

# Consumer Selection of Retail Outlets in Buying Pecans

Wojciech J. Florkowski, Zhikang You, and Chung L. Huang

The study identifies differences in consumer characteristics and the selection of the type of a retail outlet in pecan purchases. Within the framework of utility maximization, an empirical model is specified and estimated using multinomial logit. The estimation is based on data collected through a nationwide survey. Calculated marginal probabilities show the importance of age, household income, and household size among the important consumer characteristics that influence the selection of a retail outlet. Employment and the timing of pecan purchases also influence the use of a specific type of retail outlet. In particular, mail-order purchases are made by older persons with higher incomes and larger households in comparison to purchases at grocery stores or other outlets. The study provides knowledge needed to improve marketing strategies for different outlets and suggests that various strategies can be developed to reach different groups of pecan buyers by type of retail outlet.

Pecans are among the most popular tree nuts in the United States. About two of three American households use either pecans, walnuts, or almonds, according to *Pecan South* (1993), which cites the results of a consumer study commissioned by the Pecan Marketing Board. The three tree nuts are consumed in the largest quantities in the United States and are well-known to consumers. The annual production of pecans represents a \$200 million business at the farm level alone (USDA, 1995), and sustained consumption of pecans and pecan products is necessary to improve economic returns to growers (Minor, 1996). The maintenance and expansion of the pecan market is dependent on an increase in nut availability to consumers, an increase in the relative price of pecans, and improved advertising and promotion (Williams et al., 1972; Florkowski and Hubbard, 1994).

In recent decades, consumers have increasingly used channels other than supermarket stores to purchase food. Between 1980 and 1997, the conventional supermarkets faced competition from wholesale clubs, supercenters, and other outlets (*Food Retailing Review*, 1996). Pecans can be found in several different supermarket sections, including those where baking ingredients, snacks, produce, and natural foods are shelved. In non-conventional stores (for example, wholesale clubs or superstores), pecans are placed in sections where snacks and candy are shelved. However, for raw pecan sales, the

most important retail alternative to supermarkets has been mail-order firms. Industry estimates indicate that about one-quarter of shelled, raw pecans are sold through retail outlets annually while another 8 percent was reportedly sold by mail-order businesses (National Pecan Shellers Association, 1984). In spite of the great potential importance of outlets other than grocery stores to the success of marketing edible nuts, factors that affect the consumer's outlet choice have not been examined.

This paper provides insights into the socioeconomic and demographic factors that influence consumers' choice among grocery stores, mail-order firms, and other retail outlets in purchasing pecans. The identification of any potential differences in consumer characteristics associated with the selection of a specific outlet in pecan purchases will provide information needed to effectively target potential buyers by increasing the outlet personnel's awareness of possible consumer preferences, thus promoting pecan sales and saving marketing costs. The results of this study will also be of interest to retailers of other tree nuts because many outlets offer more than a single variety, allowing consumers to substitute one tree nut for another, for example, the use of pecans instead of walnuts in some baking recipes or desserts. Consumer use of shelled pecans is the primary objective of the effort on the part of grower organizations, and the results of this study help to focus the industry's promotion programs. Mail-order catalogs include pecans prepared in packages with other tree nuts—either in-shell or shelled, raw, roasted, or flavored with dried fruit and candy. Improved understanding of the potential customer by mail-order companies and selected

---

The authors are associate professor, postdoctoral associate, and professor, respectively, Department of Agricultural and Applied Economics, University of Georgia, College of Agricultural and Environmental Sciences, Griffin Campus, Griffin, GA.

catalog mailings may lower the cost of marketing and contribute to higher returns. Many mail-order companies that specialize in pecan sales lack adequate resources to research the market and, thus, base decisions only on their experience. Results from this study will permit a critical evaluation of the incomplete observations. Other tree nut industries, searching for differences and similarities among buyers of their products, may compare profiles of consumers who select pecan retail outlets to consumer selection observed in sales of other tree nuts.

### Conceptual Framework

The observed trends in the retail industry suggest the diversification of retail outlets to accommodate various needs of consumers. Pecans are sold by a number of retailers, ranging from supermarkets to mail-order companies and grower-operated specialty stores located in pecan-producing areas. Pecans and pecan products can be found in food warehouse outlets while tourism encourages the sale of pecans at road stands in areas stretching from Virginia to Texas to California. With the onset of the Internet, pecan sales found yet another outlet, reaching a specialized, but potentially lucrative, market of computer users shopping via electronic means (Florkowski and Hubbard, 1996). Internet shopping is the latest alternative to a well-established mail-order business.

