CONSUMER EXPENDITURES AT DIRECT PRODUCE MARKETS

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Abstract

Interviews of customers at direct produce markets were conducted to determine why expenditure patterns vary. Frequency of shopping at outlets, income, uses of produce, household composition, and distance to the outlet are important determinants of expenditures at direct product outlets.

Key words: consumer preference, farmers' markets, demand, fresh produce.

Vegetable and fruit crops are being considered as alternative or supplemental crops in many areas of the United States. Direct marketing is an alternative that is often considered by new producers, especially those located near population centers. Direct marketing is used by producers with relatively small acreages who do not have access to strong marketing organizations and by larger producers who also sell in wholesale channels (Vaupel). Smaller producers may lack the ability to attract principal produce buyers, except where they market through packing firms that accumulate large quantities and ensure sufficient quality regulation. Direct markets can provide immediate market access to growers in areas where packing firms do not exist or are inaccessible. Producers may find direct marketing more profitable than selling to wholesalers.

Producers who direct market need to understand purchase behaviors of customers and develop merchandising and promotion strategies designed to appeal to their customers. Understanding purchase behavior may lead to the ability to identify market segments where particular appeals are best.

The objective of this research is to explain variation in annual household expenditures per family member at produce markets. Household income, household composition, lifestyle, preferences, and season of the year are hypothesized to explain variation in annual direct market produce expenditures.

Data and specific variables related to the hypotheses are described in the following section. Estimation procedures and results are then presented and followed by conclusions.

DATA AND HYPOTHESES

Three year-round roadside markets in northeastern Oklahoma were selected for conducting customer research. All three markets were located within a four-mile radius on a map with two located along the same major highway and the other just off that highway. At the time of the surveying, the largest market was more than 15 years old and is the one located off the major highway. Another was under five years old, and the third between five and 15 years old. Each market grows more than 100 acres of produce and supplements its own produce with produce purchased from others. The markets draw heavily on local supplies of produce. During the appropriate season, local producers supply the majority of the indigenously available produce. Produce is supplied from other regions when it is not available locally. Thus, these markets are combinations of direct markets and specialty produce markets. These markets were selected because they operate year-round, the managers are interested in consumer research, and the managers have considerable merchandising expertise.

The markets were surveyed simultaneously during 12 days between August 1983 and July

1984. Each survey day consisted of two-and-a-half to seven hours of survey work per market. The survey day on weekdays tended to be shorter and included only the critical shopping time period based on market-manager recommendations. As many customers as possible were approached and asked to complete the questionnaire while they shopped. Surveys were conducted on one weekday and one Saturday each period. The survey dates were August 18 and 20, October 25 and 29, December 17 and January 5, March 5 and 10, May 16 and 19, and July 3 and 7.

A total of 2,282 surveys was collected. Respondents answered an average of 83.2 percent of the questions on the questionnaire. These respondents represented a sample of approximately 16.9 percent of all individuals, including children, that entered the market during the survey periods. A subsample of 1,037 respondents, 45.4 percent of the sample, gave complete answers for each of the questions used in the results reported here. Definitions of each of the dependent and independent variables used in the analysis are contained in Table 1 and are discussed below.

Annual per capita expenditure on produce at a specific direct market (SPEND) is used as the dependent variable in the model. This variable was constructed from three survey questions. The typical amount spent by the household on produce at the market each visit was multiplied by the number of visits to the market per year. The result is an annual ex-

