# MILK IN THE FAST-FOOD OUTLET:

# CONSUMER DEMAND AND MARKETING OUTLOOK

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Historically, dairy industry leaders have attempted to strength their market with non-brand advertising and promotion. Most efforts have concentrated on at home consumption. However, American consumption patterns are changing; some estimate that within a decade 50 percent of food expenditures will be for meals consumed away from home (Langway and Nicholson).

Many factors could have influenced this change in consumption patterns--more women in the workforce, increased per capita income, dempgraphic shifts, or even increased leisure time. A more important catalyst, however, could be the growth of fast-food restaurants--the only segment of the away from home food industry with a growing market share.

Few comprehensive analyses have been completed for dairy product sales in public eating places. Specifically, research in the fastest-growing segment of that industry, fast-food establishments, has been severely neglected. This paper presents an analysis of consumer demand for milk in fast-food outlets in Virginia and the resulting marketing implications for the Virginia dairy industry.

## Theoretical Model

A single-equation model was specified to identify components of consumer demand for milk in fast-food outlets in Virginia. Both

economic and qualitative variables were included to account for a variety of factors affecting consumer behavior.

Retail prices for milk, soft drinks, and coffee are incorporated into the model. Soft drinks and coffee are hypothosized substitutes for milk; therefore, the expected sign for these coefficients is positive. That is, rising prices of the substitute beverages should trigger increased demand for milk. Conversely, increased milk prices should dampen consumer demand for milk. Therefore, the expected sign for this coefficient is negative.

Pastry, both breakfast Danish and hot dessert pies, is identified as an item complementary with milk. Therefore, a variable reflecting the consumption of pastry is incorporated into the model and its expected sign is positive.

A proxy for per capita income is included because it was not possible to calculate the actual income level associated with each neighborhood outlet. Therefore, this variable reflects demand differences by market area instead of demand differences by individual outlet. The expected sign of this coefficient is positive, based upon earlier research by George and King.

Certain qualitative or subjective factors could affect consumer preference for one fast-food outlet over another. In order to account for these, a set of zero-one discrete dichotomous variables was included in the demand model. The first zero-one variable identified fast-food outlets which served breakfast and was included on the assumption of complementarity between milk and breakfast. Other zero-one variables accounted for main dish menu characteristics such as fish, roast beef,

and hamburger. Another zero-one variable represented a limited menu--a characteristic of Wendy's restaurants.

Two discrete variables were used to appraise locational factors. One identified outlets located near shopping malls; it was included as a proxy for the potential number of customers an outlet could attract. The other was proximity to a high school, a reflection of youth demand.

In summary, the consumer demand equation for half-pints of milk in Virginia fast-food outlets is specified as follows:

$$QMD = f(PMR, PSR, PCR, Y, QPD, D1, \ldots D6)$$

where

QMD = weekly volume of half-pints of milk sold by each fast-food outlet,

PMR = retail price of half-pints of milk, cents,

PSR = retail price of medium-sized soft drinks, cents,

PCR = retail price of cups of coffee, cents,

Y = per capita income of the locality in which an outlet is located, dollars,

QPD = weekly quantity of pastry (hot pies and Danish) sold by the outlet, number of servings,

D1 = dummy variable accounting for fast-food outlets which serve breakfast,

D2 = dummy variable accounting for location near a shopping mall,

D3 = dummy variable accounting for location near a high school,

D4 = dummy variable accounting for a fish-based menu,

D5 = dummy variable accounting for a roast-beef based menu, and

D6 = dummy variable accounting for a limited menu.

Data were collected from 62 fast-food outlets in Virginia December 11, 1978 through January 5, 1979. Seven fast-food chains (Arby's, Arthur Treacher's, Burger Chef, Burger King, Hardee's, McDonald's, and Wendy's) participated in the study.[1] Data represents quantities sold during an average week in October or November. Care was taken to exclude any week which contained a holiday. Operators asserted that milk sales do not exhibit seasonal fluctuation in the fast-food market. Per capita income statistics were obtained from the Taylor Murphy Institute.

## Empirical Results and Economic Analysis

Parameter estimates of the statistical model were obtained using ordinary least squares (OLS) on the cross-sectional data. The estimated coefficients and their standard errors are reported in Table 1. The estimated demand equation follows:

$$QMD = -460.75 - 18.93PMR + 20.06PSR + 0.021Y + 0.216QPD + 160.51D1 + 98.24D2 + 272.95D4 + 122.75D5 + 349.61D6.$$

The coefficient of determination, $R^2$, was 0.543. The F-statistic was statistically significant at the 0.005 level. Only two variables, the retail price of coffee and the zero-one locational variable for high schools, were judged not significantly different from zero at the 0.05

TABLE 1. Consumer Demand Equation for Half-Pints of Milk, Seven Virginia Fast-Food Chains, Dairy Product Fast-Food Study, 1979.[a]

| Variables | Intercept | PMR | PSR | Y | QPD | D1 | D2 | D4 | D5 | D6 |
|---|---|---|---|---|---|---|---|---|---|---|
| Coefficient | -460.75 | -18.93 | 20.06 | 0.021 | 0.216 | 160.51 | 98.24 | 272.95 | 122.74 | 349.61 |
| Std. error | 390.53 | 7.43 | 10.20 | 0.009 | 0.066 | 54.22 | 49.59 | 94.07 | 63.29 | 75.74 |
| Units | Half-pints | ¢ | ¢ | $ | Servings | 0-1 | 0-1 | 0-1 | 0-1 | 0-1 |
| Mean value | | 30.08 | 38.11 | 7190.2 | 439.3 | 0.387 | 0.209 | 0.145 | 0.300 | 0.145 |
| Elasticity | | -3.035 | 4.075 | 0.797 | | | | | | |
| Hyp. sign | | - | + | + | + | + | | | | |

[a]This is a single regression equation with 52 degrees of freedom.

