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An Analysis of the Determinants of Farmer-to-Consumer Direct-Market Shoppers

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This study examines factors affecting users of farmer-to-consumer direct markets. Data for the study were generated by telephone survey administered to 400 random sample consumers in Alabama. The sample was stratified to ensure adequate representation of both metro and non-metropolitan areas. A binary logit model was employed to analyze the data. Results revealed that education was the most significant variable with regard to shopping at farmer-to-consumer direct markets. Although income by itself was not significant, families with children were more likely to shop at a farmer-to-consumer direct market as their income increases.

Farmer-to-consumer direct marketing is a means by which farmers sell their produce directly to consumers. Some of the more familiar types of outlets are pick-your-own (PYO) produce farms, roadside stands or tailgate vehicles, and farmers' markets. PYO operations are farms where retail customers harvest their own agricultural products. Roadside stands are mostly temporary structures erected to display produce, while a tailgate vehicle involves the use of a wagon or a pick-up truck to display produce. Farmers' markets, on the other hand, are places where farmers bring their produce to be sold. A regular site and schedule is usually set for a particular farmers' market. The market sponsors frequently include a business group (such as a Chamber of Commerce), consumer groups, county extension, and/or producers. Items frequently sold through direct-marketing outlets are fruits, vegetables, flowers, nursery products, eggs, and dairy products.

Farmers view direct marketing as an alternative market outlet to increase their income, while consumers see it as a means of gaining access to fresher, higher-quality foods at lower costs (Nayga et al. 1994). Consumers also derive cultural and social benefits from direct contacts with farmers, and from visits to farm and nature.

This study determines the factors affecting direct-market users. An understanding of direct-market users will provide insights into the socio-economic characteristics of direct market clients. Information gained will be useful in formulating policies and programs to maintain the loyalty of current users and specifically target non-users. In the next section a review of related studies is presented, followed by the data description and method of analysis. The results are then presented, followed by the conclusions.

Related Studies

Govindasamy and Nayga (1996) examined consumer characteristics affecting visits and purchases in different types of produce direct markets—PYO farms, roadside stands, farmers' markets, and direct farm markets—using the logit framework. The results indicate that those who buy produce for fresh consumption are 20-percent more likely to visit roadside stands than are those who do not buy for fresh consumption. Individuals sixty-five years old or less are more likely to visit roadside stands than are those above sixty-five. Female customers were 18 percent more likely to visit direct farm markets than are male customers, while those with incomes below $40,000 are more likely to visit roadside stands and farmers' markets. The results also indicate that those who reside in urban and suburban areas are more likely to visit farmers' markets.

Gandee, Brown, and D'Souza (2003) used an econometric model to analyze the influence of consumer demographic, spatial, and land characteristics upon direct farm-marketing sales in West Virginia. The study adapted generalized least squares to estimate a single regression model. The results revealed that consumer demographics, land, and spatial characteristics significantly affect the amount of direct farm-marketing sales received

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by farm establishments in West Virginia counties. Education and income positively influenced marketing sales. An increase in the percentage of persons with a professional degree in a county increased the amount of sales in direct markets. Spatial factors were also found to influence sales: an increase in distance from the metropolitan area increased county direct farm-marketing sales.

Wolf (1997), in a case study of targeted consumer profiling and positioning for promotion of direct marketing of fresh produce, examined consumers in San Luis Obispo County, California. Two groups of consumers were identified—shoppers and non-shoppers—to compare the target market of consumers who shopped at farmers' markets with those who did not. The demographic profile of farmers' market shoppers indicates that the consumers tend to be older, married, and less likely to be employed. Farmers' market shoppers are generally in the middle and higher ends of the income distribution. There was no significant difference with regard to education and gender between farmers' market shoppers and non-shoppers.

Wolf and Berrenson (2003) examined the profile of consumers in a farmers' market in San Luis Obispo. The study compared primary shoppers with non-primary shoppers. Primary shoppers are those who come to the farmers' market to shop for produce, while non-primary shoppers are those who come for all other reasons, including, eating, socializing, shopping at downtown stores, and for entertainment. Results revealed that primary shoppers of produce tend to be older and are more likely to be married than are non-primary shoppers. Primary shoppers are more likely to be middle-income consumers.

