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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

Yuliya V. Bolotova and Andrew M. Novakovic

Cornell University
Charles H. Dyson School of Applied Economics and Management
316 Warren Hall
Ithaca, NY 14853-7801
yb47@cornell.edu
a.novakovic@cornell.edu

Abstract

The paper analyzes the effect of the New York State Milk Price Gouging Law 200% rule (June 1991-October 2008) on the nature of price-transmission process and supermarket pricing strategies in the fluid whole milk market. This rule established that the retail prices of fluid milk products were not to exceed 200% of the Class I fluid milk prices that milk processors paid to dairy farmers. The enforcement of this law significantly affected the nature of the Class I fluid milk price transmission process and the whole milk pricing strategies of supermarkets in the five largest cities in New York State: New York City, Albany, Syracuse, Buffalo and Rochester. During the pre-law period, supermarkets used the retail price-stabilization strategy; a presence of the asymmetric Class I fluid milk price transmission process was evidence of this type of pricing strategy. In contrast, supermarkets used the retail profit stabilization strategy during the law period, which was reflected in the symmetric response of retail prices and marketing margins to increases and decreases in the Class I fluid milk prices. The analyzed design of retail milk price control actually created an institutional environment that facilitated cooperative conduct of supermarkets acting in an oligopolistic market environment, which caused a shift away from the retail price stabilization strategy in the pre-law period to the retail profit stabilization strategy in the law period.

Key words: fluid milk, oligopoly, price-transmission, retail price control, supermarket strategic behavior, tacit collusion.

JEL classification codes: K21, K23, L11, L13, L66, Q13.

The authors are Visiting Scholar and E.V. Baker Professor of Agricultural Economics.

1. Introduction

The asymmetry in farm-retail price-transmission processes has been a focus of numerous empirical studies that analyzed a wide array of agricultural markets. The empirical evidence presented in these studies may suggest that asymmetric response of changes in retail prices to increasing and decreasing farm prices is a rule rather than an exception in the modern food supply chain. While the vast majority of studies focused on finding the mere presence of price asymmetries, there is a lack of research that identifies empirically and tests hypotheses relating to the factors that explain this asymmetry (Meyer & von Cramon-Taubadel 2004). Some of the causes of price asymmetry that have been discussed in the literature are the presence of market power and coordinated conduct of firms with market power, government regulations, repricing and transactions costs, shifts in supply and demand, and imperfect information[1].

A unique feature of the dairy industry, the presence of various state and federal-level government regulations, was hypothesized to influence the nature of price-transmission process in this industry by a number of studies. Kinnucan & Forker (1987) examined the effect of a decrease in the dairy price support level (1983-1985 legislations) on the asymmetry in retail-farm price-transmission process for fluid milk, butter, cheese and ice-cream[2]. Frigon et al (1999) and Romain et al (2002) analyzed the effect of the New York State Milk Price Gouging Law (June 1991) on the nature of response of marketing margins of fluid whole milk to changes in the Class I fluid milk prices. Lass et al (2001) and Lass (2005) studied the impact of the Northeast Dairy Compact (July 1997 - December 2001) on the patterns of response of retail fluid whole milk prices to changes in the Class I fluid milk prices.

The most recent studies point out that market power of retailers and a possibility of their coordinated conduct (tacit collusion) affect the nature of price-transmission processes in the modern fluid milk markets. Cotterill & Franklin (2001), Chidmi et al (2005) and Lass (2005) suggested that the market setting created by the interaction of private market power of retailers and a public policy (i.e. Northeast Dairy Compact in their studies) affected the performance of

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[1] See Meyer & von Cramon-Taubadel (2004) for a discussion of different causes of price asymmetry with references to the studies done in the areas of both agricultural economics and general economics. See Wohlgenant (2001) for the overview of the nature of marketing margins and empirical approaches used to analyze them.

[2] Emerick (1994) and Wang (2003) using a general framework developed by Kinnucan & Forker (1987) conducted the price-transmission analyses for the same dairy products using the updated data sets.

fluid milk markets including the nature of price-transmission process. It was suggested that this market setting facilitated the effective tacit collusion of retailers allowing them to charge supra-competitive prices. An analysis of supermarket fluid milk pricing strategies in the Western U.S. presented in Carman & Sexton (2005) indicates a wide presence of non-competitive pricing conduct. Furthermore, based on the results of price-transmission analysis, the study concludes that the supermarket conduct is consistent with the monopoly pricing in a considerable number of the analyzed cases.

The objective of our paper is to provide empirical evidence on the effects of the state retail milk price control regulation on the nature of price-transmission process and supermarket pricing strategies in the fluid whole milk market. A unique natural experiment involving the enforcement of the New York State Milk Price Gouging Law (MPGL) 200% rule during the period of June 1991-October 2008 allows us to determine the impact of this law on the nature of responses of retail fluid whole milk prices and marketing margins to changes in the Class I fluid milk prices[3].

The MPGL 200% rule states that the retail prices of fluid milk products are not to exceed 200% of the Class I fluid milk prices that fluid milk processors pay to dairy farmers. One of the intents of the law was to ensure that dairy farmers received a fair share of consumer dollars spent on fluid milk products. We hypothesize that this particular design of retail milk price control changes the nature of the Class I fluid milk price transmission process in the fluid milk channel towards making it more symmetric as compared to the period prior to the enactment of MPGL. This is expected to be reflected in the nature of supermarket pricing strategies.

To perform the stated objective, we analyze the response of both retail prices and marketing margins to changes in the Class I fluid milk prices during two periods: before the law was in effect (the pre-law period) and during the period when the 200% rule was enforced (the law period). We focus on the fluid whole milk market in the largest cities in New York State: New York City, Albany, Syracuse, Buffalo and Rochester.

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[3] Frigon et al (1999) and Romain et al (2002) analyzed the effect of the same regulation. The analysis presented in our study differs in a number of ways from the analysis presented in these two studies. Some of the distinct features of our analysis are the longer time period under consideration, examination of the city-specific data and of the two different fluid milk container sizes, analysis of the patterns of response of both retail prices and marketing margins to increases and decreases in the Class I fluid milk prices. Also, the Class I fluid milk prices used in our analysis are adjusted for the butter-fat content of raw milk used in manufacturing of whole milk products and they also account for the over-order producer premium.

The paper is organized as follows. Section 2 discusses the NYS Milk Price Gouging Law. Section 3 presents an empirical framework, and Section 4 discusses the data. Section 5 presents the estimation results and is followed by the conclusion.

