The Impact of the Northeast Dairy Compact:
A Comparative Evaluation of Two Studies

by

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Executive Summary

- Revised consumer impact estimates that take into consideration reductions in cooperative premiums indicate that the Dairy Compact elevated supermarket prices 2.7 cents per gallon, less than 1 percent of the $2.78 per gallon price of paid by the consumers in all New England. These are average figures for the July 1997 through July 2000 period. To measure price elevation, we compare them to the price paid immediately prior to Compact implementation in July 1997. The addition to the consumer's supermarket milk bill is $11.4 million.
- The exercise of market power increased supermarket milk prices in New England 13 cents per gallon. The addition to consumers supermarket milk bill is $54.2 million for all New England.
- The increase in supermarket prices due to strong milk markets, raw fluid prices above the $1.46 per gallon Compact minimum, was 6.5 cents per gallon and totaled $27.5 million. The increase due to increases in non-milk costs was 7.0 cents per gallon and totaled $29.6 million.
- Professor Bailey's evaluation of the Compact's impact is flawed. It is a misuse of the proportional markup concept that attributes increases in other costs and market channel firm profits to the Compact program and farmers. His estimates of the impact of the Compact on consumers, at 14 cents per gallon (Bailey 2000) and 22 cents per gallon (Bailey 2001) are not credible.
- The International Dairy Foods Association "numbers don't add up" criticism of our report is a perfect red herring. They confuse before-after and counterfactual impact analysis. These approaches ask different questions. The first asks what was the actual impact of the Compact <u>over time</u>. The second asks what would the impact be if the Compact did not exist. As we show, these are different questions and one obtains <u>different</u> answers for each. The impact numbers from one cannot be added to the numbers of the other.
- Our report is an analysis over time. It does not do a counterfactual impact analysis. If one accepts the long-run farm-to-retail price transmission analysis that Lass et al. have done, then the counterfactual impact on consumers is as follows: If the Compact did not exist, consumers would have paid approximately 5.3 cents per gallon less for milk in supermarkets during the July 1997 to July 2000 period. This constitutes less than a 2 percent reduction in the $2.78 per gallon price paid.

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I.   Introduction

This paper compares and evaluates two recent studies of the impact of the Northeast
Dairy Compact. On May 2, 2001 we released "The Public Interest and Private Economic Power:
A Case Study of the Northeast Dairy Compact."   A year earlier Professor Kenneth Bailey,
Pennsylvania State University released "Report on the Operation and Performance of the
Northeast Interstate Dairy Compact" (Bailey, 2000). This comparative evaluation of these two
studies is part of our response (Cotterill and Franklin, 2001c) to a recent peer review of our study
that Professor Bailey completed at the request of the Northeast Dairy Compact Commission[1].
Bailey's review is, at best, a confused and confusing analysis of our study. The public deserves a
more lucid explanation and critique of work in this area. So that the debate on the merits of the
Compact can proceed on a firmer scientific foundation, we have written this paper. We would
add that the criticisms of Bailey (2000) also carry over to the Bailey (2001) paper. That paper
also misuses the proportional markup model to obtain an estimate of the impact of the Dairy
Compact that is flawed and not credible.

Our paper is organized as follows. The next section reviews the data sets and time
frames of the two studies. They are quite similar. Section III then explains what we know from
these data at the outset and prior to any economic analysis of firm conduct. We call these the
uncontested facts. They include retail prices, the federal market order class I price for raw milk,
additional cooperative charges for services, quality, and possibly power premiums, and finally

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[1] All of our papers and related documents on the Dairy Compact are downloadable from our website
http://www.are.uconn.edu/fmktc.html. Bailey's papers and review of our study are available at his website,
http://www.aers.psu.edu/Dairy/Outlook/reports/NECompactStudy.htm.

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the Compact minimum price for raw milk after its implementation in July 1997. As we will show one can say a lot about milk pricing with these uncontroversial data series. Where disagreement enters the exercise is when one constructs economic models to analyze more complicated questions of corporate strategy.

Section IV moves us into this uncharted area by explaining the basic framework for economic impact analysis. Again this is uncontroversial material. Then we explain Bailey's proportional mark-up approach, which is one very specific pricing strategy that is not necessarily consistent with profit maximization. We show that Bailey's use of the proportional markup concept and his resulting analysis of the Compact's impact are flawed and inaccurate.

Next we explain the Cotterill and Franklin approach, which is consistent with profit maximization under a great variety of strategies. In this paper we explain a fact that probably should have been stressed in our report. Our impact results do not depend on assuming or proving the existence of any particular price conduct. However, once we have measured the impact results we find that they clearly are not consistent with pricing in competitive markets. Our report documented focal point tacit collusion at Compact and asymmetric pricing later in the after Compact period. The report also estimated brand level demand curves and demonstrated that observed retail price elevation constitutes an exercise of market power. Prices were elevated, output was restricted, profits increased and all of this has been attributed by industry spokespersons to the Compact.

Section V explains the impact of the Compact and market channel firm price conduct on farmers, market channel firms, and consumers. Section VI responds directly to the International Dairy Foods Association (IDFA) assertion, an assertion that Bailey uncritically repeats without scientific reasoning, that "the numbers don't add up." We will show that the numbers that these parties cite come from two different impact analyses and that in fact they should not add up. Their point is a perfect red herring, i.e. it is of no consequence for analysis of the Compact's impact. In the public relations arena, however, they have used this confusion to sow doubt about

our study. Perhaps this is to be expected, but rational discussion of policy alternatives is difficult when the industry and its minions seek to confuse and disparage rather than clarify issues[2]. As *Dairy Today* magazine recently wrote, "the Dairy Compact battles to come [may] generate a lot more heat but very little light…this summer" (Dickrell, 2001). With this paper, it is our intent to generate light.

This peer-review exercise has had one substantive impact on our research. In our report we did not include cooperative premiums for extra services and possible power premiums when computing the farm price. Since the cooperative premiums reported by USDA Dairy Market News are only for the Agrimark cooperative which sells less half of the milk in New England and less than one quarter of the milk in the Boston market area we did not feel justified in claiming that the Agrimark cooperative price represented the price processors paid for milk. In our review of Bailey we have learned that the Federal Market Administrators office supplied him with a more extensive data series that reflects the cooperative charges paid to all cooperatives (including Agrimark, St. Albans, Dairylea and Dairy Farmers of America). Since this data set covers the great majority of raw milk sales to processors in New England, one can as Bailey did,

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[2] We have read with dismay the op-ed pieces and political pundit pieces that openly mislabel the Dairy Compact program as the "dairy cartel" and "lactose Leninism" (Murdock, *Hartford Courant*, 6/10/01 p. C3) and "dairy socialism" (Chait, *New Republic*, June 11, 2001, p. 23). This, pure and simple, is red baiting. Free speech is guaranteed by the Bill of Rights. Can clear thinking Americans remain silent when dairy farmers and others who support the Compact are labeled socialists and communists? The Compact is not socialism, the public ownership and operation of industrial firms. It is not Leninism, which is socialism plus the dictatorship of the proletariat, rather than democratic socialism such as has existed in Western Europe. The International Dairy Foods Association, the trade association of the dairy processors is the prime source of this campaign of distortion and defamation. Is this the best that they can offer the public? They should be ashamed for abusing free speech in this fashion. Senator McCain was correct when he called organizations such as IDFA, the "K street bullies." The cartel moniker is equally perverse. By definition, a cartel is a combination of sellers such as OPEC that seek to control price. The Compact is a public agricultural price program directed by a commission that includes processors, retailers, and consumer representatives as well as farmers. As such, it is not a cartel. Government involvement in agricultural pricing since the 1930's is not cartelization. A careful reading of economic history shows that the public agricultural pricing programs of the 20th century were instituted as an <u>alternative</u> to cartelization with its exercise of private economic power to stabilize inherently unstable agricultural markets. In the depths of the great depression Franklin Delano Roosevelt observed that his economists were resisting agricultural policies that would elevate farm income because those policies would give private firms, in that case farmer cooperatives, the power to set market prices. President Roosevelt's response essentially was the following statement. We will sanction price elevation but we will have the government do it. The public interest not private economic power will serve as the governor of the agricultural economy (Schlesinger, 1957). Today we face the same issue of private economic power; however, we face it in triplicate. Private power exists at the farmer cooperative, processor, and retailer level. Based on our economic research we think Franklin Delano Roosevelt's solution is more timely and appropriate than ever. The public interest should supercede private cartels including tacit collusion of the sort observed in this industry.

add this cooperative charge to the higher of the class I and Compact minimum to determine the price processors paid on average in any time period for raw fluid milk.