$R^2$ = .5425 F-ratio = 6.85 Standard error of the estimate = 136.3227

The dependent variable is quantity of half-pints of milk sold each week; mean value is 187.61.

All elasticities are computed at the mean of the observations.

level. Multicollinearity did not appear to be a problem. All signs conformed to hypotheses; however, five zero-one variables did not have hypothesized signs due to a lack of a priori information. The Goldfeld-Quandt test indicated that the data did not exhibit heteroskadasticity at the 0.05 level of significance.

Consumption of half-pints of milk in these fast-food outlets was significantly influenced by changes in the price of milk and the price of medium-sized soft drinks. The coefficient of the own-price variable (-18.93) implies that consumers will demand about 19 additional half-pints of milk each week if an outlet lowers its price by one cent. The corresponding price elasticity of demand is -3.035, calculated at the mean of the observations. This greater-than-unity own-price elasticity reflects high consumer sensitivity to small price changes.

In addition, consumers appear sensitive to changes in the price of medium-sized soft drinks. This cross-price elasticity, computed at the mean of the observations, is 4.075. In other words, an outlet which decreased its soft drink price by one percent would also decrease milk sales by about four percent, all other factors remaining constant. Consumers seem very willing to substitute one beverage for the other.

Per capita income was included in the model as another element of consumer demand. The estimated coefficient (0.021) implies that consumers would demand approximately two additional half-pints of milk from each outlet each week for every $100 increase in their income. The relatively inelastic income elasticity, 0.797, was computed at the mean of the observations and implies that a one percent increase in per capita income would generate a less than one percent increase in the demand for

half-pints of milk from fast-food restaurants.

The quantity of pastry coefficient (0.216) suggests that milk consumption increases by two half-pints for each ten-serving increase in pastry sales. The zero-one variable for breakfast implies that the addition of a breakfast menu shifts the demand surface upward. Likewise, the shopping mall locational variable indicates that an outlet situated near a mall should realize greater sales of milk than the same outlet not located near a mall. The other three zero-one variables also implied an increased demand for milk when an outlet demonstrated the required characteristic.

## Conclusions and Implications

In this fast-food study, the demand for milk was shown to be very price elastic (-3.035). For every one percent reduction in the retail price of milk, consumer demand should increase approximately three percent. In this case, price reductions at the fast-food level would result in increased total revenue to the firm. Such an increase is contingent upon the actions of soft drink manufacturers, however. The very elastic cross-price estimate (4.075) makes the dairy industry susceptible to retalitory price reductions from the soft drink industry.

On the other hand, George and King obtained a very inelastic price elasticity estimate (-0.346) for milk consumed at home. Therefore, price reductions at the grocery retail level would result in decreased total revenue to the firm, just the opposite of the previous example.

The preceeding contradictory elasticity estimates for the same product purchased under different circumstances implies that consumers perceive milk as two different goods. In other words, milk consumed

at home is a different good, with different attributes, from milk consumed in a fast-food restaurant.[2] Consequently, it may be inappropriate to use price elasticity estimates derived for milk consumed at home when evaluating milk consumed away from home. Furthermore, separate price elasticity estimates should be developed for other types of restaurants rather than assuming these fast-food estimates are representative of all away from home eating places.

But what does this mean to the dairy industry? First, the very elastic cross-price estimate warns against engaging in a price war with soft drink manufacturers. In addition, fast-food outlet operators realize greater profit margins on soft drinks than on milk (Gill). Therefore, should a price war ensue, fast-food operators could sell soft drinks at reduced prices and still maintain a larger profit margin than that on milk.

The fast-food market is big business for the soft drink industry--this market accounts for about seven to nine percent of soft drink industry sales (Stout). Can the dairy industry capitalize on this ever-growing market of potential customers? Price-cutting is not the answer, even though consumers appear price-sensitive. What alternatives are left?

It seems that any efforts to capture a larger share of this fast-food market will have to be a demand-pull phenomena. In other words, the dairy industry will have to motivate consumers to purchase milk before that customer sets foot in a fast-food restaurant. It is here that advertising and promotion might help.

Details of an advertising campaign should be the subject of another study. However, several ideas come to mind. Assuming researchers find a positive consumer response to advertising, an appropriate theme could incorporate the nutritional, healthy aspects of milk. And, just as "Coke Adds Life . . . to a hamburger and fries," it is possible that "Milk is a Natural . . . with hamburger and fires" could be an effective means of capitalizing on past dairy advertising.

Researchers should investigate a cents-off coupon promotion, also. For example, the industry could attach a coupon to each one-gallon milk container. In a cooperative advertising scheme, the coupon could be used for 10¢ off a speciality item and a carton of milk from fast-food chain X.

It is possible that advertising research may show that no amount of advertising will induce customers to buy milk in a fast-food outlet. If that is the case, the dairy industry needs to know so that energy and dollars are not wasted on advertising campaigns directed at unresponsive customers. American consumption patterns are shifting rapidly; the dairy industry must become aware of its position in developing markets if it is to survive.

## FOOTNOTES

[1]For a complete discussion of survey methods and results, see Gill (1979).

[2]For a complete discussion of Lancasterian theory, see Lancaster (1966).

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