2. New York State Milk Price Gouging Law (June 1991 – October 2008)

By the beginning of 1991 the New York State dairy industry was adversely affected by the interaction of a number of market and policy forces. First, the farm level price volatility increased dramatically due to a substantial decrease in the U.S. Dairy Support Price[4]. Second, while farm prices exhibited a considerable degree of volatility, changes in retail fluid milk prices were slow to reflect changes in farm prices. In particular, when farm prices were decreasing, retail prices continued to increase, which adversely affected the farm share in the retail price. Finally, there was a fear that declining farm prices would adversely impact milk production in the State, thus decreasing the availability of quality milk available for consumption.

To remedy the adverse dairy industry condition, the New York State Legislature instructed the Commissioner of Agriculture and Markets to invoke an existing law, the Rogers-Allen Act, to set a high minimum price for the Class I fluid milk[5]. To make it more appealing to consumers and urban legislators, the Milk Price Gouging Law (MPGL) was enacted in June 1991 to ensure that retailers would not take unfair advantage of consumers by charging excessively high milk prices, and that farmers would receive a fair share of consumer dollars spent on milk. The MPGL placed a ceiling on the retail prices of beverage milk products sold for off-premise consumption in New York State. The law established that the retail fluid milk prices were not to exceed 200% of the Class I fluid milk prices that fluid milk processors paid to dairy farmers[6].

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[4] During the 1980s, the U.S. support price was reduced by 25%, which was followed by a tumultuous period of large surpluses and many largely failed policy attempts to avoid price cut. When the support price was finally reduced to $10/cwt (manufacturing grade of Class III or IV of fluid milk), markets became free to find a price with little effect from the Dairy Price Support Program. See Erba and Novakovic (1995) for a discussion of milk pricing and government interventions in 1980s.

[5] The law established the interim price for milk paid to New York farmers, which was above the New York-New Jersey milk marketing order minimum price. The Rogers-Allen minimum price was found to give out-of-state processors and distributors a price advantage against regulated in-state milk processors and distributors. As a result, the emergency price relief was revoked within seven months.

[6] The above-threshold pricing is allowed if retailers can provide proper cost-justifications.

The New York State Department of Agriculture and Markets (NYSDAM) is responsible for the enforcement of MPGL. During the period of June 1991 to October 2008, the NYSDAM made monthly announcements of the maximum retail price thresholds, which retail prices were not to exceed. The announcements were made approximately 10 days before the beginning of the month in which they were to apply. The NYSDAM threshold varied across the regions and the size of fluid milk containers, and it was applied to whole milk, low fat milk and skim milk.

First, separate thresholds were specified for the Metro area (New York City and surrounding counties) and Upstate area (all remaining counties). Second, within each region, separate thresholds were determined for three container sizes: gallon, half-gallon and quart. This differentiation of threshold levels is due to differences in the Class I fluid milk price in Upstate New York and New York City and due to differences in marketing costs relating to the container size.

The Class I fluid milk price to which the NYSDAM applies the 200% threshold includes two components. The first one is the minimum Federal Milk Marketing Order (FMMO) Class I price for fluid milk with 3.5% butterfat content, and the second one is the Class I premium paid to the New York State milk producers. Due to the FMMO location price differential, the Class I price differs between the Upstate and Metro regions. The minimum FMMO Class I fluid milk price is higher for the Metro area as compared to Upstate New York.

The enforcement procedure of the law was changed in November 2008. The MPGL 200% rule was replaced with a different mechanism based on the retail margin standard specified in $/container.

3. Empirical Framework

The vast majority of studies that analyzed price-transmission in dairy markets use a framework developed by Houck (1977), which is based on segmenting an independent variable of interest (i.e. the Class I fluid milk price in the case of dairy industry) on increasing and decreasing phases in order to identify their individual effects on the dependent variable (i.e. retail price or marketing margin in the case of dairy industry)[7].

[7] Houck's work was an extension of already existing approaches of segmenting the independent variable on increasing and decreasing phases (Wolffram 1971; Tweeten & Quance 1971). See Meyer & von Cramon-Taubadel (2004) and Frey & Manera (2007) for a comparative analysis of these and other

Capps & Sherwell (2007) point out that Houck's approach might not be the best one to be used in the situations where data exhibit non-stationarity properties. They suggest that if it can be shown that the variables are cointegrated, the Asymmetric Error Correction Model (ECM) might be a superior alternative to Houck's model. However, after having applied both models to analyze the price-transmission processes of whole and 2% milk sold in seven U.S. cities, the authors concluded that the empirical results based on these two approaches were basically statistically indistinguishable.

We use Houck's framework to analyze patterns of the Class I fluid milk price transmission in the New York State fluid whole milk market during the pre-law and law periods. The outcomes of statistical tests applied to the data series used in the analysis show that the data are stationary[8]. Equation [1] presents a generalized version of Houck's model.

[1] $Y_t^* = a_0 \times t + a_1 \times R_t^* + a_2 \times D_t^*$,

where R_t^* is the sum of all period-to-period increases and D_t^* is the sum of all period-to-period decreases in the independent variable from its initial value. R_t^* is always positive, and D_t^* is always negative. Y_t^* is the sum of all period-to-period changes in the dependent variable from its initial value[9]. If a_0 is non-zero, then it appears as a trend coefficient. The equation can be expanded by including more than one independent variable and also by including the lagged terms of segmented variables.

In the dairy industry studies, Houck's framework has been used to analyze responses of retail prices and marketing margins to changes in the Class I fluid milk prices. Both retail prices and marketing margins are indicators of the industry performance and firms' strategic behavior. Equations [2] and [3] specify econometric models to be estimated to analyze the effect of the New York State Milk Price Gouging Law on the nature of responses of retail prices (eq. 2) and marketing margins (eq. 3) to changes in the Class I fluid milk prices.

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empirical techniques used in the analysis of asymmetric price-transmission in agricultural and other markets.

[8] The statistical tests are discussed in Section 5, and the test outcomes are presented in Appendix I. The latter is available from the authors upon request.

[9] Houck (1977) and Kinnucan & Forker (1987) present numerical examples of how to transform raw data in order to be analyzed using Houck's approach.

[2] $RP_t = \beta_0 + \beta_1 \times CIP\_INC_t + \beta_2 \times CIP\_DEC_t + u_t$;

[3] $MM_t = \gamma_0 + \gamma_1 \times CIP\_INC_t + \gamma_2 \times CIP\_DEC_t + v_t$,

where RP_t and MM_t are transformed retail prices and marketing margins, respectively; CIP_INC_t and CIP_DEC_t represent the Class I fluid milk price ($CIP\_$) which is segmented into increasing (*_INC*) and decreasing (*_DEC*) components. β_0, β_1, and β_2 are the coefficients to be estimated and u_t is the error term in the retail price equation. γ_0, γ_1, and γ_2 are the coefficients to be estimated and v_t is the error term in the marketing margin equation. The original market margin variable is calculated as the difference between the retail price and Class I fluid milk price, and it is expressed as a percentage of retail price[10].