In this paper we call this the cooperative farm price and distinguish it from the class I farm price that we used in our earlier study. As we show this adjustment lowers the impact of the Compact on consumers from 4.5 cents per gallon in our prior study to 2.7 cents per gallon. The impact of market channel firm market power on consumers increases, for all New England from 11 to 13 cents per gallon.

II.   The Data and Time Frame Used by the Two Studies

At the outset we should state that we focus primarily on the Boston component of Bailey's study and our study in this paper. This avoids replication. Bailey's retail price data is far less detailed than our Information Resources, Inc. (IRI) retail data set. It is not a scientific sample whereas the IRI data is nearly a complete census of retail milk prices in New England supermarkets. The retail price data Bailey uses is collected by the Boston Federal Milk Market Administrator's office. Over time they have collected price data for Boston and Hartford. The market administrator's staff check prices in one store for each of two leading supermarket chains and a leading convenience store chain at some time during the first 10 days of each month. They check the price of the most popular sized leading brand of whole milk sold. Essentially this means they are pricing gallons of private label whole milk. The Administrator's series reports the average of this price from 3 stores as the price of milk for Boston that month.

The IRI milk data used in the UConn study is far more detailed. It contains price per gallon, and gallons sold for each brand of milk, e.g. Garelick, Hood, private label, skim/low fat, and whole milk, for each of the top 4 supermarket chains (Stop and Shop, Shaws, DeMoulas, Star) and all other supermarkets in the Boston IRI market area (see Cotterill and Franklin, 2001a, Appendix G for a map). The prices are averages and the gallons reported are total gallons of milk sold for a four-week period. There are 13 four-week periods in a year.

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IRI collects data from the check-out scanners in all stores of the top 4 chain supermarkets and from a scientific sample of the stores of smaller supermarket operators. This allows us to track perfectly the operations of the top four chains in Boston and to have an accurate estimate of the operations of all other supermarket operators. These data are routinely used by food industry firms to plan, coordinate, and evaluate their marketing strategies. IRI data also are available for Providence, Hartford/Springfield, and northern New England (Maine, New Hampshire and Vermont). The UConn study also analyzes these areas and ultimately covers 90 percent of New England.

At the raw milk level both studies use the same data. The federal milk market administrator reports the Federal Market Order (FMO) price for raw milk used to bottle fluid milk, the class 1 price, each month. After Compact implementation the Compact minimum price, $1.46 per gallon, snubbed any drop in the Class 1 price below that level. The UConn report did not factor in cooperative premiums, but we will do so now as Bailey did because he was able to obtain premiums for all cooperatives, not just those reported in USDA Dairy Market News for the leading cooperative, Agrimark.[3]

The time frames of the two studies are quite similar. Bailey's data is monthly and commences with January 1996. For his impact assessment he uses data through December 1999. The UConn IRI data set has 58 periods commencing in February 1996 and June 2000 is the last full month covered. Therefore Bailey has one more month (January 1996) in the before-Compact period which ends on July 1, 1997 the date of Compact Implementation. Bailey's after-Compact period is 6 months shorter than ours.

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[3] In telephone conversations with Erik Rasmussen, Market Administrator; and Celia Emerson, Staff Statistician on June 20 and 21, we learned of the existence of this data series. Milk marketed by Agrimark, St. Albans, Dairylea, and Dairy Farmers of America accounted for 75 percent of fluid sales in New England in December 1999. Agrimark accounted for only 42 percent. We obtained an estimate of cooperative premiums for January 2000 through July 2000 so that we could update the Bailey series and use it with our data set. Since January 2000 DFA, curiously, has refused to volunteer information on its premiums to the Market Administrator. Since the premiums of all the other cooperatives remained unchanged from the 1999 levels during the first half of 2000, we assume that DFA premiums also remain at their 1999 level. DFA accounted for less than 15 percent of all fluid milk sold in New England in December 1999.

In a before-after impact analysis study such as Bailey's and ours the length of the two periods can affect the analysis. The measurement of economic conditions that prevail before the policy intervention is as important as the measurement of post-impact conditions when one attributes the change in those conditions to the intervention. Both of these studies chose effectively the same length before compact period, 18 months for Bailey and 17 months for the UConn study. Is this a reasoned and reasonable choice? We maintain that it is because the most critical demand is that the before period reflect accurately market conditions and pricing conduct immediately prior to the advent of the Compact. Data from 1996 and the first half of 1997 capture farm price movements so that we can determine how market channel firm pricing strategy affected retail prices and margins immediately prior to the policy intervention. The before-Compact time periods used in both studies capture two and one half complete price cycles in the underlying class I raw milk price series.

Figure 1 displays the Class I and cooperative firm price series from February 1996 to June 1997. Bailey's before Compact period adds only one more data point, January 1996. Note that prices first decline slightly for two months in a weak down phase of the price cycle. Then they rise strongly for seven months, drop precipitously for 2 months, rise for five, and drop for one month. Thus we have three down sides and two upsides of the price cycle in the before-Compact period. As documented in our study there is no relationship between the current retail and the current farm price in this before-Compact period in Boston.

Looking at this price series one might ask why would one not use the average farm price for 7 months, prior to the Compact as a measure of the before-Compact price?[4] That price is lower than the 17 month average price that we used and the 18 months average that Bailey used. It would produce a higher Compact impact since the increase from that lower price to the 1.46 Compact minimum is more than the 6 cents increase from the 17 month, $1.40 average price.

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[4] See Cotterill and Franklin, (2001b) for a similar analysis of why one should not use the June 1997 farm price, the last price prior to the Compact as the measure of the before-Compact farm price.

The reason we did not use the prior 7-month average is that the retailers did not use it when pricing milk. If they had used it, assuming only that firms maximize profits, retail prices would have dropped during this period. Retail prices did not drop when farm prices crashed in late 1996 (see Figure 1). As documented in our study the best predictor of retail price during the before-Compact period is the full period's average farm price. In fact Bailey also uses the average farm price in the before-Compact period when applying his markup model to the data.

III. Uncontested Facts that Both Studies Acknowledge

Before visiting the data with any type of economic model to analyze more subtle questions, these data can tell us a great deal about milk pricing before and after the Compact. Table 1 gives key statistics for each data set before and after-Compact Implementation. In the IRI data set the before-Compact retail price averages $2.38 per gallon and the after-Compact retail price averages $2.73 per gallon. Retail prices increased 35 cents. In Bailey's FMO data retail price averaged $2.42 before and $2.67 after the Compact for a 25 cent increase. Adding the first 6 months of 2000 with its high retail prices to Bailey's data set would bring his after Compact average price closer to the IRI results. Using the higher of the class I or Compact minimum to increase raw milk price (the "Class I" farm price series) one has an average price at $1.40 before the Compact and $1.51 after the Compact. One can decompose the increase in the raw milk price into the amount due to the Compact's minimum floor price for the Class 1 series at $1.46 per gallon and the amount due to strong raw milk markets when the price above the Compact minimum. The Compact added 6 cents per gallon to the before-Compact average price but it was in effect for only 30 of the 40 after Compact periods. Thus its contribution to the increase in the average farm price for the full period is (.75 x 6) 4.5 cents per gallon. Strong milk markets added 6.5 cents per gallon.

