AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
http://ageconsearch.umn.edu
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

Competition Issues in the Fluid Milk Industry in the Eastern United States

Yuliya V. Bolotova

Assistant Professor of Agribusiness
Department of Agricultural Sciences
College of Agriculture, Forestry and Life Sciences
Clemson University
237 McAdams Hall
Clemson, SC 29634
E-mail: yuliyab@clemson.edu

Selected Paper prepared for presentation at the 2019 Agricultural & Applied Economics Association Annual Meeting, Atlanta, GA, July 21 – July 23

Copyright 2019 by Y.V. Bolotova. All rights reserved. Readers may make verbatim copies of this document for non-commercial purposes by any means, provided that this copyright notice appears on all such copies.

Abstract

The process of increasing consolidation and concentration, which affected the fluid milk channel in the U.S. during recent decades, included a series of mergers and acquisitions involving dairy cooperatives and fluid milk processors. This process resulted in a smaller number of large firms controlling milk production, fluid milk processing and retail stage of the fluid milk supply chain. In 2007 and 2009 dairy farmers in the U.S. Southeast and Northeast regions filed class action antitrust lawsuits, in which they alleged that Dean Foods, the largest fluid milk processor in the country, and Dairy Farmers of America, the largest dairy cooperative in the country, engaged in anticompetitive conduct, which restricted competition in the fluid milk markets in these regions and decreased milk prices paid to dairy farmers. The research presented in the paper analyzes conduct and performance of the fluid milk industry in the Eastern U.S. in light of structural changes leading to increasing buyer market power and seller market power of fluid milk processors and competition concerns raised by dairy farmers in the antitrust lawsuits.

Key words: antitrust, cartels, cooperatives, fluid milk, Federal Milk Marketing Orders, oligopoly, oligopsony, price-fixing, Sherman Act.

1. Introduction

The process of increasing consolidation and concentration that affected the fluid milk channel in the U.S. during recent decades included a series of mergers and acquisitions involving dairy cooperatives and fluid milk processors (Shields 2010). Dairy Farmers of America (DFA), the largest dairy cooperative in the country, was formed in 1998 as a result of the merger of four large regional dairy cooperatives. Dairy cooperatives have historically been involved in handling and marketing (including processing) milk of their farmers-members and representing dairy farmers in contract negotiations with milk processors. In 2001, Suiza Foods Corporation, then the largest fluid milk processor in the country, acquired Dean Foods Company to form a new company named Dean Foods ("Dean"), which became the largest fluid milk processor in the country.

In 2007 and 2009 dairy farmers (plaintiffs) in the U.S. Southeast and Northeast regions filed class action antitrust lawsuits, in which they alleged that Dean and DFA (among other defendants) engaged in anticompetitive conduct, which restricted competition in fluid milk markets in these regions (Shields 2010; Greene and Rhee 2011; Abrams, Commins and Foix 2014). This conduct affected the sale, purchase, marketing and processing of Grade A milk used in fluid milk manufacturing (Class I milk) in Federal Milk Marketing Orders 5 (Appalachian), 7 (Southeast) and 1 (Northeast). Dairy farmers claimed that DFA and Dean refused to compete for Grade A milk used in fluid milk manufacturing, limited the dairy farmers' access to fluid milk processing plants and decreased milk prices paid to dairy farmers. In summary, the lawsuits alleged a conspiracy among the defendants to restraint trade in fluid milk markets and to fix milk prices and a conspiracy to monopolize and monopsonize fluid milk markets in the Southeast and Northeast regions, which violated Section 1 and Section 2 of the Sherman Antitrust Act (1890).

After several years of litigations, the lawsuits have been settled. Dean and DFA agreed to pay substantial monetary penalties and DFA agreed to change some of the business practices. Both Dean and DFA did not admit any wrongdoing. The payments of DFA and Dean to dairy farmers in the Southeast region included $158.6 million and $140 million, respectively (Foix 2013; Kick 2013; Walker 2013). The payments of DFA and Dean to dairy farmers in the Northeast region included $50 million and $30 million, respectively (Webster 2015; Fatka 2018; Natzke 2018). Table 1 presents a timeline of the events relevant to milk antitrust litigations.

The first objective of the research presented in this paper is to analyze conduct and performance of fluid milk industry in the Eastern U.S. in light of structural changes leading to increasing buyer market power and seller market power of fluid milk processors and competition concerns raised by dairy farmers. The second research objective is to provide empirical evidence on fluid milk market and price behavior during the period of alleged anticompetitive conduct of fluid milk processors and the period of antitrust actions.

The paper is organized as follows. Section 2 presents the overview of the Federal Milk Marketing Orders and fluid milk industry in the U.S. and Eastern U.S. Section 3 discusses structural changes in the fluid milk industry and conduct of DFA and Dean. Section 4 presents a theoretical model explaining conduct and performance of the fluid milk industry. Section 5 presents empirical evidence on fluid milk market and price behavior at the farm level and at the retail level of the fluid milk supply chain during the period of alleged anticompetitive conduct of fluid milk processors and the period of antitrust actions. Section 6 is the conclusion.

2. Federal Milk Marketing Orders and Fluid Milk Industry: U.S. and Eastern U.S.

The system of Federal Milk Marketing Orders (FMMO) is established to regulate marketing and pricing of Grade A milk at the farm-first handler level in the U.S.[1] The two main features of FMMO are classified pricing and pooling of milk. Grade A milk produced by dairy farmers is classified in four Classes, depending on the end-use of milk (i.e. the type of processed products). Class I is milk used to manufacture fluid (beverage) milk products (whole milk, reduced-fat milk, skim milk, etc.). Class II is milk used to manufacture soft dairy products (yogurt, sour cream, cottage cheese, ice-cream, etc.). Class III is milk used to manufacture hard dairy products (cheese and cream cheese). Class IV is milk used to manufacture butter and milk products in dry and evaporated forms.

FMMO are used to determine minimum prices that regulated milk handlers (i.e. processors) have to pay for Grade A milk. Class I milk has the highest price. Dairy farmers do not receive Class milk prices directly. Class milk prices and the rates of milk utilization in each class determine uniform price (blend price) for each FMMO. This is the minimum milk price that dairy farmers within the same Order receive. Dairy cooperatives are allowed to negotiate premiums (over-order premiums), which are added to FMMO minimum prices. Over-order premiums are paid for milk

[1] A comprehensive discussion of Federal Milk Marketing Orders is presented in CRS Report (2017). Practically all milk produced in the U.S. is Grade A milk.

quality, volume and milk assembling services provided by dairy cooperatives. Over-order premiums are typically paid on Class I milk, so they also reflect supply and demand conditions in local fluid milk markets. Class milk prices and uniform prices are calculated and announced on a monthly basis. Since 2000 there have been 10 FMMO.

The analyzed in this paper conduct of DFA and Dean affected the purchase, sale, marketing and processing of Grade A milk utilized in Class I (fluid milk) in Federal Milk Marketing Order 5 (Appalachian), Federal Milk Marketing Order 7 (Southeast), collectively referred to as the Southeast, and Federal Milk Marketing Order 1 (Northeast).

Table 2 summarizes key marketing and price data for 10 FMMO for 2013[2]. These data indicate the key differences among 10 FMMO in terms of all-milk marketing, Class I milk marketing, Class I milk utilization rate (percentage of milk used as Class I milk), Class I milk price and uniform price[3].

FO1 (Northeast) Class I milk quantity was 9,508 million pounds, representing 22.2% of the total FMMO Class I milk quantity, and Class I milk price was $22.09 per cwt, which was 2% higher than FMMO average Class I milk price. FO1 Class I utilization rate was 37%. FO5 (Appalachian) Class I milk quantity was 3,845 million pounds, representing 9% of the total FMMO Class I milk quantity, and Class I milk price was $22.24 per cwt, which was 2% higher than FMMO average Class I milk price. FO5 Class I milk utilization rate was 67%. FO7 (Southeast) Class I milk quantity was 4,163 million pounds, representing 9.7% of the total FMMO Class I milk quantity, and Class I milk price was $22.64 per cwt, which was 4% higher than FMMO average Class I milk price. FO7 Class I milk utilization rate was 68%.

FO1 (Northeast) all-milk quantity was 25,420 million pounds, representing 19.2% of the total FMMO all-milk quantity, and uniform price was $20.23 per cwt, which was 4% higher than FMMO average uniform price. FO5 (Appalachian) all-milk quantity was 5,729 million pounds, representing 4.3% of the total FMMO all-milk quantity, and uniform price was $21.34 per cwt, which was almost 10% higher than FMMO average uniform price. FO7 (Southeast) all-milk

[2] 2013 is the earliest year for which this type of summary data is available on USDA AMS web-page.

[3] "All-milk quantity" and "milk quantity" are referred to a combined quantity of Class I milk, Class II milk, Class III milk and Class IV milk. The all-milk quantity and Class I milk quantity are the quantities produced by milk producers (dairy farmers) located in a particular Order.

quantity was 6,129 million pounds, representing 4.6% of the total FMMO all-milk quantity, and uniform price was $21.74 per cwt, which was almost 12% above FMMO average uniform price.

The three analyzed Orders combined produced 28% of FMMO all-milk, and they produced 41% of FMMO Class I milk. Class I milk utilization rates in these three Orders were ones of the highest among all FMMO. Class I milk price and its utilization rate directly affect uniform price. Uniform prices in the analyzed Orders were above FMMO average uniform price, and they were ones of the highest among all FMMO[4].

3. Fluid Milk Industry in the U.S. and Eastern U.S.: Structural Changes and Business Conduct of Fluid Milk Processors

3.1. Structural Changes in the U.S. Fluid Milk Industry

During the 1980-1990s, the process of increasing consolidation and concentration affected the fluid milk industry in the U.S. The number of firms operating at milk production, fluid milk processing and retailing stages of the fluid milk supply chain decreased and their size increased. A number of firms engaged in a string of mergers, acquisitions and joint ventures[5].

The combined market shares of the four largest firms increased at all stages of the fluid milk supply chain and reached a high level by the beginning of 2000. For example, in 1999, the average market share of the four largest dairy cooperatives reported for 11 U.S. markets was 76.5% (Table 3), and the average market share of the four largest fluid milk processors reported for 14 U.S. markets was 75.6% (Table 4). In 2003, the average market share of the four largest retailers reported for 15 U.S. markets was 73.9% (Table 5).

Dairy cooperatives have historically been involved in milk marketing in the U.S. Dairy cooperatives are obligated to accept and market all milk produced by dairy farmers-members. There are different types of dairy cooperatives differing due to the scope of functions performed: bargaining-only, niche-marketing, processing and diversified (USDA RD CIR 2005; Liebrand 2010; Ling 2012). Dairy cooperatives performing bargaining functions represent farmers-members in contract negotiation process with dairy processors: they negotiate over-order premiums and other terms of trade. Collective marketing activities of dairy farmers implemented through dairy

[4] FO6 Florida has the highest Class I milk utilization rate and the highest Class I milk price and uniform milk price among all FMMO.

[5] Dobson (1992), Dobson and Christ (2000), GAO reports (2001 and 2004), Gould (2010) and Shields (2010) discuss structural changes in the U.S. fluid milk industry and the firms' competitive strategies.

cooperatives, including price negotiations with dairy processors, are possible due to the Capper-Volstead Act (1922), a limited antitrust exemption from the Sherman Act (1890).

DFA is the largest dairy cooperative in the country. It was formed in 1998 as a result of the merger of four large regional dairy cooperatives (GAO Report 2001; Gould 2010). DFA is a vertically integrated cooperative. DFA owns and operates fluid milk processing plants. In 2000, DFA had the net sales of $6.76 billion.