TABLE 1. DEFINITIONS OF VARIABLES BY CONCEPT GROUP

Variable	Description of Variable	Description of Concept Group
SPEND	Amount spent per visit x visits per year/household size	Dependent variable; spending per capita per year
AGE 0–11	Members 11 and under	Household composition;
AGE 12–17	Members between 12 & 17	number of household
AGE 18–24	Members between 18 & 24	members in each
AGE 25–44	Members between 25 & 44	age group.
AGE 45–64	Members between 45 & 64	
AGE 65–70	Members between 65 & 70	
AGE 71+	Members 71 and older	
INC 0–9	$0–9,999 income class	Income range of
INC 10–19	$10,000–19,999 income class	respondent's household;
INC 20–29	$20,000–29,999 income class	1 if household is in a category,
INC 30–39	$30,000–39,999 income class	0 otherwise.
INC 40–49	$40,000–49,999 income class	
INC 50+	$50,000 and up income class	
NEW-MKT	Newest and smallest market	Market at which person
OLD-MKT	Oldest and largest market	completed survey; 1 if survey
MID-MKT	Intermediate aged and sized market	completed at this market, 0 otherwise.
WEEKLY	Shop once a week	Shopping frequency at
SEMI-MONTHLY	Shop twice a month	the market where
MONTHLY	Shop once a month	surveyed, 1 or 0.
QUARTERLY	Shop four times a year	
ANNUALLY	Shop once a year	
FRESHUSE	Use all produce fresh	Use of produce, 1 or 0.
OTHERUSE	Not all produce used fresh	
MIL 0–4.9	Less than 5 miles	Miles from home to
MIL 5–9.9	5 to 9.9 miles	market, 1 or 0.
MIL 10–14.9	10 to 14.9 miles	
MIL 15–19.9	15 to 19.9 miles	
MIL 20–24.9	20 to 24.9 miles	
MIL 25+	25 or more miles	
AUGUST	Surveyed in August	Month during which person
OCTOBER	Surveyed in October	completed survey, 1 or 0.
DECEMBER/JANUARY	Surveyed in December or January	
MARCH	Surveyed in March	
MAY	Surveyed in May	
JULY	Surveyed in July	

penditure on produce at the specific market per household. This variable was then divided by the household size to obtain an estimate of annual per capita expenditure for produce at the specific market for the household. Price and quantity data on individual items purchased were not collected because of the time required to complete a longer questionnaire and market managers' concerns about disrupting customer flow through the market.

Average spending per visit was estimated to be $13.89, and average spending per household per year was estimated to be $249. This estimate is higher than the $10.49 per visit reported by Brooker and Taylor for August 1975 data collected at the Shelby County Farmers' Market in Memphis. Toensmeyer and Ladzinski reported that consumers spent an average of $150 per year on produce purchased directly from farmers in 1981 (p.11), but they did not report average spending per visit. Because the Oklahoma markets are open all year and supply a full range of produce items from a variety of sources, it would be expected that the spending data would be higher than for outlets that only sell indigenous produce. In addition, fresh produce volumes have been increasing and price levels have risen since the earlier studies.

It is hypothesized that direct market spending on produce per household member is related to household characteristics, income, market characteristics, shopping frequency, uses of produce within the household, and travel costs. These hypotheses are supported by previous research on expenditure relationships and household production theory which recognizes that fresh fruits and vegetables may require preparation time and expertise to be used effectively as part of a meal (Becker).

The age composition of the household has been shown to influence the consumption of various food groups including fruits and vegetables (Price; Buse and Salathe). The number of household members by various age groups was collected (AGE _ _, Table 1) and included as independent variables. We hypothesize that the more children in the household, the smaller the annual per capita expenditure at the market since children might eat less fresh fruit and vegetables than adults. The household may experience economies of size.

Gross annual household income was also collected by income class (INC _ _, Table 1). If we had two families identical except for income, we hypothesized that the family with

TABLE 2. MODEL STATISTICS

Statistic	
Mean of Dependent Variable	90.32
Coefficient of Variation	72.55
OLS Coefficient of Multiple Determination	.6288
Model F Statistic	58.93
Probability of F Value	.0001

the higher income would have the higher expenditure. If fresh fruits and vegetables purchased from direct markets are normal goods, households with higher incomes will spend more per capita, *ceteris paribus*.

Dummy variables for the three markets in the study were used (_ _ –MKT, Table 1). These variables reflect differences between the markets that include breadth of product line, advertising and merchandising skill, location advantage, parking convenience, and goodwill. It is hypothesized that the oldest and largest market will have customers that spend the most because of goodwill, largest product line, apparent advertising and merchandising skills, and parking convenience. Because this market is not located on the major highway with the most traffic flow, it is more likely to have customers that make a special effort to shop at this outlet. Note that 553 of the 1,037 observations were from the oldest and largest outlet even though each outlet was surveyed an equal number of hours and the other two outlets have more drive-by traffic (Table 2).