Using the IRI data and the Class 1 farm price series, the dollar margin defined as the retail price minus the farm price, is 98 cents per gallon before the Compact. It increases to $1.22

per gallon after the Compact. The percent markup increases 10.8 percentage points from 70 to 80.8 percent.

Again retail prices go up by more than the increase in the farm price because the margin widens. The retail price increased 35 cents, and only 11 cents is due to the increase in the farm price. Fully 22 cents is due to the widening of the margin. This is an uncontested fact because it relies only on the actual data. We have, as yet, introduced no economic model or "modeled" how prices change under alternative conditions or conduct games.

Using the cooperative farm price series with the IRI data set in Table 1 reveals that the Compact's contribution to increased retail prices is even lower. Now the average farm price increases only 9 cents per gallon. It is lower than it was for the Class 1 farm price series because New England cooperatives eliminated their power premiums when the Compact took effect. As Bailey (Bailey 2000, p. 17, Appendix Table 1) and others have noted this price reduction should be factored into the Compact impact analysis. In Table 1 it is a 1.8 cent per gallon price reduction. Bailey finds the same price reduction in his paper. Thus net impact of the Compact is a 2.7 cent increase in the average price of a gallon of milk over the July 1997 to July 2000 period.

The dollar margin increase, before versus after the Compact, is now 26 cents and the percent markups increases 13.1 percentage points from 63 percent before the Compact to 76.1 percent after the Compact.

The bottom half of Table 1 provides the same set of statistics for Bailey's data. Although the numbers are slightly different, the same general results hold. Again we stress that these results are prior to introducing any economic model to the data. Until now we have only assumed that firms maximize profits. We have not specified any particular model of economic conduct or pricing strategy. As such the results reported in this section are uncontested facts. The net effect of the Compact was a negligible 2.7 cent increase in the raw milk price over the July 1997 to July 2000 time period. However, the market channel margins that were added to

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the slightly increased farm price were much larger after the Compact. Using the cooperative farm price series and IRI retail data in Boston the dollar margins increased 26 cents to $1.18. The percent markups increased 12.7 percentage points to 76 percent. These are uncontested facts that do not bode well for any economic model that assumes a constant stable markup exists in this market and uses it to forecast the impact of the Compact. As we show in our report, market channel firms pricing conduct changed dramatically at Compact implementation.

IV.   Impact Analysis: The Basics and the Models Used in the Two Studies

The Dairy Compact is a public policy that started on July 1, 1997. This date divides any data set and any economic conduct into data and conduct before and after Compact implementation.

Impact analysis can ask what happened <u>over time</u>, comparing information in the before period to information in the after period. This is before-after impact analysis. Impact analysis can also ask what would happen during the after period if the program did not exist. This is counterfactual analysis.

Before-after and counterfactual impact analyses answer two distinctly different questions. The answers that they give are also distinctly different. Figure 1 uses hypothetical data to illustrate these points for the Compact's impact on consumer prices. In Panel A the Compact raises retail prices 5 cents, but if the Compact had not been implemented consumer prices would have dropped 5 cents. Is the impact of the Compact on consumers 5 or 10 cents? It depends upon your reference point. In Panel B establishing the program has no impact on consumer prices over time but if it were not in place consumer prices would be 5 cents lower.

This difference between impact over time and counterfactual impact has eluded all players in the Compact debate to date. The Commission funded a study by Lass et al. to evaluate the impact of the implementation of the Compact on consumers. Dairy farmers and church groups met with Penn State administrators and Professor Bailey. They forcefully demanded that

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he do the study of the Compact's impact discussed here[5]. Both Lass et al. and Bailey examined the impact of doing away with the Compact, i.e. the counterfactual case, rather than its actual birth and impact over time on consumers. Therefore those studies to the extent that they are not flawed in other ways, address the question that Compact opponents wish to see put on the table, the demise of the Compact rather than the actual impact of the Compact on consumers over time. The UConn study examines the actual impact of the Compact on consumers over time.

In a very important aspect, actual impact analysis is much simpler than counterfactual analysis. Consider the Compact case. One can use the economic positions of all players during the before-Compact period as benchmarks. Then one can determine who gains and who loses after the Compact relative to those benchmarks. Note that one does not have to specify formally the economic game that stakeholders (farmers, other input suppliers, consumers, and market channel firms) are playing. That game generates the actual prices that we observe. This benchmark approach does not constrain the analysis in any fashion. Thus it gives us an unbiased measure of who gains and who loses.

The same is not true for counterfactual analysis. Now one must specify a specific economic game because one needs that model to forecast what consumer prices would be if one has no Compact. Bailey (and Lass et al.) assume that the market channel firms practice markup pricing to obtain their forecast prices. This is a very specific pricing strategy, one that is usually not consistent with profit maximization. Cotterill and Putsis explain why this is the case and actually test for markup pricing of milk within a linear structural model. They find for panel data from 1991 and 1992 that private label milk across over 59 cities seems to follow a markup strategy but that branded milk does not (Cotterill and Putsis, 2001, p. 97). Moreover they stress that one needs to test each data set used to see if observed firm conduct supports markup pricing rather than assume that it does as Bailey and Lass et al. do.

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[5] This is based on information obtained from John Bunting, a New York dairy farmer, and Brenda Cochran, a Pennsylvania dairy farmer and member of Dairy Action 2000, and advocacy group.

Bailey's use of the markup pricing concept in both papers (2000, 2001) is most irregular and leads to a set of false conclusions. Here we focus on the Bailey 2000 paper. His more recent paper also misuses the markup model to forecast Compact impacts. A markup model assumes that one knows the farm price and that a stable markup parameter exists. As Lass et al. do one uses data from before the policy event to estimate this markup parameter. Here the policy event is the change in farm price due to the Compact. One forecasts the impact of that event by multiplying the change in the farm price by the estimated markup parameter to obtain a predicted change in retail price due to the Compact.

Bailey did not do this. As we will show he uses none of the data from before the Compact when estimating the impact of the Compact. In other words he does not use an estimated markup parameter from pricing conduct prior to and independent of the Compact action, and firm responses to it. Remember, it is an uncontested fact that firms widened the margin after the Compact. Bailey uses the widened after-Compact margin to compute the impact of the Compact on consumers in a counterfactual model (Bailey p. 14, 16, 17, and Appendix Table 1).

His reasoning is as follows. If the Compact had not been in force during the July 1997 through December 1999 period the farm price would have been 9.9 cents lower because farmers would not have had the benefit of the Compact's price floor (Bailey 2000, Appendix Table 1). The after-Compact average markup is 71.6 percent (Bailey 2000, Appendix Table 1). Therefore, Bailey reasons, if the Compact had not been operating the retail price would be (9.9) (1.716) = 17 cents lower.

Bailey analyzes the impact of cooperative premiums in this counterfactual exercise by assuming that if there were no Compact they would revert to their pre-Compact level. We, and others, have no problem with this assumption. Bailey finds that if there were no Compact, cooperative premiums would increase 1.8 cents and retail prices increase (1.8) (1.716) = 3 cents. Thus the net impact of elimination the Compact is a 14 cent decrease in the retail price. This is a

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pure counterfactual impact analysis that uses the actual after-Compact margin rather than a forecast margin as in Lass et al.

Next Bailey shifts to a before-after analysis of the change in the margin. Using the before-Compact average percent markup he correctly forecasts the retail price in the after Compact period by multiplying it with the average farm price in that period. Bailey correctly notes that a widening of the margin contributes 10 cents to the retail price (Bailey 2000, p. 17, appendix table 1). He attributes it to "other factors".