Suiza and Dean were the two largest fluid milk processors in the U.S. prior to Suiza's acquisition of Dean. Suiza owned and operated 67 dairy processing plants in 29 states, and in 2000 it had the net sales of $5.76 billion[6]. Dean owned and operated 43 dairy processing plants in 19 states, and in 2000 it had the net sales of $4.4. billion[7].

In 2001, Suiza Foods Corporation acquired Dean Foods Company, and the new company was named Dean Foods. A condition of the approval of this merger by the U.S. Department of Justice (DOJ) was that Suiza and Dean had to sell 11 fluid milk processing plants (US DOJ Antitrust Press Release 2001). These fluid milk processing plants were located in Alabama, Florida, Indiana, Kentucky, Ohio, South Carolina, Virginia and Utah. The purpose of DOJ request was to protect competition for fluid milk sold through schools and retail outlets. Otherwise, this merger would have reduced competition in fluid milk markets. These 11 fluid milk processing plants were divested to National Dairy Holdings (NDH). NDH was a newly formed company, 50% owned by DFA. The new Dean became the largest fluid milk processor in the U.S. Dean Foods is a publicly traded company.

3.2. Fluid Milk Industry in the Southeast: Early 2000s

In 2000, there were 4,808 milk producers in FO7 (Southeast), and there were 4,483 milk producers in FO5 (Appalachian) (Table 6 and Table 7). In 1999, the combined market shares of the four largest dairy cooperatives were 71.5% in Atlanta and New Orleans and 85.2% in Charlotte (Table 3). In 1999, the combined market shares of the four largest fluid milk processors were 52.4% in Atlanta and New Orleans and 73.9% in Charlotte (Table 4). In 2003, the combined market shares

[6] During the 1990s, Suiza used an aggressive strategy of acquiring fluid milk processing plants leading to a tremendous growth and becoming the largest fluid milk processor in the country (Siebert et al 2000).

[7] The number of fluid milk processing plants and net sales for DFA, Suiza and Dean are reported in U.S. DOJ Antitrust Press Release (2001).

of the four largest retailers were 74.7% in New Orleans, 78.2% in Atlanta and 82% in Charlotte (Table 5).

Dean was the largest fluid milk processor (fluid milk bottler) in the Southeast[8]. Dean owned approximately 17 fluid milk bottling plants and controlled approximately 60% of fluid milk bottling capacity in the region. National Dairy Holdings (NDH) was the second largest fluid milk bottler in the Southeast. NDH owned approximately 9 fluid milk bottling plants in the Southeast. DFA was the third largest fluid milk bottler in the Southeast. DFA operated at least eight fluid milk bottling plants in the region. In addition, DFA controlled the supply of approximately 90% of Grade A milk in the region. These three fluid milk processors combined operated at least 33 plants, which represented approximately 77% of fluid milk bottling capacity in the Southeast. The two marketing agencies involved in milk marketing in the region included Dairy Marketing Services (DMS) and Southern Marketing Agency (SMA).

3.3. Fluid Milk Industry in the Northeast: Early 2000s

In 2000, there were 17,279 milk producers in FO1 (Northeast) (Table 8). In 1999, the combined market shares of the four largest dairy cooperatives were 69.6% in Boston and 76.8% in Washington, D.C. (Table 3). In 1999, the combined market shares of the four largest fluid milk processors were 54.5% in Washington, D.C. and 88.1% in Boston (Table 4). In 2003, the combined market shares of the four largest retailers were 70.1% in Boston and 76.5% in Washington, D.C. (Table 5).

Dean was the largest fluid milk bottler in the Northeast[9]. National Dairy Holdings (NDH) and HP Hood were the two other large fluid milk processors operating in the region. DFA had approximately 1,900 farmers-members in the Northeast. Dairy Marketing Services (DMS), a marketing agency, marketed milk for 9,000 dairy farmers, including independent dairy farmers and other cooperatives. DMS marketed approximately 60% of milk delivered to milk processing plants in the Northeast. DMS was owned by DFA and two other dairy cooperatives.

[8] The information presented in this paragraph is obtained from *Sweetwater Valley Farm, Inc., et al v. Dean Foods Company et al.*

[9] The information presented in this paragraph is obtained from *Allen et al v. Dairy Farmers of America, Inc. et al.*

3.4. Conduct of DFA and Dean Foods: Competition Issues

In a competitive market environment, dairy farmers should have the following marketing options: to market their milk independently by selling it directly to fluid milk processors, to market their milk through a dairy cooperative or to market their milk through a marketing agency. Milk prices dairy farmers receive are determined within the system of Federal (and State) Milk Marketing Orders, which guarantee the same minimum price for all dairy farmers located in the same Order. Premiums are negotiated for milk quality characteristics, volume and milk assembling services provided by dairy cooperatives.

In 2007 and 2009 dairy farmers (plaintiffs in the lawsuits) in the U.S. Southeast and Northeast regions filed class action antitrust lawsuits, in which they alleged that Dean and DFA (among other defendants) engaged in anticompetitive conduct, which restricted competition in the fluid milk markets in these regions. This conduct affected the purchase, sale, marketing and processing of Grade A milk, which was used as Class I milk. It was stated that anticompetitive conduct started as early as January 2001 in the Southeast region and as early as January 2002 in the Northeast region. Table 1 presents a timeline of the events relevant to milk antitrust litigations.

Dairy farmers claimed that the following conduct of DFA and Dean, among other defendants (fluid milk processors and marketing agencies), restricted competition in the fluid milk industry in the Southeast and Northeast regions[10].

- Dean and DFA entering full-supply agreements and using long-term full supply agreements between them to control the dairy farmers' access to fluid milk bottling plants.
- Decreasing and stabilizing prices paid to dairy farmers for fluid Grade A milk. In particular, decreasing and fixing the size of over-order premiums.
- Requiring dairy farmers (independent dairy farmers and independent cooperatives) to market their milk only through DFA or DFA-controlled entities (i.e. marketing agencies controlled by DFA) to gain access to fluid milk processing plants.
- Foreclosing the access of independent dairy farmers and independent dairy cooperatives to fluid milk bottling plants.

[10] Complete lists of anticompetitive practices are presented in *Sweetwater Valley Farm, Inc., et al v. Dean Foods Company et al. (Southeast) and Allen et al v. Dairy Farmers of America, Inc. et al. (Northeast).*

- Threatening, punishing and boycotting independent dairy farmers, independent cooperatives and fluid milk bottlers, who did not comply with the efforts to control these entities.
- Using DFA-controlled entities (i.e. marketing agencies controlled by DFA) to monitor prices paid to independent dairy farmers and to independent cooperatives.
- Purchasing fluid milk bottling plants, closing fluid milk bottling plants and/or refusing to operate fluid milk bottling plants.
- Primarily the Southeast-specific conduct: "Flooding" Southeast with Grade A milk from other regions to further decrease milk prices paid to dairy farmers. It was alleged that this conduct decreased the Class I utilization rate in FO5 and FO7, which consequently decreased milk prices paid to dairy farmers.

In summary, this conduct of DFA and Dean considerably restricted marketing options for dairy farmers and limited their access to fluid milk bottling plants. This might have decreased the quantity of raw milk (used as Class I milk) sold by dairy farmers and purchased by fluid milk processors, which in turn might have decreased milk prices paid by fluid milk processors to dairy farmers, in particular the amount of over-order premiums.

4. Theoretical Framework: Market Power of Fluid Milk Processors

4.1. Decision-Making Processes Affecting Milk Quantity Produced and Marketed by Dairy Farmers and Class I Milk Quantity Purchased by Fluid Milk Processors

Prior to introducing the theoretical framework explaining the market power of fluid milk processors, it is important to discuss the decision-making process of dairy farmers on milk quantity to produce and the decision-making process of fluid milk processors on Class I milk quantity to purchase.

Dairy farmers make decisions on total milk quantity to produce. Dairy farmers do not make separate decisions on Class I milk quantity to produce, Class II milk quantity to produce, Class III milk quantity to produce and Class IV milk quantity to produce. All dairy farmers located in the same FMMO receive the same milk price, which includes two components: FMMO minimum price (uniform price) and a privately negotiated over-order premium.

The buying side of the industry is more complex due to the industry structure and design of government regulations determining milk prices. Different types of milk processors operate in different sub-markets within the dairy industry. For example, large fluid milk processors (who purchase Grade A milk used in Class I) and large cheese manufactures (who purchase Grade A

milk used in Class III) are not the same firms. Fluid milk processors make decisions on the quantity of Class I milk to purchase, which theoretically should determine Class I milk price they have to pay. Cheese manufacturers make decisions on the quantity of Class III milk to purchase, which theoretically should determine Class III milk price they have to pay. Class I milk price is the highest price (among four Classes of milk), and Class I milk is the one for which over-order premiums are typically paid.

Dean is a fluid milk processor, whose economic objective is to maximize its profit. To maximize their profit, large fluid milk processors would decrease Class I milk quantity they purchase to decrease Class I milk price they pay. DFA is a vertically integrated cooperative, who owns and operates fluid milk processing plants. The economic objective of the farmer-owned cooperatives is to increase returns to their farmers-members, not to maximize profit of the milk processing businesses. Dairy cooperatives are obligated to accept and sell all milk of their farmers-members and to obtain as high as possible milk prices, which dairy farmers are not able to negotiate individually.

Dairy farmers claimed that DFA, instead of maximizing returns of dairy farmers-members, acted in a manner of a profit-maximizing fluid milk processor, who benefited from decreasing milk quantity purchased and decreasing milk price; in particular, decreasing the over-order premiums.

4.2. Theoretical Framework

A theoretical framework, which can be used to explain conduct and performance of the fluid milk industry in light of increasing consolidation and concentration and competition concerns raised by dairy farmers, is presented on Figure 1. This is a marketing margin framework, which includes (as applied to the fluid milk supply chain) dairy farm level represented by dairy farmers producing raw milk, fluid milk processing level represented by fluid milk processors purchasing raw milk from dairy farmers and processing it into fluid milk products, and retail level represented by retailers purchasing fluid milk products from fluid milk processors and selling them to final consumers. Farm supply curve represents inverse supply function for raw milk at the farm level. Wholesale demand curve represents inverse demand function for fluid milk products at the wholesale level. Retail demand curve represents inverse demand function for fluid milk products at the retail level.

Assume that fluid milk processing industry is a competitive industry with many fluid milk processors (a competitive industry scenario). These fluid milk processors purchase raw milk quantity (Class I milk quantity) denoted as Qc on Figure 1. They pay to dairy farmers raw milk price (Class I milk price) denoted as FPc. Fluid milk processors process raw milk into fluid milk products and sell fluid milk product quantity denoted as Qc to retailers. Fluid milk processors charge wholesale price of fluid milk products denoted as WPc. Retailers sell fluid milk product quantity denoted as Qc to final consumers and charge retail price denoted as RPc. In fluid milk processing, one unit of input (raw milk) is required to produce one unit of output (fluid milk products): fluid milk processing (manufacturing) is also referred to as a fluid milk bottling business. In a competitive industry scenario, marketing margin attributed to fluid milk processors is WPc – FPc in $ per unit and (WPc – FPc)*Qc in $. This marketing margin includes fluid milk processing costs and profit of fluid milk processors.

Assume that as a result of mergers and acquisitions the number of fluid milk processors decreases, and the size of remaining firms increases: there is a small number of large fluid milk processors (Table 4). Fluid milk processing industry is oligopsony on the input side (raw milk purchasing), and it is oligopoly on the output side (fluid milk marketing): this is a market power scenario. As compared to a competitive industry, to maximize their profit, oligopsonists decrease input quantity they purchase to decrease input price they pay (buyer market power affecting inverse supply). As compared to a competitive industry, to maximize their profit, oligopolists decrease output quantity they produce and sell to increase output price they charge (seller market power affecting inverse demand).

