The Demand For Food Consumed Away From Home In Georgia

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According to the Bureau of Labor Statistics, expenditures on food consumed away from home as a proportion of total food costs has been increasing steadily. We can attribute this trend to rising real incomes, the availability of fast-food, and changes in the work force and in households (Kinsey). Researchers have recently devoted increased attention to the analysis of consumer behavior related to consuming food-away-from-home (FAFH). Such research helps policymakers evaluate the impacts on demand for FAFH due to differences in socioeconomic and demographic characteristics. Furthermore, proper understanding of the consumer behavior related to consumption of FAFH provides important economic and marketing implications for away from home eating establishments.

Other studies (Sexauer; Huang and Raunikar; Lee and Brown) have analyzed the relationship between consumption of FAFH and several socioeconomic and demographic factors. Prochaska and Schrimper, Redman, and Kinsey also investigated the role of women's employment status on payment for meals away from home. They suggested that the value of homemaker's time was an important factor affecting FAFH. McCracken and Brandt measured the influence of factors affecting FAFH consumption behavior by type of food facility (restaurant, fast food, or other commercial). However, none of the previous studies has investigated FAFH patterns at the state level.

The use of state data allows policymakers and the industry to examine the impacts of socioeconomic and demographic factors from a different perspective and to test and develop specialized market strategy planning at the state or local level. The purpose of this study is to first identify and measure the influence of factors affecting FAFH consumption behavior.

Second, to determine if factors affecting FAFH consumption behavior would be different at the state and national level. Finally, we seek to discover how preference for types of eating establishments would affect FAFH patterns.

Model and Data

The theory of household production views the household as both a producing and consuming unit. This implies that household's utility is a function of household time as well as market goods and services (Lancaster 1966, 1971). Therefore, we assume the household maximizes production of commodities by using goods purchased in the marketplace as inputs. Utility maximization is constrained by the household's production function, monetary budget constraints, and a time constraint. The demand for food can then be derived as a function of the prices of food and other goods, household income, a measure of household's value of time, and other environmental variables (Lancaster 1966, 1971; McCracken and Brandt).

Based on the theoretical framework, the following statistical model is formulated to estimate the Engel relation from cross-sectional data for household FAFH expenditures in Georgia:

$$EXP = f(INC, EMP, ED, HHC, RACE, LOC, HS, PREF) + U \quad (1)$$

Where EXP is the household expenditures for FAFH, INC is the household total income, EMP is the employment status of female household head, ED is the education of female household head, HHC is household composition, RACE is the race of household, LOC is the location of household's residence, HS is the household size, PREF is the household's preference for eating establishments (cafeteria, restaurant, fast-food chains, or other eating establishments), and U is the normally distributed random disturbance. We measured household's income as total income before-tax for the previous year. This included all sources of income (wages, rent, interest, dividends, retirement, social security) from all members of the household. We used the employment and education status of the female of the household as a proxy to capture the effects of the value of household time on FAFH expenditures. One would expect employed and better educated women to spend less time on food preparation, therefore, higher expenditures for meals away from home. We classified household composition as: Preschool Children (age under 6), Elementary School Children (age 6–12), Teenagers (age 13–19), Young (age 20–30) Males, Young Females, Adult (age 30-40) Males, Adult Females, Middle-Aged (above 40) Males, and Middle-Aged Females. In addition, race, residence, and household size

were also used as proxies to reflect household's environment. We incorporated binary variables representing eating establishments to measure household expenditure allocation among different type of food facilities. The model serves as a basis for estimating Georgia households' FAFH expenditure response due to income differences, socioeconomic characteristics, and preference for different eating establishments.

Researchers frequently use the ordinary least squares (OLS) procedure to estimate equation (1). However, analysis of cross-sectional data often encounters the problem that the error term associated with the dependent variable has a number of its values clustered at a limiting value, usually zero. Since average FAFH expenditure represents both the average expenditure of all households in the market and the extent of their participation, analysis of household FAFH expenditure behavior should take both parts into consideration (see appendix). We used the Tobit maximization likelihood procedure to analyze data from a mail survey conducted among 580 households which participated in the Georgia Consumer Panel. Taken during spring, 1989, one of the purposes of this survey was to collect household food expenditures for away from home. We first sent a notification letter and followed the initial mailing by a reminder letter a week later. We mailed additional copies of survey questionnaires to nonrespondents three weeks after the first. Six weeks after the first mailing, we sent nonrespondents another copy of the questionnaire by certified mail. This survey procedure followed the total design method recommended by Dillman to lessen nonresponse bias. The survey resulted in 389 returned questionnaires which represented a response rate of 67 percent. The sample tended to be demographically upscale with older, better educated, and higher income consumers slightly over represented in comparison to census statistics. The average household size was about 2.7 persons. Female, city residents, and people of European origin represented 69 percent, 54 percent, and 77 percent of the survey respondents, respectively. Since some socioeconomic data were missing for 27 households, we used 362 observations in the analysis.

