Impact of Generic Milk Advertising on New York State Markets

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Under the Dairy and Tobacco Adjustment Act of 1983, farmers are assessed 15 cents per hundredweight (cwt) on all milk sold in the contiguous United States. In 1997, New York dairy farmers contributed approximately $17 million to federally authorized dairy promotion and advertising funds. These contributions are allocated not only to the national program,[1] but also to the regional, state, and local programs operating in markets where milk is ultimately sold. The federal legislation specifies that at least 5 cents of the 15 cent per cwt check off must be allocated to the national program, and allows for credits of up to 10 cents per cwt for contributions to authorized regional, state, or local promotion programs. In 1997, of the $17 million paid by New York dairy farmers, approximately $11.5 million was allocated to regional, state, and local programs operating in the markets where New York milk is sold.

The largest regional program operating in New York State is the American Dairy Association and Dairy Council (ADADC). Other programs receiving financial support from New York dairy farmers include Milk for Health on the Niagara Frontier, which is located in the Buffalo area, and the Rochester Health Foundation. In addition, to the extent that New York milk flows to New England, Milk Promotion Services, Incorporated receives financial support from New York dairy farmers.

These advertising and promotion organizations are engaged in a wide range of promotional activities including nutrition education, various point-of-sale merchandising activities, and media advertising. The present study focuses solely on the media advertising activities in five New York markets--New York City, Albany, Syracuse, Rochester, and Buffalo. The majority of dairy checkoff funds in New York State are invested in media advertising. Under contract with the New York Milk Promotion Advisory Board (NYMPAB), ADADC implements these advertising programs in the New York City, Albany, and Syracuse markets. Through a contractual relationship with the Rochester Health Foundation, ADADC places advertising in the Rochester market as well. Milk for Health on the Niagara Frontier operates an independent advertising program in the Buffalo market.

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[1] Operated by Dairy Management, Incorporated (DMI).

This economic report provides an updated analysis of the responsiveness of fluid milk sales to milk advertising in the New York City, Albany, Syracuse, Rochester, and Buffalo markets. Cornell economists conducted a similar study in 1997. Given the length of time that has passed since this was last studied, it is important to reexamine the relative responsiveness and rates of return associated with advertising among these markets. The following sections describe the conceptual fluid milk demand model used to evaluate advertising in the markets being analyzed, document the data collected for this analysis, discuss some specific issues related to model estimation, and report and interpret the econometric results. Finally, the econometric results are used to simulate the impacts of the New York State advertising program on the farm milk price and producer rates of returns for these five markets.

The Model

In each market, per capita fluid milk sales are assumed to be affected not only by generic advertising expenditures, but also by the retail price of milk, prices of substitutes for milk, consumer income, consumer health concerns about dietary fat, and competing advertising expenditures for milk substitutes. In addition, the demand equation for each market incorporates a set of variables to account for seasonality in fluid milk consumption, and a set of yearly indicator variables to account for differences in sales between years. The general form for the demand equation for each market can be expressed as:

Quantity = f(milk price, substitute price, income, dietary fat concerns, competing beverage advertising expenditures, generic milk advertising expenditures, seasonality, yearly indicators).

Regardless of the functional form chosen for estimation, economic theory provides a basis for expectations with regard to the signs of the price and income variables. With fluid milk quantity as the dependent variable, the estimated coefficient for fluid milk price should have a negative sign. In other words, the expected consumer response to an increase in the price of milk is lower consumption. When the price of a substitute for milk rises, making milk a relatively better buy, the effect should be to increase milk consumption. Thus, the estimated coefficient for any substitute price is expected to be positive. The estimated coefficient for income is also expected to have a positive sign. When income rises, consumers can be expected to purchase more milk, as well as more of most other goods.

One can also make reasonable hypotheses on the expected signs for the consumer fat concerns, competing advertising, and milk advertising variables. Since some fluid milk products have a relatively high fat content (e.g., whole milk), consumer concerns about dietary fat should depress milk consumption. Accordingly, the estimated coefficient on the consumer fat concerns variable should have a negative sign. Advertising of milk substitutes should also decrease milk consumption. Therefore, there should be an inverse relationship between competing advertising expenditures and milk consumption. If milk advertising is effective, an increase in milk advertising should be associated with greater milk consumption; thus estimated generic milk advertising coefficients should have positive signs when this advertising is working as intended.