Mail order has been recognized as a form of diversifying distribution channels on an international scale (Greenland and McGoldrick, 1991). Sales of pecans through the mail have been a recognized form of distribution for about two decades (Mosteller, 1980). Mail-order sales of pecans have been among the fastest-growing forms of retailing pecans and offer a flexible and convenient in-home shopping alternative. Recent predictions have emphasized that consumers "seek convenient and speed shopping" (Humphreys, 1996). In response to consumer demands for convenience, supermarket chains market themselves as "one-stop shopping." Fierce competition exists among grocery stores; the construction of mega stores, among other efforts, is intended to save customers additional shopping trips in search of desired products. Supermarket managers encourage customers to identify items that cannot be found in their stores but that can be added to the list of continually stocked foods. For an edible nut

industry, such as the pecan industry, the projections of consumer behavior and the retail sector development imply the real importance of grocery store chains for shelled nut sales but suggest a need to explore other forms of marketing pecans. Pecan producers, food manufacturers and distributors must assure that their products remain accessible to consumers. In case of the pecan industry, the two most frequently shopped retail outlets for shelled pecans are grocery stores and mail-order firms.

Conceptually, linking customer characteristics with a visit to a specific outlet can be viewed as the utility-maximization problem subject to constraints of time and income. Grocery store shopping often requires the preparation of a list of items to be purchased and the possible combination of the trip with the purchase of non-food items or services. About two-thirds of trips involving grocery shopping consist of multiple stops (O'Kelly, 1981). The motives for multiple-stop trips include the notion of saving transportation costs and time. The amount of time and energy devoted to grocery-store shopping can be considerable and is influenced by the location of the store with regard to the consumer's residence, ease of parking, period of waiting at the checkout counter, weather and traffic conditions, and the number of items purchased.

Mail orders free a consumer from the circumstances that surround a trip to a grocery store and inconvenient delays inside the store. The customer who places an order is clearly in control of when the order is placed, how it is paid for, and what is ordered. A mail-order purchase, however, is not risk-free. Customers have no opportunity to see the actual product prior to purchase. The reputation of the mail-order firm can be difficult to assess unless the mail-order service happens to be associated with a major chain store or a brand. Such links are rare or non-existent in the mail-order pecan trade, which is mostly represented by family-owned businesses. Each firm typically carries products under its own brand, but the volume sold limits the brand exposure. The mail-order purchase involves a payment in advance, either by check, money order, or the authorization of a credit card charge. It often takes several days or weeks to receive the purchased product, but placing the actual purchase order is accomplished expeditiously at a time chosen by the consumer, something supermarket shopping cannot promise. Once the order was placed, the consumer remains certain that the product will arrive within

the period of time typical for catalog purchases of non-food items or telephone purchases made in response to television commercials (the usual delivery time is 4–8 weeks). Occasionally, product quality may be inadequate or compromised during shipping (for example, an unsealed or damaged package). However, mail-order firms print their specific policies in their catalogs; these policies vary among firms. Some are especially restrictive because of the edible nature of pecan products.

The decision concerning the selection of a specific retail outlet as a source of pecan purchases can be influenced by consumers' socioeconomic and demographic characteristics. Such characteristics are typically used in explaining consumer decisions in empirical studies and include consumer's age and gender, racial background, household size, and employment status. Household gross annual income is an essential characteristic that influences consumer shopping behavior and is relevant to the selection of outlets that sell pecans. In addition, place of residence, cultural characteristics, opinions, and perceptions may also affect the selection decision. This empirical study accounts for the timing of pecan purchases because of the observed concentration of tree nut sales during selected periods of the year.

