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The Influence of Socio-Economic Characteristics on Food Advertisement Usage

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Executive Summary

Only 22 percent of surveyed consumers reported making frequent use of food advertisements when purchasing food products. However, certain demographic segments appear to place a greater emphasis on food advertisements than others. This study empirically evaluates which socio-economic characteristics encourage consumers to be more likely to take food advertisements into account when purchasing grocery products. The results indicate that those with lower annual incomes, those with lower levels of education, and those living in suburban and rural areas are the most likely to make use of food advertisements in the newspaper. The results also indicate that households with children, single individuals, and those over 65 years of age are less likely to use food advertisements.

Introduction

Food advertisement is a powerful tool for positioning and promoting food products in a highly competitive market. Run-away product proliferation and competition for supermarket shelf space has resulted in the success of only a small percentage of newly introduced food products (Senaur, 1991). Yet the effects of food marketing can greatly increase the chances of success for food products. Positive food advertisement, even in the presence of negative information presented in the media, has been shown to have a positive effect on market demand for food commodities (Chang and Kinnucan, 1991). While many studies have provided aggregate estimates of the effect of food advertisement on overall commodity demand, (e.g. Green et al., 1991, Brester and Schroeder, 1995) little research has created a profile of those who frequently make use of food advertisements. For most new products, selective targeting of a specific audience is necessary. However, any modifications in consumer behavior arising from new advertising campaigns are intrinsically limited by the existing use of food advertisements. Determining which consumers are most likely to make use of food advertisements may be beneficial to increasing the success of advertising campaigns or lowering the cost of food marketing. Specifically, this analysis attempts to predict consumer usage of newspaper food advertisements and decompose the effects of demographic characteristics which encourage consumers to make use of food advertisements.

Examination of food advertisement usage to determine its effectiveness is not only underrepresented in the existing literature, but will also aid in selectively targeting advertisement for the highest return on marketing expenditure. One necessary step is to ascertain which consumers are most likely to make use of food advertisements in actual purchase practice. In addition to aggregate measures of advertisement usage, specific consumer demographic characteristics can be tested for their marginal contributions to advertisement usage. As advertisement usage is not homogeneous across population segments, a program which selectively targets specific groups could maximize the net benefits of an advertising campaign.

Advertisement by food marketers is used in several ways. Food promotions can inform consumers and differentiate products based on price or availability and also be used to introduce new processed and prepared food products. In the case of newspaper advertisement, which is an important form of promotion for the grocery market, the primary motivation of the consumer is price comparison. The consumer is most often interested in finding the lowest cost for food products he or she is already familiar with. Staple commodities such as beef and tomatoes and brand name processed foods are competitively advertised and marketed through newspaper promotions based on price. Coupons accompanying the advertisement provide further incentive for consumer patronage and can also be used to gauge the effectiveness of advertising campaigns.

Those who report reading food advertisements actively exhibit a concern about food product prices. Assumptions can be made about the perceptions and motivations of

advertisement users because the act of finding information, reading about, and comparing advertised products requires an investment of time and effort. This investment represents a value which under assumptions of rational behavior suggests that information acquisition is less costly than non-comparative shopping. Therefore, those found to regularly consult food advertisements might typically be expected to have an above average concern over the cost of their food expenditures. They may also be more willing to switch supermarkets frequently in order to purchase advertised specials. The use of special promotions may effectively gain the patronage of shoppers who are transient between retailers.

Since the late 1960's, the United States has undergone a series of dramatic demographic changes which present the challenge of developing and distributing new food products to a dynamic population. Among the major demographic shifts are the changing age distribution, the slowing population growth, changes in the structure of the median family, and the gender make-up of the work force (Senauer, 1991; U.S. Department of Commerce, 1988). In order to successfully market new food products, demographic shifts and differences must be well understood and the needs of specific consumer segments must be considered. Not only must food products be developed with demographic differences in mind, but food marketing initiatives must also be planned according to these differences as well.