Shopping frequency is represented by a series of dummy variables (WEEKLY, SEMIMONTHLY, MONTHLY, QUARTERLY, and ANNUALLY, Table 1) and is included to measure the effect of having loyal customers who shop regularly at a market. We hypothesize that shopping frequency and annual expenditures per household member are positively related. In particular, those who shop at these markets each week would be expected to spend significantly more in a year than any other group.

The preparation time for fresh produce at the market will be different when the produce is used fresh rather than being canned or frozen. Households preserving some of the produce they purchase for future consumption have chosen to budget time for food processing activities. The ability to combine time, preservation expertise, and equipment with fresh produce to create a product for future consumption suggests rather involved house-

hold production functions (Becker). Canning and freezing by the consumer are probably used for different reasons (Johnson). The independent variable OTHERUSE indicates whether all of the produce is used fresh, 0, or part of it is processed, 1. We hypothesize that if the household processed part of its purchase, it would spend more annually since it is both buying for fresh preparation and allocating time for processing.

Traveling to the market involves both the cost of time and the expense of traveling. We hypothesize that those traveling greater distances will spread the fixed cost of the miles to the market (MIL __ __, Table 1) across more units and spend more at the direct markets. Miles to the market ignores the possibility that the shopper travels past the market for other purposes. Data on travel patterns were not collected.

Seasonality of consumer expenditures at direct markets has received very little attention in previous studies. It was expected that the pattern of annual expenditures per capita for each survey month would be different. We hypothesize that many December/January shoppers probably visit the markets specifically for pecans or fruit baskets, and if they did not stop frequently, they probably had higher expenditures than those shopping less frequently in other months. March and August are the two slowest months included in this survey in terms of produce sales, but probably include a higher proportion of the regular shoppers who visit the market since these shoppers are shopping when little locally grown produce is available. Shoppers surveyed who frequent the market regularly should have the highest annual per capita spending. May shoppers include many berry buyers since local strawberries and blackberries are available. Many shoppers who shop infrequently shop for these special items. July features sweet corn sales and high traffic flows. The area is best known for sweet corn production, and many of the loyal shoppers at the market were probably first introduced to the market during this season. If the shopper is an infrequent shopper and shops only during July, then annual expenditures may be low since sweet corn tends to be lower priced than special items available during other survey months. Pumpkins, another lower expenditure item, are promoted in October and are also likely to attract families that shop less frequently at the markets.

Other household characteristics considered for inclusion in the model were home gardening status, race, occupation, and residence (urban or rural). Previous research by Smallwood and Blaylock, Blackburn and Jack, Kaitz, and Blaylock and Gallo suggests that these factors may be related to vegetable consumption or purchases at direct markets.

ESTIMATION PROCEDURE AND RESULTS

Generalized least-squares (GLS) was used to estimate the model since heteroscedasticity was expected (Judge et al., p. 419). Glejser's procedure of regressing the absolute value of the ordinary least squares residuals on the dependent variables was used to define the weight variable, the squared reciprocal of the predicted residuals from an ordinary least-squares estimation.

A series of general linear hypotheses was used to determine which groups of dummy variables and classification variables had significant F statistics for inclusion in the model. Statistics for the model are presented in Table 2. The parameter estimate for each variable, the standard error for each parameter estimate, and the F statistic for each group of variables are reported in Table 3. Home gardening status, race, occupation, and residence were excluded from the final model because each F statistic was not significant at the .10 level.

The GLS model did a good job of explaining the dependent variable. Six of the seven variable groups are significant for inclusion in the full model at the 95 percent confidence level. The model F statistic is highly significant. The coefficient of multiple determination for the ordinary least square equation is .62, high for cross-sectional data. The pseudo R^2_{wls} (Willett and Singer) is .58.

