Household Consumption of Food-Away-From-Home: Total Expenditure and by Type of Food Facility

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Consistent with prior expectations based on household production theory, household income, time value, size and composition, and the environment in which production and consumption occurred were all important determinants of total household expenditures on food-away-from-home. However, the importance of these factors varied by type of food facility: conventional restaurants, fast-food facilities, and other commercial establishments. Decomposition of the tobit elasticities indicated the differential importance of market participation effects of household size, income, and time value by level of the variable and by type of food facility.

Key words: consumption analysis, food-away-from-home expenditures, household production theory, tobit analysis.

In recent years the sociodemographic and economic structure of the U.S. population has changed significantly. Major changes have involved the composition and size of the household, the number of households with multiple wage earners, the location of residence and social mix of the population, and per capita income. Household food expenditure patterns have also changed. Per capita expenditures for food at home (FAH) as a proportion of per capita personal consumption expenditures have trended downward since at least 1960. However, the proportion spent on food-away-from-home (FAFH) has increased slightly and, within the total FAFH market, consumption patterns by type of food and facility have shifted. Conventional full service restaurants accounted for the bulk of expenditures on FAFH in the past. However, the number of fast-food eating establishments has more than tripled in the last twenty years. Coupled with their diverse and expanded menus, this growth has resulted in two out of every five dollars for FAFH in 1982 being spent at fast-food facilities compared to one out of seven in 1963 (U.S. Department of Commerce). These changes in the structure of the total food sector and within the FAFH subsector will continue to have varying impacts on the marketing, distribution, retailing, and food service system and on farm-level demand for agricultural products.

Much of the previous literature on FAFH has been descriptive in nature (LeBovit; Manchester 1977, 1978; Van Dress 1979, 1980) or has examined FAFH expenditures as a single category within the broader context of consumer eating habits (Haidacher et al., Lee and Phillips, Raunikar, Salathe, Smallwood and Blaylock) or within the context of total consumer market good expenditures (Hiemstra and Eklund, Ketkar and Cho, Mann). These studies have contributed to understanding consumption patterns away from home, but their descriptive or aggregate nature does not allow one to sort out the effects of selected factors on FAFH by type of facility. These studies have not explained FAFH behavior within an explicit theoretical framework.

Drawing on household production theory, Prochaska and Schrimper concluded that the value of the homemaker's time was an important factor affecting food consumption,

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reflected through expenditures on FAFH. Others have identified the importance of income, race, residence, and size and composition of the household on FAFH (Demousis and Wohlgenant, Fletcher, Kinsey, Redman, Sexauer). Kinsey (p. 18) hypothesized that "households with two full-time workers . . . might frequent limited menu, family-type, or fast-food restaurants, . . . or substitute food that can be prepared quickly at home." The conclusions of Capps, Tedford, and Havlicek support this hypothesis. Techniques have differed, and the results have been mixed regarding the relative importance of these factors as well as the value of household time on FAFH demand.

While numerous studies have confirmed the connection between the value of household time and household income with food consumption away from home, none has investigated this link by type of food facility. Identifying and measuring the influence of factors affecting away-from-home food consumption behavior by type of facility (restaurant, fast food, or other commercial) can lead to improved market planning and is the motivating force in this research. The remainder of this article includes developing a theoretical framework, specifying and estimating the model, reporting empirical results including FAFH expenditure patterns by type of facility and decomposition of expenditure elasticities, and concluding comments.