Data

For each of the five markets being analyzed, the relevant market area is assumed to be the dominant market area (DMA) for the television stations broadcasting from the major city in the market. In each market, this definition leads to a multi-county designation. Of the five markets included in this study, the New York City market is the only one in which a significant portion of the DMA lies outside the boundaries of New York State. The New York City DMA includes roughly the northern half of New Jersey--a multi-county area that coincides with the New Jersey portion of the New York-New Jersey Federal Milk Marketing Order (Order #2). In the past, we obtained fluid milk sales data for the New Jersey portion of the New York City DMA from the New Jersey Department of Agriculture, and more recently from the Market Administrator's Office for Order #2. Unfortunately, data are no longer available from either of these sources. Therefore, in the present analysis of the New York City DMA, only the New York State portion is considered, and it is assumed that per capita milk sales in northern New Jersey are the same as per capita sales in New York City. All data used in the model were collected on a monthly basis over the period 1986-97.

Fluid milk sales for each of the five markets are estimates based on data collected by the Division of Dairy Industry Services and Producer Security (DIS), New York State Department of Agriculture and Markets. Each year, in May and October, every plant and milk dealer with route sales in New York State must file a report showing the amounts of milk sold in each county in which they do business. In addition, all plants from which processed fluid milk is delivered to New York State dealers, or sold on routes in New York State, must file monthly plant reports. Based on these reports, it is possible to trace all milk sold into any designated market area back to the plants in which it was processed. Based on the May report and the monthly plant reports for May, plant-specific allocation factors can be developed and applied to the monthly plant reports to estimate monthly in-market sales for January through June. Likewise, the October report provides the basis for estimating monthly in-market sales for July through December.

Fluid milk prices for each market comes from the DIS publication titled *Survey of*

Retail Milk Prices for Selected Markets in NYS. This report contains retail prices for each type of milk (whole, 2%, 1%, and skim) in various container sizes for several cities in New York. The price series used in this analysis are for whole milk in half-gallon containers.

The Consumer Price Index (CPI) for nonalcoholic beverages in the Northeast is used as a proxy for the substitute price in each equation. This series is available in the *CPI Detail Report* published by the Federal Bureau of Labor Statistics. This report is also the source for the CPI for all items, which is used as a deflator for income.

The income measure used in this study is from the New York State Department of Labor's *Employment Review*. For each of the five markets being studied, this periodical contains timely reports of average weekly earnings of production workers in the manufacturing sector. Although a measure of per capita income would be preferable, reporting lags of several years on this data preclude its use here. Liu and Forker also used this variable as a proxy for consumer income.

The fat concern variable was included because consumer concerns about dietary fat were expected to be an important factor negatively associated with milk consumption. This variable was constructed by Ward based on a quarterly survey of 14,000 consumers nationwide conducted by the National Panel Diary (NPD) Group, which is a company that collects survey information on consumer behavior and attitudes. Since the survey was random, the 14,000 consumers in one quarter were not necessarily the same as the 14,000 consumers in the next quarter. Because this was a national survey, it was assumed that consumers in the New York State markets had identical behavior and attributes as consumers in the rest of the United States. Consumers were asked whether they completely agree, agree mostly, agree somewhat, neither agree nor disagree, disagree somewhat, disagree mostly, or completely disagree with the statement ... "a person should be cautious about the fat in one's diet." The fat concern variable was constructed based on the percentage of consumers expressing concern regarding this statement. To convert this variable from a quarterly to monthly basis, a linear interpolation procedure was used.

Nominal advertising expenditures for competing beverages were collected on a quarterly basis from *Leading National Advertisers*. The products included coffee and tea, bottled water, fruit and vegetable juices, carbonated beverages, and other nonalcoholic, non-dairy beverages. The sum of all competing product advertising is used to represent competitors to milk advertising. To adjust for inflation and seasonal change in media costs, these expenditures were deflated by the Media Cost Index. The resulting advertising expenditures, which are on a national basis, were then prorated on a population basis to obtain an estimate of the portion of the national advertising effort effecting each of the New York State markets. Finally, linear interpolation was used to translate this series from a quarterly to a monthly basis.