Data Description and Analysis

The data for this study were obtained by means of telephone surveys. The survey consists of questions soliciting information related to consumer characteristics and preferences toward farmer-to-consumer direct markets. In addition, questions relating to consumer shopping habits, problems encountered by shoppers in direct markets, and consumer demographics were collected. The survey was pretested, modified, and revised in collaboration with Advanced Strategic Research (ASR) in Baton Rouge, Louisiana prior to full-scale data collection. The survey was designed to require approximately eight minutes to administer.

The sample frame included a statewide random sample of consumers. From this, 400 participants were selected for the interview. To achieve the targeted sample and enhance representation, as necessary, three call-back attempts were made to each number dialed. These procedures enhanced the validity of the sample as hard-to-reach respondents were included in the sample. The participants were stratified into metro and non-metropolitan areas to ensure adequate representation of rural and urban areas in the sample. Three hundred participants were randomly selected, and an additional 100 respondents from rural areas were interviewed to increase the representation of the sample.

Methodology

A logit model was used to analyze the data. Logit is the natural logarithm of the odds in favor of a positive response (shopping at a direct market). The estimated logit was represented as

$$1)\quad L_i = \ln\left(\frac{P_i}{1-P_i}\right) = Z_i = \beta_0 + \sum \beta_i X_i \,,$$

where L_i is the logarithm of the odds of shopping at a direct market, X_i represents the independent variables, P_i is the conditional probability of a consumer shopping at a direct market given X_i, and β_i represents the parameters estimated.

Definition of Variables

Table 1 presents the definitions of variables used in the logit analysis and their descriptive statistics. The dependent variable (shopping at a direct market) is dichotomous with an assigned value of "1" for those respondents who shopped at a farmer-to-consumer direct market and "0"for those who did not buy their produce at a farmer-to-consumer direct market.

The independent variables included in the analysis were age, gender, race, education, marital status, income, families with children, and the interaction of families with children and income. *Age* was the actual age of the respondents, and it was hypothesized to have a positive sign. *Gender* was a dummy variable with male respondents = 1 and female respondents = 0, and was hypothesized to have a negative sign. *Race* was classified as a dummy variable, with white = 1 and non-white

Table 1. Definition of Variables Used in Logit Analysis and Their Descriptive Statistics.

Variables	Definition	Mean	Std. dev.	Expected sign
Dependent variable				
Shopping at a direct market	1= shopped at a direct market; 0= did not shop	0.79	0.410	N/A
Independent variables				
Age	Actual age (years)	46.43	20.143	+
Gender	1= male; 0= female	0.2825	0.4508	-
Race	1= white; 0= non-white	0.7868	0.4102	+
Education	1= Above high school; 0= high school grad and less	0.5953	0.4915	+
Marital Status	1= married; 0= single	0.6269	0.4842	+
Income	Continuous	2.07	1.837	+
FWC	1= families with children; 0= families without children	0.4689	0.4997	+
Income by FWC	Families with children by income	1.09	1.74	+
Location	1= metro; 0= non-metro	0.7250	0.4471	+

= 0. Similarly, *Education* was a dummy variable with more than high school education = 1 and high school graduates and below = 0. The expected sign was positive, suggesting that respondents with more than high school education will be more likely to shop at a farmer-to-consumer direct market. *Marital status* was also a dummy variable with married = 1 and single = 0. *Income* was a continuous variable and was expected to have a positive sign. Income was coded as "1" for income under $25,000, "2" between $25,000 and $34,999, "3" between $35,000 and $49,999, "4" between $50,000 and $74,999, "5" between $75,000 and $99,999, and "6" for $100,000 or more. *Families with children* was a dummy variable with households with children = 1 and households without children = 0. Due to the initial results, an interaction between families with children and income was introduced into the model and this variable was hypothesized to have a positive sign. *Location* was a dummy variable with a value of "1" for respondents who reside in metropolitan areas and "0" for those in non-metropolitan areas. This variable was expected to have a positive sign.