In the market power scenario, fluid milk processors purchase Class I milk quantity denoted as Qmp and pay to dairy farmers Class I milk price denoted as FPmp on Figure 1. Fluid milk processors process raw milk into fluid milk products; they sell fluid milk product quantity denoted as Qmp to retailers and they charge wholesale price denoted as WPmp. Retailers sell fluid milk product quantity denoted as Qmp to final consumers and charge retail price denoted as RPmp. In the market power scenario, marketing margin attributed to fluid milk processors is WPmp – FPmp in $ per unit and (WPmp – FPmp)*Qmp in $. This marketing margin includes fluid milk processing costs and profit of fluid milk processors. The profit of fluid milk processors increases due to their market power: their ability to decrease raw milk quantity purchased to decrease raw milk price

(buyer market power) and their ability to decrease the quantity of fluid milk products produced to increase fluid milk prices (seller market power).

As compared to a competitive industry, dairy farmers who sell milk are underpaid due to buyer market power of fluid milk processors. The underpayment to dairy farmers is FPmp-FPc in $ per unit and (FPmp-FPc)*Qmp in $[11]. There are also dairy farmers who do not sell milk, due to a reduction in milk quantity purchased by fluid milk processors (deadweight loss attributed to the dairy farm sector).

As compared to a competitive industry, retailers (direct buyers) and final consumers (indirect buyers) are overcharged due to seller market power of fluid milk processors. The overcharge attributed to retailers (direct buyers) is WPmp-WPc in $ per unit and (WPmp-WPc)*Qmp in $[12]. The overcharge attributed to final consumers (indirect buyers) is RPmp-RPc in $ per unit and (RPmp-RPc)*Qmp in $. There are also retailers and final consumers who do not purchase fluid milk products, due to a reduction in fluid milk quantity sold by fluid milk processors (deadweight loss attributed to retail sector and deadweight loss attributed to final consumers).

Buyer market power increases profit of fluid milk processors by the amount of underpayment to dairy farmers. Seller market power increases profit of fluid milk processors by the amount of overcharge attributed to buyers of fluid milk products. There is also deadweight loss attributed to the fluid milk processing sector.

The competition concerns raised by dairy farmers were related to buyer market power of fluid milk processors. As compared to a competitive industry, fluid milk processors decrease the quantity of Class I milk they purchase, which decreases Class I milk price they pay. Dairy farmers sell a smaller Class I milk quantity and receive a lower Class I milk price[13]. Given that milk price received by dairy farmers includes FMMO minimum price and over-order premium, buyer market power of fluid milk processors decreases the amount of over-order premium, and consequently it decreases milk price received by dairy farmers.

---

[11] Supply elasticity (i.e. the steepness of supply curve on a graph) affects the magnitude of price decrease.

[12] Demand elasticity (i.e. the steepness of demand curve on a graph) affects the magnitude of price increase.

[13] FMMO Class milk prices are calculated using a series of formulas, which include wholesale prices of manufactured dairy products (cheese, butter, dry whey and nonfat dry milk) (USDA AMS Dairy Program 2017).

The elements of the conduct of DFA and Dean, which have affected and might have decreased Class I milk quantity available in the market and purchased include: (a) full-supply agreements and long-term supply agreements between DFA and Dean, which effects were to control the dairy farmers' access to fluid milk bottling plants, (b) requiring dairy farmers to market their milk only through DFA or DFA-controlled entities (i.e. marketing agencies controlled by DFA) to gain access to fluid milk processing plants, (c) foreclosing the dairy farmers' access to fluid milk bottling plants, and (d) purchasing fluid milk bottling plants, closing fluid milk bottling plants and/or refusing to operate fluid milk bottling plants. In addition, "flooding" the Southeast with Grade A milk from outside of FO5 and FO7 was likely to decrease Class I milk quantity purchased.

The business incentive for DFA and Dean to use these business practices in the fluid milk industry in the Southeast and Northeast regions was to decrease milk costs in order to increase the profit of fluid milk manufacturing. As compared to FMMO average, the Southeast and Northeast regions have the highest Class I milk utilization rates and highest Class I milk prices, thus leading to higher costs that fluid milk processors have to pay for milk in these regions (Table 2).

5. Fluid Milk Market and Price Behavior: Empirical Evidence

The fluid milk market and price behavior is evaluated at the farm level and at the retail level of the fluid milk supply chain. The farm level analysis includes evaluation of changes in milk quantities (all-milk and Class I milk), milk prices (uniform prices and Class I milk prices), over-order premiums and dairy farm profitability. The retail level analysis includes evaluation of changes in retail fluid whole milk prices and marketing margins.

To evaluate the fluid milk market and price behavior to identify the effects of competition issues, the data are analyzed over the two periods of interest: pre-antitrust action period (i.e. alleged anticompetitive conduct) and antitrust action period.

In the case of the Southeast region, pre-antitrust action period is 2001- 2008, and antitrust action period is 2009-2018 for the purpose of the yearly data analysis at the farm level. The year of 2001 is the beginning of pre-antitrust action period; January 2001 is the date when the alleged anticompetitive conduct started affecting fluid milk market in the Southeast region[14]. The corrected

[14] *Sweetwater Valley Farm, Inc., et al v. Dean Foods Company et al* (corrected consolidated amended complaint; August 04, 2008) and Dean Foods Company settlement notice (U.S. District Court for the Eastern District of Tennessee; February 14, 2012).

consolidated amended complaint was filed in the U.S. District Court for the Eastern District of Tennessee in August 2008. The year of 2009 is the beginning of antitrust action period in the Southeast region for the purpose of the yearly data analysis at the farm level.

In the case of the Northeast region, pre-antitrust action period is 2002 - 2009, and antitrust action period is 2010 – 2018 for the purpose of the yearly data analysis at the farm level. The year of 2002 is the beginning of pre-antitrust action period; January 2002 is the date when the alleged anticompetitive conduct started affecting fluid milk market in the Northeast region[15]. The complaint was filed in the U.S. District Court for the District of Vermont in October 2009. The year of 2010 is the beginning of antitrust action period in the Northeast region for the purpose of the yearly data analysis at the farm level.

5.1. Dairy Farm-Level Effects: Milk Quantities, Prices and Dairy Farm Profitability

The yearly data on the number of milk producers, milk quantities and milk prices are summarized in Table 6 (FO7 Southeast), Table 7 (FO5 Appalachian) and Table 8 (FO1 Northeast)[16]. The percentage changes in Class I milk quantities over all individual years are summarized in Table 9. The yearly dairy farm profitability measures are summarized in Table 10 (Southern Seaboard Region: FO5 and FO7), Table 11 (Eastern Uplands Region: FO5 and FO7) and Table 12 (Northern Crescent Region: FO1)[17]. The yearly averages of milk quantities, milk prices and dairy farm profitability measures are calculated for the two periods of interest, and changes in the yearly averages between the two periods are reported in these tables.

An analysis of changes in Class I milk quantity on a yearly basis indicates that there is a general trend for Class I milk quantity to decrease over time in both the Southeast and Northeast

[15] *Allen et al v. Dairy Farmers of America, Inc. et al* (revised consolidated amended class action complaint and jury demand; April 13, 2011) and DFA/DMS settlement notice (U.S. District Court for the District of Vermont).

[16] These data are collected from Annual Statistics reports available on the web-pages of FO5, FO7 and FO1.

[17] These data are collected from USDA ERS commodity costs and returns reports**.** These reports provide the $ per cwt difference between the value of production and total costs and the $ per cwt difference between the value of production and total operating costs. These $ per cwt differences are referred to as "profit based on total costs" and "profit based on total operating costs" in this paper. The percentage profit measures are calculated to get a better understanding of the magnitude of profit and loss. The percentage profit is a $ per cwt profit expressed as a percentage of the value of production measured in $ per cwt.

regions during pre-antitrust action period and during the following antitrust action period (Table 9).

5.1.1. FO7 Southeast

The number of milk producers (dairy farmers) in FO7 decreased from 4,887 in 2001 to 1,672 in 2018. This represents a decrease in the number of milk producers by 3,215 or by 66%. The following changes in milk quantities, milk prices and dairy farm profitability took place between pre-antitrust action period and antitrust action period.

The yearly average milk quantity decreased from 7,497 million pounds to 6,069 million pounds (19% decrease). The yearly average uniform price increased from $16.27 per cwt to $19.57 per cwt (20.3% increase). The yearly average Class I milk quantity decreased from 4,718 million pounds to 4,177 million pounds (11.5% decrease). The yearly average Class I milk utilization rate increased from 63.1% to 69.2% (9.7% increase). The yearly average Class I milk price increased from $17.42 per cwt to $20.60 per cwt (18.3% increase).

In the Southern Seaboard region, the yearly average profit based on total costs decreased from -8.7% to -26.3% (204% increase in loss). The yearly average profit based on total operating costs decreased from 35.7% to 19.4% (45.7% decrease in profit). In the Eastern Uplands region, the yearly average profit based on total costs increased from -52% to -47.3% (9% decrease in loss). The yearly average profit based on total operating costs decreased from 22% to 17.4% (20.8% decrease in profit). As a comparison, the U.S. dairy industry profitability analysis indicates that the yearly average profit based on total costs decreased from -16.2% to -17.8% (10.1% increase in loss). The U.S. dairy industry yearly average profit based on total operating costs decreased from 33.8% to 22.4% (33.6% decrease in profit).

5.1.2. FO5 Appalachian

The number of milk producers (dairy farmers) in FO5 decreased from 4,017 in 2001 to 1,692 in 2018. This represents a decrease in the number of milk producers by 2,325 or by 58%. The following changes in milk prices, quantities and dairy farm profitability took place between pre-antitrust action period and antitrust action period.

The yearly average milk quantity decreased from 6,286 million pounds to 5,808 million pounds (7.6% decrease). The yearly average uniform price increased from $16.30 per cwt to $19.21 per cwt (17.5% increase). The yearly average Class I milk quantity decreased from 4,269 million pounds to 3,985 million pounds (6.6% decrease). The yearly average Class I milk

utilization rate increased from 68% to 68.6% (1% increase). The yearly average Class I milk price increased from $17.40 per cwt to $20.20 per cwt (16.2% increase).

In the Southern Seaboard region, the yearly average profit based on total costs decreased from -8.7% to -26.3% (204% increase in loss). The yearly average profit based on total operating costs decreased from 35.7% to 19.4% (45.7% decrease in profit). In the Eastern Uplands region, the yearly average profit based on total costs increased from -52% to -47.3% (9% decrease in loss). The yearly average profit based on total operating costs decreased from 22% to 17.4% (20.8% decrease in profit). As a comparison, the U.S. dairy industry profitability analysis indicates that the yearly average profit based on total costs decreased from -16.2% to -17.8% (10.1% increase in loss). The U.S. dairy industry yearly average profit based on total operating costs decreased from 33.8% to 22.4% (33.6% decrease in profit).

5.1.3. FO1 Northeast

The number of milk producers (dairy farmers) in FO1 decreased from 16,869 in 2002 to 10,574 in 2018. This represents a decrease in the number of milk producers by 6,295 or by 37%. The following changes in milk prices, quantities and dairy farm profitability took place between pre-antitrust action period and antitrust action period.

The yearly average milk quantity increased from 23,591 million pounds to 25,794 million pounds (9.3% increase). The yearly average uniform price increased from $15.34 per cwt to $18.59 per cwt (21.1% increase). The yearly average Class I milk quantity decreased from 10,549 million pounds to 9,352 million pounds (11.4% decrease). The yearly average Class I milk utilization rate decreased from 44.8% to 36.4% (18.7% decrease). The yearly average Class I milk price increased from $17.16 per cwt to $20.64 per cwt (20.3% increase).