**Statistical Model**

Suppose there are J+1 retail outlets selling pecans. Let  $P_{ij}$  be the probability that household I selects retail outlet  $j$  ( $j = 0, 1, \dots, J$ ) as the primary purchasing source. For household I, assume

$$(1) \quad U_{ij} = X_i' \beta_j + \varepsilon_{ij} \quad (i=1, \dots, n; j=0, 1, \dots, J);$$

further assume that the indirect utility associated with choice  $j$  is

$$(2) \quad \begin{aligned} P_{ij} &= \text{Prob (choose outlet } j) = \\ \text{Prob (} U_{ij} &> U_{ik}, \forall j \neq k) = \frac{e^{X_i' \beta_j}}{\sum_{k=0}^J e^{X_i' \beta_k}} \quad (j = 0, 1, \dots, J) \end{aligned}$$

where  $X_i'$  represents a vector of household-specific characteristics and other variables,  $\beta_j$  denotes a vector of parameters to be estimated, and  $\varepsilon_{ij}$  is a random disturbance. When household I selects retail outlet  $j$  as its primary purchasing source, we assume

that  $U_{ij}$  is the maximum among the J+1 utilities. If the disturbances  $\varepsilon_{ij}$  are assumed to be independently and identically distributed with the log Weibull distribution, then the probability that household I chooses outlet  $j$  is given (Maddala, 1983; Greene, 1990).

Equation (2) is called the multinomial logit model. The model, as expressed in current form, is underidentified because the identical set of probabilities result if we define  $\beta_j^* = \beta_j + \gamma$  for any nonzero vector  $\gamma$ . In order to identify the parameters of the model, we impose the convenient normalization that  $\beta_0 = 0$ . Equation (2) is then expressed as

$$(3) \quad \begin{aligned} P_{i0} &= \frac{1}{1 + \sum_{k=1}^J e^{X_i' \beta_k}} \\ P_{ij} &= \frac{e^{X_i' \beta_j}}{1 + \sum_{k=1}^J e^{X_i' \beta_k}} \quad \text{for } j = 1, 2, \dots, J. \end{aligned}$$

From equation (3), we can compute J log-odds ratios,

$$(4) \quad \ln \left( \frac{P_{ij}}{P_{i0}} \right) = X_i' \beta_j.$$

Thus, the coefficients in the model represent the effects of household-specific characteristics on the relative size of the probability that household I selects outlet  $j$  as opposed to a standard alternative (outlet 0) as the primary source. It is not difficult to obtain other odds ratios, and they are computed as  $\ln(P_{ij}/P_{ik}) = X_i'(\beta_j - \beta_k)$ .

Equation (3) can be estimated by the method of maximum likelihood. Define  $d_{ij} = 1$  if outlet  $j$  is selected by household I as the primary purchasing source, and 0 if not. The log likelihood function for equation (3) is written as

$$(5) \quad \ln L = \sum_{i=1}^n \sum_{j=0}^J d_{ij} \ln P_{ij}.$$

The parameter estimates for the  $\beta_j$  vectors that maximize the log likelihood function can be obtained using the Newton method (Greene, 1995).

Given a household's characteristics and using equation (3) with estimated coefficients, we can calculate the likelihood that the household will select each retail outlet as its primary pecan purchasing source. Using the sample mean values for

all the explanatory variables specified in the model, one can estimate the probabilities for a "typical household."

By differentiating equation (3), we obtain the marginal effects of the regressors on the probabilities as

$$(6) \quad \frac{\partial p_{i0}}{\partial x_i} = -p_{i0} \varepsilon \sum_{k=1}^J P_{ik} \beta_k$$

$$\frac{\partial p_{iy}}{\partial x_i} = p_{ij} [\beta_j - \varepsilon \sum_{k=1}^J P_{ik} \beta_{k0}] \text{ for } j=1,2,\dots,J.$$

Using equation (6), we can find changes in probabilities for retail outlet selection due to a slight change in one of the household's characteristics while holding all other explanatory variables fixed (usually at their mean value).

## Data

A nationwide mail survey of nut consumption was conducted in 1993. Household addresses were randomly drawn from files accumulated by two pecan industry firms. Each firm controlled the selection by applying its own drawing scheme—for example, by selecting every  $x$ th address from safeguarded lists. The firms were sensitive to the potential reaction of consumers who might be contacted by survey organizers; therefore, the coding of the incoming responses excluded some of the potentially useful information, including the area of residence. The industry list included pecan buyers who purchased pecans for their own use or for use by others and the names of potential buyers gathered by the industry. The list was extended by one-third through the random selection of names from telephone-service subscribers and consisted of 1,260 addresses.

Prior to mailing the questionnaires to a nationwide sample of households, a pilot test was conducted. Responses from the pilot study confirmed acceptable preparation of the questionnaire, as only minor changes were introduced into it. Using Dillman's approach (1978), following the first mailing of the questionnaires, postcards were sent to respondents, serving as a reminder to complete and return questionnaires. A follow-up mailing to those who did not respond proceeded two weeks after the mailing of the reminder.