Results

Table 2 presents the result of the logistic regression analysis and the computed change in probability, including the maximum-likelihood estimated coefficients, Wald-test statistics, change in probability-likelihood-ratio test, Nagelkerke R^2, and the model-prediction success. The R^2 indicates that the model fits the data fairly well. A low R^2 is acceptable in logistic regression (Hosmer and Lemeshow 2000). The likelihood-ratio test, which measures the significance of the model, was significant, with a score of 374.4, suggesting that there is a relationship between the probability of shopping at a farmer-to-consumer direct market and the sug-

Table 2. Probability Estimation of the Logit Model.

Variables	β Coeff	Std. error	Wald	Sig. level	Change in probability
Constant	0.824	0.499	2.726	0.10	-
Age	0.003	0.007	0.138	0.71	0.0006
Gender	0.092	0.290	0.102	0.75	0.0188
Race	0.089	0.321	0.077	0.78	0.0182
Location	-0.138	0.293	0.223	0.64	-0.0307
Education*	0.524	0.262	4.002	0.05	0.0858
Marital status	-0.144	0.278	0.268	0.61	-0.0321
FWC x Income**	0.138	0.086	2.591	0.10	0.0274
Log-likelihood ratio test statistics	= 374.4				
Nagelkerke R^2 = 0.033					
Model prediction success =78.5%					

* significant at .05 level ** significant at .10 level

gested independent variables.

The model correctly predicted 78.5 percent of the responses, assuming a 50-percent shopping rate for a 28.5 percent improvement over chance.

The estimated results were interpreted using the change in probability (ΔP_i), given as

$$2) \quad \Delta P_i = \beta_j P_i (1 - P_i)$$

where P_i is the estimated probability of shopping at a farmer-to-consumer direct market, evaluated at the mean and β_j is the estimated coefficient of the jth variable. The change in probability (ΔP_i) is a function of the probability, and when multiplied by 100 gives the percentage change in the probability of occurrence given a change in the variable, all other things being equal.

The table shows that education (above high school) was the most significant variable when it comes to shopping at a farmer-to-consumer direct market. The change in probability suggests that respondents with education above high school were 8.5 percent more likely to shop at a farmer-to-consumer direct market, and this was significant at the five-percent level. Another important variable was income. Although not significant by itself, the interaction between families with children and income was significant at the ten-percent level. The change in probability suggests that as the income of families with children increases, they were about three percent more likely to shop at a farmer-to-consumer direct market.

Age was positively correlated with shopping at a farmer-to-consumer direct market as expected, suggesting that the older the consumer, the higher the likelihood of shopping at a farmer-to-consumer direct market. However, it was not significant. The change in probability shows that older people were about 0.06 percent per year more likely to shop at a farmer-to-consumer direct market. Whites were 1.8 percent more likely to shop at a farmer-to-consumer direct market than were non-whites, although the relationship was not significant.

In contrast to Govindasamy and Nayga (1997), males were about 1.8 percent more likely to buy at a farmer-to-consumer direct market than were females. This may be due to the fact that this study covered all types of farmer-to-consumer direct markets. However, this also was not significant.

With regard to location, those who lived in metropolitan areas were less likely to buy at a farmer-to-consumer direct market. The change in probability indicates that they were three percent less likely to shop at a farmer-to-consumer direct market. Again, unlike the previous studies, this relationship may be due to the fact that this study combined all types of farmer-to-consumer direct markets.

Furthermore, there was a negative but not-significant relationship between married couples and shopping at a farmer-to-consumer direct market.

Conclusion

The results of this study provide insights into the factors that affect shopping at a farmer-to-consumer direct market. The results are generally consistent with previous studies.

With regard to shopping at a farmer-to-consumer direct market, education was the most significant variable. Consumers with education above high school were more likely to shop at a farmer-to-consumer direct market, and this was significant at the five-percent level. Similarly, as income increases, families with children were more likely to shop at a farmer-to-consumer direct market than were families without children. Older people, males, and whites were all more likely to shop at a farmer-to-consumer direct market. However, their relationships were not significant.

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