Theoretical Framework

The FAFH market is most appropriately analyzed within the theoretical context of household production economics, an approach which incorporates less restrictive assumption on models of consumer behavior (Deaton and Muellbauer). Household production theory implies that household time as well as market goods and services enter the assumed utility maximization process and views the household as both a producing and consuming unit (Lancaster 1966, 1971). Goods purchased in the marketplace are used as inputs into the production of commodities within the household. The household is assumed to maximize a utility function whose arguments are commodities produced by the household subject to the usual monetary budget constraint and additional production (i.e., consumption technology) and time constraints. Under certain assumptions on the consumption technology, the demand for market goods can be derived as a function of the price of the good and other goods, household income, a measure of the household's opportunity cost or value of time, and other environmental variables (Lancaster 1966, 1971; Michael):

$$(1) \quad C_{ij} = C_i(P_j; Y_j; W_j; E_j), \; i = 1, \ldots, n,$$

where C_{ij} is the jth household's consumption of the ith market good, P_j is the vector of market prices faced by the jth household, Y_j is the jth household's measure of income, W_j is the jth household's value of time, and E_j is a vector of variables reflecting the environment in which production for the jth household occurs.[1]

This general demand relationship was used by Prochaska and Schrimper, Kinsey, Redman, and others to develop more explicit models for purposes of hypothesis testing. Prochaska and Schrimper measured consumption, C, in equation (1) by the number of meals purchased and consumed away from home; Kinsey and Redman used aggregate expenditures on FAFH as the dependent variable. These studies examined the influence of income, value of time, household composition, employment status, and other socioeconomic and demographic factors (reflecting the production environment, E) on consumption behavior.

In this study, equation (1) is modified to disaggregate the dependent variable from total expenditures on FAFH to expenditures at various types of food facilities. With this disaggregation, other hypotheses in addition to those suggested and examined in previous studies can be tested, including: (*a*) increased values of household time will significantly increase expenditures at fast-food facilities more than at time-intensive, sit-down restau-

[1] These demand equations stress the interrelationships between human capital, the allocation of time in the household market and nonmarket activities, and the environment within which these activities occur. While the above demand equations derived from theory constitute a complete demand system with complex interdependencies among the goods, a single-equation approach was taken here, with explicit consideration given only to the FAFH market. This does not imply that the demand for FAH is independent of the demand for FAFH. In fact, they are likely close substitutes for most individuals most of the time. However, because of the complexities involved with using disaggregate food consumption data of the type utilized in this study, an analysis of one segment (FAFH) apart from the others (FAFH and all other goods and services) provides more useful information than provided by no analysis at all. Nonetheless, the results of this study should be interpreted within the context of the empirical model.

rants; (*b*) households with higher incomes spend proportionately more at sit-down restaurants than at fast-food facilities; and (*c*) household size and composition affect away-from-home food expenditures differently by type of food facility. Kinsey (p. 18) has noted that "eating FAFH is not necessarily less time-intensive than home-produced meals." However, her model did not disaggregate the expenditure variable by type of facility; thus the implied hypothesis (see hypothesis *a*, above) could not be tested.

Model Specification and Estimation

Individual food intake (aggregated to the household level) and sociodemographic and economic data from the spring quarter of the 1977–78 Nationwide Food Consumption Survey (U.S. Department of Agriculture) were used in the empirical section of this study. The data are unique from those previously collected by USDA since detail is provided about the kinds and quantities of all foods consumed, both at home and away from home, for each household member. As with any disaggregated cross-sectional data, missing/incomplete data were a problem. A small number of households not reporting key demographic information (e.g., race and education) were discarded. Over 20% of the households did not report their before-tax income, but many did provide other information affecting their income status. A system was developed to impute before-tax income for these households. This system was based on reported current monthly income, after-tax income, and various sociodemographic information for before-tax income reporters and nonreporters. Households that did not report intake information for all individual members were not considered.[2]

The aggregate measure of the dependent variable in the demand model (C_{ij}) in equation (1) is total household expenditures on FAFH. The disaggregate measures of consumption are household expenditures at different types of food facilities—restaurants, fast food, and other commercial facilities.

Prices (P_j) are assumed to be relatively constant in this cross-sectional data set. Thus issues of aggregation or quality differences among geographic areas that are not systematically accounted for by other variables in the model were not encountered. Hence the analysis is not concerned with factors that fully determine FAFH demand but with factors which are associated with differences in consumption of FAFH.