The econometric models are estimated for fluid whole milk sold in gallon and half-gallon containers in the five largest New York State Cities: New York City, Albany, Syracuse, Buffalo and Rochester. Given that we hypothesize that the Milk Price Gouging Law 200% rule did affect the nature of price-transmission process and supermarket pricing strategies in the fluid milk industry, we estimate separate models for the pre-law period (October 1982 – May 1991) and the law period (June 1991 – October 2008).

The null hypothesis of the symmetry test in the retail price equation is $\beta_1 = \beta_2$, meaning that the magnitude of the Class I price increase transmission is the same as the magnitude of the Class I price decrease transmission. Similarly, the null hypothesis of the symmetry test in the marketing margin equation is $\gamma_1 = \gamma_2$. Based on our discussion of the MPGL 200% rule and of the events leading to the enactment of the law, we hypothesize that the enforcement of the MPGL 200% rule resulted in a more symmetric response of retail prices and marketing margins to increases and decreases in the Class I fluid milk prices during the law period as compared to the pre-law period. Therefore, we expect to observe different patterns of the estimated coefficients in the models based on the pre-law and law samples.

It is important to mention the two assumptions that we used in specifying our econometric models. First, we assume that changes in the Class I fluid milk prices cause changes in the retail prices and marketing margins, and not the other way around. Given that the Class I

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[10] The marketing margin expressed as a percentage of retail price has a more meaningful interpretation than the marketing margin expressed in $/container, the reason why we decided to use the former in our analysis.

fluid milk prices are government-set prices that are announced in advance on a monthly basis, it is reasonable to assume the one-way causation effect. In the presence of a complex system of the federal and state milk marketing orders characterized by the classified pricing system and market wide pooling, it is unlikely that changes in retail prices and marketing margins would cause changes in the Class I fluid milk prices.

Second, we do not include the wholesale milk price in our analysis. Given that the Class I fluid milk price is government-set, the fluid milk processors and distributors basically charge a mark-up equal to the sum of their costs and profit. In addition, the large supermarket chains own the milk processing plants and/or have long-term contracts with milk processors. The fluid milk processing and distribution charges are privately negotiated and are not publicly available. Therefore, we omit the wholesale milk price from our analysis. These considerations are consistent with the approaches used in other studies of the dairy industry price transmission processes.

Third, in contrast to previous studies, we do not include the lags of the segmented Class I fluid milk prices in our econometric models. We assume that the current Class I fluid milk price affects the current retail price and the current marketing margin. The dairy industry institutional environment, which is characterized by in-advance monthly announcements of the Class I fluid milk prices and by privately negotiated fluid milk processing and distribution charges, eliminates to a considerable extent the cost uncertainty for retailers.

The New York State Milk Price Gouging Law was enforced by announcing the maximum retail price thresholds on a monthly basis. The New York State retailers, by the beginning of each month, had information on the cost of fluid milk and also on the maximum retail price that they were basically allowed to charge. Given that retailers operate in the oligopolistic market environment, they would use this information to set up the profit-maximizing retail price on a monthly basis.

To test the validity of our interpretation of the retailers' behavior, we also estimated a series of distributed lag models by including up to 3 lagged terms of the segmented Class I fluid milk prices. In the majority of cases only the current period variable was significant, which supports our interpretation of the supermarket pricing strategies. We also examined statistical significance of the lagged terms of segmented Class I fluid milk prices reported in other studies.

Although many studies included lagged segmented terms, in many cases they were not statistically significant.

In addition, there is likely to be a high degree of correlation between the current and lagged terms that may distort the estimation results by suggesting that some lags are statistically significant when they are actually not. Given the unique nature of the dairy industry pricing, the notions of the short-run and long-run asymmetries in the price-transmission process need to be subjected to a rigorous analysis in future research.

4. Data

To conduct the price-transmission analysis, we use retail prices of fluid whole milk sold in supermarkets[11] in gallon (plastic) and half-gallon (paper) containers[12]. The five cities included in our analysis are New York City, and four cities in Upstate New York: Buffalo, Rochester, Syracuse and Albany. These are the largest in terms of population cities in New York State. The retail prices are reported in the New York State Retail Milk Price Survey conducted by the NYSDAM Division of Milk Control and Dairy Services on a monthly basis in selected New York State markets[13]. The reported in the survey prices are the average prices calculated based on the lowest price brand sold by each surveyed store in the area. Appendix II contains detailed information on the data sources used to collect retail prices[14].

The Class I fluid milk price that fluid milk processors pay to dairy farmers at particular locations are set by either a Federal Milk Marketing Order (New York City, Albany and Syracuse) or by the Western New York State Milk Marketing Order (Buffalo and Rochester). The Class I fluid milk price is a sum of the announced Class I price and over-order premium paid to dairy farmers[15].

[11] Supermarkets were the primary target of the MPGL.

[12] Fluid whole milk is sold in three types of containers at the retail level: gallon, half gallon and quart. The sales of quart containers represent a rather small share of the total sales; therefore, this type of container is omitted from our analysis.

[13] A description of the survey methodology can be found on the web-page of the NYSDAM Division of Milk Control and Dairy Services.

[14] Appendix II is available from the authors upon request.

[15] The Class I fluid milk price used by the NYSDAM to calculate the monthly maximum retail price threshold includes the producer premium paid for Class I fluid milk. We do not have access to this type of premium; we use the over-order premium paid to New York State dairy farmers as a proxy for the Class I premium.

We adjust the announced Class I fluid milk prices for a specific location to match the retail prices at that location. Finally, the announced Class I fluid milk prices, which are for the fluid milk with 3.5% butterfat content, are adjusted to a 3.2% butterfat content. These are the prices that are paid for raw milk used in manufacturing of the fluid whole milk products sold at the retail level. Given that the Class I fluid milk prices are reported in $/cwt, and retail prices are reported in $/gallon and $/half-gallon containers, we convert the Class I fluid milk price units into the retail price units. The Class I price expressed in $/cwt is divided by 11.628 to be expressed in $/gallon, and it is divided by 23.256 to be expressed in $/half-gallon. Appendix II contains detailed information on the data sources used to collect information necessary to construct the Class I fluid milk prices and on the implemented adjustment procedures[16].

The retail fluid whole milk prices and Class I fluid milk prices are collected for the period of October 1982 – October 2008. The MPGL became effective in June 1991. Given that the enforcement procedure was substantially changed in November 2008, the law period in our study is June 1991 – October 2008. The pre-law period is October 1982 – May 1991. This particular beginning date was chosen because the New York City aggregate retail prices started being reported in October 1982. We do not discuss descriptive statistics of our data set because we do not use the original retail prices and the Class I fluid milk prices in our analysis. A detailed descriptive analysis of the data set used in this study is presented in Bolotova & Novakovic (2010), who examined the level and volatility of retail prices and marketing margins during the pre-law and law periods.

