

---

# **Evaluating the Effectiveness of Generic Advertising and Nonadvertising Marketing Activities on New York State Milk Markets**

---

Yuqing Zheng, Cornell University, AEM  
Harry Kaiser, Cornell University, AEM  
March 14, 2008, SC

---

# Overview and Motivation

- Investigated the separate impacts of generic advertising and nonadvertising marketing activities on New York state retail demand for fluid milk
  - Generic milk advertising has taken the lion's share of two check-off programs' budgets (the Dairy Program and the MilkPEP Program) and therefore has been the subject of most of the studies that have evaluated fluid-milk promotion (e.g., Kaiser 1997, 1999; Vande Kamp and Kaiser 1999; Adachi and Liu 2006). Optimal media allocation and optimal temporal policies also have been addressed for generic fluid-milk advertising expenditures (Pritchett, Liu, and Kaiser 1998; Dong, Schmit, and Kaiser 2007; Vande Kamp and Kaiser 2000)
-

---

# What about Nonadvertising Marketing?

- Nonadvertising Marketing activities consist mainly of sales promotions, public relations, nutrition education, and sponsorship by fluid-milk processors and dairy farmers
  - Expenditures for marketing other than advertising have consumed a small but increasing portion (less than 8% before 1998 but around 20% thereafter) of fluid-milk check-off funds. Dairy farmers recently have significantly decreased spending on generic advertising and in 2008 will spend none of the mandatory budget on advertising. Milk processors, on the other hand, continue to spend a significant amount on advertising for the “milk moustache” campaign
  - Given the limited amount of check-off funds available, optimal allocation of the funds between advertising and other marketing efforts to maximize returns to dairy producers has become an especially important issue for program managers and stakeholders
-

---

# Objective

- The objective of this research is to investigate the separate impacts of these two forms of marketing activities—generic advertising and nonadvertising—on fluid-milk demand
  - We generate estimates of advertising and nonadvertising elasticities and then use those estimates to obtain benefit cost ratios and determine the optimal allocation of fluid-milk check-off funds between advertising and nonadvertising marketing
-

# Retail Demand Model

$$\ln Q_{it} = \beta_0 + \beta_1 \ln Q_{it-1} + \beta_2 \ln P_{it} + \beta_3 \ln Inc_{it} + \beta_4 Adv_{it}^* + \beta_5 Nadv_{it}^* + \sum_{j=6}^{18} \beta_j X_{jt} + u_{it}$$

- $i$ : ALB, BUF, NYC, ROC, SYR.  $t$ : 1986.Q1-2005.Q4
- Per capita retail demand for fluid milk is a function of demand in the previous quarter, retail price for fluid milk, per capita personal disposable income, generic advertising and nonadvertising goodwill
- Advertising goodwill: the weighted sum of advertising expenditures in the previous three quarters. Use of goodwill accounts for possible carryover effects. Weight is jointly estimated with the model
- $X$  is a vector of control variables that includes competing beverage advertising, race and age compositions, a dining-out effect represented by per capita food-away-from-home expenditures, regional and quarterly dummies, and a time trend

# Results: Elasticities

**Table 1. Elasticities for Factors Affecting the Retail Demand for Fluid Milk**

Demand Factors	Adv and Nadv Separately	Adv and Nadv Combined
	Elasticity	Elasticity
Retail price	-0.061	-0.084
Per capita income	0.247**	0.195
<b>Generic advertising</b>	0.035**	0.055*
<b>Nonadvertising marketing activities</b>	0.0068*	
Competing beverage advertising	-0.037	0.001
Percent of Hispanic population	0.253*	0.063
Percent of Asian population	0.032	-0.147
Percent of population between age 5 to 19	-1.421*	-1.508*
Northeast per capita food-away-from-home expenditures	0.008	-0.018

Example: A 1 percent increase in income is estimated to increase per capita sales of fluid milk by 0.247 percent.

\* = Statistically significant at the 5% significance level or less.

\*\* = Statistically significant at the 10% significance level or less.

Adjusted  $R^2$  is 0.91. Degrees of freedom are 369.

# Market-Specific Elasticities

**Table 2. Market-Specific Elasticities**

Elasticity	Albany	Buffalo	NYC	Rochester	Syracuse
Generic advertising	0.035	0.035	0.035	0.035	0.025
Nonadvertising marketing activities	0.0072	0.0098	0.0068	0.0072	0.0078

- We don't find the elasticities statistically different from each other for the five markets

---

# Returns to Dairy Producers

- We simulate the retail demand together with a retail-to-farm price linkage equation and a farm supply equation (assuming a supply elasticity of 0.6). The whole model translates advertising- and nonadvertising-induced shifts in retail demand into changes in farm prices
  