The appropriate measure of income (Y_j) to use in a demand model has had much debate. Friedman argues that total expenditures are a better measure of permanent income rather than actual measured income, whereas Summers suggests total expenditures are affected by the timing of purchase. Liviatan suggests an instrumental variable approach to obtain a consistent income measure. Most empirical work has used total household income, largely because of the availability of data (Kinsey, Prochaska and Schrimper, Redman, and Sexauer). Here, income was measured as the reported or imputed value of before-tax household income for the previous year. It was included in the model in both a logarithmic and logarithmic squared form (i.e., quadratic-in-log form).

The education level and age of the household head are hypothesized to affect household productivity in food preparation as well as household preferences for consumption of FAFH. Other hypothesized environmental factors (E_j) include retirement status of the household, geographic location of residence of the household (both regional location and urbanization), race of household, and household size and composition. Households are hypothesized to have different expenditure patterns during the week and on the weekend.

Finally, the value of household time (W_j) is expected to affect FAFH demand; however, quantification of the variable has varied across studies. Prochaska and Schrimper imputed a wage for each homemaker in their sample from a wage equation estimated using ordinary least squares (OLS) and 1960 census data. Despite criticism of their approach, they laid the foundation for other, more sophisticated studies. Redman and Kinsey, in separate studies, used dummy variables to differentiate working (full- and part-time) and nonworking wives in order to account for the time component in their FAFH demand models. Fletcher used observed market wages to measure household value of time for individuals who were employed outside the household. For nonemployed individuals, Fletcher estimated potential market earnings using a

[2] Details about these missing/incomplete data problems are discussed in McCracken and Brandt (1986b).

procedure that corrects for the selection bias from using observed market wages to impute values to nonemployed individuals.

While estimates of the value of time are not the main objective of this study, they are important because of their hypothesized effects on the demand for FAFH. Misleading conclusions about FAFH consumption could result from using observed market earnings for employed individuals to estimate potential market earnings for nonemployed individuals (without accounting for selection bias) and then using these earnings as measures of the value of household time in the FAFH equation. For example, explanatory variables such as education or household composition may appear to affect consumption of FAFH. However, these may be significant factors in the earnings function that correctly accounts for selection bias but not significant determinants of FAFH. Omission of the value of time (in a FAFH demand model) could produce biased coefficient estimates for the other variables in the model (Mincer, Prochaska and Schrimper).

Building upon the labor supply work of Heckman, the value of the household's time in this study was estimated using a stochastic censoring model. This model consisted of two possibly related behavioral equations—a potential market earnings equation and a reservation earnings equation—and a sample selection rule which determines whether or not an individual participates in the labor market and thus has observed market earnings. An individual was assumed to participate if the utility or benefit derived from participation (potential earnings) is greater than that derived from not participating (reservation earnings). The independent variables included measures of age, education, sex, and location of residence of household heads, nonearned income, spouse's earnings, and the age and presence of children in the household. The model was estimated separately for males and females from single-headed and dual-headed households.[3] Consistent two-stage estimates of the unknown parameters in the model were used as initial values in the iterative solution of the likelihood equation. These maximum likelihood (ML) results were used to estimate potential earnings (measured in ln $/year) for all household heads in the sample. Then the household's value of time was measured by the estimated potential earnings of the household head responsible for preparing food for the household.[4]

The theoretical framework and model specification suggest estimation of the following equations:

$$(2)\quad EXP_{jk} = f(Y_j, W_j, ED_j, AGE_j, DAY_j, RE_j, UR_j, RACE_j, HS_j, EMP_j),$$

where EXP_{jk} is the jth household's expenditure on food consumed away from home in the kth type of facility (total, restaurant, fast food, and other commercial), ED_j is the education in years of the head of household, AGE_j is the age of the head of household, DAY_j is the time of the week (weekday versus weekend) the food was consumed by the household member, RE_j is the region of the country, UR_j is the location of the household within the urban setting, $RACE_j$ is the race of the head of household, HS_j is the household size and composition component, and EMP_j is the employment status of the head of household. For dual-headed households, these variables refer to the male head. This specification incorporates the important demographic and economic factors expected to influence FAFH expenditures.