The survey resulted in 664 returned questionnaires, representing a response rate of 52.7 percent.

Participants were asked a variety of questions concerning their consumption preferences, including their pecan purchasing habits and their shared opinions about the use of pecans. Information about respondents' socioeconomic and demographic characteristics was also collected.

Of the 664 returned surveys, 456 were used in this study. The remaining observations were excluded from the empirical analysis, primarily because of incomplete responses to the question used in the dependent variable construction or the absence of household income data. Many consumers are sensitive to questions that probe even for a broad indication of income, as was the case in this survey in which respondents could choose among several income-level categories. However, the overall number of returns remained substantial.

Given the industry origin of the sample, we concentrated on potential pecan buyers, and the omitted observations were assumed to have little influence on the results. The sample profile may be fully indicative of the population of pecan consumers but not tree nut consumers in general. The summary of household characteristics and household choices of pecan retail outlets for the sample used in estimation are presented in Table 1. Of the 456 respondents, 272 indicated that they purchased pecans mainly from grocery stores (59.6 percent); 65 chose a mail-order firm as the major source of pecan purchase (14.3 percent); and the remaining 119 respondents (26.1 percent) bought pecans primarily from other outlets, such as specialty stores, fund-raisers, and road stands. Cross-shopping was allowed for choosing the season of pecan purchase because the harvesting season and the holiday season partially overlap in some regions of the United States.

The 456-respondent sample compared favorably with U.S. Census statistics with respect to education (years of schooling) and household size. However, respondents tended to be older and had higher household incomes while female and white consumers were overrepresented. Approximately 37 percent of the participants resided in rural areas, and almost one-half of respondents were employed full-time. Finally, 47.4 percent of the responding households indicated that they bought pecans during the holiday season; 41.4 percent bought pecans throughout the year; and 23.9 percent purchased pecans only during the harvest season.

**Table 1. Characteristics of Respondents.**

| Habits or Characteristics              | Number of Respondents | Percent of Total Sample |
|--|-----------------------|-------------------------|
| Primary Pecan Purchase Source          |                       |                         |
| Grocery Store                          | 272                   | 59.6                    |
| Mail-Order Firm                        | 65                    | 14.3                    |
| Others                                 | 119                   | 26.1                    |
| Gender                                 |                       |                         |
| Male                                   | 160                   | 35.1                    |
| Female                                 | 296                   | 64.9                    |
| Race                                   |                       |                         |
| White                                  | 416                   | 91.2                    |
| Others                                 | 40                    | 8.20                    |
| Place of Residence                     |                       |                         |
| Urban                                  | 285                   | 62.5                    |
| Rural                                  | 171                   | 37.5                    |
| Household Income                       |                       |                         |
| 1 = Less than \$ 10,000                | 13                    | 2.9                     |
| 2 = \$10,000–\$19,999                  | 49                    | 10.7                    |
| 3 = \$20,000–\$29,999                  | 57                    | 12.5                    |
| 4 = \$30,000–\$39,999                  | 78                    | 17.1                    |
| 5 = \$40,000–\$49,999                  | 63                    | 13.8                    |
| 6 = \$50,000–\$59,999                  | 56                    | 12.3                    |
| 7 = \$60,000 or More                   | 140                   | 30.7                    |
| Household Size                         |                       |                         |
| 1 = 1 Person                           | 54                    | 11.8                    |
| 2 = 2 Persons                          | 248                   | 54.4                    |
| 3 = 3–4 Persons                        | 123                   | 27.0                    |
| 4 = 5 or More Persons                  | 31                    | 6.8                     |
| Employment Status                      |                       |                         |
| Full-Time Employed                     | 224                   | 49.1                    |
| Others                                 | 232                   | 50.9                    |
| Occasion Of Buying Pecans <sup>a</sup> |                       |                         |
| Around Christmas/New Year              | 216                   | 47.4                    |
| Throughout Year                        | 189                   | 41.4                    |
| Harvest Season                         | 109                   | 23.9                    |
| Years of Schooling Received            | 14.44 <sup>b</sup>    | 2.6 <sup>c</sup>        |
| Age of Respondent                      | 54.78 <sup>b</sup>    | 14.1 <sup>c</sup>       |
| Number of Respondents in Sample        | 456                   | 100.0                   |

<sup>a</sup> Exceeds 456 because respondents could select more than a single period.