The regression coefficients for each variable group are discussed briefly in this section. Variables are discussed in the order in which they appear in Table 3. The results of tests of hypotheses suggested for each variable group are discussed. In order to facilitate discussion, a base household is developed that contains two people age 30, one child age 8, and one age 14; has an income of $25,000; shops at the oldest market twice a month; uses some of the produce other than fresh; lives 10 to 15 miles away; and was surveyed in August. This base household is estimated to spend $386.48 annually at the market or $96.62 annually per household member. Expenditure levels per

TABLE 3. PARAMETER ESTIMATES AND RELATED STATISTICS

Variable	Parameter Estimate	Standard Error	F Value for Concept Group	Number of observations for which the variable is not zero
INTECEPT	24.46	55.647	18.77	1,037
AGE 0–11	–4.894	0.819	28.10	383
AGE 12–17	–7.132	0.938		241
AGE 18–24	–3.864	1.222		211
AGE 25–44	–8.088	1.348		619
AGE 45–64	–7.189	1.338		434
AGE 65–70	–2.389	4.666		83
AGE 71 +	1.676	5.165		49
INC 0–9	–6.047	7.465	3.523	53
INC 10–19	–7.021	2.563		141
INC 20–29	–8.467	2.299		224
INC 30–39	–6.086	2.243		223
INC 40–49	–5.644	3.243		181
INC 50 +	0.0			215
NEW-MKT	–9.764	2.355	9.333	140
OLD-MKT	0.0			553
MID-MKT	–6.672	2.055		344
WEEKLY	204.570	7.814	311.2	214
SEMIMONTHLY	93.797	4.207		243
MONTHLY	43.771	3.074		173
QUARTERLY	12.774	2.518		307
ANNUALLY	0.0			100
FRESHUSE	0.0		8.153	485
OTHERUSE	5.004	1.752		552
MIL 0–4.9	0.0		7.257	153
MIL 5–9.9	4.451	3.206		230
MIL 10–14.9	10.026	3.386		253
MIL 15–19.9	14.246	3.508		131
MIL 20–24.9	18.743	4.909		95
MIL 25 +	14.881	3.511		175
AUGUST	0.0		1.914	127
OCTOBER	5.170	3.123		170
DECEMBER/JANUARY	9.316	3.576		81
MARCH	0.556	4.545		112
MAY	5.671	2.701		222
JULY	2.947	2.702		325

household member for other shopping frequencies are shown in Table 4.

Age Composition

The results confirm the hypothesis that age composition of the household affects annual per capita spending at direct outlets. The impact of age-group on household purchases can be examined by changing the construction of the hypothetical base family. If the age of each family member is moved into the next older category, the household would be estimated to spend $2.83 more annually per household member, a 3 percent increase. If the base household is assumed to contain just two

TABLE 4. ESTIMATED EXPENDITURES FOR A HYPOTHETICAL HOUSEHOLD—CONTAINS TWO ADULTS AGE 30, ONE CHILD AGE 8, ONE CHILD AGE 14; HAS AN INCOME OF $25,000; SHOPS AT THE OLDEST MARKET; FREEZES OR CANS PART OF ITS PURCHASES; LIVES 12 MILES FROM THE MARKET; AND WAS SURVEYED IN AUGUST FOR VARIOUS SHOPPING FREQUENCIES

Shopping Frequency	Annual Expenditures Per Capita	Expenditures Per Visit Per Capita
	$	$
Annual	2.83	2.83
Quarterly	15.60	3.90
Monthly	46.60	3.88
Semi-Monthly	96.62	4.03
Weekly	207.40	3.99

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adults age 30, the household would be estimated to spend $12.03 more annually per household member, but $169.20 less annually for the household at the market. The presence of children lowers the per household member spending level but increases the household's total annual expenditures. Households with older adults spend the highest amounts per household member.

As the size of the household increases, expenditures per capita decrease, but household expenditures increase. The results for age composition suggest there are economies of scale in consumption for the household except for the oldest age class.