In summary, Bailey concludes:

> "The results of this simple analysis imply that the retail price of milk rose $0.24 per gallon during the compact period July 1997 – December 1999 when compared to the period January 1996 – June 1997. (Our emphasis.) Part of this increase in the retail price of milk--$0.17 per gallon—was directly due to the compact. This increase was partially offset by a 3-cent-per-gallon decline in the retail price of milk due to the reduction in the cooperative market over-order premium. One could argue that this was an indirect impact of the compact. The rest of the increase in the retail price of milk--$0.10 per gallon – appears to be related to other factors. [Bailey 2000, p. 17].

What is wrong with this analysis? First, Bailey uses the wrong markup in his counterfactual model to measure the impact of the Compact and cooperative premiums. More importantly however, he erroneously concludes that these counterfactual results say something about how retail prices actually changed from before the Compact (January 1996 to June 1997) to after the Compact (July 1997 to December 1999).

Since eliminating the Compact drops the retail price 14 cents, he assumes that elevating the price at Compact implementation by the same amount would raise the price 14 cents (Bailey 2000 Appendix Table 1). This is not correct because, as we explained in Figure 2, a counterfactual analysis says nothing about the actual impact of the Compact on consumers over time.

Other flaws in his method also destroy his impact analysis. It is an uncontested fact that in Bailey's data set over time the Compact only raised the farm price 2.4 cents (Table 1). Therefore even with his analysis, the net retail price increase over time due to Compact is only

4.1 cents. If we use the correct before Compact percent markup to avoid charging farmers for the widening of the margin, the impact of the Compact on consumers over time is 4 cents, not 14 cents per gallon.

Finally even this estimate is flawed because it forces the farmers to accept responsibility not only for their own price increase, it forces them to accept responsibility for increases in the prices of other inputs and increases in a "normal" profit.   Think about it for a moment. If the farmer's price goes up 2.4 cents, this is the amount that they are taking from downstream firms and consumers. Why should other input suppliers and the owners automatically get 70 percent of this amount? In a policy impact analysis of this sort they should not. Moreover, under no circumstances should such increases for others be attributed to farmers. Alternatively when the farm price drops, for example, 10 cents do market channel firms demand 7 cents of wage, other input prices and profit givebacks and drop the price 17 cents? They do not. Bailey clearly misuses the proportional markup model.

To illustrate how incorrect Bailey's proportional markup model is for policy analysis, consider an application of it to the breakfast cereal market. The grain, e.g. wheat, that goes into a box of cereal typically costs less that 10% of the retail price. If wheat in a box of Wheaties is 30 cents and the box costs $3.00, the markup is 1,000 percent. Now if the price of wheat doubles because a government program limits planting to benefit farmers, Bailey would use the percent markup to conclude that the price of Wheaties doubles to $6.00 per box. Bailey would conclude that a 30 cent increase in the price of raw wheat for the box of cereal causes a $3.00 increase in the retail price.   No one accepts this conclusion as a valid measure of farm-to-retail price transmission. Moreover Bailey would assert that the wheat farmer program is responsible for the

full $3.00 increase in the retail price when within his own model all of the margin increase goes to other factors of production. Clearly this is unacceptable and flawed economic reasoning.[6]

Turning now to our own Before-After analysis we stress that it addresses and answers the primary question: what was the actual impact of the Compact on consumers? Bailey's criticisms of our work and our in-depth analysis of his work suggests one modification and a sensitivity analysis, as well as a careful restatement of our method to address and neutralize his confusing comments.

The modification is a switch to the cooperative farm price series. The sensitivity analysis examines how results change when one uses the average margin from the before compact period, as Bailey does, instead of our before-Compact margin which uses the forecast June 1996 retail price (based on a retail price trend line) rather than the average retail price from the before period.

With the uncontested facts reported in Table 1 we are well on our way with a before-after impact analysis. We know how the prices that consumers pay have changed. We also know how raw milk prices have changed, what portion of that change is due to the Compact and what portion is due to strong milk markets. We also know what portion of the retail price increase is due to a widening of the dollar margins and the percent markups.

If one wants to know whether the widening of the dollar margin and the percent markup are due to increases in the costs of the other inputs that marketing channel firms use or whether it is due to an increase in retail price in excess of these cost increases, i.e. an exercise of market power, then one needs more data. We review information on the increases in other inputs (labor, fuel, electricity) as well as changes in the general price level in Boston (consumer price index, producer price index). These data justify specifying a 3 percent growth rate in the margin during the after Compact period. Once we control for this cost-justified expansion in the dollar gross

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[6] Bailey errs in his counterfactual analysis because, unlike Lass et al., he does not estimate the relationship between farm and retail prices. Rather he assumes that percent markup gives the cost pass through relationship between the prices. It does not.

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margin, we find that the market channel firms exercised market power. In other words the actual retail prices in the after-Compact period increased by more than the amount needed to cover the increase in raw milk costs and the increases in all other market channel costs. Therefore the market channel firm net dollar profits are higher in the after-Compact period than they are in the before-Compact period.

Note that this conclusion does not rely upon any theory of tacit collusion, markup pricing, or any other pricing theory. Clearly some pricing strategy does underlie the actual observed price conduct. A major portion of our case study uses the detailed IRI brand and chain level data to identify pricing strategies that explain the observed pricing conduct.

Clearly observed conduct is not consistent with competitive market pricing which requires that price equal marginal cost. Assuming a perfectly elastic supply curve, competition requires that changes in price equal changes in marginal cost. For the fluid milk channel change in the farm price for raw milk and changes in other input costs, in total, are in excess of the change in marginal cost. This is because some other costs are fixed and do not vary with output. Therefore the change in retail price should be less than the sum of the change in our measured change in farm milk price and other inputs. It is not.

Consider the only other possible supply situation. If the raw milk supply curve is upward sloping, then in a competitive market, changes in retail price would also be less, not more than, changes in the farm price and other costs. Since supply curves are not downward sloping, under no conditions does a competitive market generate an increase in retail price that is greater than the increase in the farm price.

One must look beyond competitive markets to explain actual observed price conduct and the widening of the margin post-Compact. We document in our study that the data and historical events in the New England milk industry support a tacit collusion strategy at Compact implementation. That event served as a focal point for joint retail price elevation. The industries public responses in opposition to the Compact enabled them to signal each other and unite

behind a retail price hike equal in size to any government imposed increase in the price of raw milk on July 1, 1997. This enabled the industry to lock in a margin increase in excess of increases in non-milk costs.

Later in the after-Compact period as noted by Bailey (Bailey 2000, p. 14) asymmetric pricing at retail also widened the dollar margin. When farm prices dropped, retail prices decreased by much less. (This actual result contradicts Bailey's prediction of a 1.7 cent drop in the retail price for every 1 cent drop in farm price).

Returning to our before-after impact analysis, Bailey uses and suggests that we should use the average margin in the before-Compact period rather than the retail trend based margin that we do use. Figure 1 gives the before-Compact retail and cooperative farm price data series. Bailey subtracts the average retail price from the average farm price to obtain the average dollar margin and average percent markup. We concur with Bailey in using the average farm price over this extreme farm price cycle.[7]

Turning now to the retail price series, one can see in Figure 1 that retail prices clearly trend up over time. For this reason we use the forecast June 1996 retail price along with the average farm price to measure the dollar margin that occurred immediately prior to the Compact implementation. Nonetheless since Bailey uses average margin, we also analyze the impact of the Compact and firms pricing strategies on retail prices using the average before-Compact margin. This responds to Bailey's criticism and shows the sensitivity of our results to before-Compact margin measurement.

Table 2 displays the results for the Class 1 and Cooperative farm price series. Case 1 is the results that we reported in our study (Cotterill and Franklin, 2001a, p. 57, Table 14). The Compact increases price on average 4.5 cents per gallon during the July 1997 to July 2000 period

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[7] We explain that this is consistent with a mean-variance approach to profit maximization given a risky input price. Given the Compact focus on price stabilization (reducing price risk) this seems to be a most appropriate economic model to use. It is sufficient but not necessary for our analysis.

compared to the forecast actual price that Boston consumers paid immediately prior to the Compact, $2.43 per gallon. The exercise of market power widened channel firms net profit margins 13 cents per gallon.