Monthly nominal advertising expenditures on radio and television in the New

York City, Albany, Syracuse, and Rochester markets come from a report titled "Committed Recaps" which was previously provided by D'Arcy, Masius, Benton and Bowles, the advertising agency handling the fluid milk account. With the recent agency switch on the fluid milk account, these data are now provided by the Leo Burnett agency. Nominal radio and television expenditures in the Buffalo market are provided by DIS from audits of Milk for Health on the Niagara Frontier. For all five markets, adjustments are made to advertising expenditures to transform them into a measure of advertising effort. These adjustments account not only for year-to-year inflation in media costs, but also for quarter-to-quarter variations in media costs within any year. Monthly national fluid milk advertising expenditures are supplied by Dairy Management, Inc.; these expenditures are deflated and prorated on a population basis to obtain an estimate of the portion of the national fluid milk advertising effort affecting each of the markets under study here.

Estimation

A double-log equation of the form is specified for each market:

$$(1) \ln SALES = \alpha_0 + \alpha_1 \ln (PRICE/SUB) + \alpha_2 \ln EARNINGS + \alpha_3 \ln FAT + \sum_{i=0}^{m} \beta_i \ln BEVAD_{t-i} + \sum_{j=0}^{n} \omega_j \ln MILKAD_{t-j} + \sum_{k=1}^{p} \delta_k SEASON_k + \sum_{r=1}^{q} \gamma_r YEARDUM_r.$$

In this equation, SALES is per capita fluid milk sales, PRICE is the retail fluid milk price, SUB is the nonalcoholic beverage price index, EARNINGS is average weekly earnings deflated by the CPI for all items, FAT is the consumer fat concern index, BEVAD is a vector of deflated advertising expenditures for competing milk products in the current and previous months, MILKAD is a vector of deflated generic milk advertising expenditures in the current and previous months, $SEASON_k$ is a vector of seasonality variables represented by the k-th wave of the sine and cosine functions, and YEARDUM is a vector of intercept dummy variables for various years in the sample. Because there is a high correlation between the retail fluid milk price and the nonalcoholic beverage price index, inclusion of these two variables separately in the model causes multicollinearity problems. To deal with this problem, a ratio of the retail milk price to the nonalcoholic beverage price index is used. Monthly data from 1986 through 1997 are used to estimate the coefficients in equation (1).

The coefficients on all advertising variables are estimated with a second order polynomial distributed lag function with endpoint restrictions imposed. This approach is used to estimate the effect on current month sales of not only current month advertising, but also on advertising in past months. This assumes that the impact of advertising is distributed over time rather than being limited to only the month that the advertising is aired, which is a common assumption (Liu and Forker, Kaiser and Reberte). The length of the lag for each market is determined by selecting the lag length resulting in the best statistical fit for the model. Consequently, the models for all markets are the same with the possible exception of the number of lagged advertising variables.

One advantage of the double-log form is that it provides coefficient estimates that are direct estimates of elasticities. An estimated elasticity is a measure of the percentage change in the dependent variable (sales in this case) resulting from a one percent change in an independent variable. In the equation specified above, α_1 is the own price elasticity (the elasticity of milk sales with respect to the milk price), α_2 is the income elasticity (the elasticity of milk sales with respect to income), α_3 is the consumer fat concerns elasticity (the elasticity of milk sales with respect to consumer fat concerns), and β_i and ω_j are the competing and own advertising elasticities (the elasticity of milk sales with respect to competing beverage and milk advertising expenditures in the current and previous months).

In July and August of 1994, expenditures for national fluid milk advertising were zero. Since the logarithm of zero is undefined, a nominal expenditure of $1 is specified for each of these two months so that the double-log model can be estimated.