Households with members in the 25–44 and 45–65 age categories are estimated to spend the smallest amount per household member. These are the households that are also most likely to have children which would further decrease expected per household member expenditures. However, the household's total annual expenditure will be larger if children are present in the household.

The results suggest that households with older members prefer shopping at direct outlets and are sufficiently interested in fresh product to take time to shop for fresh produce. These results suggest that markets located in areas with an older population are likely to find higher annual per household member expenditures at direct markets. Given an aging population, a direct produce market located near areas with concentrations of people over 65 should focus marketing and merchandising strategies on that group.

Income

Annual income class variables are significantly related to expenditures. The results indicate that households in the highest income class spend more per capita on produce than households in the other income classes. F-tests on each of the first five groups fail to reject the hypothesis that each pair is not different. Thus, the significance of the income variables is primarily due to differences between those in the highest income category and those in the other income categories. These results suggest that market managers need to develop merchandising strategies with a broad appeal to consumers with different incomes while maintaining the ability to specifically meet the needs of high-income households.

Market

The market where the consumer was shop-

ping when the questionnaire was filled out is an effective variable in explaining consumer expenditure variation. The largest and oldest market with the widest product line and volume of produce attracted higher spending per capita than the other two markets. The difference between the intermediate and new market is not statistically significant when tested by an F-test. The ability of the older market to generate higher spending was hypothesized and reflects the relative market share of each market. This result is probably due to the older market having a wider produce selection, more experienced management, more advertising and merchandising skills, more accumulated reputation and goodwill, and better parking convenience.

Shopping Frequency

Shopping frequency is perhaps the most important variable influencing annual per capita spending at direct produce markets. Table 4 shows the per capita annual and per visit expenditures for a base household. There is very little difference in expenditures per visit except for the once-a-year group. However, when the per visit expenditure is converted to an annual expenditure, there is a very large difference. If the base household is changed from shopping twice a month to shopping weekly, the expenditure per visit declines by 0.9 percent, but the household's annual expenditure at the market increases by 214.6 percent. The number of shoppers in each category is shown in the right-hand column of Table 3. Of the 1,037 customers represented in the data set, 21 percent shop weekly, 23 percent twice per month, 17 percent once per month, and 39 percent quarterly or annually. The large number of less-frequent shoppers suggests that strategies to attract and maintain more frequent shoppers would likely increase the level of purchases from a given customer base.

Produce Use

The use of produce for nonfresh purposes is significantly related to annual expenditures. As hypothesized, consumers using some of the produce purchased for other than fresh uses spend more than those who do not. Consumers who freeze or can produce allocate time for preservation and may have a greater appreciation for the freshness of produce sold at direct markets. This result may reflect lower relative prices since quantity discounts are frequently offered for large-volume buyers.

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More than one-half of the sample did use produce for other than fresh uses. Merchandising to meet the needs of these customers is likely to be an important way to increase sales. All three of the markets offered some canning or freezing supplies and literature telling how best to preserve specific produce items.

Miles to Market

The number of miles from home to market has a significant effect on annual per capita expenditures at each market. The results suggest the relationship expected between mileage and expenditures within the first five ranges. The three longest ranges were not statistically different. While data on travel patterns were not collected, roughly 45 percent of the survey respondents checked "drive by often" as one of the ways they learned about the market where they were surveyed. For these shoppers, mileage to the market is a less-important factor in their expenditures.

Survey Month

The month in which the consumer completed the market survey is significantly related to annual per capita expenditures. Consumers surveyed in August have the lowest annual per capita expenditures, followed by those in March with no significant difference between the two months. July is also not significantly different from August and March. October and May are intermediate in annual spending levels. December/January shoppers reported the highest level of annual per capita expenditures. Households surveyed in the off-season who do not shop at the market frequently have made a special trip to the market to obtain the specialty items available at that time. Since they make a special trip, their expenditures are likely to be higher. These results tend to support the hypothesis that those households who used the markets during the off-season make the largest annual per capita expenditures because they are more likely to be frequent shoppers.