5. Estimation Results

The Ordinary Least Squares (OLS) estimation procedure was used to estimate econometric models. The estimation results are summarized in Tables 1-5. Each of these tables presents estimation results on the response of retail prices and marketing margins to changes in the Class I fluid milk prices for whole milk sold in gallon and half-gallon containers in an individual city during the pre-law and law periods.

As indicated by the Durbin-Watson statistics reported in Tables 1-5, there is a presence of autocorrelation in each of the estimated models. Therefore, we use the autocorrelation-robust

[16] Novakovic and Washburn (2008) discuss a methodology of calculation of the Class I fluid milk prices to be used in the analysis of retail prices.

standard errors that are calculated based on the Newey-West approach to compute the Z-ratios for individual parameters and for a series of the symmetry tests. All data series were tested for a presence of the unit root using the standard and modified Dickey-Fuller tests. The null hypothesis of a presence of the unit root is rejected in all cases, and the outcomes of these tests are reported in Appendix I.

5.1. Response of retail whole milk prices to changes in the Class I fluid milk prices

5.1.1. Class I fluid milk price transmission patterns during the pre-law period

There is a presence of obvious asymmetry in the transmission process of changes in the Class I prices to retail prices during the pre-law period. The null hypothesis of symmetry of the effects of increases and decreases in the Class I prices on changes in the retail prices is rejected in all analyzed cases. Increases in the Class I prices are transmitted more completely than decreases, which is similar to the empirical evidence reported by other studies. There is no striking difference in the price-transmission patterns across the cities and whole milk container sizes, although there are some city-specific and container-specific variations.

For example, in Syracuse (Table 2) a $0.10 increase in the Class I price would lead to a $0.119 increase in the retail price of whole milk sold in gallon containers. However, a $0.10 decrease in the Class I price would lead to only $0.062 decrease in the retail price. In Albany, the Class I price increases and decreases are transmitted somewhat less completely than in other cities. For example, a $0.10 increase in the Class I price would result in a $0.059 increase in the retail price of whole milk sold in gallon containers. However, a similar decrease in the Class I price would result in a $0.044 decrease in the retail price.

If a comparison is made across the analyzed cities, the magnitude of the effect of Class I price increases on changes in retail prices is in the range of 0.59 (Albany) to 1.19 (Syracuse) for whole milk sold in gallon containers, and it is in the range of 0.54 (Albany) to 1.30 (Syracuse) for whole milk sold in half-gallon containers. In contrast, the magnitude of the effect of Class I price decreases varies from 0.39 (Buffalo) to 0.70 (Rochester) for whole milk sold in gallon containers, and it ranges from 0.34 (Albany) to 0.68 (Syracuse) for whole milk sold in half-gallon containers.

If the Class I price-transmission patterns are compared across the two container sizes, there is no considerable difference observed. In New York City, Syracuse and Buffalo, the Class I price increases tend to be transmitted at a slightly higher rate for whole milk sold in half-gallon containers as compared to the whole milk sold in gallon containers. At the same time, the Class I price decreases are transmitted at approximately the same rate in the case of both container sizes in these three cities. In Albany and Rochester, both increases and decreases in the Class I price tend to be transmitted at a lower rate for whole milk sold in half-gallon containers as compared to whole milk sold in gallon containers. This empirical evidence confirms the fact that retail fluid milk markets are local in nature, and supermarket fluid milk pricing strategies tend to be city-specific.

5.1.2. Class I fluid milk price transmission patterns during the law period

The estimation results characterizing the law period reveal a completely different price-transmission pattern than the one characterizing the pre-law period. The symmetry test outcomes suggest that the null hypothesis of the symmetric transmission of increases and decreases in the Class I prices to retail prices is rejected. However, evaluation of the magnitude of the estimated coefficients for the Class I price increases and decreases as well as their comparison with the pre-law period coefficients may suggest that retail prices respond to increases and decreases in the Class I fluid milk prices in a symmetric manner in all analyzed cases in the law period. Furthermore, the magnitude of the estimated coefficients for both increases and decreases in the Class I price is higher in the law period as compared to the pre-law period[17].

If the results for whole milk sold in gallon containers are compared across the analyzed cities, the magnitude of the Class I price increase effect on changes in the retail prices is in the range of 0.92 (Syracuse) to 1.46 (New York City), and the magnitude of the Class I price decrease effect is in the range of 0.97 (Syracuse) to 1.34 (New York City). In the case of whole milk sold in half-gallon containers, the magnitude of the Class I price increase effect varies from 1.49 (New York City) to 1.77 (Syracuse), and the magnitude of the Class I price decrease effect is in the range from 1.37 (New York City) to 1.74 (Syracuse).

As for the differences in the price-transmission patterns across the two container sizes, these patterns tend to be somewhat different in all analyzed cities except New York City. For example, in the case of whole milk sold in half-gallon containers in New York City, a $0.10 increase (decrease) in the Class I fluid milk price would result in a $0.149 ($0.137) increase

[17] The only exception is whole milk sold in gallon containers in Syracuse where the magnitude of the Class I price increase effect is slightly lower in the law period as compared to the pre-law period. However, changes in retail prices respond to changes in the Class I prices in a symmetric manner during the law period.

(decrease) in the retail price. In the case of whole milk sold in gallon containers, a $0.10 increase (decrease) in the Class I fluid milk price would lead to a $0.146 ($0.134) increase (decrease) in the retail price. The Class I price-transmission pattern is practically the same for whole milk sold in gallon and half-gallon containers in New York City in the law period.

The price-transmission patterns differ across the fluid milk container sizes in all Upstate New York cities (Syracuse, Albany, Buffalo and Rochester). First, in contrast to the pre-law period empirical evidence, the magnitude of the estimated coefficients for the Class I price increases and decreases is significantly higher for whole milk sold in half-gallon containers as compared to the whole milk sold in gallon containers. Second, the magnitude of the estimated effects for the whole milk sold in half-gallon containers tends to be higher and the magnitude of the estimated effects for the whole milk sold in half-gallon containers tends to be lower in Upstate New York cities as compared to New York City.

Third, the price-transmission patterns of whole milk sold in gallon containers in Syracuse, Buffalo and Rochester during the law period are reversed as compared to whole milk sold in gallon containers in New York City and Albany and whole milk sold in half-gallon containers in all analyzed cities. The Class I price decreases are transmitted more completely than the Class I price increases, which is the opposite of what is typically observed. For example, in Syracuse, a $0.10 increase (decrease) in the Class I price would lead to $.0.092 (0.097) increase (decrease) in the retail price. In Buffalo, a $0.10 increase (decrease) in the Class I price would lead to $.0.108 (0.113) increase (decrease) in the retail price.