Econometric Results

The elasticity estimates of important economic variables are reported in Table 1, while Table 2 presents the entire econometric estimates for the five markets, which were estimated using ordinary least squares. The estimated coefficients on the traditional economic variables (e.g., price and income) were either not significantly different from zero, or were relatively small in magnitude. For example, the retail price elasticity was only statistically significant in New York City (-0.375), i.e., a one percent increase in price would have resulted in an average decrease in per capita sales of 0.375 percent in New York City. The relatively small magnitude or lack of statistically significant elasticities was consistent with virtually every previous study of New York State markets (see, for example, Kinnucan; Kinnucan and Forker; Kaiser and Reberte). The income variable was only statistically significant in New York City. In this market, a one percent increase in income had a positive impact of increasing per capita milk sales by 0.232 percent. The negligible impact of price and income on per capita fluid milk sales was not surprising considering that milk is generally viewed as a staple good, i.e., changes in price or income have little impact on milk sales.

Consumer concerns over dietary fat was statistically significant from zero in the Albany and Rochester markets. The elasticity of per capita milk sales with respect to fat concerns was -0.259 in Albany and -0.197 in Rochester. It appears that milk consumption is significantly effected by consumer concerns about dietary fat in these two markets. Competing beverage advertising was only statistically significant in the Rochester market. In this market, a one- percent increase in competing beverage advertising had the impact of reducing per capita milk sales by 0.21 percent.

Generic milk advertising had a positive impact on milk sales in all markets, and was statistically significant in four out of the five markets. Buffalo had the highest average long-run generic milk advertising elasticity of 0.077, i.e., a one percent increase in generic milk advertising expenditure resulted in an average increase in per capita milk sales of 0.077 percent.[2] New York City was close behind with an average long-run advertising elasticity of 0.058. All three remaining markets had a generic milk advertising elasticity of 0.012.

Impacts of New York State Advertising on Farm Prices and Profits

The estimated model was used to simulate the impact of New York State generic milk advertising on producer prices and returns. The model was simulated under two advertising scenarios over the 1987-97 period: (1) with combined national and New York State milk advertising expenditures equal to historic monthly levels, and (2) with national milk advertising expenditures equal to historic levels, but no New York State advertising. This model implicitly assumes that dollars spent on the New York program have the same impact as dollars spent on the national program. A comparison of the results of the two scenarios provides a measure of the state program's impact on New York markets. The two bottom-line measures that New York dairy farmers are interested in are how state-level advertising impacts the blend (farm milk) price and whether the benefits of state-level advertising are greater than the costs in each of the five markets.

New York State dairy farmers invest 5 to 6 cents (in nominal terms) of their checkoff money for each hundredweight of milk marketed in local advertising. Assuming there is no supply response and no changes in Class I and Class II prices due to New York State advertising, the advertising impacts on blend price (ΔBP) are equal

to:

[2] The estimated advertising elasticity for Buffalo may be biased upward for two reasons. First, there are some milk sales in this market from Canadians living over the border which are attributed to the Buffalo population.. Second, there is some milk advertising from Ontario in this market which is not included in the demand equation.

$$\Delta BP = BP_a - BP_0 = \frac{(P^{II} + DF)Q_a^I + P^{II}(Q - Q_a^I)}{Q} - \frac{(P^{II} + DF)Q_0^I + P^{II}(Q - Q_0^I)}{Q}$$

$$= \frac{(P^{II} + DF)(Q_a^I - Q_0^I) - P^{II}(Q_a^I - Q_0^I)}{Q} = \frac{DF \bullet \Delta Q^I}{Q}$$

where BP_a and BP_0 are blend prices with and without New York State advertising expenditures; Q_a^I, Q_0^I, Q, and ΔQ^I are fluid milk sales with and without advertising, total milk sales, and change in fluid milk sales due to fluid milk advertising, respectively; and P^{II} and DF are milk price in manufactured markets and Class I differential.

The simulation results indicated that over the period 1986-97, investing 5.5 cents per cwt into generic fluid milk advertising increased the blend price for New York State dairy producers by an average of 8.8 cents per cwt. Since the blend price is based on marketwide information, which is geographically larger than any of the five individual New York State cities considered in this study, the same procedures cannot be used to estimate a return for each city. However, a different but comparable method can be used to measure the impacts of New York State advertising for each market in terms of returns. The benefits of fluid milk advertising are the additional Class I revenues created by increasing fluid milk sales since milk going into fluid use receives a premium (Class I differential) compared to milk going into manufactured dairy products. Accordingly, the benefits in each market due to state milk advertising are equal to:

$$BENEFIT = DF * \Delta SALES * POP,$$

where BENEFIT is the monetary value of benefits in the market due to state-level advertising, ΔSALES is the change in per capita sales in the market due to state-level milk advertising, and POP is the market population. The benefits associated with New York State generic milk advertising were computed monthly from 1987 to 1997 by simulating the above two scenarios and taking the difference in per capita sales to obtain ΔSALES. To account for inflation, the Class I differential in each market was deflated by the CPI (in 1997 dollars). The cost in each market due to state milk advertising is the advertising cost. As was the case before, to account for inflation, advertising cost (COST) was deflated by the Media Cost Index (in 1997 dollars). A benefit-cost ratio for state-level advertising in each market can then be calculated as:

$$BCR = BENEFIT/COST.$$

Table 3 displays the estimated average BCRs to New York State generic milk advertising from 1987 to 1997 for the five markets and a weighted average for all five markets. It is clear from these findings that state spending on generic milk advertising over the period 1987-97 has been profitable for dairy farmers. The weighted average BCR for the five markets was 2.82, i.e., an additional dollar spent on state generic milk advertising resulted in an average increase of $2.82 in Class I revenue. This figure is higher than our previous study using similar data over the period 1986-95, which estimated an average BCR for New York state of 2.35.

In terms of individual New York State markets, New York City had the highest BCR, which was closely followed by Buffalo. This result was similar to earlier findings by Thompson and Eiler, and Thompson using data from the 1970s. Liu and Forker, however, found that the BCR was slightly higher in Syracuse than in New York City, and recommended increasing advertising in Syracuse threefold at the expense of a 10 percent reduction in advertising in New York City and Albany. But Liu and Forker did not consider the Buffalo market. The relative change in BCR between New York City and Syracuse may be due to wear out in the Syracuse market and/or diminishing returns to advertising. Advertising levels in Syracuse were increased threefold in 1990, and maintained at this level ever since. Consequently, it is entirely reasonable to expect some erosion in the BCR for this market. All of the markets, except for Rochester, had BCRs at or above above 1.00, indicating that the New York State contribution to the overall advertising program had benefits that exceeded costs, on average, over this period of time.

Conclusion

The purpose of this study was to examine the responsiveness of fluid milk sales to milk advertising in the New York City, Albany, Syracuse, Rochester, and Buffalo markets. Fluid milk demand equations for New York City, Albany, Syracuse, Rochester, and Buffalo were estimated with monthly data from 1986-97. The demand equations included the following explanatory variables: retail milk price, nonalcoholic beverage price index, per capita weekly earnings in the manufacturing sector, consumer fat concerns index, competing beverage advertising expenditures, generic milk advertising expenditures, seasonality variables, and annual indicator variables.

The results indicated that generic milk advertising was positive and statistically significant at the 10 percent significance level in all but one market. The highest advertising elasticity was in the Buffalo market, followed closely by New York City. The model was simulated to determine the impact of the New York State portion of advertising expenditures on producer milk prices and returns. The results indicated that the blend price increased by 8.8 cents per cwt, on average, while farmers invested 5.5 cents per cwt in fluid milk advertising for each market. Benefit-cost ratios were also estimated for each of the five markets. The weighted average BCR for the five markets was 2.82. In terms of individual New York State markets, New York City had the highest BCR, which was followed closely by Buffalo. All of the markets, except for Rochester, had BCRs at or above 1.00, indicating that New York State's contribution to the overall advertising program had benefits that exceeded costs, on average, over this period of time.

Table 1. Selected elasticities, evaluated at sample means, for the five New York markets.

Variable	Albany	Buffalo	NYC	Rochester	Syracuse
Price	-0.005	-0.105	-0.375*	0.076	-0.064
Income	-0.118	-0.123	0.232*	0.207	0.091
Fat concerns	-0.259*	-0.022	0.123	-0.197*	-0.004
Competing advertising	0.109	0.085	-0.053	-0.210*	0.016
Milk advertising	0.012*	0.077*	0.058*	0.012	0.012*

* Statistically significant from zero at the 10 percent level.