<sup>b</sup> Average.

<sup>c</sup> Standard deviation.

## Results

The empirical model of retail outlet selection included demographic and socioeconomic variables. In addition, three binary variables were added to account for the season of buying pecans. The specification for the selection of the grocery stores, mail-order firms, and other retail outlets was: Retail outlet selected =  $f$  (years of schooling, age, gender, household income, household size, employment, race, place of residence, pecan purchase in holiday season, pecan purchase throughout the year, pecan purchase in harvest season).

The estimated results from the multinomial logit model are presented in Table 2. The model was statistically significant based on the  $\chi^2$  test statistic criterion, and the overall ability of the model to yield correct predictions on respondents' choice of the primary pecan purchase source among grocery stores, mail-order firms, and other retail outlets was 63.4 percent. The number of statistically significant variables varied in the three equations. In the case of the first equation, most of the household-specific characteristics as well as the timing of pecan purchases significantly affected the log of the ratio of the odds that a household chose mail-order firms over grocery stores as its primary pecan purchase source. In the second equation, almost one-half of the household characteristics appeared to have statistically significant effects on (the log of) the relative size of the probability that a household selected other retail outlets as opposed to the grocery stores as the main purchase source. However, in the third equation, these factors—with the exception of age and household size—were not significant in explaining a household's choice between mail-order firms and "other" outlets. It is plausible that the classification of several types of outlets into the category "other" prevented the identification of possible, statistically discernible differences.

The results suggest that older respondents are more likely to select the mail-order firms or other retail outlets and less likely to choose grocery stores as the primary pecan purchase source. This specific effect of age is likely influenced by experience in buying pecans and may be related to expectations of quality. Older consumers, who are fully employed, may also have sufficient discretionary income and be willing to pay a higher price for exceptional quality. According to the results,

high-income households appeared more likely to buy pecans via mail orders or from other retail outlets but less likely to buy them from grocery stores than lower-income households were. Furthermore, full-time employed respondents and respondents from large households had a lower probability of buying pecans in grocery stores but a higher probability of acquiring pecans through mail orders than non-full-time employed respondents and respondents from smaller households, respectively. However, respondents from either group did not seem to differ from their respective counterparts in regard to the choice of the primary pecan purchase source between grocery stores and other non-mail-order outlets. Finally, years of schooling, race, and place of residence did not influence the household's preference in selecting pecan retail outlets. It appears that urban and rural residents have similar access to primary retail outlets that sell pecans.

Results indicate that households' choices of retail outlet were significantly influenced by the timing of pecan purchases. Specifically, those who purchased pecans during the holiday season or throughout the year were likely to buy pecans in grocery stores but less likely to purchase pecans through mail orders or from other outlets. On the other hand, respondents who purchased pecans in the harvest season had a higher probability of choosing mail-order firms but a lower probability of selecting grocery stores as the primary purchase source than those who did not. However, whether one purchased pecans during the harvest season was not a significant factor in affecting the choice of the primary pecan purchase source between grocery stores and other non-mail-order outlets.

In general, household-specific characteristics and the timing of pecan purchases provided fewer insights about factors influencing the household's choice between mail-order firms and other non-grocery store retail outlets than between mail-order firms and grocery stores. The two statistically significant parameter estimates suggested that older respondents and respondents from large households had a higher probability of choosing mail-order firms over other outlets as the primary pecan purchase source than their respective counterparts did.

For qualitative choice models, the estimated coefficients are better interpreted in the concept of