CONCLUSIONS AND IMPLICATIONS

Annual per capita expenditures on produce at year-round direct markets reflect both household and market characteristics. Characteristics found to be important are household age composition, income, market where the survey was completed, frequency of shopping at the roadside market, use of produce other than fresh, miles to market, and month the consumer was surveyed. The results also indicate that it is possible for markets to develop considerable goodwill or merchandising expertise that significantly increases consumer purchases at an outlet.

Families with multiple members in the 25 to 64 age categories and with children would be expected to spend substantially less per household member. However, since the household is larger, the household's annual total expenditures will be greater than households containing one or two older family members. Frequent shoppers are a very important customer group that spends more per household member on an annual basis than other customer groups. Direct market managers should develop advertising, promotion, and merchandising strategies to encourage shoppers who visit the store less frequently to become regular shoppers.

Households who can or freeze produce are an important market segment representing more than one-half of the existing customers. The ability to appeal to this segment of the market is likely to be important to the direct marketer's success.

Regular customers who travel 15 or more miles to the market make up a surprisingly large portion of the sample. Those consumers who travel to the market more than 15 miles once a year or more comprise more than 38 percent of all consumers. These shoppers also had the highest expenditure coefficients for mileage. Although this group might be difficult to target in the general population other than through ads or promotions in distant cities, the present shoppers can be targeted with direct mail such as seasonal newsletters with special promotional features.

In conclusion, the most important determinants of annual household expenditures at a particular roadside market are the number of people in the household and the frequency with which the household shops at the market. As household size increases, per capita expenditure declines, but household expenditure increases. As frequency of shopping increases, expenditure per visit remains about constant, but annual expenditures increase.

REFERENCES

Becker, G. S. "A Theory of the Allocation of Time." *Econ. J.*, 75(1965):493–517.

Blackburn, K. L., and R. L. Jack. "Consumers' Opinions, Attitudes and Use of Direct Markets in West Virginia." West Virginia University, Ag. and For. Exp. St., Bul. 686, March 1984.

Blaylock, J. R., and A. E. Gallo. "Modeling the Decision to Produce Vegetables at Home." *Amer. J. of Agri. Econ.*, 65, 4(1983):722–29.

Brooker, J. R., and E. G. Taylor. "Direct Marketing of Produce—the Shelby County Farmers' Market Case." University of Tennessee Agricultural Experiment Bulletin 569, April 1977.

Buse, R. C., and L. E. Salathe. "Adult Equivalent Scales: An Alternative Approach." *Amer. J. of Agri. Econ.*, 60, 3(1978):460–68.

Glejser, H. "A New Test for Heteroscedasticity." *J. Amer. Stat. Assn.*, 64(1969):316–23.

Johnson, E. H. "Canning and Freezing—What is the Payoff?" *Family Econ. Rev.*, ARS-NE-36 (1976):6–13.

Judge, G. G., W. E. Griffiths, R. C. Hill, H. Lütkepohl, and T. C.Lee. *The Theory and Practice of Econometrics*. 2nd edition. New York: John Wiley & Sons, Inc., 1985.

Kaitz, E.F. "Home Gardening and Incidence of Freezing and Canning." *Family Econ. Rev.*, ARS-NE-36(1977):3–6.

Price, D. W. "The Effects of Household Composition on Income Elasticities of Food Commodities." Washington State University, Ag. Exp. St., Tech. Bul. 63, 1969.

Smallwood, D. M., and J. R. Blaylock. "Household Expenditures for Fruits, Vegetables, and Potatoes." USDA, ERS, Tech. Bul. 1690, May 1984.

Toensmeyer, U. C., and K. Ladzinski. "Consumer Attitudes Concerning Marketing of Fresh Fruits and Vegetables through Direct Markets, Delaware." University of Delaware, Department of Agricultural and Food Economics, Bul. 443, February 1983.

Vaupel, S. "The Farmers of Farmers' Markets." *California Agriculture*, 43, 1(1989)28–30.

Willett, J. B., and J. Di Singer. "Another Cautionary Note About R^2: Its Use in Weighted Least-Squares Regression Analysis." *The Amer. Stat.*, 42,3(1988):236–38.