For this study, FAFH was defined to include only food consumed at commercial facilities.[5] Other studies have included noncommercial sources, such as schools and other institutions and other individuals' homes. These different definitions may partially explain the varying results in different FAFH demand studies.

As shown in table 1, 43% of the sample households had not consumed any FAFH during the three-day survey period. When disaggregated eating places are considered, even a larger portion of households did not consume FAFH in any given place. For example, only about 35% and 30% of the sample households consumed food from restaurants and fast-food establishments, respectively.

Use of OLS to estimate the FAFH model

[3] The term "household head" as used here does not refer to the traditional meaning of authority within the household, but identifies related adult members (either married or unmarried) of the household.

[4] The details and results of this procedure are discussed in McCracken and Brandt (1986c).

[5] NFCS listed 13 commercial and noncommercial sources of food consumption away from home. Restaurant and fast-food facilities were separate commercial sources. Other commercial facilities included other public eating places; cafeterias, dining rooms, or other places at work; and lunch counters at grocery or food stores.

Table 1. Percent of Sample Households Eating Food-Away-From-Home: Total and by Type of Food Facility

Type of Food Facility	Number of Meals[a]				
	0	1	2	3	>3
	(%)				
1) All types of food facilities	43.0	12.7	12.0	10.1	22.2
2) Restaurants	65.1	11.3	9.0	5.0	9.6
3) Fast food facilities	70.9	11.7	7.0	3.8	6.6
4) Other commercial facilities	59.7	10.8	7.7	5.4	16.4

Source: USDA.
[a] Refers to the total number of meals that the household consumed away from home during the three-day survey period.

would result in biased and inconsistent estimates because of the large number of households who had not consumed FAFH. Deleting the nonconsuming households and using OLS does not solve the problem of inconsistency and would reduce the efficiency of the estimates because of the smaller sample size. Tobit analysis (Tobin) is a theoretically preferred technique that uses information about all households in estimating the regression function. With tobit analysis, in a cross-sectional analysis it is possible to estimate both the quantity responses of households actively consuming (conditional quantity elasticities) and the participation adjustments of exit-entry households (market participation elasticities). Elasticities estimated using time-series data reflect both types of adjustments, whereas OLS estimates from cross-sectional data would not include the market participation component and therefore would underestimate the total elasticity. For these reasons, tobit analysis was used in this study, and the results may help reconcile the differences in elasticities which have been reported in time-series and cross-sectional studies.

The data set was divided into two parts to avoid the problems of "pretest estimation" or "data dredging" (Wallace). Approximately one-half of the data was used for model selection, the other half for reestimating the selected model for purposes of hypothesis testing and elasticity construction. While arbitrary, this data-splitting procedure has considerable support in the methodological literature (Anderson, Allen, and Cady; Judge et al.; Theil; Toyoda and Wallace) and recently in empirical studies (Hymans and Shapiro, Kinsey). Estimates from the data used for hypothesis testing and elasticity investigation are reported in the results section.

Results

In this section the tobit results are reported separately for total expenditures on FAFH and for expenditures on FAFH by type of food facility.

Total Expenditures on FAFH

Tobit estimates for total expenditures on FAFH indicate that the age and retirement status of the household head, membership in other-than-white race, and observation during the week (as opposed to during the weekend) all had negative effects on total expenditures (table 2). Certain types of individuals (e.g., males older than 15, females 15–20, and children 7–14 years of age) had positive influences on expenditures, while the effect of household size (squared) was negative.[6] Hence, the total effect of a certain type of individual depends upon the household size. For example, the presence of a child 7–14 years old may positively influence expenditures for small households but have a negative effect for larger households. Consistent with prior expectations, increases in income were associated with increases in expenditures, but at a decreasing rate (for relevant ranges of income in the sample). The value of the household food manager's time was positively related to total expenditures, consistent with the hypothesis that households with high time values will eat out rather than at home to save time.