Case 2 continues to use the forecast margin but now uses the cooperative farm price series as a measure of the actual prices paid by fluid milk processors for raw milk both before and after the Compact. The impact of the Compact on consumer prices is now 2.7 cents per gallon. This is only 1 percent of the $2.73/gallon average price that consumers paid for supermarket milk in Boston during the three years after Compact implementation. The price increase due to margin widening exercise of market power by channel firms is now 14.8 cents per gallon. The noncompetitive price conduct of processors and retailers is 5.5 times (14.8/2.7 = 5.5) more important than the Compact program is for retail price elevation.

Since we now regard this as our best estimate of the impact of the Compact and channel firm pricing practices on consumers we have updated Table 14 from our report and provide the new version here as Table 3. For all New England the Compact component of the retail price hike is 2.7 cents. Again this is less than 1 percent of the all New England average price, $2.78/gallon. The Cooperative farm price increases 9.2 cents. Strong raw milk markets account for the 6.5 cents not contributed by the Compact program. Other input prices contribute 7 cents to the retail price increases and the increase in the net profit margin (market power) contributes 13 cents to the price increase.

Returning to Table 2, Case 3 and Case 4 show how the results change if one uses the average retail price in the before-Compact period as well as the average farm price to compute an average margin. Since the average margin is 5 cents less than the forecast margin and the farm price series are not changed, this reduction in the before-Compact margin drops to net profits and increases the market power contribution to higher retail prices by 5 cents.

V.   Impact Analysis: Before-After and Counterfactual Results

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Figure 3 focuses exclusively on the raw fluid market and illustrates the difference between the two analytic approaches on a per gallon basis using the cooperative farm price series. Before the Compact the cooperative price averaged $1.461 per gallon. After the Compact the actual cooperative prices paid by processors increased to $1.553 per gallon. This actual 9.2 cent increase was due to the actual impact of the Compact, 2.7 cents, and the actual impact of strong milk markets, 6.5 cents. Again we stress that this is what actually happened in New England markets.

Next we shift to hypothetical or counterfactual analysis. If there had been no Compact the price farmers would have received would have been 10.1 cents lower. This $1.449 per gallon cooperative price consists of the average Class 1 price for the period $1.388 and the average cooperative premium from the before-Compact period. We use the before-Compact cooperative premium because, as Bailey and others assume, we also assume that absent the Compact cooperatives would resume their practice of changing power premiums as well as changing for the costs of services performed.

The prices reported in Figure 3 are uncontested facts. One needs no economic model to compute these averages for the before and after time periods. With Figure 3 in hand, we shift to a detailed consumer impact analysis in Table 4. It requires more information, i.e. information on increases in other (nonmilk costs) to decompose the actual observed margin change into the proportion due to nonmilk cost increases and the residual portion due to increases in net profits. Again we stress that these are estimates of actual cost and margins changes that occurred in the market. Also we will repeat the points made earlier that 1) our before-after analysis documents the actual change in the welfare position of the key stakeholders in the New England dairy industry and 2) this analysis requires no modeling of pricing strategies or other conduct moves by the players. Clearly the key players, i.e. the processors and retailers, are executing some strategies in response to the Compact and other supply-side market forces in the raw milk market. However those strategies determine the actual retail prices that consumers pay and as

such are reflected in the actual price series that we observe. Our analysis uses the before-Compact position of stakeholders as benchmarks. We ask how did their welfare position change after the Compact. Did consumers pay more? Did farmers receive more income? Given our estimate of how other input costs increased did the net profit margin of processors and retailers increase?

Table 4 answers these questions. New England consumers paid 122.8 million dollars more for milk in the after-Compact period because the price increased 29 cents per gallon over the before-Compact price. Dairy farmers received 11.4 million dollars more from the sale of milk in the supermarket channel because the Compact increased the price 2.7 cents per gallon. Dairy farmers also received 27.5 million dollars more for milk sold through supermarkets because strong raw milk markets during the 3 year post-Compact period raised price above the Compact minimum price 25 percent of the time. This revenue comes from the 6.5 cent per gallon increase in raw milk price post-Compact that is due strong raw milk markets. Increases in other costs (7 cents per gallon) accounted for 29.6 million dollars of the 122.8 million dollar increase in the milk bill. Finally, since we have accounted for the increases due to all inputs, the remaining 54.2 million dollars falls to the bottom line of the market channel firms as an increase in net profits. These numbers add up. This completes our before-after analysis of the changes in the welfare position of the stakeholders. Lets now shift to the counterfactual impact analysis.

When using the cooperative price series we estimate for all class 1 sales in New England that if Compact had not been in place farmers would have lost 111.8 million dollars. This is less than the 128.5 million that we estimated in our report because we assume the cooperatives re-institute their power premiums as a level consistent with what they charged in the before-Compact period. It is this sort of impact analysis that the Compact Commission has published to illustrate how the Compact has benefited farmers.

Under this counterfactual approach what do we know? We know prior to specifying any economic model that if there were no Compact farm revenue would decrease 10.1 cents per

gallon (Figure 3). This amounts to a loss of 111.8 million dollars and all Class 1 milk. For supermarket channel milk, this sums to a 42.8 million dollar decrease in farm revenue. This number, as Bailey correctly notes, is the amount that processors would have saved on their milk procurement bill if there had been no Compact. It has nothing to do with what actually happened to market channel firm profits. Since we do not formally specify and estimate a model of price conduct, and Bailey's approach is flawed we have no basis to predict or hypothesize how much of the counterfactual drop in farm price would be passed forward to consumers.

If one is willing to accept a long-run markup model analysis (1982-1996) of the relationship between farm and retail prices as estimated by Lass et al. one can determine the counterfactual retail impact.[8] Lass et al. studied a different post-Compact period (only 12 months), found that raw milk prices would be reduced 12 cents if there were no Compact, and that 6.9 cents (57.5 percent) would be passed on to consumers in Boston and 5.7 cents (47.5 percent) would be passed on to consumers in Hartford (Bailey 2000, p. 12). If one computes the average of these pass through rates and apply them to our 10.1 cent farm price reduction, the all New England retail price would be 5.3 cents lower if there were no Compact. This is less than a 2 percent reduction in the $2.78 per gallon all New England retail milk price.

VI.   An Answer to "The Numbers Don't Add Up" Charge by IDFA and Bailey

The last issue that we wish to address is the assertion advanced by the International Dairy Foods Association (IDFA, 2000) and repeated by Bailey in his review that "the numbers do not add up." This misunderstanding arises from not clearly understanding the difference between a before and after policy impact analysis and a counterfactual policy impact analysis. As we have

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[8] The Lass et al. price is a technically proficient, credible estimation of a long-run markup model. Nonetheless we continue to have serious reservations as explained in our report about the long-run markup model that Lass et al. use. Agricultural marketing and industrial organization analysis of price transmission in noncompetitive markets has advanced beyond the Hien markup model from 1980 and the Kinnucan and Forker model of 1987. See Sexton and LaVoie (2000), McCorriston et al. (1998), Cotterill (2001), Tyagi (2000), Azzam (1999, 1992). Moreover we stress that pricing strategy in this oligopolistic market is not stable. Leading firms change strategy at will, as they did at Compact implementation. How they will react to the demise of the Compact, if that event occurs, is entirely at their discretion. In other words competitive forces are not strong in these highly concentrated milk processing and supermarket retailing markets.

shown the two approaches answer different questions and the answers are different. The numbers in the before-after analysis add up in the following fashion. In Table 3 for each market the components of the change in retail prices add up to the total change in retail price.