**Table 2. Parameter Estimates from the Multinomial Logit Model for the Choice of Pecan Retail Outlets.<sup>a</sup>**

| Variable                                    | Log-Odds Ratios of Selecting                               |   |  |
|---|--|---|--|
|   | Mail Order<br>vs.<br>Grocery Store<br>$\ln(P_{i1}/P_{i0})$ | Other Outlets<br>vs.<br>Grocery Store<br>$\ln(P_{i2}/P_{i0})$ | Mail Order<br>vs.<br>Other Outlets<br>$\ln(P_{i1}/P_{i2})$ |
| Constant                                    | -7.880***<br>(4.29)  | -2.238*<br>(1.73)   | -5.642***<br>(2.93)  |
| Years of schooling                          | -0.044<br>(0.66)   | -0.051<br>(0.97)  | 0.007<br>(0.10)  |
| Age   | 0.084***<br>(4.56)   | 0.031***<br>(2.40)  | 0.053***<br>(2.80)   |
| Gender (male=1)                             | -0.419<br>(1.24)   | -0.429<br>(1.63)  | 0.010<br>(0.03)  |
| Household income                            | 0.340***<br>(3.15)   | 0.170**<br>(2.13)   | 0.170<br>(1.52)  |
| Household size                              | 0.584**<br>(2.20)  | 0.109<br>(0.56)   | 0.475*<br>(1.69)   |
| Full-time employed (=1)                     | 0.755*<br>(1.89)   | 0.385<br>(1.26)   | 0.370<br>(0.90)  |
| Race (white=1)                              | -0.304<br>(0.55)   | 0.217<br>(0.48)   | -0.521<br>(0.85)   |
| Place of residence (urban=1)                | 0.019<br>(0.06)  | -0.115<br>(0.46)  | 0.096<br>(0.28)  |
| Person buying pecans in holiday season (=1) | -0.576*<br>(1.81)  | -0.636**<br>(2.57)  | 0.060<br>(0.18)  |
| Person buying pecans throughout year (=1)   | -1.694***<br>(4.46)  | -1.452***<br>(5.37)   | -0.241<br>(0.58)   |
| Person buying pecans in harvest season (=1) | 0.806**<br>(2.36)  | 0.370<br>(1.30)   | 0.436<br>(1.25)  |
| Number of observations                      | 456  |   |  |
| $\chi^2$ (with 24 df)                       | 108.6***   |   |  |
| Percent correctly classified                | 63.4   |   |  |

<sup>a</sup> $P_{i0}$ ,  $P_{i1}$ , and  $P_{i2}$  represent the probability that a household selects grocery store, mail-order firm, and other outlets as the primary pecan purchasing source, respectively. \*, \*\*, and \*\*\* indicate the significance level of 10, 5, and 1 percent, respectively.

probability. The estimated marginal probabilities for three continuous variables and probabilities for several binary variables are shown in Table 3. For each statistically important binary variable, the corresponding probabilities were calculated while all other variables were held at the sample means. Note that, for a given variable, the sum of marginal prob-

abilities is equal to zero, and the sum of probabilities is equal to one.

Based on calculations from Table 3, when the respondent's age increases by one year, the probabilities of choosing mail-order firms and other outlets as the primary pecan purchase source will increase by 0.007 and 0.004, respectively. However,

**Table 3. Estimated Marginal Probabilities and Probabilities by Pecan Retail Outlet.<sup>a</sup>**

| Variable                                   | Retail Outlets              |            |        |
|--|-----------------------------|------------|--------|
|  | Grocery Store               | Mail Order | Others |
|  | <i>Marginal Probability</i> |            |        |
| Age  | -0.011                      | 0.007      | 0.004  |
| Household income                           | -0.051                      | 0.027      | 0.024  |
| Household size                             | -0.057                      | 0.052      | 0.005  |
|  | <i>Probability</i>          |            |        |
| Male                                       | 0.692                       | 0.089      | 0.219  |
| Female                                     | 0.595                       | 0.116      | 0.289  |
| Full-time employed                         | 0.570                       | 0.140      | 0.290  |
| Not-full-time employed                     | 0.684                       | 0.079      | 0.237  |
| Person buying pecans in holiday season     | 0.703                       | 0.087      | 0.210  |
| Person not buying pecans in holiday season | 0.560                       | 0.124      | 0.316  |
| Person buying pecans throughout year       | 0.806                       | 0.050      | 0.144  |
| Person not buying pecans throughout year   | 0.475                       | 0.161      | 0.364  |
| Person buying pecans in harvest season     | 0.536                       | 0.166      | 0.298  |
| Person not buying pecans in harvest season | 0.657                       | 0.091      | 0.252  |

<sup>a</sup> Probabilities for binary variables were calculated for the values 1 and 0. For example, the gender variable assumed the value of 1 when the respondent was a male and 0 when a female; the corresponding probability for a male respondent selecting a grocery store as the primary source of purchasing pecans is 0.692 and for a female respondent is 0.595.

the probability of selecting grocery stores will decrease by 0.011. Similarly, if a household has an increase in income of \$10,000 or adds a family member, the probability that it will choose mail-order firms as the major pecan purchase source will increase by 0.027 and 0.052, respectively. Simultaneously, the probability that the household will select other pecan-selling outlets will increase by 0.024 and 0.005, respectively, in response to a positive change in household income or size. On the other hand, the probability that a household will choose grocery stores as the primary purchase source will decrease by 0.051 and 0.057, respectively, for the same two household characteristics. Overall, the calculated probabilities support the primary importance of grocery stores for retail pecan sales but also indicate the rising importance of

mail-order purchases for certain high-income consumers, large households, or older customers.