We asked panel members a variety of questions concerning weekly FAFH expenditures. We also asked about factors that influence their purchase decisions, type of eating establishment most often patronized, and how often they ate out. We asked about their age, race, sex, income, family size, employment status, education level, and spouse's employment and educational status. A summary of sample statistics is presented in Table 1.

Results

Table 2 shows the regression results for FAFH expenditures per household per week. Presented are the estimated coefficients and corresponding asymptotic t-ratios along with the market participation effect (MPE), the conditional marginal effect (CME), and the total effect (TE). By decomposing the Tobit effects into effects conditional upon being above zero and the probability of being above zero, the analysis provides further economic insights into the effects of independent variables on FAFH expenditures. Most of the explanatory variables included in the model were statistically different from zero at the .10 significance level or less and their signs are in agreement with previous studies based on national sample data.

Most of the age-sex composition variables were significantly different from zero. The results suggest that among the various age-sex groups of household members, the addition of a teenager, a young male or female between 20 and 30 years of age, an adult male, or a middle aged male, increased household FAFH expenditures. This result is consistent with the findings of Huang and Raunikar, and Lee and Brown. The positive impact on FAFH expenditures is more for teenagers, young males, and adult males (about $7 per week) than for young females. On the other hand, the addition of a child 12 years of age or under, an adult female, or a middle aged female, significantly decreased FAFH expenditures. The addition of a child under 6 years decreased household FAFH expenditures by $11 per week. The addition of a child between 6 and 12 years of age, an adult or middle aged female decreased FAFH expenditures by about $5 a week.

The coefficients on the FEMP and FCOL variables support the hypothesis that employed wives and wives with college education spend less time on food preparation and more money on FAFH. Households with college educated wives spent about $4 more per week than households without college educated wives. The difference was statistically significant at the .05 significance level.

The parameter estimates for the race variables showed that FAFH expenditures differ significantly among different races. White and black households spent significantly more than households of other races. The household size squared term failed to identify the existence of economies of scale associated with FAFH expenditures.

The coefficients for the type of food facility most often patronized by the households showed that households visiting restaurants most often spent significantly more for FAFH than those who visited fast food facil-

Table 1.
Descriptive Statistics of the Variables Used in Tobit Model

Variable	Variable Name	Mean	Standard Deviation	Max	Min
Household expenditure away from home in $/week	EXP	26.928	21.519	150	0
Female employment, 1 = employed full time or part time; 0 otherwise	FEMP	.564	.497	1	0
Female education, 1 = college educated; 0 otherwise	FCOL	.395	.400	1	0
Presence of child under 6 years of age, 1 = yes; 0 otherwise	CHILD5	.146	.354	1	0
Presence of child between 6 to 12 years of age, 1 = yes; 0 otherwise	CHILD12	.204	.404	1	0
Presence of child between 13 to 19 years of age, 1 = yes; 0 otherwise	TEEN19	.254	.436	1	0
Presence of young male between 20 to 30 years of age, 1 = yes; 0 otherwise	YOUNGM	.160	.367	1	0
Presence of young female between 20 to 30 years of age, 1 = yes; 0 otherwise	YOUNGF	.221	.415	1	0
Presence of adult male between 30 to 40 years of age, 1 = yes; 0 otherwise	ADULTM	.215	.412	1	0
Presence of adult female between 30 to 40 years of age, 1 = yes; 0 otherwise	ADULTF	.249	.433	1	0
Presence of middle aged male above 40 years of age, 1 = yes; 0 otherwise	MAGEDM	.472	.499	1	0
Presence of middle aged female above 40 years of age, 1 = yes; 0 otherwise	MAGEDF	.528	.499	1	0
Income in $000	INC	31.556	20.056	150	1
Race, 1 = white; 0 otherwise	WHITE	.779	.415	1	0
Race, 1 = black; 0 otherwise	BLACK	.204	.404	1	0
Race, 1 = other than white and black; 0 otherwise	ORACE	.017	.128	1	0

Table 1. *(Continued)*
Descriptive Statistics of the Variables Used in Tobit Model

Variable	Variable Name	Mean	Standard Deviation	Max	Min
Residence, 1 = if in urban areas; 0 otherwise	URBAN	.554	.498	1	0
Household size (#) to the power of 2	HS^2	10.232	14.210	196	1
Type of food facility most often visited, 1 = if cafeteria; 0 otherwise	CAFE	.069	.254	1	0
Type of food facility most often visited, 1 = if fast food; 0 otherwise	FAST	.384	.487	1	0
Type of food facility most often visited, 1 = if restaurant; 0 otherwise	RESTU	.467	.499	1	0
Type of food facility most often visited, 1 = if other types; 0 otherwise	OTHER	.017	.128	1	0

ities. On the other hand, for households often patronizing cafeteria or any other eating establishments, expenditure for FAFH was not significantly different from that of households frequenting fast food facilities. These results suggest that Georgia consumers spend most in restaurants followed by fast food facilities, cafeteria and other types of eating establishments.