Previous marketing research has suggested that food consumption behavior is not consistent across the country. For instance, Nayga documented statistical differences

suggesting expenditure on fresh vegetables (1995) and nutritional label usage (1996) differs among national regions. In contrast to food marketing studies which have employed national data sets, the data source used in this analysis represents a sample of New Jersey consumers. The study findings are likely to be applicable to other northeastern states and highly populated regions of the country. A localized sample better exemplifies a specific region of the country and may help avoid incongruencies which are found in some national studies. Virtually no food advertisement usage research has centered solely on any part of the northeast region, one of the richest consumer markets in the nation. Because of its high population density, its working consumers being among the highest paid in the nation, and for its high number of food manufacturers, New Jersey was an ideal focus for this analysis.

The purpose of this study was to empirically evaluate which socio-economic characteristics encourage consumers to read newspaper food advertisements when making grocery purchases. A logit framework is used to quantify the effects of several demographic factors on advertisement usage.

Methods

A review of existing studies revealed no widely accepted theoretical or empirical guidelines for evaluating the impact of socio-demographic factors in the likelihood of food advertisement usage. Although relevant literature is limited, there is ample justification to suggest that demographic characteristics should influence food advertisement usage. Firstly, the primary purpose of food advertisement usage is price

comparison. Numerous studies have show that price sensitivity and household food expenditures differ among socio-economic groups. For instance, Govindasamy and Italia (1997) reported that price sensitivity toward fresh produce is influenced by demographic characteristics. Other studies have illustrated that fresh produce expenditures also differ among different household characteristics (Blaylock and Smallwood, 1985; Ritzman, 1982; Nayga, 1995)

Secondly, food advertisement usage, like nutritional labeling usage, is essentially information acquisition for the purpose of making purchase related decisions. Guthrie et al. (1995) and Nayga (1996) approached the information provided by nutritional labels as a commodity which consumers will continue to make use of as long as the benefits surpass the costs of label usage. Although the motivation behind nutritional labeling usage is likely to be health-related and use of food advertisements is likely to be price-related, the same approach can be employed for both analyses. Both food label and advertisement usage require an investment of time and effort on the part of the consumer for information acquisition. This methodology, initially proposed by Stigler (1961), specifically models the consumer's search for information which itself has been shown to be influenced by individual characteristics (Katona and Mueller, 1955). Clearly, information acquisition can be influenced by factors which affect diversified consumer segments and households in different fashions. These factors include time constraints, literacy in English, and the marginal effect of price changes on a particular household's demand for food products. These factors also vary among

distinct demographic segments supporting the use of consumer characteristics in evaluating usage of food advertisements.

The logit model was selected for the regression in this analysis because its asymptotic characteristic constrains the predicted probabilities to a range of zero to one. The logit model is also favored for its mathematical simplicity and is often used in a setting where the dependent variable is binary. As the survey utilized in this analysis provided individual rather than aggregate observations, the estimation method of choice was the maximum likelihood estimation (Gujarati, 1992). Among the beneficial characteristics of MLE are that the parameter estimates are consistent and asymptotically efficient (Pindyck and Rubinfeld, 1991).

The model assumes that the probability of being a frequent user of nutrition labels, P_i , is dependent on a vector of independent variables (X_{ij}) associated with consumer i and variable j , and a vector of unknown parameters β . The likelihood of observing the dependent variable was tested as a function of variables which included socio-demographic and consumption characteristics.

$$P_i = F(Z_i) = F(\alpha + \beta X_i) = 1 / [1 + \exp(-Z_i)]$$

Where:

$F(Z_i)$ = represents the value of the standard normal density function associated with each possible value of the underlying index Z_i .

P_i = the probability that an individual is a frequent user of food advertisements given knowledge of the independent variables X_i s

e = the base of natural logarithms approximately equal to 2.7182

Z_i = the underlying index number or βX_i

α = the intercept

And βX_i is a linear combination of independent variables so that:

$$Z_i = \log [P_i / (1 - P_i)] = \beta_0 + \beta_1 X_{i1} + \beta_2 X_{i2} + \dots + \beta_n X_{in} + \varepsilon$$

Where:

i = 1, 2, . . . , n are observations

Z_i = the unobserved index level or the log odds of choice for the i^{th} observation

X_n = the n^{th} explanatory variable for the i^{th} observation

β = the parameters to be estimated

ε = the error or disturbance term

The dependent variable Z_i in the above equation is the logarithm of the probability that a particular choice will be made. The parameter estimates do not directly represent the effect of the independent variables. To obtain the estimators for continuous explanatory variables in the logit model, the changes in probability that $Y_i = 1(P_i)$ brought about by a change in the independent variable, X_{ij} is given by:

$$(\partial P_i / \partial X_{ij}) = [\beta_j \exp(-\beta X_{ij})] / [1 + \exp(-\beta X_{ij})]^2$$