Table 2. Estimation results for the per capita milk sales model for each market.[1]

Variable	Albany	Buffalo	NYC	Rochester	Syracuse
Constant	2.3837 (2.78)	1.3283 (1.69)	0.2855 (0.24)	4.0485 (3.71)	2.3978 (3.28)
Milk Price / Nonalcoholic Beverage Price Index	-0.0046 (-.04)	-0.1046 (-1.01)	-0.374 (-3.89)	0.0762 (0.48)	-0.0640 (-0.90)
Average weekly earnings	-0.1179 (-.51)	-0.122 (-0.78)	0.2321 (1.49)	0.2071 (1.16)	0.0908 (0.70)
Consumer fat concern	-0.2587 (-2.31)	-0.0220 (-0.21)	0.1232 (1.20)	-0.1972 (-1.37)	-0.0035 (-0.04)
Generic milk advertising, t	0.0005 (1.59)	0.0082 (1.98)	0.0016 (3.75)	0.0008 (0.81)	0.0003 (2.04)
Generic milk advertising, t-1	0.0009 (1.59)	0.0137 (1.98)	0.0030 (3.75)	0.0014 (0.81)	0.0006 (2.04)
Generic milk advertising, t-2	0.0013 (1.59)	0.0165 (1.98)	0.0041 (3.75)	0.0018 (0.81)	0.0008 (2.04)
Generic milk advertising, t-3	0.0015 (1.59)	0.0165 (1.98)	0.0050 (3.75)	0.0020 (0.81)	0.0010 (2.04)
Generic milk advertising, t-4	0.0016 (1.59)	0.0137 (1.98)	0.0057 (3.75)	0.0020 (0.81)	0.0011 (2.04)
Generic milk advertising, t-5	0.0016 (1.59)	0.0082 (1.98)	0.00609 (3.75)	0.0018 (0.81)	0.0012 (2.04)
Generic milk advertising, t-6	0.0015 (1.59)		0.0062 (3.75)	0.0014 (0.81)	0.0012 (2.04)
Generic milk advertising, t-7	0.0013 (1.59)		0.0060 (3.75)	0.0008 (0.81)	0.0012 (2.04)
Generic milk advertising, t-8	0.0009 (1.59)		0.0057 (3.75)		0.0011 (2.04)
Generic milk advertising, t-9	.0005 (1.59)		0.0050 (3.75)		0.0010 (2.04)
Generic milk advertising, t-10			0.0041 (3.75)		0.0008 (2.04)

Variable	Albany	Buffalo	NYC	Rochester	Syracuse
Generic milk advertising, t-11			0.0030 (3.75)		0.0006 (2.04)
Generic milk advertising, t-12			0.0016 (3.75)		0.0003 (2.04)
Sum of lagged generic milk advertising coefficient	0.0119 (1.59)	0.0772 (1.98)	0.0578 (3.75)	0.0124 (0.81)	0.0116 (2.04)
Competing advertising, t	0.0049 (1.01)	0.009 (1.19)	-0.0015 (-0.43)	-0.0140 (-1.82)	0.0004 (0.17)
Competing advertising, t-1	0.0088 (1.01)	0.0151 (1.19)	-0.0027 (-0.43)	-0.0245 (-1.82)	0.0008 (0.17)
Competing advertising, t-2	0.0118 (1.01)	0.0181 (1.19)	-0.0038 (-0.43)	-0.0315 (-1.82)	0.0011 (0.17)
Competing advertising, t-3	0.0138 (1.01)	0.0181 (1.19)	-0.0046 (-0.43)	-0.0350 (-1.82)	0.0014 (0.17)
Competing advertising, t-4	0.0148 (1.01)	0.0151 (1.19)	-0.0052 (-0.43)	-0.0350 (-1.82)	0.0015 (0.17)
Competing advertising, t-5	0.0148 (1.01)	0.009 (1.19)	-0.0055 (-0.43)	-0.0315 (-1.82)	0.0016 (0.17)
Competing advertising, t-6	0.0138 (1.01)		-0.0056 (-0.43)	-0.0245 (-1.82)	0.0017 (0.17)
Competing advertising, t-7	0.0118 (1.01)		-0.0055 (-0.43)	-0.0140 (-1.82)	0.0016 (0.17)
Competing advertising, t-8	0.0088 (1.01)		-0.0052 (-0.43)		0.0015 (0.17)
Competing advertising, t-9	0.0049 (1.01)		-0.0046 (-0.43)		0.0014 (0.17)
Competing advertising, t-10			-0.0038 (-0.43)		0.0011 (0.17)
Competing advertising, t-11			-0.0027 (-0.43)		0.0008 (0.17)