- The model was simulated under three generic advertising scenarios for the 2002–2005 period:
  1. Base – historical advertising expenditures
  2. National milk advertising expenditures equal to historical levels, and no NYS milk advertising
  3. National milk advertising expenditures equal to historical levels, and NYS generic milk advertising expenditures set to 99% of historical levels

Scenarios 1 and 2 yield average benefit-cost ratio: the return to *every* dollar spent on advertising

Scenarios 1 and 3 yield marginal benefit-cost ratio: the return to the *last* dollar spent on advertising

---

# Gross Benefit-Cost Ratios and Marginal Effects

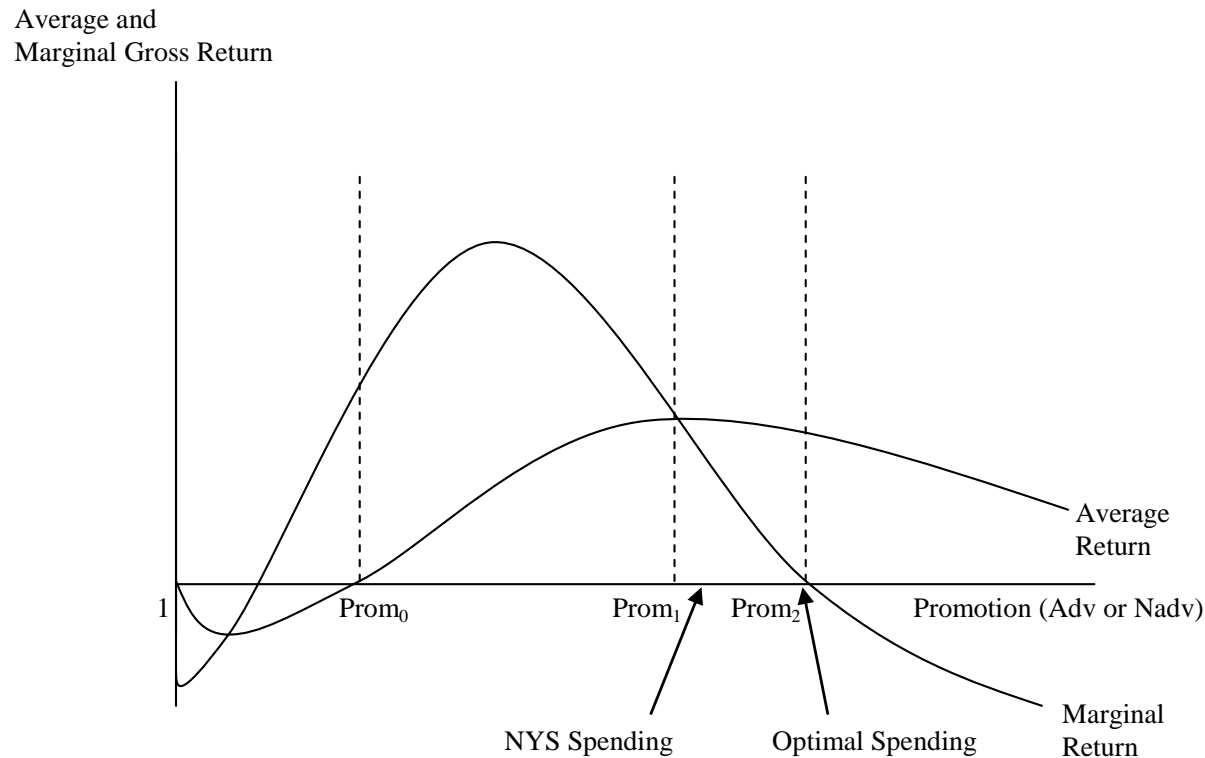
**Table 3. Benefit-Cost Ratios and Marginal Effects of Milk Advertising and Nonadvertising Marketing**

	Adv and Nadv		Adv and NAdv
	Separate		Combined
<b>Benefit-Cost Ratios (BCR)</b>	<i>Adv</i>	<i>NAdv</i>	<i>Adv+NAdv</i>
Average BCR (2002-2005)	2.94	1.72	2.62
Marginal BCR (2002-2005)	2.78	1.42	2.29
<b>Marginal Effects of per \$mln Input</b>			
Marginal Effects (2002-2005)	2.39	2.14	

- Example of marginal effect: A \$1 million increase in advertising is estimated to increase per capita sales of fluid milk by 2.39 pounds.