In the Northern Crescent region, the yearly average profit based on total costs increased from -29.5% to -27.2% (7.7% decrease in loss). The yearly average profit based on total operating costs decreased from 31.5% to 20.7% (34.1% decrease in profit). As a comparison, the U.S. dairy industry profitability analysis indicates that the yearly average profit based on total costs increased from -21.6% to -13.7% (36.5% decrease in loss). The U.S. dairy industry yearly average profit based on total operating costs decreased from 28.8% to 24.7% (14.2% decrease in profit).

5.2. Farm-Level Effects: Over-Order Premiums

Class I milk prices analyzed above do not include over-order premiums. To evaluate changes in the over-order premiums paid on Class I milk, the results reported in Bolotova (2018) are used. These results are summarized in Table 13 (Southeast: selected markets in FO5 and FO7) and Table 14 (Northeast: selected markets in FO1)[18].

These tables report the monthly average Class I milk price (FMMO minimum Class I milk price) measured in $ per cwt, the monthly average announced cooperative Class I milk price measured in $ per cwt, the monthly average over-order premium ("premium") measured in $ per cwt and the monthly average over-order premium measured as a percentage of the announced cooperative Class I milk price for pre-antitrust action period and antitrust action period.

The reported premiums are calculated as the differences between the announced cooperative Class I milk prices and minimum Class I milk prices. Actual premiums paid might be different. The Class I milk prices and premiums are analyzed for the following locations in the Southeast region: Louisville, KY; Memphis, TN; Charlotte, NC; Atlanta, GA and New Orleans, LA. The Class I milk prices and premiums are analyzed for the following locations in the Northeast region: Boston, MA; Hartford, CT; Philadelphia, PA; Baltimore, MD and Washington, D.C.

While the length of pre-antirust action period in this analysis practically coincides with the length of this period in the analysis of yearly data presented in the previous section[19], the length of antirust action period is shorter (it ends in December 2012).

5.2.1. Southeast Region: FO5 and FO7 Selected Markets

During pre-antitrust action period, the average Class I milk price is in the range of $16.32 per cwt in Louisville to $17.72 per cwt in New Orleans, and the average cooperative Class I milk price is in the range of $18.17 per cwt in Louisville to $19.42 per cwt in New Orleans[20]. The average

[18] Data source for Class I milk prices and premiums: USDA Agricultural Marketing Service Milk Marketing Order Statistics Public Database.

[19] Given that the analysis presented in the previous section is based on a yearly data, in the case of the Southeast, 2008 was included in pre-antitrust action period, and in the case of the Northeast, 2009 was included in pre-antitrust action period. The analysis of premiums is based on a monthly data. In the Southeast, January – June 2008 is included in pre-antitrust action period, and July-December 2008 is included in antitrust action period. In the Northeast, January – September 2009 is included in pre-antitrust action period, and October-December 2009 is included in antitrust action period.

[20] All average prices and premiums analyzed in this section are monthly average prices and premiums.

Premium varies from $1.70 per cwt in New Orleans to $1.97 per cwt in Atlanta. The average Premium calculated as a percentage of the cooperative Class I milk price varies from 8.74% in New Orleans to 10.33% in Atlanta.

The average Class I milk price, the average cooperative Class I milk price, and the average Premium measured in $ per cwt and as a percentage of cooperative Class I milk price have increased in all analyzed cities in antirust action period, as compared to pre-antitrust action period. The average Premium increase is $1.24 per cwt in New Orleans, $1.26 per cwt in Louisville, $1.31 per cwt in Charlotte, $1.35 per cwt in Atlanta and $1.53 per cwt in Memphis. The average Premium ($ per cwt) increases are approximately 68% in Atlanta, Louisville and Charlotte, 73% in New Orleans and 86% in Memphis. The average Premium calculated as a percentage of the cooperative Class I milk price increases by about 4.3%-points in Charlotte and Atlanta, 4.55%-points in New Orleans, 4.73%-points in Louisville and 5.72%-points in Memphis.

In antitrust action period, the average Premium is $2.94 per cwt in New Orleans, $3.11 per cwt in Louisville, $3.24 per cwt in Charlotte, $3.30 per cwt in Memphis and $3.32 per cwt in Atlanta. In the majority of the analyzed cities in the Southeast region, in antitrust action period, the average Premium expressed as a percentage of the cooperative Class I milk price is in the range of 14.5%-15%. The average Class I milk price ranges from $18.25 per cwt in Louisville to $19.75 per cwt in Atlanta and New Orleans, and the average cooperative Class I milk price ranges from $21.36 per cwt in Louisville to $23.07 per cwt in Atlanta.

5.2.2. Northeast Region: FO1 Selected Markets

During pre-antitrust action period, the average Class I milk price is in the range of $16.94 per cwt in Baltimore and Washington D.C. to $17.19 per cwt in Boston, and the average cooperative Class I milk price is in the range of $18.64 per cwt in Hartford to $19.19 per cwt in Philadelphia. The average Premium varies from $1.55 per cwt in Boston and Hartford to $2.20 per cwt in Philadelphia. The average Premium calculated as a percentage of the cooperative Class I milk price varies from approximately 8.5% in Boston and Hartford to 11.68% in Philadelphia.

The average Class I milk price and the average cooperative Class I milk price have increased in all analyzed cities in antitrust action period, as compared to pre-antitrust action period. The average Premium measured in $ per cwt has increased in Boston, Hartford and Philadelphia, and it has decreased in Baltimore and Washington D.C. in antitrust action period, as compared to pre-antitrust action period. The average Premium increase is $0.06 per cwt in Boston and Hartford,

and it is $0.89 per cwt in Philadelphia. The average Premium ($ per cwt) increase is almost 4% in Boston and Hartford and 40.5% in Philadelphia. The average Premium decrease is $0.11 per cwt in Baltimore and Washington D.C, which is approximately a 6% decrease.

The average Premium measured as a percentage of the cooperative Class I milk price has decreased in Boston, Hartford, Baltimore and Washington D.C., and it has increased in Philadelphia in antitrust action period, as compared to pre-antitrust action period. The average Premium decrease is about 1%-point in Boston and Hartford, and it is approximately 2%-points in Baltimore and Washington D.C. Premium (% of the cooperative Class I milk price) in Philadelphia increases by almost 2%-points.

In antitrust action period, the average Premium is $1.61 per cwt in Boston and Harford, $1.67 per cwt in Baltimore and Washington D.C. and $3.09 in Philadelphia. The average Premium measured as a percentage of the cooperative Class I milk price is approximately 7.5% in Boston and Hartford, 7.81% in Baltimore and Washington D.C., and it is 13.54% in Philadelphia. The average Class I milk price ranges from $19.99 per cwt in Baltimore and Washington D.C. to $20.24 per cwt in Boston. The average cooperative Class I milk price ranges from $21.66 per cwt in Baltimore and Washington D.C. to $23.13 per cwt in Philadelphia.

5.3. Retail-Level Effects: Fluid Whole Milk Prices and Marketing Margins

To evaluate changes in retail fluid whole milk prices and farm-to-retail margins (marketing margins), the results reported in Bolotova (2017) are used[21]. These results are summarized in Table 15 (Southeast: selected markets in FO5 and FO7) and Table 16 (Northeast: selected markets in FO1)[22].

These tables report the monthly average cooperative Class I milk prices (i.e. farm prices in this analysis) measured in $ per gallon, the monthly average retail prices of fluid whole milk measured in $ per gallon, the monthly average farm-to-retail margins measured in $ per gallon and the monthly average farm-to-retail margins measured as a percentage of retail prices for pre-

[21] There are also changes in cost pass-through (farm-to-retail price transmission process) between two analyzed periods, which might indicate a change in the type of retail fluid milk pricing practices used by retailers in the analyzed regions. An econometric analysis of changes in cost pass-through between pre-antitrust action period and antitrust action period is presented in Bolotova (2017).

[22] Data source for Class I milk prices and retail whole milk prices: USDA Agricultural Marketing Service Milk Marketing Order Statistics Public Database.

antitrust action period and antitrust action period[23]. Farm-to-retail margin (marketing margin) measured in $ per gallon is the difference between retail fluid whole milk price and Class I milk price.

Retail fluid whole milk prices and marketing margins are analyzed for the following locations in the Southeast region: Atlanta, GA; Louisville, KY and New Orleans, LA. Retail fluid whole milk prices and marketing margins are analyzed for the following locations in the Northeast region: Philadelphia, PA; Hartford, CT and Boston, MA.

5.3.1. Southeast Region: FO5 and FO7

In pre-antitrust action period, the average Class I milk prices are $1.56 per gallon in Louisville, $1.65 per gallon in Atlanta and $1.67 per gallon in New Orleans[24]. The average retail whole milk prices are $2.88 per gallon in Louisville, $3.35 per gallon in Atlanta and $3.78 per gallon in New Orleans. The average marketing margins measured in $ per gallon are $1.31 per gallon in Louisville, $1.70 per gallon in Atlanta and $2.11 per gallon in New Orleans. The average marketing margins measured as a percentage of retail prices are 46% in Louisville, 51% in Atlanta and 56% in New Orleans.

The average Class I milk prices and the average retail fluid whole milk prices have increased in all analyzed cities in antitrust action period, as compared to pre-antitrust action period. The rate of the Class I milk price increase is much higher than the rate of the retail price increase in Atlanta and Louisville. For example, while the average Class I milk price increases by approximately 20% in Atlanta, the average retail price increases only by 2.3%. Similarly, in Louisville, while the average Class I milk price increases by 17.6%, the average retail price increases only by 6.6%. The pattern of price changes in New Orleans is somewhat different, both the average Class I milk price and the average retail price increase at approximately similar rates, 16.8% and 14.5%, respectively.

In antitrust action period, the average marketing margins measured in $ per gallon decrease in Atlanta and Louisville by 15% and 6.6%, respectively, and the average marketing margin increases in New Orleans by 12.7%. The average marketing margins are $1.23 per gallon in

[23] Footnote 19 explains the lengths of these periods.

[24] The average prices, premiums and margins analyzed in this section are the monthly average prices, premiums and margins.

Louisville, $1.44 per gallon in Atlanta and $2.38 per gallon in New Orleans in antitrust action period.

In antitrust action period, the average marketing margins measured as a percentage of retail prices decrease in all analyzed cities. The average marketing margins decrease by 9.22%-points in Atlanta, 6.24%-points in Louisville and 1%-point in New Orleans. The average marketing margins are 39.72% in Louisville, 41.7% in Atlanta and almost 55% in New Orleans in antitrust action period.

5.3.2. Northeast Region: FO1

In pre-antitrust action period, the average Class I milk prices are $1.60 per gallon in Hartford, $1.61 per gallon in Boston and $1.65 per gallon in Philadelphia. The average retail fluid whole milk prices are $3.29 per gallon in Boston, $3.30 per gallon in Philadelphia and $3.38 per gallon in Hartford. The average marketing margins measured in $ per gallon are $1.65 per gallon in Philadelphia, $1.68 per gallon in Boston and $1.78 per gallon in Hartford. The average marketing margins measured as a percentage of retail prices are 50.3% in Philadelphia 51.23% in Boston and 52.8% in Hartford.

The average Class I milk prices and the average retail whole milk prices have increased in all analyzed cities in antitrust action period, as compared to pre-antitrust action period. The rate of the Class I milk price increase is higher than the rate of the retail price increase in Boston and Hartford. For example, while the average Class I milk prices increase by approximately 17% in Boston and Hartford, the average retail prices increase by 10.5% and 8.4%, respectively. The pattern of price changes is somewhat different in Philadelphia, where both the average Class I milk price and the average retail price increase by approximately 20%[25].