Although grocery stores were the most popular source for buying pecans, the probability of choosing a specific retail outlet as the primary purchase source was found to be greatly affected by employment status and the timing of pecan purchases. Respondents who bought pecans throughout the year had probabilities of 0.811, 0.050, and 0.144 of selecting grocery stores, mail-order firms, and other outlets, respectively, as the primary purchase source, while those who did not buy pecans throughout the year had probabilities of only 0.475 that they would choose grocery stores but of 0.166 and 0.364 that they would select mail-order firms and other outlets as the main purchase sources, respectively. Accord-



ing to these calculations, supermarket pecan sales are essential in creating conditions for encouraging pecan consumption outside the holiday season. Mail-order companies seem to serve a separate segment of the population and continue to focus on the traditional pecan-selling season.

### **Implications and Concluding Remarks**

Using survey data, this study examined the impacts of socioeconomic and demographic factors and the timing of pecan purchases on consumers' choice of retail outlets. The empirical value of this study to the pecan industry lies in its direct results concerning factors influencing the primary pecan purchase outlet. The pecan industry lacked general knowledge of its retail customers and based its marketing approach on observations of consumer purchase behavior in individual outlets. Although practical knowledge and experience are valuable, the findings from this study allow one to critically reevaluate the industry notions. Firstly, the study provides guidelines to strengthen the ongoing efforts to reach consumers using specific types of retail outlets during various seasons of the year. Secondly, results that reflect past purchasing habits, with regard to retail outlet selection, provide the opportunity to improve the industry's future planning and implementation efforts aimed at increasing pecan sales.

The importance of grocery stores as the primary source of pecan purchase is indicated by purchases occurring there throughout the year with substantially higher probability that they will occur in other outlets. The availability of pecans in grocery stores throughout the year is essential if consumers are expected to broaden their use of pecans beyond the traditional holiday season in response to increased industry promotions. Pecans are a very versatile nut and have been used in various dishes served at seasonal occasions as well as in everyday meals, possibly lowering the concentration of sales during holidays.

The grocery store remains the largest-volume outlet for pecans, offering raw, shelled halves, and pieces. According to retailers' observations of sales of other edible nuts, pecans can often be an impulse purchase during a trip to a grocery store. Enticing these unplanned purchases requires attractive displays and information about pecans and their uses to encourage consumption. Efforts to reach customers must recognize differences in the demographic and economic status of potential buyers. Supermarkets

are the primary source of pecan purchase for younger customers who represent small households or have less income. The industry can choose to focus on both groups, or only one group, of consumers. To attract younger buyers, buyers with less income, or buyers from smaller households, the pecan industry has several options. A cooperative effort between retailers and pecan shellers, wholesalers, and distributors can lead to adjusted package size; the preparation of pecans for immediate use in cooking or baking recipes, eliminating the in-home processing of nuts; and novel uses of pecans in types of foods desired by younger consumers, for example, salads or ice cream topping. The fact that younger respondents named grocery stores as the primary pecan purchase source may require that the image of pecans be reshaped to increase the consumption of this group of customers.

Mail-order pecan buyers have demographic and economic profiles similar to buyers of other mail-order goods. Such customers tend to be older, have higher incomes, or represent larger households than the general population does. Customers with these characteristics tend to value convenience and to appreciate the flexibility offered by mail-order shopping. High-income households are likely to use credit cards as the form of payment and are willing to accept the relatively high price of pecans sold through the mail-order firms. Mail-order prices tend to be higher than prices of pecans in grocery stores, but mail-order firms also offer a wider selection of pecans and pecan products; various, but relatively large (1-pound or larger), package sizes; a choice of decorative containers; and gift-shipping services. Often, flavored and roasted pecan halves and pieces are merchandised and sold in combination with other edible nuts and foods. Because mail-order purchases are conducted differently than those that occur in supermarkets, the purchases appear deliberate and contrast with the impulse purchases often made in grocery stores. Therefore, increasing the volume sold through mail orders requires attention to quality and service, distinguishing these firms from grocery stores. The segment of mail-order firms' customers may have different expectations regarding the product and, consequently, require a different approach to service and information management.