As expected, total household income had a positive effect on FAFH expenditures. We estimated income elasticity for FAFH to be .70, suggesting that food expenditures away from home are income inelastic (Table 3). The estimated income elasticity reported in this study is somewhat lower than those reported in most of the previous studies.[1]

Decomposition of the Tobit regression coefficients provides additional economic information on the importance of differential responses among households. Returning to Table 2, the conditional marginal effects due to changes in all the independent variables accounted for about 90 percent of the total effect of food expenditures away from home. This suggests that most of the variation on FAFH expenditures was due to changes in the amount households spent eating away from home. The decomposition of the income elasticity further reflects this variation. We found the conditional income elasticity for FAFH to be .61 and market participation income elasticity to be .09 (Table 3).

Table 2.
Regression Results of Tobit Analysis for Food Expenditure Away From Home per Household per Week in Georgia

Variable	β	Asymptotic t-ratio	MPE[a]	CME[b]	TE[c]

Table 2.
Regression Results of Tobit Analysis for Food Expenditure Away From Home per Household per Week in Georgia

Variable	β	Asymptotic t-ratio	MPE[a]	CME[b]	TE[c]
CONSTANT	− 6.441	− .743			
FEMP	1.813	.818	.051	1.630	1.681
FCOL	4.399**	1.963	.148	3.930	4.079
CHILD5	−12.160***	−3.720	−.087	−11.189	−11.276
CHILD12	− 5.684*	−1.952	− .067	− 5.204	− 5.271
TEEN19	7.760***	2.902	.276	6.920	7.196
YOUNGM	7.058**	2.227	.206	6.339	6.545
YOUNGF	.417	.122	.009	.377	.386
ADULTM	7.577**	2.416	.250	6.777	7.026
ADULTF	− 5.828	−1.581	− .056	− 5.348	− 5.404
MAGEDM	1.917	.725	.053	1.725	1.777
MAGEDF	− 4.967*	−1.686	− .004	− 4.602	− 4.606
INC	.409***	7.224	.048	.331	.380
WHITE	14.913*	1.766	1.617	12.212	13.829
BLACK	16.250*	1.866	.743	14.326	15.068
URBAN	1.015	.490	.025	.916	.941
HS[2]	.091	.844	.003	.082	.084
CAFE	− .293	− .072	− .006	− .266	− .272
RESTU	4.944**	2.372	.188	4.397	4.585
OTHER	− 3.022	− .391	− .061	− 2.741	− 2.802
Sample Size: 362					
Wald Statistics: 927.656					

[a]Market Participation Effect (MPE): $E(EXP^*) \times \delta F(z)/\delta \times$.
[b]Conditional Marginal Effect (CME): $F(z) \times \alpha E(EXP^*)/\delta \times$.
[c]Total Effect (TE): MPE + CME.
*significant at .10 level.
**significant at .05 level.
***significant at .01 level.

Implications

The study shows that differences in household sex-age composition exerts a significant influence on household FAFH expenditures. Households with small children and older females spend significantly less on FAFH. On the other hand, the presence of teenagers, younger females, and males of all age in the household tend to increase FAFH expenditures. The study also provides evidence that households with college educated and employed

Table 3.
Survey of Estimated Income Elasticities of Away From Home Food Expenditures

Study	Market Participation Elasticity	Conditional Elasticity	Total Elasticity
This Study	0.09	0.61	0.70
Smallwood & Blaylock	NA	NA	0.817
Salathe	NA	NA	0.869
Kinsey			
Over Income Range			
Low	NA	NA	0.11
High	NA	NA	0.84
Average	NA	NA	NA
McCracken & Brandt			
Over Income Range			
Low	0.073	0.023	0.096
High	0.169	0.178	0.347
Average	0.185	0.059	0.244
Huang & Raunikar			
Over Income Range			
Low	0.207	2.019	2.226
High	0.042	0.596	0.639
Average	0.074	0.854	0.928

women spend more on FAFH. Furthermore, total household income is an important factor that exerts a positive influence on FAFH expenditures. White and black households spend significantly more on FAFH than households of any other race. These findings should help the away from home eating establishments in identifying target markets for development of promotional campaigns. In essence, the target population for eating establishments in Georgia is higher income families of both white and black races, households without small children and older females, and households with college educated and employed wives.