In antitrust action period, the average marketing margins measured in $ per gallon increase in Philadelphia, Boston and Hartford by 19%, 4.5% and 1%, respectively. The average marketing margins are $1.75 per gallon in Boston, $1.79 per gallon in Hartford and $1.96 per gallon in Philadelphia in antitrust action period. The average marketing margins measured as a percentage

[25] A somewhat different pattern of milk price behavior in Pennsylvania is due to the effect of the state milk price control regulation, which affects both wholesale and retail prices of fluid milk products in Pennsylvania (Novakovic and Washburn 2008; Bolotova and Novakovic 2016). While FMMO affect farm-level milk pricing, some states have state milk price control regulations affecting retail fluid milk prices (New York State) or wholesale and retail fluid milk prices (Pennsylvania) (Bolotova and Novakovic 2012).

of retail prices decrease in all analyzed cities in antitrust action period. The average marketing margins decrease by almost 4%-points in Hartford, by almost 3%-points in Boston and by 0.6%-points in Philadelphia. The average marketing margins are 48.29% in Boston, 49.04% in Hartford and 49.72% in Philadelphia in antitrust action period.

6. Conclusion

The process of increasing consolidation and concentration, which affected the fluid milk channel in the U.S. during recent decades, included a series of mergers and acquisitions involving dairy cooperatives and fluid milk processors. This process resulted in a smaller number of large firms controlling milk production, fluid milk processing and retail stage of the fluid milk supply chain. In 2007 and 2009 dairy farmers in the U.S. Southeast and Northeast regions filed class action antitrust lawsuits, in which they alleged that Dean Foods, the largest fluid milk processor in the country, and Dairy Farmers of America, the largest dairy cooperative in the country, engaged in anticompetitive conduct, which restricted competition in the fluid milk markets in these regions and violated Section 1 and Section 2 of the Sherman Act (1890). This conduct affected milk marketing and milk prices received by dairy farmers. It was argued that milk marketing options of dairy farmers were restricted, and milk prices received by dairy farmers were decreased.

According to the settlement agreements reached in the Southeast, the payments of DFA and Dean to dairy farmers in the Southeast region included $158.6 million and $140 million, respectively; SMA paid additional $5 million[26]. In addition, DFA agreed to put a refundable $9.3 million per year for two years in a fund to increase Class I milk utilization rate in FO5 and FO7. According to the settlement agreements reached in the Northeast, the payments of DFA and Dean to dairy farmers in the Northeast region included $50 million and $30 million, respectively.

While DFA and Dean did not admit any wrongdoing, the DFA settlement agreements included changes in some of its business practices, which intend to restore competition in fluid milk markets in the Southeast and Northeast regions. The changes in the business conduct, which directly affect competition process, are those including milk supply agreements, and in particular full supply agreements. The settlement agreements include some restrictions on DFA entering new full supply agreements and renewing existing full supply agreements during the settlement terms.

[26] Attorney fees and other related litigation expenses are to be deducted from these monetary settlements. Attorney fees can be as large as one-third of the monetary settlements.

This paper analyses conduct and performance of fluid milk industry in the Eastern U.S. during the period of alleged anticompetitive conduct (pre-antitrust action period) and antitrust action period. The empirical evidence presented in the paper reveals the following changes in the economic variables characterizing conduct and performance of fluid milk industry in the Eastern U.S.

During the analyzed period (2000-2018) a general trend for the total producer milk quantity was to decrease in the Southeast (FO5 and FO7) and to increase in the Northeast (FO1). A general trend for Class I milk producer quantity was to decrease in all analyzed regions. During antitrust action period, Class I milk utilization rate increased in FO7 (Southeast), it practically did not change in FO5 (Appalachian), and it decreased is FO1 (Northeast). Class I milk prices and uniform milk prices increased over time.

The over-order premiums measured as a percentage of Class I milk prices increase in the Southeast region, and these premiums decrease in the Northeast region (except Philadelphia) in antitrust action period, as compared to pre-antitrust action period. In antitrust action period, the over-order premiums are approximately 15% of the cooperative Class I milk prices in the Southeast markets, and these premiums are approximately 8% of the cooperative Class I milk prices in the Northeast markets (except Philadelphia). The number of milk producers decreases over time, and dairy farm profitability tends to decrease.

The rates of Class I milk price increases are higher than the rates of retail fluid whole milk price increases in the majority of the analyzed cities in both the Southeast and Northeast regions between pre-antitrust action period and antitrust action period. Marketing margins measured as a percentage of retail fluid whole milk prices decrease in antitrust action period in all analyzed cities. The magnitude of the margin decrease is higher in the Southeast markets, as compared to the Northeast markets. In antirust action period, marketing margins are approximately 40% of retail fluid whole milk prices in Atlanta and Louisville (Southeast), and marketing margins are approximately 50% of retail fluid whole milk prices in Philadelphia, Boston and Hartford (Northeast).

References

Abrams, R.G., G.J. Commins and D.W. Foix. (2014). United States: Private Antitrust Litigations. The Antitrust Review of the Americas. Global Competition Review.

Bolotova, Y. (2018). An Analysis of Milk Pricing in the Eastern United States. Selected paper, presented at Annual Meeting of Southern Agricultural Economics Association; Jacksonville, FL; February 2-6, 2018. https://ageconsearch.umn.edu/record/266563?ln=en

Bolotova, Y. (2017). An Analysis of Retail Fluid Milk Pricing in the Eastern United States. Selected paper, presented at Annual Meeting of Southern Agricultural Economics Association; Mobile, AL; February 4-7, 2017. http://ageconsearch.tind.io/record/252744?ln=en

Bolotova, Y. and A. Novakovic. (2016). An Analysis of Retail Milk Pricing in the Eastern United States. Journal of Food Distribution Research XLVII(1): 65-72.

Bolotova, Y.V. and A.M. Novakovic. (2012). The Impact of the New York State Milk Price Gouging Law on the Price Transmission Process and Supermarket Pricing Strategies in the Fluid Whole Milk Market. Agribusiness: An International Journal 28: 377-399.

Congressional Research Service. (2017). Federal Milk Marketing Orders: An Overview. R45044.

Dobson, W.D. (1992). Competitive Strategies of US Fluid Milk Processors: A Case Study. Agribusiness (8): 425-444.

Dobson, W.D., and P. Christ. (2000). Structural Change in the U.S. Dairy Industry: Growth in Scale, Regional Shifts in Milk Production and Processing, and Internationalism. Staff Paper No. 438, Agricultural and Applied Economics, University of Wisconsin-Madison.

Fatka, J. (2018). Northeast Dairy Farmers Receive Settlement Payouts. Feedstuffs, published on September 05, 2018. https://www.feedstuffs.com/news/northeast-dairy-farmers-receive-settlement-payouts

Foix, D. (2013). Court Approves $158.6 Million Settlement Obtained by BakerHostetler's Antitrust Lawyers. Antitrust Advocate, published on May 28, 2013. https://www.antitrustadvocate.com/2013/05/28/court-approves-158-6-million-settlement-obtained-by-bakerhostetlers-antitrust-lawyers/

Gould, B. W. (2010). Consolidation and Concentration in the U.S. Dairy Industry. Choices, 2nd quarter.

Greene, A.I., and J.S. Rhee. (2011). Price Fixing and Enforcement of the Antitrust Laws in the Dairy Industry. Bloomberg Law Reports; Antitrust and Trade.

Kick, C. (2013). DFA to Pay $158.6 million in Antitrust Settlement. Farm and Dairy, published on January 29, 2013. https://www.farmanddairy.com/news/dfa-to-pay-158-6-million-in-antitrust-settlement/47061.html

Liebrand, C.B. (2010). Financial Profile of Dairy Cooperatives, 2007. Research Report 219, Rural Business-Cooperative Service, U.S. Department of Agriculture.

Ling, K.C. (2012). The Nature of the Cooperative: A Dairy Cooperative Case Study. Research Report 224, Rural Business and Cooperatives Programs, U.S. Department of Agriculture.

Natzke, D. (2018). Northeast Lawsuit Payments Finally Hit Dairy Farmer Mailboxes. Progressive Dairy, published on 31 August 2018. https://www.progressivedairy.com/news/industry-news/northeast-lawsuit-payments-finally-hit-dairy-farmer-mailboxes

Novakovic, A.M. and E. Washburn. (2008). Farm and Retail Milk Price Relationships in New York. Briefing Paper Number 08–01. Ithaca, NY: Cornell University, Department of Applied Economics and Management, Cornell Program on Dairy Markets and Policy.

Shields, D.A. (2010). Consolidation and Concentration in the U.S. Dairy Industry. Congressional Research Service Report R41224.

U.S. Department of Agriculture, Agricultural Marketing Service, Dairy Program. Federal Milk Order Marketing and Utilization Summary, Annual 2013. https://www.ams.usda.gov/sites/default/files/media/2013AnnualFederalMilkMarketingUtilizationSummary.pdf

U.S. Department of Agriculture, Agricultural Marketing Service, Dairy Program. Federal Milk Marketing Order 1 “Northeast”. Northeast Milk Marketing Area Statistical Handbook. http://www.fmmone.com/Statistical_Report.htm

U.S. Department of Agriculture, Agricultural Marketing Service, Dairy Program. Federal Milk Marketing Order 5 “Appalachian”. Statistical Material. http://www.malouisville.com/linkeddocs/StatReports/StatisticalMaterial/statmat.html

U.S. Department of Agriculture, Agricultural Marketing Service, Dairy Program. Federal Milk Marketing Order 7 “Southeast”. Annual Statistics. http://www.fmmatlanta.com/Statistical_Report.htm

U.S. Department of Agriculture, Agricultural Marketing Service, Dairy Program. (2017). Marketing Order Statistics Price Formulas 2017. https://www.ams.usda.gov/sites/default/files/media/PriceFormulas2017.pdf

U.S. Department of Agriculture, Agricultural Marketing Service, Milk Marketing Order Statistics Public Database https://www.ams.usda.gov/resources/marketing-order-statistics

U.S. Department of Agriculture, Economic Research Service. Commodity Costs and Returns. https://www.ers.usda.gov/data-products/commodity-costs-and-returns/

U.S. Department of Agriculture, Rural Development (USDA RD). (2005). Cooperatives in the Dairy Industry. Cooperative Information Report 1 Section 16.

U.S. Department of Justice. Antitrust Press Release. (December 18, 2001). Justice Department Requires Suiza Foods and Dean Foods to Divest 11 Dairy Processing Plants. https://www.justice.gov/archive/opa/pr/2001/December/01_at_652.htm

U.S. Government Accountability Office (GAO) Report. (2004). Dairy Industry: Information on Milk Prices, Factors Affecting Prices, and Dairy Policy Options. GAO-05-50.

U.S. General Accounting Office (GAO) Report. (2001). Dairy Industry: Information on Milk Prices and Changing Market Structure. GAO-01-561.

