Shaw's) and a sample technique to estimate the remaining stores in each region that do not report full sales data. Data is then grouped by market area defined by local county definitions. Maps of the IRI market areas used in this study follow.

Key to market areas:

55 San Francisco

56 Seattle- Tacoma

9 Chicago

30 Miami- Fort Lauderdale

13 Dallas- Fort Worth