The results also show that consumer preferences for cafeteria and other eating establishments do not affect FAFH expenditures compared with preference for fast food facilities. However, preference for restaurants has significantly greater impact on FAFH expenditures than that of fast food facilities. Furthermore, we attribute most of the changes in FAFH expenditures to the variations in the amount spent by households already eating away from home. This clearly suggests that the industry should direct their strategic planning for market development and promotional efforts to the consuming households.

Notes

1. Smallwood and Blaylock's estimated FAFH income elasticity was .817 and that of Salathe was .869. Kinsey estimated income elasticity ranging from .11 to .84, and McCracken and Brandt reported an income elasticity of .096 for low income level and .347 for high income level. Huang and Raunikar's estimated income elasticities vary from .639 at high income levels (greater than $15,000) to .894 at moderate income levels ($10,000 to $15,000) to 2.226 at low income levels (less than $5,000). The diversity in the magnitudes of income elasticity found in the literature was not unexpected due to differences in model specifications and estimation methods. However, both Kinsey, and McCracken and Brandt reported that income elasticity increases with increasing income level. Huang and Raunikar's study suggested that elasticity rises with falling income. The behavioral implications of these results do not seem to be consistent. Huang and Raunikar argue that away from home food is a luxury good for households at low income levels. If this is the case we can explain the relatively small income elasticity found in this study is due to the greater proportion of sample households earning more than $15,000 per year (75 percent).

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Appendix

To account for the underlying structure of a stochastic model in which the dependent variable has some limited values, we rewrote equation (1) as:

$$\begin{aligned} EXP_i &= X_{ij}\beta + e_j, && \text{if } X_{ij}\beta + e_j > 0 \\ &= 0, && \text{if } X_{ij}\beta + e_j \leq 0 \end{aligned} \tag{2}$$

where X_{ij} represents a matrix of explanatory variables, β is an unknown parameter vector, and e_j represents a vector of normal error terms with zero mean, and constant variance σ^2; and $i = 1,2,...,k$; $j = 1,2,...,n$.

The model assumes there is an underlying index equal to $(X\beta + e)$ observed only when it is positive. As Amemiya shows, the conditional expectation of EXP, denoted as $E(EXP^*)$ in equation (2), since EXP is greater than zero, is:

$$E(EXP^*) = E(EXP|EXP > 0) = X\beta + E(e|EXP > 0), \text{ and} \tag{3}$$
$$E(e|EXP > 0) = \sigma\ f(z) / F(z).$$

Where $z = X\beta/\sigma$, $f(z)$ is the unit normal density function, and $F(z)$ is the cumulative normal distribution function. Clearly that the conditional expectation of the error term in equation (3) will not be zero. Thus, application of OLS to equation (2) yields biased and inconsistent estimators (Greene). Specifically, the difficulties of using OLS in estimating the parameters of equation (2) arise because the usual OLS assumptions of $E(e) = 0$, and $E(e^2) = \sigma^2$ do not hold when the dependent variable is limited.

We require adjustments in Tobit regression coefficients to compute the marginal effect of a change in the ith variable of X on EXP, and the elasticity of EXP with respect to X_i (McDonald and Moffitt). The computations differ from the procedure used with OLS because the unconditional expected value $E(EXP)$ in equation (2) is no longer equal to $X\beta$. The unconditional expected value, $E(EXP)$, according to Amemiya is

$$E(EXP) = X\beta\ F(z) + \sigma\ f(z) = E(EXP^*)\ F(z). \tag{4}$$

Thus, the unconditional expected value of EXP in equation (2) is equal to the conditional expected value of EXP, $E(EXP^*)$, adjusted for the probability that EXP is greater than zero. The effect of a change in the ith variable of X on EXP is

$$\delta E(EXP)/\delta X = F(z)[\delta E(EXP^*)/\delta X] + E(EXP^*)[\delta F(z)/\delta X]. \tag{5}$$

The first part of the marginal effects of X on EXP measures the change in the value of the dependent variable, if it is already above the limit, weighted by the probability of being above the

limit. The second part measures the change in the probability of being above the limit weighted by the conditional expected value of EXP. The elasticity of EXP with respect to X, ε_i, is calculated by:

$$\varepsilon_i = [\delta E(EXP^*)/\delta X][X/E(EXP^*)] + [\delta F(z)/\delta X][X/F(z)]. \quad (6)$$

The first part of equation (6) is referred to as the conditional elasticity associated with actual expenditure. The second part is referred to as the market participation elasticity. This represents the elasticity of change in the probability of being a consuming household associated with a change in the ith independent variable.