# Relationship between Average BCR and Marginal BCR

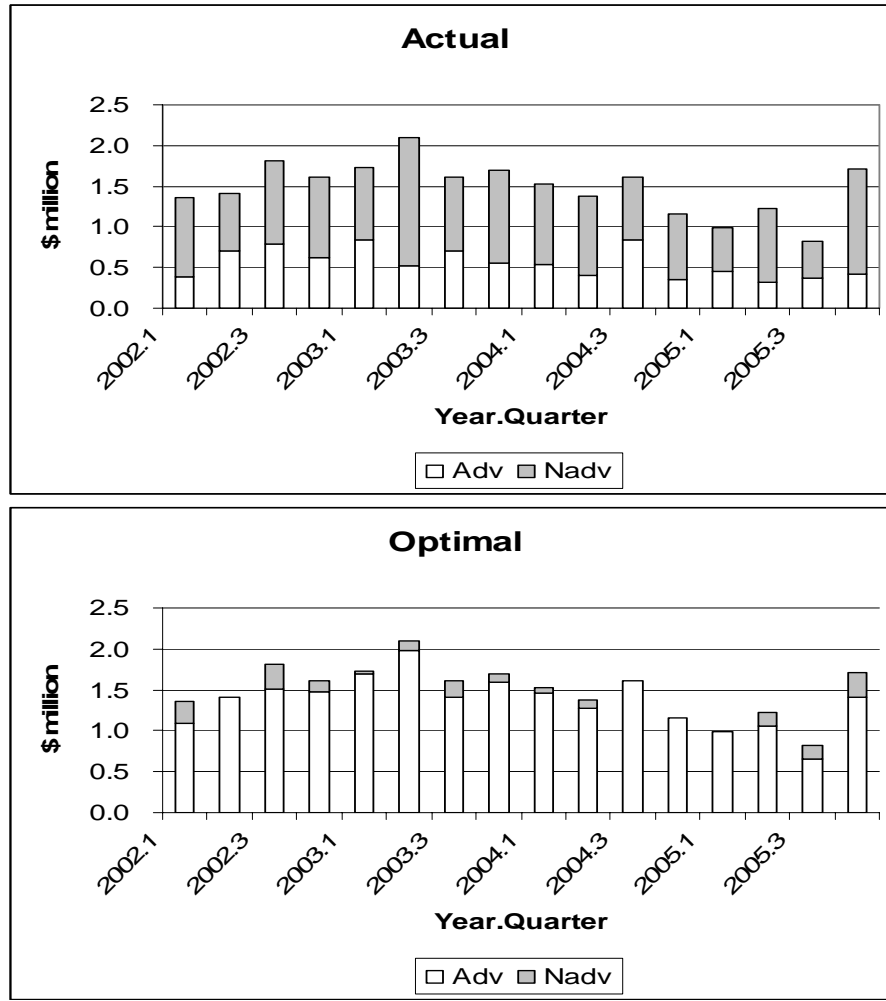
Figure 1. Relationship between Average and Marginal Returns to Promotion



# Optimal Allocation Of Fluid-milk Check-off Funds

- Principle: allocation decisions can proceed strictly on the magnitude of promotion-specific elasticities (similar to Kinnucan and Thomas, 1997) 
$$\frac{Adv_{it}}{Nadv_{it}} = \frac{E_a}{E_n}$$
- Since NYS program managers do not have control over national funds, the optimal allocation of NYS's regional funds given national budgets is 
$$\frac{Adv_{it}^{Natl} + Adv_{it}^{NYS}}{Nadv_{it}^{Natl} + Nadv_{it}^{NYS}} = \frac{E_a}{E_n}$$
- - For given  $Adv_{it}^{Natl}$ ,  $Nadv_{it}^{Natl}$ ,  $E_a$ ,  $E_n$ , and the sum of  $Adv_{it}^{NYS}$  and  $Nadv_{it}^{NYS}$ , we solve for  $Adv_{it}^{NYS}$  and  $Nadv_{it}^{NYS}$  for 2002 through 2005.

Figure 2. Actual and Optimal Allocation of Expenditures on NYS Fluid-Milk Advertising and Nonadvertising for 2002–2005



- Under optimal allocation for 2002 through 2005, NYS dairy producers could have enjoyed a gain of \$129,626 per quarter in producer surplus and this return would have been virtually free of cost since it would have been a reallocation of existing dollars

# Conclusion

- First, panel-data estimates of the long-term advertising and nonadvertising elasticities—0.035 and 0.0068, respectively—indicate that both types of marketing activities have a positive and statistically significant effect on per capita milk demand. These estimates also support the conventional wisdom that advertising is one of the most powerful marketing tools available
- Second, simulation using an equilibrium-displacement model yields (gross) average and marginal benefit-cost ratios of 2.94 and 2.78 for advertising and 1.72 and 1.42 for nonadvertising expenditures in the long term. These results suggest that both advertising and nonadvertising marketing efforts have been profitable for dairy farmers in NYS and that it would be beneficial for farmers to increase their investment in these activities
- Third, it would be optimal to divert more nonadvertising expenditures to advertising in the NYS market. Under optimal allocation for 2002 through 2005, NYS dairy producers could have enjoyed a gain of \$129,626 per quarter in producer surplus and this return would have been virtually free of cost since it would have been a reallocation of existing dollars