A comparison of the explanatory power of the estimated models indicates that the R2 magnitude tends to be higher in the law period models as compared to the pre-law period models for whole milk sold in half-gallon containers in all analyzed cities[18]. The law period R2 is also higher in regressions for whole milk sold in gallon containers in New York City and Albany. In contrast, the explanatory power of the law-period models for whole milk sold in gallon containers in Syracuse, Rochester and Buffalo is lower than the explanatory power of similar models estimated based on the pre-law samples.

We also estimated a set of regression models without segmenting the Class I fluid milk price variable into increasing and decreasing phases. We constructed the independent variable

[18] The magnitude of R2 can be misleading in the models where autocorrelation is present (Kennedy 2003). This has to be kept in mind while evaluating the magnitude of R2 in the price equations where autocorrelation is present.

using exactly the same procedure as the one used to construct the dependent variable. This modified model is less superior to Houck's traditional model, if used to analyze the price-transmission patterns in the presence of asymmetric price-transmission during the pre-law period. However, given that the law period empirical evidence may suggest a presence of the symmetric response of changes in retail prices to increases and decreases in the Class I fluid milk prices, we decided to use a modified model to estimate the parameters for the Class I price.

The Milk Price Gouging Law 200% rule basically allows the Class I fluid milk prices and retail prices to move in a proportion 1:2. Therefore, we hypothesize that if the NYSDAM maximum retail price threshold was binding, then the estimated coefficient for the Class I fluid milk price should be equal to two. The estimation results of modified models are presented in Table 6[19], and there is empirical evidence supporting our hypothesis.

The estimated coefficient for the Class I fluid milk price is approximately equal to two in the law period in all analyzed cities in the case of whole milk sold in half-gallon containers and in New York City in the case of whole milk sold in gallon containers. This may suggest that the NYSDAM maximum retail price threshold was binding in these cases. In the case of whole milk sold in gallon containers, the estimated coefficient is 1.5 in the equation for Albany. Although this coefficient is lower than two, it is considerably higher than the estimated coefficients in the equations for Syracuse, Buffalo and Rochester, where they are in the range of 0.73-0.89.

An evaluation of the estimated coefficients for the Class I fluid milk price during the law and pre-law periods indicates that the estimated coefficients tend to be higher in the law period in all cases except for whole milk sold in gallon containers in Syracuse and Rochester. Furthermore, the explanatory power of the law period models tends to be much higher than the explanatory power of the pre-law period models.

A comparison of the estimation results of the modified models and traditional models suggests that in the cases where the NYSDAM maximum retail price threshold is binding, the Class I price increases are transmitted at a higher rate than the Class I price decreases (whole milk sold in half-gallon containers in all analyzed cities and whole milk sold in gallon containers in New York City). In contrast, in the cases where the NYSDAM maximum retail price threshold is not binding, the Class I price decreases are transmitted at a higher rate than the Class I price

[19] The estimation results of the modified models turned out to be exactly the same as in the case when the original (nontransformed) retail and Class I fluid milk prices were used (Bolotova & Novakovic 2010).

increases (whole milk sold in gallon containers in Syracuse, Buffalo and Rochester). Although, whole milk sold in gallon containers in Albany was not priced at the NYSDAM threshold, the price-transmission pattern characterizing this case was more consistent with the pattern characterizing New York City rather than the rest of Upstate New York cities.

5.2. Response of marketing margins to changes in the Class I fluid milk prices

5.2.1. Class I fluid milk price transmission patterns during the pre-law period

The null hypothesis of the symmetric response of changes in marketing margins to increases and decreases in the Class I fluid milk prices is rejected in all analyzed cases. In addition, the magnitude of the estimated coefficients indicates the presence of obvious asymmetric response of marketing margins to increases and decreases in the Class I fluid milk prices. The absolute value of increases in marketing margins is higher when the Class I prices decrease, and the absolute value of decreases in marketing margins is lower when the Class I prices increase.

For example, in the case of whole milk sold in gallon containers in New York City, a $0.10 increase in the Class I price would lead to a 2.22 %-point decrease in the marketing margin[20]. However, a $0.10 decrease in the Class I price would result in a 3.0 %-point increase in the marketing margin. Furthermore, in the case of whole milk sold in half-gallon containers in New York City, a $0.10 increase in the Class I price would lead to a 3.6 %-points decrease in the marketing margin. In contrast, a $0.10 decrease in the Class I price would lead to a 5.8 %-point increase in the marketing margin.

The absolute value of the estimated coefficients for whole milk sold in half-gallon containers tends to be noticeably higher than the one for whole milk sold in gallon containers in all analyzed cities. For example, in the case of whole milk sold in gallon containers, the estimated coefficient for the Class I price increases is in the range of -14.46 (Syracuse) to -28.83 (Albany), and the estimated coefficient for the Class I price decreases is in the range of -25.75 (Rochester) to -34.51 (Buffalo). In the case of whole milk sold in half-gallon containers, the estimated coefficient for the Class I price increases varies from -24.74 (Syracuse) to -59.09 (Albany), and the one for the Class I price decreases varies from -54.69 (Syracuse) to -68.30 (Albany).

[20] The marketing margin in our study is the difference between the retail price and Class I fluid milk price, and it is expressed as a percentage of retail price.

These results along with the empirical evidence on the transmission of changes in the Class I fluid milk prices to changes in the retail prices may suggest that the supermarket prevailing strategy during the law period was the retail price stabilization. The majority of the estimated coefficients for responses of retail prices to changes in the Class I fluid milk prices is less than one in magnitude, which indicates the presence of retail market power and also exercise of the retail price stabilization strategy.

5.2.2. Class I fluid milk price transmission patterns during the law period

The Class I fluid milk price transmission patterns in the law period are remarkably different from the ones in the pre-law period. Although the null hypothesis of the symmetric response of changes in marketing margins to changes in the Class I fluid milk prices is rejected in all analyzed cases, the magnitude of the estimated coefficients for increasing Class I prices is approximately the same as the magnitude of the estimated coefficients for decreasing Class I prices. Furthermore, the magnitude of the estimated coefficients during the law period is considerably lower than the magnitude of the estimated coefficients during the pre-law period.

For example, in the case of whole milk sold in gallon containers in New York City, a $0.10 increase in the Class I price would lead to a 1%-point decrease in the marketing margin, and a $0.10 decrease in the Class I price would result in a 1.2%-point increase in the marketing margin. In the case of whole milk sold in half-gallon containers in New York City, a $0.10 increase in the Class I price would cause a 2.1%-point decrease in the marketing margin, and a $0.10 decrease in the Class I price would cause a 2.4%-point increase in the marketing margin.