One cannot, as best we understand the IDFA public relations cant (IDFA, 2001), and Bailey in his review, claim that one should add impact numbers from the counterfactual analysis to those from the before-after analysis. If one does this, we readily admit that the numbers do not add up to anything meaningful. Our critics are correct but confused. This confusion is the cornerstone of the IDFA criticism of our study that they have disseminated to the press (IDFA, 2001, Dickrell, 2001). Bailey, in his review states the confusion as follows:

> "If only $19 million was passed on to consumers and processors paid $51.5 million higher costs for milk due to the Compact, I would conclude that processors/retailers "ate" the difference of $32.5 million. Given their study, I would argue that processors/retailers lacked the market power to pass these higher costs on to consumers. However, Cotterill and Franklin assumed just the opposite. Again, their numbers don't add up." (Bailey, 2001, p.3).

Here is how Bailey and IDFA confuse before-after analysis with counterfactual analysis. In our report using the Class 1 farm price, consumers paid 19 million more for milk after as compared to before the Compact because of the Compact. After versus before the Compact, processors paid only 4.5 cents per gallon more ($19 million more) for milk because of the Compact. Processors did not pay 51.5 million more (after versus before) for milk. If the Compact had not existed (counterfactual) then the processors during the after Compact period would have paid $51.5 million less for milk than they actually paid. Processors/retailers "ate" no increased milk costs. In fact we show that in addition to passing on to consumers the 4.5 cents per gallon increase in their cost of raw milk due to the Compact, they increased retail prices to cover increases in other costs and widened their net profit margins substantially.

The quote from Bailey and our analysis of it use our report's impact estimates that are based on the Class 1 farm price series. Our revised estimates using the cooperative farm price presented in this paper are 2.7 cents per gallon or 11.4 million dollar Compact impact and 13 cents per gallon or 54.2 million dollar impact due to market power for all New England. These are actual before-after impacts. If the Compact had not existed, then processors, during the after-Compact period, would have paid 42.8 million dollars less for raw milk.

Return now to Figure 1, Panel B. It illustrates the situation. Consumers effectively pay no more for milk after the Compact (compared to before the Compact) but farmers receive a higher price than they otherwise would have received due to the Compact's minimum price floor. This "confusion" is in reality the core rationale for the Compact: not increase consumer prices but limit the ability of market channel firms to capture large increases in their profits (windfall profits) at the expense of farmers when the raw fluid milk price drops. Clearly the Compact seeks to redistribute channel income without significantly affecting consumer prices over time. Clearly the channel firms are resisting this diminution of their power and their right to capture additional income from the channel at the expense of farmers.

We stress that our before-after analysis does not penalize or confiscate profits from market channel firms. The benchmark approach allows them to retain in the after-Compact period the same dollar net profit rate as they had in the before-Compact period. However, we find that they increased the consumer prices, for all New England an extra 13 cents per gallon. This added $54.2 million to their net profits at the expense of consumers. Perhaps they would claim that this increase in profits at the expense of consumers is necessary because the Dairy Compact program prevented them from increasing profits at the expense of farmers during the weak phase of the farm price cycle. In response to this conjecture, we would note that our benchmark net profit rate in the before-Compact period is an average across several farm price cycles, including a major run-up and crash in farm prices. As such it allows firms a profit rate

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that reflects all farm price conditions that they face. The benchmark is not based on a stage of the farm price cycle with an abnormally low farm-retail margin.

From the standpoint of consumers, one might respond as follows: "OK, the Compact did not raise our milk price over time, but if it were disbanded, our prices would drop." This may be true but the decline may be according to Lass et al. 5.3 cents, which is less than a 2 percent drop in the retail price. This drop pales in comparison to the actual and potential price increases due to the exercise of market power by channel firms. As we explained in our study, consumers in the long run would be better served by participating in a Compact Commission that uses its investigatory power to uncover noncompetitive milk pricing practices and to promote effective competition. Clearly the documented price conduct of powerful market channel firms in New England and elsewhere including Chicago and Seattle (Cotterill and Brundage, 2001) deserve and require tougher public policies.

Finally, one point raised by farmers that have responded to our work. Our benchmark method preserves the before-Compact profit levels of market channel firms by allowing retail price increases to cover all their cost increases. What about farmers? This method is inherently unfair to them. The 2.7 cents per gallon increase due to the Compact, and even the 9.2 cents per gallon total increase in farm price is not adjusted (reduced) by the increase in farm production costs over the 1997-2000 period. The Compact, and more generally the fluid milk market, has not protected farm income <u>over time</u> even though it has increased it 10.1 cents per gallon ($111.8 million) over what it would have been if there were no Compact. Slight wonder, as reported in *Dairy Today*, the number of farms in Vermont fell 14 percent and the number of cows in Vermont fell by 1,000 head between 1997 and 2000 (Dickrell, 2000).

Returning to the consumer side, consumer income has advanced over time while milk price increases, <u>due to the Compact</u>, are negligible. What about the incomes of families that work on New England dairy farms? We doubt that they have grown as fast as the incomes of urban consumers. Farmers and many others maintain that the structure and rules of the game in

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the U.S. economy need to give rural America a fair shake. Congress and the executive determine what is fair. Welcome to the political debate on farm policy in general, and the Compact in particular.

VII.   Summary and Conclusions

In conclusion let's return to economic analysis. The before and after method finds a 2.7 cents per gallon actual increase in consumer prices on average during the 3 years after the Compact, compared to before the Compact, and the Lass et al. counterfactual method finds that if the Compact had not existed New England retail prices would have been 5.3 cents per gallon lower. Since these analyses answer different questions there is absolutely no reason to expect that they would give the same answer. However since the primary question in the debate over the Compact is what impact did it actually have on consumers we maintain that our before-after analysis provides the appropriate answer. The Dairy Compact elevated consumer prices in New England less than one percent. This amount for many interested parties is trivial given the Compact's contribution to dairy farm income, open space preservation and rural New England.

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Table 1. Average Farm-to-Retail Margins and Mark-ups Before and After the Compact

Part A

Cotterill and Franklin IRI Retail Data Set: Feb. 1996–Jun. 1997; Jul 1997–Jun. 2000.

	Before Compact	After Compact	Increase
Using Class 1 Farm Price			
Avg. Retail Price	2.384	2.732	0.348
Avg. Class 1 Price	1.400	1.510	0.110
Change due to compact			.045
Change due to strong market			.065
Dollar Margin	0.984	1.222	0.238
Percent Markup	70.3%	80.9%	+10.6
Using Coop Farm Price			
Avg. Retail Price	2.384	2.732	0.348
Avg. Coop Price	1.461	1.553	0.092
Avg. Coop Premium	0.061	0.043	-0.018
Change due to Compact			0.045
Net Change Due to Compact			0.027
Change due to Strong Markets			0.065
Dollar Margin	0.923	1.179	0.256
Percent Markup	63.2%	75.9%	+12.7

Part B

Bailey's FMO Retail Price Data Set: Jan. 1996–Jun. 1997; Jul. 1997–Dec. 1999

	Before Compact	After Compact	Increase
Using Class 1 Farm Price			
Avg. Retail Price	2.417	2.674	0.257
Avg. Class 1 Price	1.400	1.514	0.114
Change due to Compact			0.042
Change due to strong markets			0.072
Dollar Margin	1.017	1.160	0.143
Percent Markup	72.6%	76.6%	+4.0
Using Coop Farm Price			
Avg. Retail Price	2.417	2.674	0.257
Avg. Coop Price	1.462	1.558	0.096
Avg. Coop Premium	0.061	0.044	-0.018
Change due to Compact			0.042
Net Change Due to Compact			0.024
Change due to Strong Markets			0.072
Dollar Margin	0.955	1.116	0.161
Percent Markup	65.3%	71.6%	+6.3

Table 2. Who Gained from the Retail Milk Price Hikes in Boston: Alternative Before Compact Margins and Farm Price Series.