Although not identical, this aggregate measure of FAFH consumption is similar to that

[6] Household size is implicitly included in the model through the household composition variables. Because of possible economies of scale in household food consumption, both household size (number of persons of different age and gender) and household size squared variables were evaluated.

Table 2. Tobit Regression Results for Total Expenditures on Food-Away-From-Home, and by Type of Eating Facility

Independent Variables[a]	Total Household Expenditure on Food-Away-From-Home	Expenditures at Restaurants	Expenditures at Fast-Food Facilities	Expenditures at Other Commercial Facilities
Intercept	27.224	42.266	−8.897*	−11.946*
	(19.816)[b]	(29.308)	(3.770)	(3.149)
Age (years)	−.141	−.119	−.047	−.032
	(.074)	(.104)	(.056)	(.046)
Education (years)	−.124	−.088	0.214	0.025
	(.299)	(.409)	(.213)	(.180)
Age * education	0.007	0.012	−.002	−.001
	(.006)	(.008)	(.004)	(.003)
Retirement (1 = yes)	−2.040*	−3.523*	−.719	−.990
	(1.044)	(1.594)	(.827)	(.632)
Value of time (ln $/year)	0.478*	0.404**	0.241*	0.267*
	(.152)	(.236)	(.099)	(.085)
Region:[c]				
North central	0.447	1.012	0.758	−.255
	(.735)	(1.034)	(.497)	(.418)
South	−.550	−1.044	0.234	−.466
	(.684)	(1.015)	(.461)	(.401)
West	−.303	1.113	0.250	−1.638*
	(.765)	(1.062)	(.540)	(.489)
Urbanization:[d]				
Central city	0.264	0.040	−.238	0.255
	(.663)	(.926)	(.454)	(.390)
Nonmetropolitan	−.643	−.152	0.088	−.337
	(.643)	(.908)	(.409)	(.378)
Day (1 = weekday interview)[e]	−1.185*	−1.440**	−.488	−.512
	(.581)	(.840)	(.395)	(.322)
Race (1 = nonwhite)	−1.614**	−2.507*	−.345	−.542
	(.862)	(1.292)	(.492)	(.461)
Income (ln $/year)[f]	−8.088**	−13.439*	0.109	.865*
	(4.321)	(6.394)	(.270)	(.220)
[Income (ln $/year)]^2	0.539*	0.842*	—	—
	(.243)	(.359)		
Household composition:				
Males > 40 (number)	4.343*	4.223*	2.874*	1.855*
	(.846)	(1.272)	(.577)	(.500)
Females > 40	0.253	−1.406	1.237*	0.433
	(.715)	(1.055)	(.544)	(.480)
Males 21–40	5.208*	5.499*	2.964*	1.848*
	(.822)	(1.258)	(.509)	(.421)
Females 21–40	1.332	0.554	1.577*	1.069*
	(.842)	(1.268)	(.551)	(.499)
Males 15–20	2.489*	1.227	2.520*	1.293*
	(.697)	(1.147)	(.481)	(.412)
Females 15–20	3.376*	3.057*	2.396*	1.375*
	(.727)	(1.131)	(.479)	(.438)
Children 7–14	1.490*	0.919	1.426*	0.923*
	(.615)	(.964)	(.410)	(.366)
Children 3–6	0.413	−.557	0.949*	0.577
	(.736)	(1.123)	(.459)	(.441)
Infants ≦ 2	−.975	−1.978	0.015	−.036
	(.841)	(1.288)	(.470)	(.491)
[Household size]^2	−.176*	−.150	−.134*	−.085*
	(.059)	(.104)	(.040)	(.036)
Sample size	1,302	1,356	1,359	1,336
LF^g	−4,524.08	−3,029.03	−2,368.66	−2,553.16
$\hat{\sigma}^{2h}$	61.78	103.00	20.59	15.84

[a] The age, education, and retirement variables were measured for the household head in single-headed households and for the male head in dual-headed households. Value of time for the household was measured by the estimated potential earnings of the head who was the food manager for the household.