The Class I price-transmission patterns across the two container sizes differ among the analyzed cities. In New York City and Albany, the magnitude of the estimated coefficients for whole milk sold in half-gallon containers is almost two times higher than the magnitude of the estimated coefficients for whole milk sold in gallon containers, and the estimates do not differ considerably between these two cities. For example, in the case of whole milk sold in gallon (half-gallon) containers in Albany, a $0.10 increase in the Class I price would result in a 1.1 (1.7) %-point decrease in the marketing margin, and a $0.10 decrease in the Class I price would cause a 1.2 (1.9) %-point increase in the marketing margin.

The Class I price-transmission patterns across two container sizes are different in Syracuse, Buffalo and Rochester. First, in the case of whole milk sold in gallon containers, the absolute value of decreases in marketing margins tends to be higher when the Class I prices increase as compared to the absolute value of increases in marketing margins when the Class I prices decrease. This is the opposite pattern to what is typically observed. However, the identified empirical evidence on the response of marketing margins to changes in the Class I prices is consistent with the pattern characterizing the response of retail prices of whole milk sold in gallon containers to changes in the Class I prices in Syracuse, Buffalo and Rochester.

For example, in Syracuse, a $0.10 increase in the Class I price would lead to a 1.84 %-point decrease in the marketing margin, and a $0.10 decrease in the Class I price would cause a 1.74 %-point increase in the marketing margin. Similarly, in Buffalo, a $0.10 increase in the Class I price would lead to a 1.5 %-point decrease in the marketing margin, and a $0.10 decrease in the Class I price would result in a 1.4 %-point increase in the marketing margin. The estimated effects for whole milk sold in both gallon and half-gallon containers tend to be similar in Buffalo and Rochester. In contrast, in Syracuse the absolute value of the estimated effects for whole milk sold in gallon containers is almost two times higher than the absolute value of the estimated effects for whole milk sold in half-gallon containers.

The patterns of response of marketing margins to changes in the Class I fluid milk prices along with the patterns of response of retail prices to changes in the Class I prices during the law period indicate that supermarkets used the retail margin (profit) stabilization strategy rather than the retail price stabilization strategy used in the pre-law period.

The estimation results also reveal that there was a change in the consumer demand for whole milk sold in gallon containers in Syracuse, Buffalo and Rochester. The retail prices and marketing margins were more responsive to decreases in the Class I fluid milk prices than to increases in these prices. Given that consumption of reduced-fat milk was increasing in Upstate New York during recent decades, the identified pattern of the Class I price transmission may indicate a shift away from consumption of whole milk towards consumption of reduced-fat milk.

5.3. Discussion

We attribute the identified patterns in the behavior of retail prices and marketing margins in the law period to change in the supermarket strategic behavior. To support this claim, we should ideally analyze the supermarket margin and profit, which is not possible due to the absence of publicly available data. We should discuss another factor that could have potentially contributed to the observed changes in the Class I fluid milk price-transmission process. The marketing margin includes two components, retail component and processing/distribution component.

Therefore, another factor that could have impacted the behavior of retail prices and marketing margins is the cost of fluid milk processing and distribution.

As it was mentioned earlier, large supermarket chains own fluid milk processing plants or have long-term contracts with milk processors. The supermarkets know their milk processing and distribution costs in advance, and these costs are typically flat charges conditional on a certain volume of fluid milk and the fluid milk container size. It is rather unlikely that changes in the costs of processing and distribution of fluid milk drove the observed changes in the behavior of marketing margins between the pre-law and law periods.

Finally, a symmetric response of retail prices to increases and decreases in the Class I fluid milk prices during the law period in conjunction with the symmetric response of marketing margins to increases and decreases in the Class I prices confirm that the prevailing strategy used by supermarkets during the law period was profit (margin) stabilization.[21]

6. Conclusion

The empirical results presented in the paper suggest that the enforcement of the New York State Milk Price Gouging Law 200% rule had a significant effect on the nature of the Class I fluid milk price-transmission process and supermarket pricing strategies in the fluid whole milk market. Prior to the enactment of the law, supermarkets used the retail price stabilization strategy. The empirical evidence on the asymmetric response of changes in retail prices and marketing margins to increases and decreases in the Class I fluid milk prices is an indication of the presence of this type of strategy. In contrast, during the period of enforcement of the MPGL 200% rule, supermarkets used the retail profit stabilization strategy. The empirical evidence on the symmetric response of changes in retail prices and marketing margins to increases and decreases in the Class I fluid milk prices may indicate a presence of this strategy.

During the law period, the retail profit stabilization strategy was preferred to the retail price stabilization strategy. First, the Class I fluid milk prices were more volatile during the law

[21] In the setting of this study, we cannot determine whether this was a retail profit- or retail margin-stabilization strategy. However, based on the analysis of the estimated retail profitability in the pre-law and law periods presented in Bolotova and Novakovic (2010), it is likely that supermarkets used the profit stabilization strategy.

period as compared to the pre-law period[22]. Second, a presence of the NYSDAM maximum retail price threshold announced on a monthly basis decreased substantially the feasibility and effectiveness of the retail price stabilization strategy. Third, the Milk Price Gouging Law 200% rule basically allowed retailers to price at the NYSDAM threshold level, if it was profitable for them.

As suggested by Bolotova and Novakovic (2010), the advanced public announcements of the NYSDAM maximum retail price thresholds in conjunction with the advanced public announcements of the Class I fluid milk prices on a monthly basis actually created an institutional environment that facilitated cooperative conduct of retailers acting in an oligopolistic market environment. In this type of market environment, the retail profit stabilization strategy was more profitable for retailers than the retail price-stabilization strategy.

One of the original objectives of the New York State Milk Price Gouging Law was to ensure that dairy producers would receive a fair share of consumer dollars spent on fluid milk products. The enforcement of the law did change the nature of the Class I fluid milk price-transmission process from asymmetric in the pre-law period to symmetric in the law period. However, the symmetry characterizing responses of retail prices and marketing margins to changes in the Class I fluid milk prices was likely to be an indicator of the effective coordinated conduct of supermarkets that was facilitated by this particular design of retail milk price control.

We conclude with proposing a number of directions for future research in this area. First, we focused only on one group of fluid milk products – whole milk products. During recent decades, consumption of the reduced-fat milk products has increased considerably. An analysis of the effect of the MPGL 200% rule on the nature of price-transmission process and supermarket pricing strategies in the reduced-fat milk market would provide additional empirical evidence necessary to gain a more systematic understanding of the performance of the fluid milk channel under this type of regulatory regime. Second, examining the effect of market structure on the nature of price-transmission patterns across different cities during the pre-law and law periods deserves consideration. The empirical models can be expended by including variables characterizing market structure at both the fluid milk processing and retail level. Finally, conducting comparative analyses of the nature of price-transmission process across a number of

[22] A discussion of changes in the level and volatility of retail prices and marketing margins between the pre-law and law periods is presented in Bolotova and Novakovic (2010).