Case 1: Forecast Margin and Class 1 Farm Price Series

    Increase in retail price due to the Compact   0.045

    Increase in retail price due to market power   0.13

Case 2: Forecast Margin and Cooperative Farm Price Series

    Net increase in retail price due to the Compact   0.027

    Net increase in retail price due to market power   0.148

Case 3: Average Margin and Class 1 Farm Price Series

    Increase in retail price due to the Compact   0.045

    Increase in retail price due to market power   0.180[a]

Case 4: Average Margin and Cooperative Farm Price Series

    Net increase in retail price due to the Compact   0.027

    Net increase in retail price due to market power   0.198[a]

[a] The average margin is 5 cents less than the forecast margin and all of this increase goes to the firm's net profit and the market power component.

Table 3. Who Gained from the Retail Milk Price Hikes: July 1997 to July 2000

	Before the Compact	After the Compact	Change per gallon
All New England			
1 Average Coop Farm Price	$1.46	$1.55	0.09
Net Increase due to Compact*			0.027
Increase due to Strong Raw Milk Market			0.065
2 Increase due to non Milk inputs			0.07
3 Total Cost Increase (1+2)			0.16
4 Retail Price	$2.49	$2.78	0.29
Increase in Profits (4-3)			0.13
Boston			
1 Average Coop Farm Price	$1.46	$1.55	0.09
Net Increase due to Compact*			0.027
Increase due to Strong Raw Milk Market			0.065
2 Increase due to non Milk inputs			0.06
3 Total Cost Increase (1+2)			0.15
4 Retail Price	$2.43	$2.73	0.30
Increase in Profits (4-3)			0.15
Hartford-Springfield			
1 Average Coop Farm Price	$1.46	$1.55	0.09
Net Increase due to Compact*			0.027
Increase due to Strong Raw Milk Market			0.065
2 Increase due to non Milk inputs			0.08
3 Total Cost Increase (1+2)			0.17
4 Retail Price	$2.60	$2.94	0.34
Increase in Profits (4-3)			0.17
Providence			
1 Average Coop Farm Price	$1.46	$1.55	0.09
NetIncrease due to Compact*			0.027
Increase due to Strong Raw Milk Market			0.065
2 Increase due to non Milk inputs			0.07
3 Total Cost Increase (1+2)			0.16
4 Retail Price	$2.54	$2.87	0.33
Increase in Profits (4-3)			0.17
Northern New England			
1 Average Coop Farm Price	$1.46	$1.55	0.09
Net Increase due to Compact*			0.027
Increase due to Strong Raw Milk Market			0.065
2 Increase due to non Milk inputs			0.06
3 Total Cost Increase (1+2)			0.15
4 Retail Price	$2.47	$2.71	0.24
Increase in Profits (4-3)			0.09

* Net change due to compact is 0.045 change due to compact minus change in Coop Premium 0.018.

Table 4. Dollar Impacts on Consumers and Farmers: All New England

	$ Million	Percent
Actual increase in consumers supermarket milk bill ($0.29 x gals)	122.8	100.0
Increase due to Compact	11.4	9.2
Increase due to strong Milk Markets	27.5	22.4
Increase due to other costs	29.6	24.1
Increase in profits	54.2	44.1
Decrease in Farm Revenue from Supermarkets	42.8	
Sales of milk if no Compact ($0.101 x gals)		
Increase in Consumer Supermarket Milk bill if no Compact	**?**	

* based on Table 3 results and 423.5 million gallons of milk purchased in the after Compact period.

Figure 1.

**Boston IRI Retail Prices, Class 1 Farm Price
and Cooperative Farm Price Series:
February 1996- June 1997**
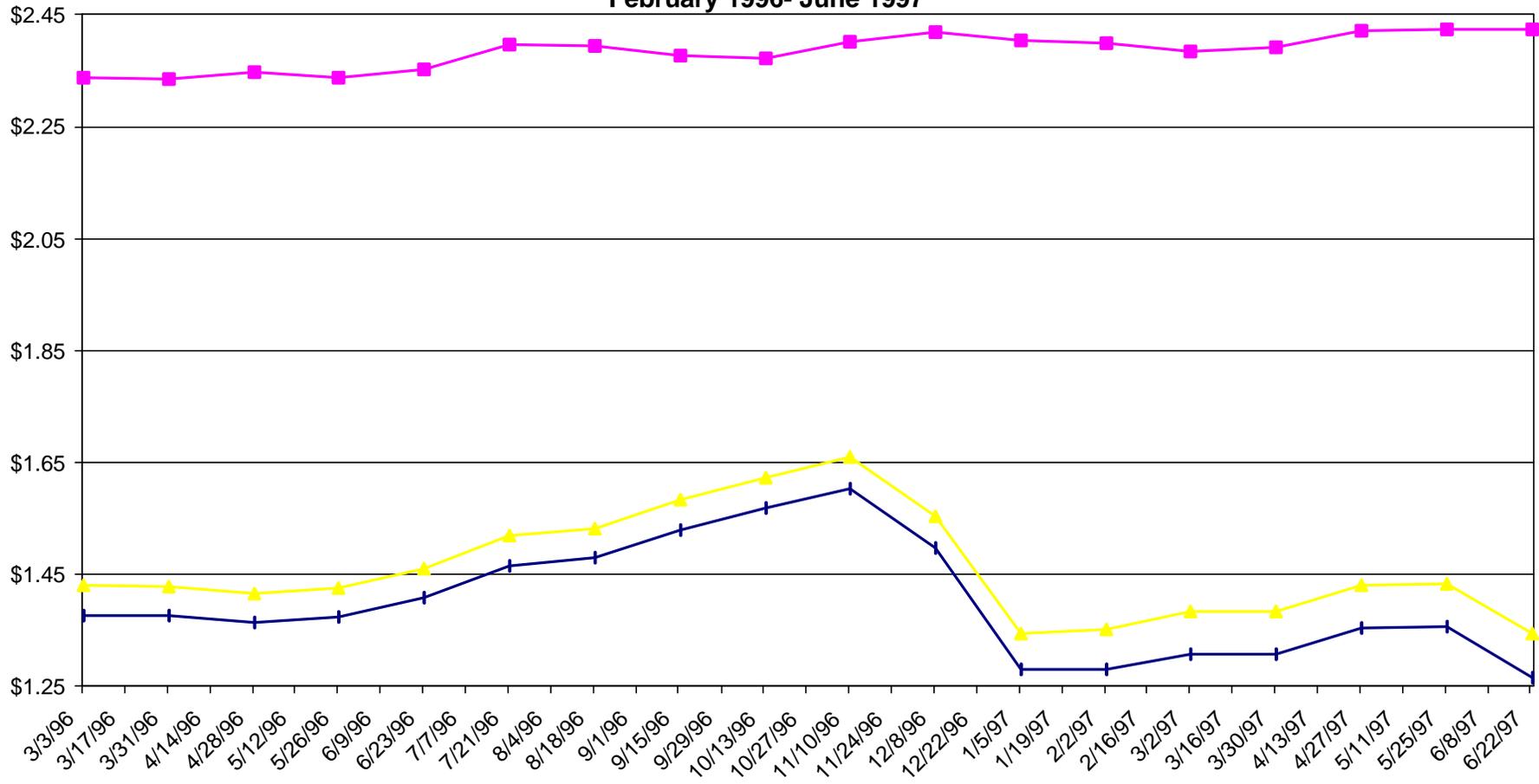
Source: Food Marketing Policy Center IRI database, Bailey (2001).