For qualitative discrete variables, such as the explanatory variables used in this study, $\partial P_i / \partial X_{ij}$ does not exist. Probability changes are then determined by:

$$(\partial P_i / \partial X_{ij}) = P_i(Y_i : X_{ij} = 1) - P_i(Y_i : X_{ij} = 0)$$

The following model was developed to predict the likelihood of making frequent use of printed food advertisements (i.e. those who usually or always consult food advertisements when deciding on which food products to purchase). The model was tested under the specification:

$$\text{Prob} = \beta_0 + \beta_1 \text{Male} + \beta_2 \text{Over65} + \beta_3 \text{Income1} + \beta_4 \text{Income2} + \beta_5 \text{Education2} \\ + \beta_6 \text{Education3} + \beta_7 \text{Suburb} + \beta_8 \text{Rural} + \beta_9 \text{Single} + \beta_{10} \text{Household_Size} \\ + \beta_{11} \text{Children} + \beta_{12} \text{Prime} + \beta_{13} \text{Media} + \beta_{14} \text{Shop_Many} + \beta_{15} \text{Label}$$

Where:

- Prob = 1 if the participant usually or always checked food advertisements when purchasing foods and 0 otherwise
- Male = 1 if the individual is male and 0 otherwise
- Over65 = 1 if the individual is older than 65 years of age and 0 otherwise
- Income1 = 1 if the annual household income is under \$30,000 and 0 otherwise
- Income2 = 1 if the annual household income is between \$30,000 and \$49,000 and 0 otherwise
- Education2 = 1 if the individual had completed at least a bachelors degree but not a graduate degree and 0 otherwise
- Education3 = 1 if the individual had completed at least a graduate degree and 0 otherwise
- Suburban = 1 if the individual resides in a suburban neighborhood and 0 otherwise
- Rural = 1 if the individual resides in a rural neighborhood and 0 otherwise
- Single = 1 if the individual was presently unmarried and 0 otherwise
- Household_Size = 1 if the number of individuals living in the household were 4 or more and 0 otherwise

Children	= 1 if any individuals under the age of 17 resided in the household and 0 otherwise
Prime	= 1 if the individual was the primary household shopper and 0 otherwise
Media	= 1 if the individual made frequent use of television and radio reports on food safety issues in forming opinions of the safety of food products and commodities and 0 otherwise
Shop_Many	= 1 if the individual frequently shopped at several different supermarkets in order to purchase advertised specials and 0 otherwise
Label	= 1 if the participant usually or always checked nutritional labeling when purchasing foods and 0 otherwise

For estimation purposes, one classification was eliminated from each group of variables to prevent perfect collinearity. The base group of individuals and omitted variables are given in Table 1. Based on previous food information acquisition literature (i.e. nutritional label usage) and food product expenditure and price sensitive literature, a hypothetical composite was developed to characterize food advertisement users. Those with lower annual incomes and lower levels of education were expected to be more frequent advertisement users (Govindasamy and Italia, 1997). Females (Nayga; Bender and Derby, 1992; Guthrie et al.) and households with children (Feick, Harrmann, and Warland, 1986; Guthrie et al.) were initially hypothesized to be likely to be advertisement users. Older individuals were expected to be less likely to be advertisement users (Bender and Derby).