Webster, J. (2015). DFA, Northeast Farmers Settle Antitrust Suit for $50 million. Agri-Pulse, published on March 24, 2015. https://www.agri-pulse.com/articles/5044-dfa-northeast-farmers-settle-antitrust-suit-for-50-million

Walker, J.G. (2013). DFA Settlement Fund Monies Released by the Court. Agweb, published on December 12, 2013. https://www.agweb.com/article/dfa_settlement_fund_monies_released_by_the_court_naa_news_release/

Relevant web-pages: Northeast milk antitrust litigation

Northeast Dairy Farmer Settlement with DFA/DMS website http://www.northeastdairyclass.com/Home.aspx

Allen et al v. Dairy Farmers of America, Inc. et al (revised consolidated amended class action complaint and jury demand filed on April 13, 2011). http://www.northeastdairyclass.com/Portals/0/Documents/ECF%20No%20%20286%20-%20Publicly%20Available%20(and%20redacted)%20CAC.pdf

DFA/DMS settlement notice (U.S. District Court for the District of Vermont). http://www.northeastdairyclass.com/Portals/0/Documents/2015-2016%20Settlement%20Docs/3805_NE%20Milk_Notice_v4.pdf

The second amended settlement agreement between DFA and dairy farmers in the Northeast. http://www.northeastdairyclass.com/Portals/0/Documents/2015-2016%20Settlement%20Docs/Second%20Amended%20Settlement%20Agreement%2012-22-15.pdf

Relevant web-pages: Southeast milk antitrust litigation

Southeast milk antitrust litigation website http://www.southeastdairyclass.com/index.htm

Sweetwater Valley Farm, Inc., et al v. Dean Foods Company et al (corrected consolidated amended complaint filed on August 04, 2008). http://www.southeastdairyclass.com/PDFs/CorrectedConsolidatedAmendedComplaint.pdf

Dean Foods Company settlement notice (U.S. District Court for the Eastern District of Tennessee; February 14, 2012). http://www.southeastdairyclass.com/PDFs/FINAL%20-%20Notice%20wAtty%20chgs%202-21-12.pdf

The settlement agreement between Dean Foods and dairy farmers in the Southeast. http://www.southeastdairyclass.com/PDFs/SettlementAgreement.pdf

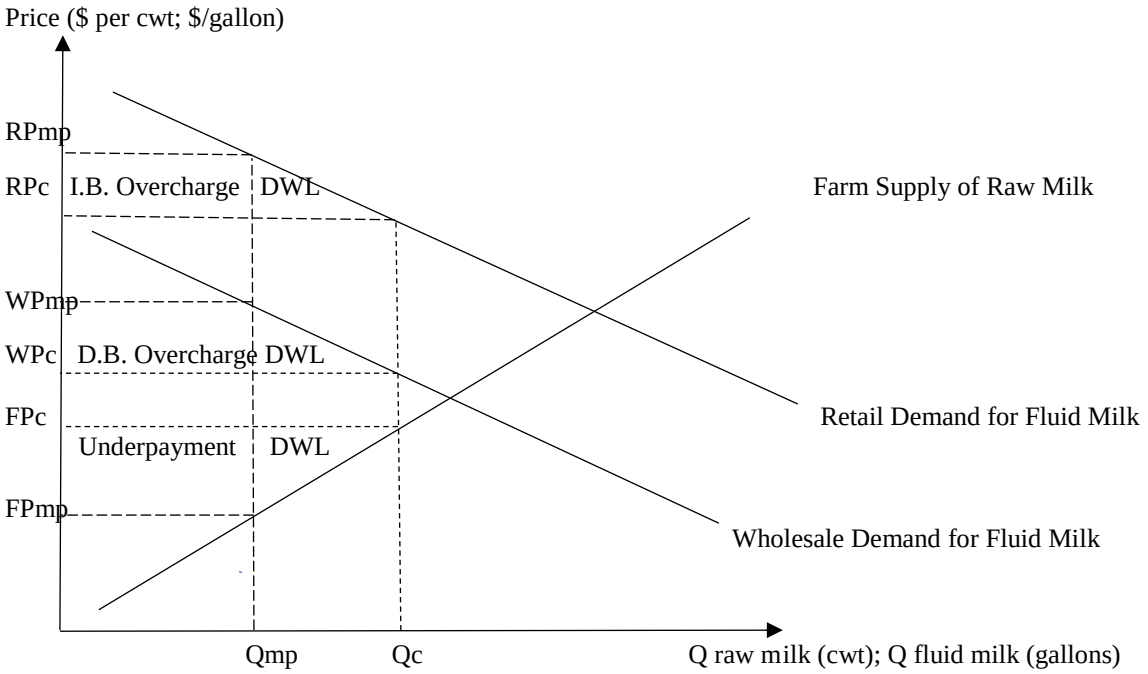

Figure 1. Price Effects of Market Power of Fluid Milk Processing Industry.

Fluid Milk Processing Industry: A Competitive Industry Environment

Qc is raw milk quantity purchased by fluid milk processors and fluid milk quantity produced and marketed by fluid milk processors.

FPc is milk price fluid milk processors pay to dairy farmers (input price for fluid milk processors).

WPc is wholesale fluid milk price fluid milk processors charge direct buyers of fluid milk products (output price for fluid milk processors).

RPc is retail price of fluid milk products

WPc – FPc ($ per unit) and (WPc – FPc)*Qc ($): marketing margin attributed to fluid milk processing industry; it includes fluid milk processing costs and profit.

Fluid Milk Processing Industry: Buyer Market Power and Seller Market Power

Qmp is raw milk quantity purchased by fluid milk processors and fluid milk quantity produced and marketed by fluid milk processors (Qmp < Qc).

FPmp is milk price fluid milk processors pay to dairy farmers (input price for fluid milk processors).

WPmp is wholesale fluid milk price fluid milk processors charge direct buyers (output price for fluid milk processors).

RPmp is retail price of fluid milk products.

WPmp – FPmp ($ per unit) and (WPmp – FPmp)*Qmp ($): marketing margin attributed to fluid milk processing industry; it includes fluid milk processing costs and profit. Due to buyer marker power and seller market power of fluid milk processing industry, its marketing margin increases by the amount of underpayment to dairy farmers and the amount of overcharge to direct buyers (for example, retailers).

The market effects of market power of fluid milk processing industry

FPc – FPmp ($ per unit) and (FPc – FPmp)*Qmp ($): underpayment to dairy farmers due to buyer market power of fluid milk processors. Deadweight Loss (DWL) attributed to dairy farmers is a triangle next to the underpayment rectangle.

WPmp – WPc ($ per unit) and (WPmp – WPc)*Qmp ($): overcharge attributed to direct buyers (for example, retailers) due to seller market power of fluid milk processors. DWL attributed to direct buyers is a triangle next to the direct buyers overcharge rectangle.

RPmp – RPc ($ per unit) and (RPmp – RPc)*Qmp ($): overcharge attributed to indirect buyers (for example, final consumers) due to seller market power of fluid milk processors. DWL attributed to indirect buyers is a triangle next to the indirect buyers overcharge rectangle.

Table 1. U.S. Southeast and Northeast Milk Antitrust Litigations: A Timeline of Relevant Events.

Date	Action
2001	Suiza Foods Corporation acquired Dean Foods Company. A new company was named Dean Foods.
2001	Anticompetitive conduct of DFA and Dean began in the Southeast region (FO5 "Appalachian" and FO7 "Southeast").
2002	Anticompetitive conduct of DFA and Dean began in the Northeast region (FO1 "Northeast").
2007-2008	Dairy farmers in the Southeast region filed antitrust lawsuits.
2009	Dairy farmers in the Northeast region filed antitrust lawsuits.
2011	Settlement agreement was reached between Dean and dairy farmers in the Northeast.
2012	Settlement agreement was reached between Dean and dairy farmers in the Southeast.
2013	Settlement agreement was reached between DFA and dairy farmers in the Southeast.
2014-2016	Settlement agreement was reached between DFA and dairy farmers in the Northeast.
2013-2016	Dairy farmers in the Southeast received payments.
2018	Dairy farmers in the Northeast received payments.

Table 2. Federal Milk Marketing Orders: Market Summary (2013).

FMMO	Total milk: producer quantity		Class I milk: producer quantity		Utilization of producer milk (%)				Class I milk price		Uniform price	
	million pounds	market share (%)	million pounds	market share (%)	Class I	Class II	Class III	Class IV	$/cwt	Class I milk price/ Average	$/cwt	Uniform Price/ Average
Northeast (Boston)	**25,420**	**19.2**	**9,508**	**22.2**	**37**	**26**	**25**	**12**	**22.09**	**1.02**	**20.23**	**1.041**
Appalachian (Charlotte)	**5,729**	**4.3**	**3,845**	**9.0**	**67**	**15**	**8**	**10**	**22.24**	**1.02**	**21.34**	**1.098**
Florida	2,833	2.1	2,424	5.7	86	8	3	3	24.24	1.12	23.53	1.210
Southeast (Atlanta)	**6,129**	**4.6**	**4,163**	**9.7**	**68**	**12**	**13**	**7**	**22.64**	**1.04**	**21.74**	**1.118**
Upper Midwest	34,315	26.0	3,686	8.6	11	2	86	1	20.64	0.95	18.29	0.941
Central	15,199	11.5	4,867	11.4	32	10	46	12	20.85	0.96	18.82	0.968
Mideast	16,719	12.7	6,448	15.1	39	14	34	13	20.85	0.96	19.17	0.986
Pacific Northwest	8,239	6.2	2,120	5.0	26	6	45	23	20.74	0.96	18.83	0.969
Southwest	12,901	9.8	4,324	10.1	33	8	54	5	21.85	1.01	19.59	1.008
Arizona	4,615	3.5	1,357	3.2	29	9	27	35	21.19	0.98	19.41	0.998
Market average or total	**132,100**	**100.0**	**42,742**	**100.0**	**32**	**12**	**47**	**9**	**21.70**	**1.00**	**19.44**	**1.000**

Data Source: USDA AMS Dairy Program, Federal Milk Order Marketing and Utilization Summary, Annual 2013.
Market shares and price ratios are calculated by the author.

Table 3. Market Shares of the Four Largest Dairy Cooperatives in Selected Markets in the Eastern U.S. and U.S. (1997-1999).

Selected Market	Market share of the four largest cooperatives (%)		
	December 1997	December 1998	December 1999
Atlanta, GA	61.5	69.9	71.5
Boston, MA	68.5	70.4	69.6
Charlotte, NC	77.6	79.5	85.2
New Orleans, LA	61.5	69.9	71.5
Washington, D.C.	77.1	77.0	76.8
Average for 11 U.S. markets	72.4	74.7	76.5

Source: GAO Report (2001).

Table 4. Market Shares of the Four Largest Fluid Milk Processors in Selected Markets in the Eastern U.S. and U.S. (1997-1999).

Selected Market	Market share of the four largest fluid milk processors (%)		
	December 1997	December 1998	December 1999
Atlanta, GA	38.5	47.8	52.4
Boston, MA	66.2	85.4	88.1
Charlotte, NC	64.4	74.7	73.9
New Orleans, LA	38.5	47.8	52.4
Washington, D.C.	45.7	43.7	54.5
Average for 14 U.S. markets	69.0	74.2	75.6

Source: GAO Report (2001).

Table 5. Market Shares of the Four Largest Supermarkets in Selected Markets in the Eastern U.S. and U.S. (1992, 1998 and 2003).

Selected Market	Market share of the four largest supermarkets (%)		
	1992	1998	2003
Atlanta, GA	66.9	69.1	78.2
Boston, MA	55.0	70.3	70.1
Charlotte, NC	84.7	83.0	82.0
New Orleans, LA	72.2	76.1	74.7
Washington, D.C.	81.3	79.6	76.5
Average for 15 U.S. markets	71.5	74.0	73.9

Source: GAO Reports (2001 and 2004).

Table 6. Market Analysis for the Federal Milk Marketing Order 7 "Southeast" (2000-2018).