Class 1 — Coop(bailey) — Boston Retail

Figure 2. Hypothetical Examples of Before-After and Counterfactual Impact Analysis

Panel A
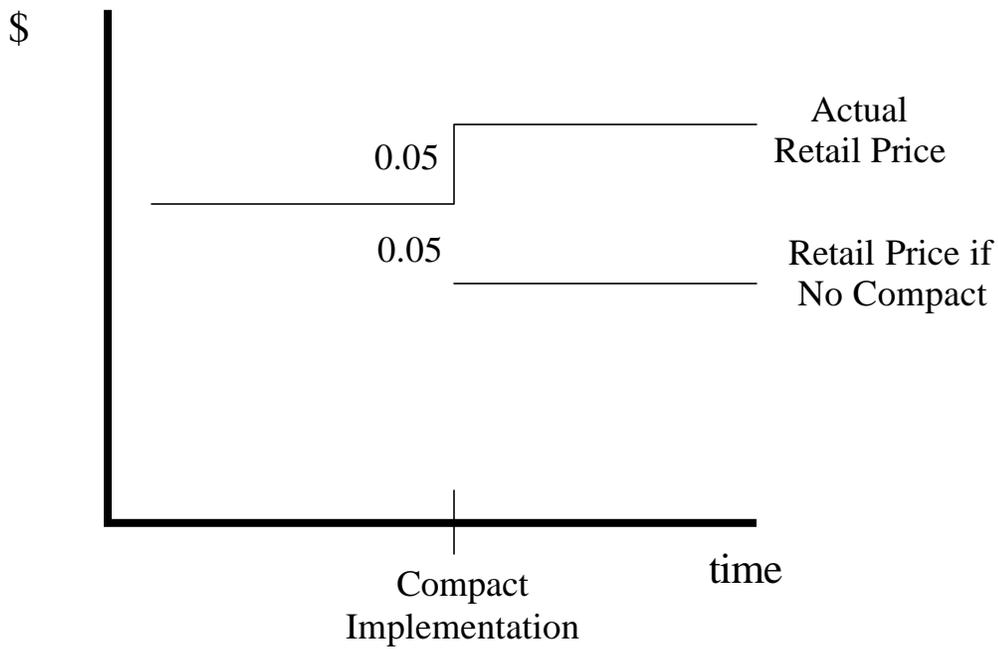
Panel B
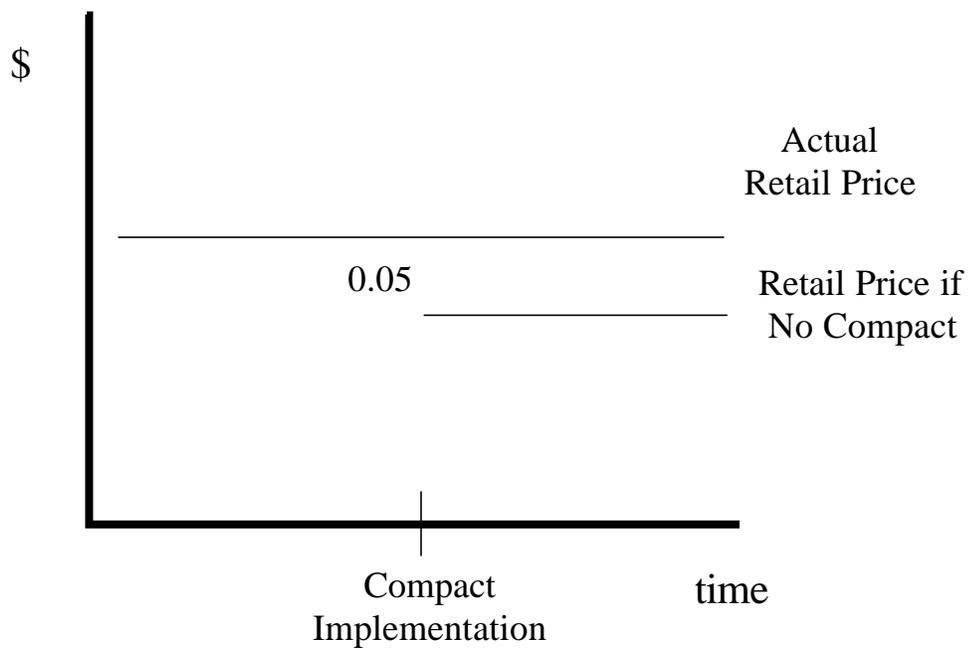
Figure 3. Actual and Counterfactual (if no Compact) Average Cooperative Prices
Paid by Processors*
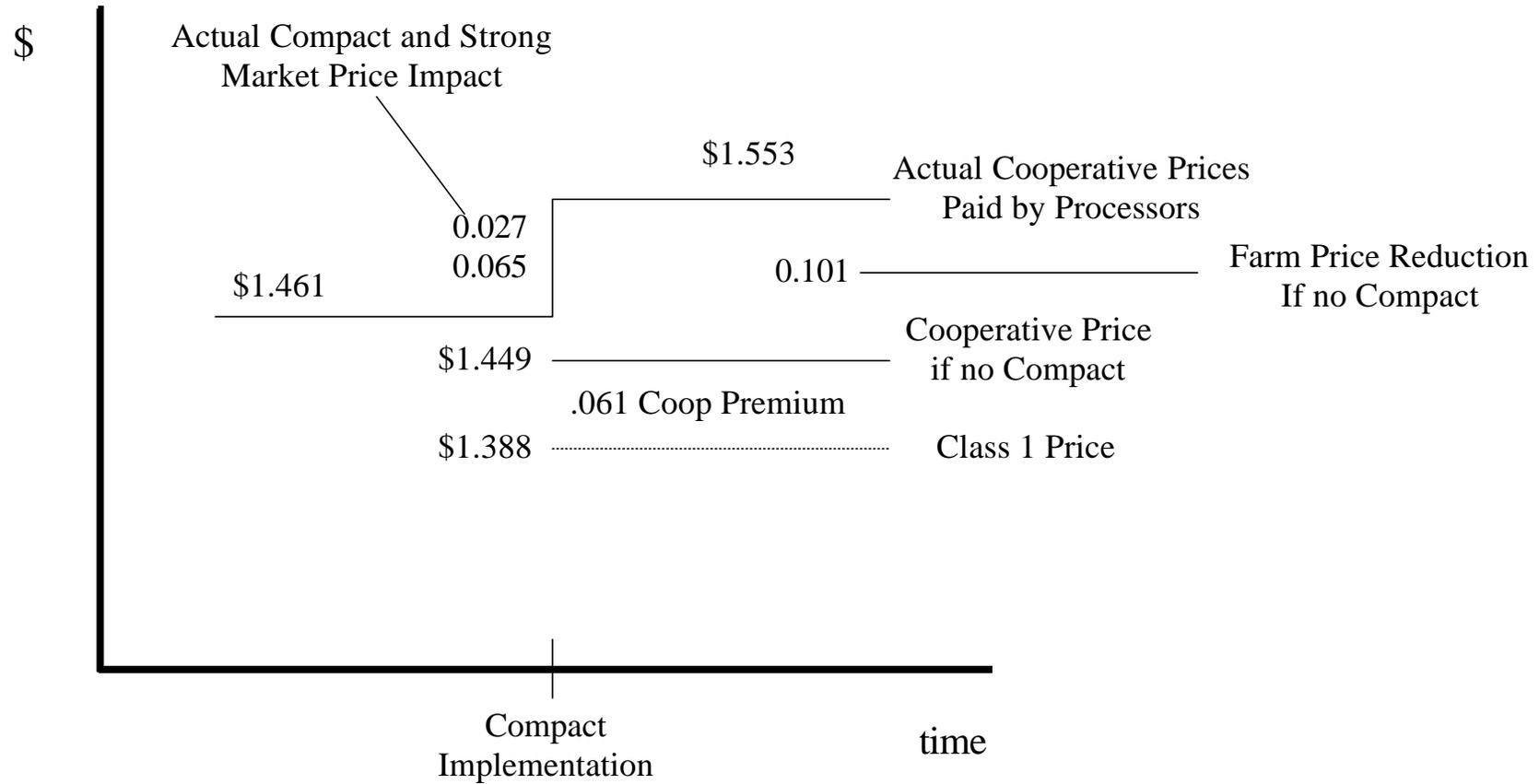
* All prices are averages for the 17 months prior to the Compact (Feb. 1996-June 1997) or the
36 months after the Compact (July 1997-June 2000).