Variable	Albany	Buffalo	NYC	Rochester	Syracuse
Competing advertising, t-12			-0.0015 (-0.43)		0.0004 (0.17)
Sum of lagged competing advertising coefficient	0.1087 (1.01)	0.0847 (1.19)	-0.0527 (-0.43)	-0.2100 (-1.82)	0.0159 (0.17)
Cos1	0.0347 (4.15)	0.0592 (4.86)	0.0265 (3.55)	0.0415 (3.98)	0.04722 (7.96)
Cos2	-0.0071 (-1.29)	-0.0084 (-1.57)	0.0021 (0.41)	-0.0163 (-2.38)	-0.0138 (-3.00)
Cos3	0.0162 (3.75)	0.0161 (4.16)	0.0151 (2.89)		0.0077 (1.73)
Cos4	0.0101 (2.64)	0.0119 (3.28)	0.0087 (1.73)	0.0073 (1.52)	0.0109 (2.50)
Cos5	0.0075 (2.17)	0.0134 (4.45)	0.0121 (2.35)		0.0080 (1.82)
Cos6	-0.0124 (-5.32)	-0.0068 (-3.41)	-0.0104 (-3.02)	-0.0063 (-2.07)	-0.0116 (-3.93)
Sin1	-0.0014 (-0.11)	0.0063 (0.46)	0.0054 (0.91)	-0.0196 (-0.98)	-0.001 (-0.20)
Sin2	-0.0161 (-2.96)	-0.0165 (-3.03)	-0.0218 (-4.64)	-0.0259 (-3.84)	-0.0332 (-7.40)
Sin3	0.0012 (.28)	0.0080 (2.11)	0.0049 (1.05)	0.0196 (3.57)	0.0135 (3.10)
Sin4	0.0070 (1.86)	0.0098 (2.94)	0.0166 (3.56)	0.0086 (1.84)	0.007 (1.86)
Sin5	0.0299 (8.83)	0.0191 (6.63)	0.0208 (4.43)	0.0218 (5.05)	0.0237 (5.73)
D87					
D88			0.0000 (0.00)		

Variable	Albany	Buffalo	NYC	Rochester	Syracuse
D89		0.0472 (2.21)	0.0163 (0.70)		
D90	0.0191 (0.83)	0.0463 (1.88)	0.0550 (1.90)	0.0407 (1.32)	0.0392 (2.11)
D91	-0.0448 (-1.86)	0.0448 (1.90)	0.0650 (2.13)	0.044 (1.62)	0.1233 (6.24)
D92	-0.0133 (-0.63)	0.0273 (1.22)	0.0262 (0.98)	0.0006 (0.02)	0.0357 (1.99)
D93	-0.0362 (-1.69)	0.0304 (1.41)	-0.0248 (-0.90)	-0.028 (-0.94)	-0.0290 (-1.62)
D94	-0.0397 (-1.86)		-0.040 (-1.50)	-0.0066 (-0.23)	-0.0443 (-2.40)
D95	-0.0451 (-1.60)		-0.0469 (-1.56)	-0.0519 (-1.35)	-0.0704 (-3.09)
D96	-0.0874 (-3.26)		-0.0421 (-1.32)	-0.0762 (-2.03)	-0.0851 (-3.93)
D97	-0.0562 (-2.12)		-0.0735 (-2.59)	-0.1315 (-3.07)	-0.1138 (-5.90)
Adjusted R-Square	.6868	.6865	.6107	.6745	.8309
Durbin Watson	2.005	2.068	1.960	2.138	1.982

[1] Numbers in parentheses are t-statistics, based on the number of observations used for equation estimation--an estimated t-statistic of 1.282 or above indicates statistical significance in this study at the 10 percent significance level.

Table 3. Benefit-cost ratios to New York state generic milk advertising, evaluated at sample means, for the five New York markets.

	Albany	Buffalo	NYC	Rochester	Syracuse	Market average
Benefit-cost ratio	1.00	2.84	3.42	0.94	1.15	2.82

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