States with and without retail price control would enrich our understanding on the effect of retail price control on the performance of fluid milk channel and supermarket pricing strategies.

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Table 1. The OLS estimation results of the response of retail prices and marketing margins to increases and decreases in the Class I fluid milk prices: New York City.

Variable	Whole milk sold in gallon containers		Whole milk sold in half-gallon containers	
	Pre-law period	Law period	Pre-law period	Law period
Retail price equation				
N_CIP_INC	**0.82*** (7.56)	**1.46*** (31.13)	**1.04*** (11.59)	**1.49*** (38.84)
N_CIP_DEC	**0.45*** (3.64)	**1.34*** (27.34)	**0.43*** (4.49)	**1.37*** (34.19)
Constant	0.01 (0.94)	-0.38***** (-23.81)	0.01 (0.94)	-0.23***** (-28.63)
DW-statistic	0.11	0.38	0.14	0.47
R2	0.71	0.96	0.91	0.97
Ho: CIP_INC=CIP_DEC Z-statistic (p-value)	11.05 (0.0000)	22.81 (0.0000)	24.43 (0.0000)	26.57 (0.0000)
Marketing margin equation				
N_CIP_INC	**-22.00*** (-8.73)	**-10.33*** (-12.47)	**-35.66*** (10.24)	**-20.74*** (-16.47)
N_CIP_DEC	**-30.06*** (-11.05)	**-12.30*** (-14.24)	**-58.07*** (-16.99)	**-24.35*** (-18.57)
Constant	0.65***** (1.92)	-6.8***** (-24.84)	0.72***** (3.63)	-7.13***** (-28.25)
DW-statistic	0.13	0.38	0.16	0.43
R2	0.63	0.82	0.86	0.84
Ho: CIP_INC=CIP_DEC Z-statistic (p-value)	12.28 (0.0000)	23.90 (0.0000)	37.05 (0.0000)	25.79 (0.0000)

The table entries are the estimated coefficients (Z-ratios).
*The estimated coefficient is statistically significant at a 10% significance level; Ho: β=0 and Ha: β≠0; the Z-statistic rejection regions are (-∞;-1.64] and [1.64; +∞).
The Z-statistics are calculated based on the autocorrelation-robust standard errors adjusted using Newey-West approach.

Table 2. The OLS estimation results of the response of retail prices and marketing margins to increases and decreases in the Class I fluid milk prices: Syracuse.

Variable	Whole milk sold in gallon containers		Whole milk sold in half-gallon containers	
	Pre-law period	Law period	Pre-law period	Law period
Retail price equation				
S_CIP_INC	**1.19*** (14.06)	**0.92*** (11.75)	**1.30*** (14.13)	**1.77*** (35.94)
S_CIP_DEC	**0.62*** (7.21)	**0.97*** (11.70)	**0.68*** (7.82)	**1.74*** (34.59)
Constant	-0.04* (-2.77)	-0.11* (-5.73)	-0.01* (-1.89)	-0.08* (-14.66)
DW-statistic	0.16	0.71	0.18	1.23
R2	0.87	0.63	0.87	0.97
Ho: CIP_INC=CIP_DEC Z-statistic (p-value)	23.84 (0.0000)	-6.36 (0.0000)	28.99 (0.0000)	8.97 (0.0000)
Marketing margin equation				
S_CIP_INC	**-14.46*** (-6.42)	**-18.39*** (-12.16)	**-24.74*** (-4.92)	**-10.41*** (-7.32)
S_CIP_DEC	**-28.53*** (-13.21)	**-17.40*** (-10.88)	**-54.69*** (-11.55)	**-11.39*** (-7.80)
Constant	-0.59* (-1.68)	-2.94* (-7.40)	-0.26 (-0.71)	-3.16* (-17.88)
DW-statistic	0.16	0.73	0.18	1.18
R2	0.76	0.76	0.76	0.43
Ho: CIP_INC=CIP_DEC Z-statistic (p-value)	29.24 (0.0000)	-6.35 (0.0000)	31.96 (0.0000)	9.16 (0.0000)

The table entries are the estimated coefficients (Z-ratios).
*The estimated coefficient is statistically significant at a 10% significance level; Ho: $\beta=0$ and Ha: $\beta\neq0$; the Z-statistic rejection regions are $(-\infty;-1.64]$ and $[1.64; +\infty)$.
The Z-statistics are calculated based on the autocorrelation-robust standard errors adjusted using Newey-West approach.

Table 3. The OLS estimation results of the response of retail prices and marketing margins to increases and decreases in the Class I fluid milk prices: Albany.

Variable	Whole milk sold in gallon containers		Whole milk sold in half-gallon containers	
	Pre-law period	Law period	Pre-law period	Law period
Retail price equation				
A_CIP_INC	**0.59*** (8.46)	**1.32*** (20.87)	**0.54*** (6.52)	**1.53*** (22.83)
A_CIP_DEC	**0.44*** (6.53)	**1.27*** (19.63)	**0.34*** (4.02)	**1.47*** (21.13)
Constant	0.05* (7.17)	-0.27* (-11.86)	0.03* (7.26)	-0.07* (-8.62)
DW-statistic	0.48	0.90	0.59	0.82
R2	0.64	0.86	0.63	0.93
Ho: CIP_INC=CIP_DEC Z-statistic (p-value)	10.25 (0.0000)	7.80 (0.0000)	10.62 (0.0000)	13.25 (0.0000)
Marketing margin equation				
A_CIP_INC	**-28.83*** (-15.51)	**-10.83*** (-8.60)	**-59.09*** (-14.05)	**-17.09*** (-8.30)
A_CIP_DEC	**-32.47*** (-18.07)	**-11.99*** (-9.25)	**-68.30*** (-15.98)	**-19.47*** (-9.12)
Constant	1.44* (7.64)	-6.36* (-12.88)	1.73* (7.83)	-3.09* (-9.82)
DW-statistic	0.47	0.77	0.59	0.78
R2	0.79	0.35	0.79	0.52
Ho: CIP_INC=CIP_DEC Z-statistic (p-value)	10.57 (0.0000)	7.68 (0.0000)	10.69 (0.0000)	13.61 (0.0000)

The table entries are the estimated coefficients (Z-ratios).
*The estimated coefficient is statistically significant at a 10% significance level; Ho: $\beta=0$ and Ha: $\beta\neq0$; the Z-statistic rejection regions are $(-\infty;-1.64]$ and $[1.64; +\infty)$.
The Z-statistics are calculated based on the autocorrelation-robust standard errors adjusted using Newey-West approach.

Table 4. The OLS estimation results of the response of retail prices and marketing margins to increases and decreases in the Class I fluid milk prices: Buffalo.