	Number of milk producers	Class I milk: producer quantity (million pounds)	Total milk: producer quantity (million pounds)	Class I milk utilization (%)	Class I milk price ($/cwt)	Uniform price ($/cwt)
2000	*4,808*	*4,867*	*7,487*	*65.0*	*14.65*	*13.63*
2001	4,887	4,805	7,769	61.9	17.37	16.13
2002	4,343	4,767	7,927	60.1	14.11	13.02
2003	3,975	4,629	7,071	65.5	14.49	13.46
2004	3,680	4,640	7,164	64.8	18.08	16.94
2005	3,347	4,654	7,544	61.7	17.50	16.14
2006	3,153	4,774	8,055	59.3	14.98	13.90
2007	3,143	4,772	7,521	63.5	21.24	20.40
2008	2,974	4,700	6,923	67.9	21.56	20.17
Pre-Antitrust Action Period (2001-2008)						
Average	**3,688**	**4,718**	**7,497**	**63.1**	**17.42**	**16.27**
2009	2,746	4,747	7,169	66.2	15.28	14.25
2010	2,752	4,684	7,001	66.9	19.15	18.07
2011	2,615	4,572	7,057	64.8	22.93	21.72
2012	2,358	4,483	6,794	66.0	21.26	20.03
2013		4,163	6,129	67.9	22.64	21.78
2014	1,991	3,905	5,289	73.8	27.08	26.20
2015		3,906	5,205	75.1	20.14	19.27
2016		3,839	5,390	71.2	18.60	17.51
2017		3,767	5,451	69.1	20.25	19.13
2018	1,672	3,705	5,204	71.0	18.64	17.71
Antitrust Action Period (2009-2018)						
Average		**4,177**	**6,069**	**69.2**	**20.60**	**19.57**
Change: Antitrust Action Period relative to Pre-Antitrust Action Period						
Average		**-541**	**-1,428**	**6.1**	**3.18**	**3.30**
%		**-11.5**	**-19.0**	**9.7**	**18.3**	**20.3**

Data source: USDA AMS Dairy Program, Federal Milk Marketing Order 7 Annual Statistics.

Table 7. Market Analysis for the Federal Milk Marketing Order 5 "Appalachian" (2000-2018).

	Number of milk producers	Class I milk: producer quantity (million pounds)	Total milk: producer quantity (million pounds)	Class I milk utilization (%)	Class I milk price ($/cwt)	Uniform price ($/cwt)
2000	*4,483*	*4,343*	*6,318*	*68.8*	*14.65*	*13.97*
2001	4,017	4,352	6,673	65.2	17.37	16.34
2002	3,948	4,449	6,706	66.3	14.11	13.24
2003	3,268	4,443	6,315	70.4	14.49	13.55
2004	3,196	4,325	6,202	69.7	18.08	17.01
2005	3,097	4,191	6,400	65.5	17.50	16.23
2006	3,141	4,137	6,243	66.3	14.98	13.99
2007	2,645	4,120	5,865	70.3	21.24	20.49
2008	2,819	4,133	5,882	70.3	21.30	19.90
Pre-Antitrust Action Period (2001-2008)						
Average	**3,266**	**4,269**	**6,286**	**68.0**	**17.4**	**16.3**
2009	2,702	4,150	5,950	69.7	14.88	14.00
2010	2,709	4,134	6,042	68.4	18.75	17.94
2011	2,246	4,207	6,128	68.7	22.53	21.68
2012	2,291	3,985	5,863	68.0	20.86	19.70
2013	2,222	3,845	5,729	67.1	22.24	21.37
2014	2,226	3,783	5,593	67.6	26.69	25.62
2015	2,288	3,871	5,646	68.6	19.74	18.58
2016	2,079	3,892	5,595	69.6	18.20	17.09
2017	1,858	4,002	5,801	69.0	19.85	18.79
2018	1,692	3,984	5,734	69.5	18.24	17.31
Antitrust Action Period (2009-2018)						
Average	**2,231**	**3,985**	**5,808**	**68.6**	**20.20**	**19.21**
Change: Antitrust Action Period relative to Pre-Antitrust Action Period						
Average	**-1,035**	**-283**	**-478**	**0.6**	**2.81**	**2.86**
%	**-31.7**	**-6.6**	**-7.6**	**0.9**	**16.2**	**17.5**

Data source: USDA AMS Dairy Program, Federal Milk Marketing Order 5 Statistical Material.

Table 8. Market Analysis for the Federal Milk Marketing Order 1 "Northeast" (2000-2018).

	Number of milk producers	Class I milk: producer quantity (million pounds)	Total milk: producer quantity (million pounds)	Class I milk utilization (%)	Class I milk price ($/cwt)	Uniform price ($/cwt)
2000	*17,279*	*10,513.1*	*23,956.9*	*43.90*	*14.80*	*13.04*
2001	*17,165*	*10,642.1*	*24,549.8*	*43.30*	*17.52*	*15.67*
2002	16,869	10,694.8	25,357.0	42.30	14.26	12.64
2003	16,114	10,701.2	24,036.8	44.50	14.64	12.99
2004	15,039	10,691.8	22,667.0	47.20	18.23	16.49
2005	14,904	10,612.9	23,562.9	45.00	17.65	15.64
2006	14,284	10,544.5	22,677.0	46.50	15.13	13.53
2007	13,877	10,495.8	23,037.5	45.60	21.39	19.85
2008	13,584	10,384.8	23,894.0	43.50	21.25	18.62
2009	13,384	10,267.8	23,494.7	43.70	14.73	13.01
Pre-Antitrust Action Period (2002-2009)						
Average	**14,757**	**10,549**	**23,591**	**44.8**	**17.16**	**15.34**
2010	13,429	10,386.5	24,333.5	42.70	18.60	16.92
2011	12,965	10,074.9	24,357.3	41.40	22.38	20.64
2012	12,633	9,801.9	24,695.1	39.70	20.71	18.63
2013	12,353	9,507.9	25,419.9	37.40	22.09	20.25
2014	12,157	9,122.9	25,793.1	35.40	26.54	24.28
2015	11,754	8,943.4	26,038.7	34.30	19.59	17.14
2016	11,461	8,828.0	27,007.1	32.70	18.05	15.90
2017	11,171	8,798.5	27,396.7	32.10	19.70	17.44
2018	10,574	8,700.8	27,109.0	32.10	18.09	16.09
Antitrust Action Period (2010-2018)						
Average	**12,055**	**9,352**	**25,794**	**36.4**	**20.64**	**18.59**
Change: Antitrust Action Period relative to Pre-Antitrust Action Period						
Average	**-2,701**	**-1,198**	**2,204**	**-8.37**	**3.48**	**3.24**
%	**-18.3**	**-11.4**	**9.3**	**-18.7**	**20.3**	**21.1**

Data source: USDA AMS, Dairy Program, Federal Milk Marketing Order 1 Northeast Milk Marketing Area Statistical Handbook.

.

Table 9. Class I Milk Producer Quantity in Federal Milk Marketing Orders 1, 5 and 7 (2000-2018).

	FO1: Class I milk producer quantity		FO5: Class I milk producer quantity		FO7: Class I milk producer quantity		FO5 and FO7: Class I milk producer quantity	
	million pounds	% change	million pounds	% change	million pounds	% change	million pounds	% change
2000	10,513		4,343		4,867		9,210	
2001	10,642	1.2	4,352	0.2	4,805	**-1.3**	9,158	**-0.6**
2002	10,695	0.5	4,449	2.2	4,767	**-0.8**	9,216	0.6
2003	10,701	0.1	4,443	**-0.1**	4,629	**-2.9**	9,072	**-1.6**
2004	10,692	**-0.1**	4,325	**-2.7**	4,640	0.2	8,965	**-1.2**
2005	10,613	**-0.7**	4,191	**-3.1**	4,654	0.3	8,845	**-1.3**
2006	10,545	**-0.6**	4,137	**-1.3**	4,774	2.6	8,911	0.7
2007	10,496	**-0.5**	4,120	**-0.4**	4,772	**-0.03**	8,893	**-0.2**
2008	10,385	**-1.1**	4,133	0.3	4,700	**-1.5**	8,833	**-0.7**
2009	10,268	**-1.1**	4,150	0.4	4,747	1.0	8,897	0.7
2010	10,387	1.2	4,134	**-0.4**	4,684	**-1.3**	8,818	**-0.9**
2011	10,075	**-3.0**	4,207	1.8	4,572	**-2.4**	8,780	**-0.4**
2012	9,802	**-2.7**	3,985	**-5.3**	4,483	**-2.0**	8,468	**-3.5**
2013	9,508	**-3.0**	3,845	**-3.5**	4,163	**-7.1**	8,008	**-5.4**
2014	9,123	**-4.0**	3,783	**-1.6**	3,905	**-6.2**	7,688	**-4.0**
2015	8,943	**-2.0**	3,871	2.3	3,906	0.03	7,777	1.2
2016	8,828	**-1.3**	3,892	0.5	3,839	**-1.7**	7,730	**-0.6**
2017	8,799	**-0.3**	4,002	2.8	3,767	**-1.9**	7,769	0.5
2018	8,701	**-1.1**	3,984	**-0.4**	3,705	**-1.7**	7,689	**-1.0**

Table 10. Dairy Farm Profitability in the Southern Seaboard Region and U.S. (2000-2017).

	Southern Seaboard: Value of Production and Profit					U.S.: Profit	
	VP ($/cwt)	VP - TC ($/cwt)	VP - TOC ($/cwt)	VP - TC (%)	VP - TOC (%)	VP - TC (%)	VP - TOC (%)
2000	*16.63*	*-1.16*	*6.39*	*-7.0*	*38.4*	*-26.5*	*34.2*
2001	19.69	1.35	9.34	6.9	47.4	-7.4	44.4
2002	16.51	-2.32	6.02	-14.1	36.5	-33.8	30.9
2003	16.93	-2.38	6.11	-14.1	36.1	-30.6	32.1
2004	20.88	1.14	9.70	5.5	46.5	-6.2	44.4
2005	17.70	-2.11	6.00	-11.9	33.9	-8.4	34.8
2006	15.90	-4.89	3.39	-30.8	21.3	-29.5	22.2
2007	22.32	-0.32	8.00	-1.4	35.8	1.2	37.8
2008	22.85	-2.16	6.51	-9.5	28.5	-14.9	23.5
Pre-Antitrust Action Period (2001-2008)							
Average	**19.10**	**-1.46**	**6.88**	**-8.7**	**35.7**	**-16.2**	**33.8**
2009	16.65	-7.60	1.32	-45.6	7.9	-50.7	4.3
2010	19.57	-4.87	4.96	-24.9	25.3	-15.2	27.4
2011	22.65	-8.06	2.17	-35.6	9.6	-18.4	16.7
2012	22.00	-11.30	-0.58	-51.3	-2.6	-33.8	4.0
2013	23.70	-9.13	1.94	-38.5	8.2	-24.5	12.1
2014	27.98	-1.57	9.81	-5.6	35.1	7.1	38.4
2015	21.96	-6.06	5.56	-27.6	25.3	-17.9	25.2
2016	19.95	-1.94	5.76	-9.7	28.9	-6.8	34.4
2017	22.40	0.41	8.26	1.8	36.9	-0.2	39.1
Antitrust Action Period (2009-2017)							
Average	**21.87**	**-5.57**	**4.36**	**-26.3**	**19.4**	**-17.8**	**22.4**
Change: Antitrust Action Period relative to Pre-Antitrust Action Period							
Average	**2.78**	**-4.11**	**-2.53**	**-17.7**	**-16.4**	**-1.6**	**-11.3**
%	**14.5**	**281.1**	**-36.7**	**203.8**	**-45.7**	**10.1**	**-33.6**

Data source: USDA ERS costs and returns estimates.
The calculation of percentage profit measures was performed by the author.
VP is value of production ($/cwt).
TC is total costs ($/cwt) and TOC is total operating costs ($/cwt)
Profit measures are calculated as a percentage of the value of production.

Table 11. Dairy Farm Profitability in the Eastern Uplands Region and U.S. (2000-2017).