According to the results, mail-order firms could expect that a large portion of purchases be made during the pecan harvest season. This pattern of grocery store buyer behavior continues to pre-

vail. The heavy dependence on the holiday season limits marketing strategy and is harmful to the industry. Growers are under pressure to harvest while shellers must time deliveries to retailers during the last few weeks of the year. According to the results, consumers' habits persist and they continue to purchase pecans at the time of harvest but change the type of outlet from which they purchase them. Harvest time is the time that the mail-order pecan industry sends catalogs, which continue to encourage the timing of purchase in the last quarter of a calendar year. Although the results indicate that older, more affluent and larger households should be targeted as the primary pecan buyers by mail-order firms, the latter may consider ways of expanding pecan sales outside the harvest season. However, some mail-order companies may find it difficult to explore such possibilities without rethinking inventory and labor management.

The study offers relatively less guidance regarding sales in other retail outlets. The importance of age and household size has been indicated and may result from differences in time allocation and the combination of trips into a single multi-stop trip. In addition, regional factors, which were not addressed in this study, may have also influenced the selection of other retail outlets as the primary source of pecan purchases. In pecan-growing areas, some consumers may search for nuts in other outlets in order to take advantage of potentially lower prices.

Future studies can expand the presented results by addressing the influence of regional differences in the primary pecan source selection. Pecans are grown in a wide area across the southern United States, and the accessibility to various outlets may be limited in some regions. Furthermore, the effectiveness of promotion, the information that is produced and distributed by the pecan industry and individual

firms, and the relation of that information to changes in pecan purchases needs to be addressed by collecting additional data to measure such relationships.

## References

- Dillman, D.A. 1978. *Mail and Telephone Surveys: the Total Design Method*. New York, NY: Wiley.
- Florkowski, W.J., and E.E. Hubbard. 1994. "Structure and Performance of the Pecan Market," in *Pecan Technology*, C.R. Santerre, ed. New York, NY: Chapman & Hall.
- Florkowski, W.J., and E.E. Hubbard. 1996. "Pecan Products Can Be Found on the Internet." *The Pecan Grower*. 8(2):37.
- Food Retailing Review—1996 Edition*. 1996. Fair Lawn, NJ: The Food Institute.
- Greene, W.H. 1990. *Econometric Analysis*. New York, NY: Macmillan Publishing.
- Greene, W.H. 1995. *LIMDEP*. Bellport, NY: Econometric Software.
- Greenland, S.J., and P.J. McGoldrick. 1991. "From Mail Order to Home Shopping—Revitalizing the Non-Store Channel." *Journal of Marketing Channels*. 1:59–85.
- Humphreys, J.M. 1996. "Holiday Retail Sales Forecast." *Georgia Business and Economic Condition*. 56:11.
- Maddala, G.S. 1983. *Limited-Dependent and Qualitative Variables in Econometrics*. New York, NY: Cambridge University Press.
- Minor, E. 1996. "Poor Promotion Blamed as Georgia Pecan Prices Sag." *The Atlanta Constitution*. November.
- Mosteller, E. 1980. "Mail Order Pecans—A Growing Segment of the Market." *The Pecan South and Pecan Quarterly*. 7:10.
- National Pecan Shellers Association. 1984. *Perfect Performance with Pecans*. Atlanta, GA: National Pecan Shellers Association.
- O'Kelly, M.E. 1981. "A Model of the Demand for Retail Facilities Incorporating Multipurpose Trips." *Geographical Analysis*. 13:134–148.
- Pecan South*. 1993. "Survey Identifies Targets for Pecan Promotion." 26(February):17.
- USDA (U.S. Department of Agriculture). 1995. *Fruits and Tree Nuts: Situation and Outlook Report*. FTS-274, Economic Research Service, Washington, DC.
- Williams, F.W., M.G. LaPlante, and E.K. Heaton. 1972. "The Consumer Market for Pecans and Competing Nuts." *Southern Journal of Agricultural Economics*. 4(July):101–106.