Variable	Whole milk sold in gallon containers		Whole milk sold in half-gallon containers	
	Pre-law period	Law period	Pre-law period	Law period
Retail price equation				
B_CIP_INC	**0.76*** (15.11)	**1.08*** (13.91)	**0.87*** (14.25)	**1.70*** (48.07)
B_CIP_DEC	**0.39*** (7.15)	**1.13*** (13.96)	**0.43*** (5.82)	**1.61*** (42.98)
Constant	-0.03***** (-4.23)	-0.04***** (-1.97)	-0.02***** (-3.52)	-0.13***** (-16.92)
DW-statistic	0.31	0.41	0.34	0.63
R2	0.92	0.62	0.90	0.96
Ho: CIP_INC=CIP_DEC Z-statistic (p-value)	24.57 (0.0000)	-5.58 (0.0000)	16.99 (0.0000)	16.65 (0.0000)
Marketing margin equation				
B_CIP_INC	**-25.27*** (-17.64)	**-15.06*** (-9.07)	**-44.87*** (-15.91)	**-14.41*** (-11.91)
B_CIP_DEC	**-34.51*** (-24.76)	**-13.93*** (-8.02)	**-65.93*** (-22.22)	**-17.38*** (-13.52)
Constant	-0.47***** (-3.29)	-1.53***** (-3.65)	-0.53***** (-2.84)	-5.17***** (-16.99)
DW-statistic	0.33	0.43	0.37	0.64
R2	0.94	0.60	0.92	0.65
Ho: CIP_INC=CIP_DEC Z-statistic (p-value)	31.81 (0.0000)	-5.34 (0.0000)	22.71 (0.0000)	16.42 (0.0000)

The table entries are the estimated coefficients (Z-ratios).

*The estimated coefficient is statistically significant at a 10% significance level; Ho: $\beta=0$ and Ha: $\beta\neq0$; the Z-statistic rejection regions are $(-\infty;-1.64]$ and $[1.64; +\infty)$.

The Z-statistics are calculated based on the autocorrelation-robust standard errors adjusted using Newey-West approach.

Table 5. The OLS estimation results of the response of retail prices and marketing margins to increases and decreases in the Class I fluid milk prices: Rochester.

Variable	Whole milk sold in gallon containers		Whole milk sold in half-gallon containers	
	Pre-law period	Law period	Pre-law period	Law period
Retail price equation				
R_CIP_INC	**0.97*** (10.25)	**1.05*** (9.41)	**0.95*** (12.43)	**1.66*** (39.40)
R_CIP_DEC	**0.70*** (6.52)	**1.13*** (9.89)	**0.59*** (6.20)	**1.58*** (35.38)
Constant	-0.09***** (-5.64)	-0.03 (-1.24)	-0.05***** (-5.74)	-0.17***** (-25.56)
DW-statistic	0.20	0.25	0.15	0.70
R2	0.70	0.54	0.78	0.96
Ho: CIP_INC=CIP_DEC Z-statistic (p-value)	7.30 (0.0000)	-7.74 (0.0000)	10.82 (0.0000)	15.34 (0.0000)
Marketing margin equation				
R_CIP_INC	**-20.28*** (-10.62)	**-16.03*** (-5.34)	**-40.61*** (-13.57)	**-15.11*** (-11.56)
R_CIP_DEC	**-25.75*** (-12.14)	**-14.12*** (-4.60)	**-54.80*** (-15.32)	**-17.68*** (-12.75)
Constant	-1.89***** (-5.63)	-1.16***** (-1.90)	-1.86***** (-5.71)	-6.40***** (-25.74)
DW-statistic	0.21	0.20	0.16	0.68
R2	0.72	0.60	0.80	0.67
Ho: CIP_INC=CIP_DEC Z-statistic (p-value)	7.69 (0.0000)	-7.22 (0.0000)	11.90 (0.0000)	15.87 (0.0000)

The table entries are the estimated coefficients (Z-ratios).
*The estimated coefficient is statistically significant at a 10% significance level; Ho: $\beta=0$ and Ha: $\beta\neq0$; the Z-statistic rejection regions are $(-\infty;-1.64]$ and $[1.64; +\infty)$.
The Z-statistics are calculated based on the autocorrelation-robust standard errors adjusted using Newey-West approach.

Table 6. The OLS estimation results of the response of retail prices to changes in the Class I fluid milk prices: New York City, Albany, Syracuse, Buffalo and Rochester.

Variable	Whole milk sold in gallon containers		Whole milk sold in half-gallon containers	
	Pre-law period	Law period	Pre-law period	Law period
New York City				
N_CIP	**1.01*** (5.30)	**1.94*** (24.40)	**1.35*** (5.16)	**2.00*** (25.48)
Constant	0.14***** (7.70)	-0.21***** (-8.03)	0.11***** (8.61)	-0.14***** (-9.71)
DW-statistic	0.08	0.23	0.06	0.23
R2	0.32	0.81	0.32	0.81
Syracuse				
S_CIP	**1.47*** (5.84)	**0.73*** (10.75)	**1.60*** (6.03)	**1.89*** (37.45)
Constant	0.15***** (6.30)	-0.17***** (-9.21)	0.09***** (6.80)	-0.06***** (-9.90)
DW-statistic	0.07	0.57	0.08	1.04
R2	0.36	0.53	0.37	0.96
Albany				
A_CIP	**0.67*** (6.67)	**1.55*** (19.70)	**0.65*** (5.49)	**1.80*** (23.90)
Constant	0.11***** (10.86)	-0.19***** (-9.43)	0.07***** (11.84)	-0.03***** (-2.86)
DW-statistic	0.32	0.75	0.34	0.59
R2	0.43	0.81	0.33	0.88
Buffalo				
B_CIP	**0.67*** (2.59)	**0.89*** (12.27)	**0.77*** (2.50)	**2.02*** (45.80)
Constant	0.10***** (5.30)	-0.11***** (-6.03)	0.06***** (5.27)	-0.07***** (-7.22)
DW-statistic	0.04	0.32	0.06	0.27
R2	0.18	0.53	0.17	0.88
Rochester				
R_CIP	**0.91*** (4.06)	**0.73*** (7.17)	**0.87*** (3.24)	**1.95*** (40.30)
Constant	-0.001 (-0.08)	-0.14***** (-5.89)	0.01 (1.48)	-0.12***** (-13.49)
DW-statistic	0.10	0.15	0.06	0.35
R2	0.32	0.34	0.24	0.90

The table entries are the estimated coefficients (Z-ratios).
*The estimated coefficient is statistically significant at a 10% significance level; Ho: β=0 and Ha: β≠0; the Z-statistic rejection regions are (-∞;-1.64] and [1.64; +∞). The Z-statistics are calculated based on the autocorrelation-robust standard errors adjusted using Newey-West approach.