	Eastern Uplands: Value of Production and Profit					U.S.: Profit	
	VP ($/cwt)	VP - TC ($/cwt)	VP - TOC ($/cwt)	VP - TC (%)	VP - TOC (%)	VP - TC (%)	VP - TOC (%)
2000	*15.64*	*-9.63*	*2.89*	*-61.6*	*18.5*	*-26.5*	*34.2*
2001	18.49	-7.39	5.42	-40.0	29.3	-7.4	44.4
2002	15.29	-11.11	1.86	-72.7	12.2	-33.8	30.9
2003	15.78	-11.81	1.59	-74.8	10.1	-30.6	32.1
2004	19.75	-9.28	4.44	-47.0	22.5	-6.2	44.4
2005	18.07	-7.54	5.64	-41.7	31.2	-8.4	34.8
2006	15.96	-10.45	3.03	-65.5	19.0	-29.5	22.2
2007	22.11	-7.04	6.68	-31.8	30.2	1.2	37.8
2008	22.60	-9.58	4.87	-42.4	21.5	-14.9	23.5
Pre-Antitrust Action Period (2001-2008)							
Average	**18.51**	**-9.28**	**4.19**	**-52.0**	**22.0**	**-16.2**	**33.8**
2009	16.16	-14.06	0.70	-87.0	4.3	-50.7	4.3
2010	20.02	-9.77	4.51	-48.8	22.5	-15.2	27.4
2011	22.95	-13.12	1.50	-57.2	6.6	-18.4	16.7
2012	23.16	-15.66	-0.71	-67.6	-3.1	-33.8	4.0
2013	25.30	-13.18	2.10	-52.1	8.3	-24.5	12.1
2014	29.73	-5.89	9.77	-19.8	32.9	7.1	38.4
2015	23.21	-10.64	5.31	-45.9	22.9	-17.9	25.2
2016	19.36	-5.40	5.51	-27.9	28.5	-6.8	34.4
2017	21.05	-4.10	7.14	-19.5	33.9	-0.2	39.1
Antitrust Action Period (2009-2017)							
Average	**22.33**	**-10.20**	**3.98**	**-47.3**	**17.4**	**-17.8**	**22.4**
Change: Antitrust Action Period relative to Pre-Antitrust Action period							
Average	**3.82**	**-0.93**	**-0.21**	**4.7**	**-4.6**	**-1.6**	**-11.3**
%	**20.6**	**10.0**	**-5.0**	**-9.0**	**-20.8**	**10.1**	**-33.6**

Data source: USDA ERS costs and returns estimates.
The calculation of percentage profit measures was performed by the author.
VP is value of production ($/cwt).
TC is total costs ($/cwt) and TOC is total operating costs ($/cwt)
Profit measures are calculated as a percentage of the value of production.

Table 12. Dairy Farm Profitability in the Northern Crescent Region and U.S. (2000-2017).

	Northern Crescent: Value of Production and Profit					U.S.: Profit	
	VP ($/cwt)	VP - TC ($/cwt)	VP - TOC ($/cwt)	VP - TC (%)	VP - TOC (%)	VP - TC (%)	VP - TOC (%)
2000	*14.70*	*-5.63*	*5.72*	*-38.3*	*38.9*	*-26.5*	*34.2*
2001	*17.83*	*-2.75*	*8.76*	*-15.4*	*49.1*	*-7.4*	*44.4*
2002	14.71	-6.30	5.44	-42.8	37.0	-33.8	30.9
2003	15.44	-6.08	5.85	-39.4	37.9	-30.6	32.1
2004	19.57	-2.29	9.76	-11.7	49.9	-6.2	44.4
2005	17.70	-3.31	5.85	-18.7	33.1	-8.4	34.8
2006	15.31	-6.09	3.29	-39.8	21.5	-29.5	22.2
2007	21.74	-1.16	8.40	-5.3	38.6	1.2	37.8
2008	21.70	-4.07	5.86	-18.8	27.0	-14.9	23.5
2009	15.28	-9.05	1.03	-59.2	6.7	-50.7	4.3
Pre-Antitrust Action Period (2002-2009)							
Average	**17.7**	**-4.8**	**5.7**	**-29.5**	**31.5**	**-21.6**	**28.8**
2010	18.99	-5.78	4.45	-30.4	23.4	-15.2	27.4
2011	23.18	-7.08	3.25	-30.6	14.0	-18.4	16.7
2012	22.38	-10.63	0.10	-47.5	0.4	-33.8	4.0
2013	23.36	-9.40	1.57	-40.3	6.7	-24.5	12.1
2014	28.01	-2.35	8.85	-8.4	31.6	7.1	38.4
2015	20.77	-7.84	3.56	-37.7	17.1	-17.9	25.2
2016	19.66	-2.72	6.80	-13.8	34.6	-6.8	34.4
2017	20.91	-1.83	7.95	-8.8	38.0	-0.2	39.1
Antitrust Action Period (2010-2017)							
Average	**22.16**	**-5.95**	**4.57**	**-27.2**	**20.7**	**-13.7**	**24.7**
Change: Antitrust Action Period relative to Pre-Antitrust Action Period							
Average	**4.48**	**-1.16**	**-1.12**	**2.3**	**-10.7**	**7.9**	**-4.1**
%	**25.3**	**24.2**	**-19.7**	**-7.7**	**-34.1**	**-36.5**	**-14.2**

Data source: USDA ERS costs and returns estimates.
The calculation of percentage profit measures was performed by the author.
VP is value of production ($/cwt).
TC is total costs ($/cwt) and TOC is total operating costs ($/cwt)
Profit measures are calculated as a percentage of the value of production.

Table 13. U.S. Southeast Region: Class I Milk Prices, Announced Cooperative Class I Milk Prices and Premiums in Selected Markets (2001-2012).

		Pre-antitrust action period 01/2001-07/2008 Average	Antitrust action period 08/2008-12/2012 Average	Change in the average between two periods (%)
Louisville, KY				
Class I milk price	$/cwt	16.32	18.25	1.93 (11.8)
Coop Class I milk price	$/cwt	18.17	21.36	3.19 (17.6)
Premium	$/cwt	1.85	3.11	1.26 (68.1)
Premium	%	10.12	14.85	4.73 (46.7)
Memphis, TN				
Class I milk price	$/cwt	16.92	18.85	1.93 (11.4)
Coop Class I milk price	$/cwt	18.68	22.15	3.47 (18.6)
Premium	$/cwt	1.77	3.30	1.53 (86.4)
Premium	%	9.48	15.20	5.72 (60.3)
Charlotte, NC				
Class I milk price	$/cwt	17.22	19.35	2.13 (12.4)
Coop Class I milk price	$/cwt	19.16	22.59	3.43 (17.9)
Premium	$/cwt	1.93	3.24	1.31 (67.9)
Premium	%	10.20	14.57	4.37 (42.8)
Atlanta, GA				
Class I milk price	$/cwt	17.24	19.75	2.51 (14.6)
Coop Class I milk price	$/cwt	19.21	23.07	3.86 (20.1)
Premium	$/cwt	1.97	3.32	1.35 (68.5)
Premium	%	10.33	14.66	4.33 (41.9)
New Orleans, LA				
Class I milk price	$/cwt	17.72	19.75	2.03 (11.5)
Coop Class I milk price	$/cwt	19.42	22.69	3.27 (16.8)
Premium	$/cwt	1.70	2.94	1.24 (72.9)
Premium	%	8.74	13.29	4.55 (52.1)

Data Source: USDA AMS Milk Marketing Order Statistics Public Database.

Table 14. U.S. Northeast Region: Class I Milk Prices, Announced Cooperative Class I Milk Prices and Premiums in Selected Markets (2002-2012).

		Pre-antitrust action period 01/2002-09/2009 Average	Antitrust action period 10/2009-12/2012 Average	Change in the average between two periods (%)
Boston, MA				
Class I milk price	$/cwt	17.19	20.24	3.05 (17.7)
Coop Class I milk price	$/cwt	18.74	21.85	3.11 (16.6)
Premium	$/cwt	1.55	1.61	0.06 (3.9)
Premium	%	8.52	7.45	-1.07 (-12.6)
Hartford, CT				
Class I milk price	$/cwt	17.09	20.14	3.05 (17.8)
Coop Class I milk price	$/cwt	18.64	21.75	3.11 (16.7)
Premium	$/cwt	1.55	1.61	0.06 (3.9)
Premium	%	8.57	7.48	-1.09 (-12.7)
Philadelphia, PA				
Class I milk price	$/cwt	16.99	20.04	3.05 (18.0)
Coop Class I milk price	$/cwt	19.19	23.13	3.94 (20.5)
Premium	$/cwt	2.20	3.09	0.89 (40.5)
Premium	%	11.68	13.54	1.86 (15.9)
Baltimore, MD				
Class I milk price	$/cwt	16.94	19.99	3.05 (18.00)
Coop Class I milk price	$/cwt	18.71	21.66	2.95 (15.8)
Premium	$/cwt	1.78	1.67	-0.11 (-6.2)
Premium	%	9.79	7.81	-1.98 (-20.2)
Washington, D.C.				
Class I milk price	$/cwt	16.94	19.99	3.05 (18.0)
Coop Class I milk price	$/cwt	18.71	21.66	2.95 (15.8)
Premium	$/cwt	1.78	1.67	-0.11 (-6.2)
Premium	%	9.79	7.81	-1.98 (-20.2)

Data Source: USDA AMS Milk Marketing Order Statistics Public Database.

Table 15. U.S. Southeast Region: Announced Cooperative Class I Milk Prices, Retail Fluid Whole Milk Prices and Marketing Margins in Selected Markets (2001-2012).

		Pre-antitrust action period 01/2001-07/2008 Average	Antitrust action period 08/2008-12/2012 Average	Change in the average between two periods (%)
Atlanta, GA				
Class I milk price	$/gallon	1.65	1.98	0.33 (20.1)
Retail price	$/gallon	3.35	3.42	0.08 (2.3)
Margin	$/gallon	1.70	1.44	-0.25 (-15.0)
Margin	% of retail price	50.92	41.70	-9.22 (-18.1)
Louisville, KY				
Class I milk price	$/gallon	1.56	1.84	0.27 (17.6)
Retail price	$/gallon	2.88	3.06	0.19 (6.5)
Margin	$/gallon	1.31	1.23	-0.09 (-6.6)
Margin	% of retail price	45.96	39.72	-6.24 (-13.6)
New Orleans, LA				
Class I milk price	$/gallon	1.67	1.95	0.28 (16.8)
Retail price	$/gallon	3.78	4.33	0.55 (14.5)
Margin	$/gallon	2.11	2.38	0.27 (12.7)
Margin	% of retail price	55.92	54.90	-1.02 (-1.8)

Data Source for Class I milk prices and retail prices: USDA AMS Milk Marketing Order Statistics Public Database.

Table 16. U.S. Northeast Region: Announced Cooperative Class I Milk Prices, Retail Fluid Whole Milk Prices and Marketing Margins in Selected Markets (2002-2012).

		Pre-antitrust action period 01/2002-09/2009 Average	Antitrust action period 10/2009-12/2012 Average	Change in the average between two periods (%)
Philadelphia, PA				
Class I milk price	$/gallon	1.65	1.99	0.34 (20.5)
Retail price	$/gallon	3.30	3.95	0.65 (19.7)
Margin	$/gallon	1.65	1.96	0.31 (18.9)
Margin	% of retail price	50.29	49.72	-0.57 (-1.1)
Hartford, CT				
Class I milk price	$/gallon	1.60	1.87	0.27 (16.7)
Retail price	$/gallon	3.38	3.67	0.28 (8.4)
Margin	$/gallon	1.78	1.79	0.02 (1.0)
Margin	% of retail price	52.81	49.04	-3.78 (-7.1)
Boston, MA				
Class I milk price	$/gallon	1.61	1.88	0.27 (16.6)
Retail price	$/gallon	3.29	3.63	0.34 (10.4)
Margin	$/gallon	1.68	1.75	0.08 (4.5)
Margin	% of retail price	51.23	48.29	-2.94 (-5.7)

Data Source for Class I milk prices and retail prices: USDA AMS Milk Marketing Order Statistics Public Database.