Table 1: Descriptive Statistics for Explanatory Variables

Variable		N	Percentage	Std. Dev.
Gender				
(Male)	Male	100	0.344	0.4757
	Female*	191	0.656	0.4757
Age				
(Over_65)	Less than 36 years of age	51	0.175	0.3808
(Under_65)	36 - 50 years of age*	240	0.825	0.3808
Annual Household Income				
(Income1)	Less than \$30,000	48	0.165	0.3717
(Income2)	\$30,000 to \$50,000	58	0.199	0.4002
(Income3)	More than \$50,000	185	0.636	0.4821
Education				
(Education1)	Less than 4 year college degree*	98	0.337	0.4734
(Education2)	Completed 4 year college degree	114	0.391	0.4489
(Education3)	At least graduate degree	79	0.271	0.4454
Regional Characteristics				
(Suburban)	Suburban region	229	0.787	0.4102
(Rural)	Rural region	39	0.134	0.3412
(Urban)	Urban region*	23	0.079	0.2702
Are you currently single?				
(Single)	Yes	42	0.144	0.3520
	No*	249	0.856	0.3520
Household Size				
(Household_Size)	Four or more individuals	67	0.770	0.4217
	Less than four individuals*	224	0.230	0.4217
Are there children residing in the household?				
(Children)	Yes	97	0.333	0.4722
	No*	194	0.667	0.4722
Are you the primary grocery purchaser of the household?				
(Prime)	Yes	244	0.838	0.3686
	No*	47	0.162	0.3686
Do food safety reports in the media frequently help determine the food products you purchase?				
(Media)	Yes	119	0.409	0.4925
	No*	172	0.591	0.4925
Do you frequently shop at several stores in order to purchase advertised specials?				
(Shop_Many)	Yes	210	0.3882	0.4882
	No*	81	0.3882	0.4882
Do you frequently make use of nutritional labeling on the food products you purchase?				
(Label)	Yes	210	0.721	0.4489
	No*	81	0.279	0.4489

* Refers to omitted category in the logit analysis

Data Description

The data for this analysis was collected from a survey conducted by Rutgers Cooperative Extension. The survey was administered at five grocery retailers throughout New Jersey and was completed in 1997. The retail locations included three corporate supermarkets of various sizes, one independent supermarket, and a privately owned direct market establishment. The survey was conducted during both weekend and weekday periods throughout the morning and afternoon hours. Respondents were approached at random while entering the retail establishment. Before distribution, the survey was pre-tested by a group of randomly selected individuals. The pre-tested surveys were not included in the final data set. The survey data was input into a flat text file which was subsequently read by SAS running on a UNIX platform for descriptive and econometric analysis.

The survey contained questions which dealt with the several issues important to food purchasing behavior, food risk perceptions, and the socio-demographic characteristics of the respondents. Overall, 408 surveys were physically distributed to New Jersey shoppers yielding a sample of 291 responses with a response rate of 71 percent.

In the case of the dependent variable, 64 respondents (22%) indicated that food advertisements in newspapers were usually or always used when making decisions about which food products to purchase and 227 (78%) respondents reported that advertisements were not often important. Table 1 provides a descriptive tabulation of

the explanatory variables used in this analysis. Approximately 66 percent of respondents were female and 83 percent had completed at least some college. About 58 percent of the participants were 49 years of age or below, while approximately 37 percent of the respondents had annual household incomes of less than \$39,999. Approximately 33 percent purchased groceries for children who lived in their household. About 13 percent lived in rural areas while 8 percent lived in urban areas and 79 percent lived in suburban areas.

Empirical Results

The maximum likelihood estimates for frequent label usage are displayed in Table 2. Those over 65 years of age were found to be 18 percent less likely to use food advertisements than those who were younger. Some possible interpretations would be that older individuals are more financially stable and because their food expenditures tend to be lower than average, they may not be as sensitive to food prices. Another possibility is that older individuals are more likely to continue their purchasing behavior through force of habit. This would imply that they might be less likely to search for lower prices or less expensive brands which require them to travel to stores at greater distances.

Those with at least one child under the age of 17 living in the household were found to be 18 percent less likely to use food advertisements. Although households with children may have less discretionary per capita income, this finding might suggest that information acquisition imposes a significant opportunity cost of time on those who care

for children. Households with children have also been found to be less sensitive to price when purchasing food (Govindasamy and Italia, 1997). One possible reason might be that parents concern for their children's healthy eating overshadows frugality in households which can afford to do so.

Table 2: Maximum Likelihood Estimates of the Logit Model

<i>Variable</i>	<i>Estimate</i>	<i>Standard Error</i>	<i>Change in Probability</i>
Intercept***	-3.4898	1.2410	-0.7985
Male	-0.3242	0.3791	-0.0741
Over65*	-0.7977	0.4675	-0.1825
Income1	0.2438	0.4004	0.0558
Income2***	1.0508	0.3756	0.2404
Education2*	-0.6153	0.4394	-0.1408
Education3*	-0.7436	0.4394	-0.1702
Suburb*	1.9648	1.0827	0.4496
Rural*	2.1188	1.1491	0.4848
Single*	-0.9992	0.5436	-0.2286
Household_Size	0.4397	0.4636	0.1006
Children*	-0.7878	0.4483	-0.1803
Prime	0.5692	0.5161	0.1303
Media	0.4979	0.3255	0.1139
Shop_Many***	-0.1577	0.3474	0.2778
Label	-0.4772	0.3633	-0.1092

Ratio of nonzero observations to the total number of observations: 0.22

*: significant at the .10 level
 **: significant at the .05 level
 ***: significant at the .01 level

Variables denoting regional location suggest that those who reside in urban neighborhoods are less likely to make use of food advertisements than those who live in rural or suburban areas. Of the significant variables regional location had the

greatest magnitude effect on advertisement usage. Those living in rural and suburban areas were respectively 48 percent and 45 percent more likely to use food advertisement than urban residents.

Although only one of the two income variables was statistically significant, the estimated coefficients of both suggest that lower earning households are more frequent users of food advertisements. Specifically, those annually earning between \$30,000 and \$49,999 were 24 percent more likely to use food advertisements than those annually earning in excess of \$50,000. This finding further supports the notion that advertisement use is motivated by price sensitivity. Also consistent with the hypothesis that advertisement users are highly sensitive to price, those who frequently shop at more than one supermarket to purchase advertised specials were found to be 28 percent more likely to be frequent label users than those who do not.

Education was significant in predicting those who used food advertisements. Two separate variables suggested that those with higher levels of education were less likely to be frequent advertisement users. Those with at least a bachelors degree were 14 percent less likely to use food advertisements than those who did not. Similarly, those with at least a graduate degree were 17 percent less likely to make use of food advertisements than those who had not complete a four year college degree. As highly educated individuals are also often higher earning individuals, the estimates for education also appear consistent with the results for income.

Single individuals were also found to be 23 percent less likely to use food advertisements than those who are not. This may suggest that singles purchase less grocery products than non-singles and rely more heavily on prepared meals.

Variables denoting the primary household grocery shopper and gender, which although highly correlated with one another, were found to be insignificant in predicting use of food advertisement. Two additional measures of information acquisition which captured the effect of households which made frequent usage of food safety reports in the media and those who frequently made use of nutritional labeling were also insignificant. However, the motivation behind the consumers' information search in these instances were preservation of health and safety as opposed to comparative price shopping. Other insignificant variables included a dummy variable which denoted the primary household shopper and a measure of household size.

The logit model chi-square statistic was significant at the 0.0001 level clearly rejecting the null hypothesis that the set of explanatory variables were together insignificant in predicting variation in the dependant variable. With a 50-50 classification scheme, approximately 75 percent of the individuals in the sample were correctly classified as those who place a high degree of importance on nutritional labeling when selecting grocery products.

Conclusion

Qualitative choice models are ideal for analysis of many types of consumer behavior. This study illustrates the potential of a logistic framework in decomposing the effects of individual demographic characteristics in decision making. From the perspective of food marketing agents, the characteristics of advertisement users should aid in developing a profile of those likely to respond to market campaigns. Marketers can choose to selectively target characteristics such as suburban and rural households, younger individuals and those with lower incomes through advertising in regional areas where these characteristics are highly prevalent. Larger supermarket firms may also choose to target individual demographic groups through television commercials.

Alternatively, other characteristics may be less likely to respond to advertisement such as those over 65 years of age, single individuals, those living in urban areas, and those with high incomes. Marketers may choose to reduce advertisements in regional areas in which these characteristics are high allowing a more aggressive concentration on areas which are more likely to generate higher responses.

Ideally, food advertisement would translate into changes in consumer purchase behavior. Ultimately, the promotional impact of food advertisement is limited by the current usage of advertisements by consumers. While the findings of this study did bring to light several significant variables, some limitations should be noted. Specifically, the small sample size and highly concentrated regional makeup of the

participants warrant some caution when extending the outcome of this study to other geographic areas. Furthermore the socio-economic characteristics of sample area indicate the region to be more densely populated than most regions of the country and that local consumers tend to be more highly educated and higher earning than those in most other regions. This study attempted to identify the effect of consumer characteristics on the likelihood of being a frequent user of food advertisements. The results may be useful for professionals in food marketing by increasing the effects of their marketing endeavors.

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