[b] Numbers in parentheses are the estimated standard errors; * and ** indicate significance at the 5% and 10% level, respectively, according to a classical two-tailed hypothesis test.

[c] Omitted region category: northeast.

[d] Omitted urbanization category: metropolitan.

[e] The day variable differentiates households whose 3-day observation period was mainly during the week (as opposed to the weekend).

[f] Income was measured as total household, before-tax income for the previous year.

[g] LF is the value of the likelihood function at convergence. A higher LF value indicates that the parameter estimates are more likely than those associated with a lower LF value, similar to concept of R^2 in OLS models.

[h] $\hat{\sigma}$ is the standard error estimate of the dependent variable and is simultaneously estimated with the β's.

of other studies. In general, the results of other studies are consistent with those reported here for income, race, and location of residence. However, most studies differed in their quantification of and results reported for the value of household time. Prochaska and Schrimper found that the opportunity cost of the homemaker's time (based on "out-of-sample" information) is an important determinant of FAFH demand. Slightly different results were reported by Redman, whose model failed to establish a significant relationship between FAFH meal expenditures and the household time (value) constraint. However, her approach incorporated a simple dummy variable which distinguished between employment and nonemployment of married women to quantify the time constraint in a sample that included both married and unmarried women. The Redman model did not explicitly account for the value of time, as in Prochaska and Schrimper.

Expenditures on FAFH by Type of Food Facility

Given the hypothesis that the demand for FAFH differs by type of eating establishment, disaggregated regression models were separately estimated for expenditures at restaurants, fast-food, and other commercial facilities. The tobit estimates (table 2) show the differing importance of the various sociodemographic factors by type of eating establishment. Expenditures at restaurants and at other commercial establishments were positively affected by the level of household income. However, the value of household time had strongly significant (positive) effects on fast-food and other commercial expenditures, but was only marginally significant for restaurant expenditures. This finding suggests that individuals eat at restaurants other than just to save time (e.g., as a recreation diversion) and that eating away from home in fast-food places depends less on income than on the value of the food preparer's time. This is an example of capital substituting for labor (at the value of the food manager's time), as long as the capital-intensive method produces the commodity more quickly than the labor-intensive method.

Other differences involved household size and composition, race, retirement, and observation period. While children less than 2 years of age did not significantly affect expenditures at any type of facility, household size and composition had stronger effects on spending at fast-food and other commercial facilities than at restaurants. Accounting for both household size and composition, the effect of children 3–6 and 7–14 years old was positive for smaller households (<4 and ≦5 members, respectively) and negative for other households. Males older than 14 years and females 15–20 years old all had positive impacts on fast-food expenditures for most household sizes in the sample. Finally, the effect of females 21–40 and older than 40 on fast-food expenditures depended on the size of their households. These household size results indicate either economies of scale in fast-food consumption or a decreasing probability of eating at fast-food facilities with increasing household size. Interestingly, women of childbearing age (21–40 years) had significant positive effects on expenditures at other commercial establishments (which includes eating facilities in the workplace). This effect could be more important in the future with more childbearing-age women in the paid labor force.

Decomposition of Expenditure Elasticities

The Tobit estimates in table 2 were decomposed and expressed in elasticity form for household size and value of the food manager's time. The two components of the total elasticity are the conditional elasticity associated with actual expenditure and the elasticity of the probability of consumption.[7] The house-

[7] Following the derivations of McDonald and Moffitt, the unconditional and conditional (upon being above the limit) expected values of the dependent variable, Y_i, in the tobit model can be written, respectively, as

$$E(Y_i|X_i) = F\left(\frac{\beta'X_i}{\sigma}\right)(\beta'X_i) + \sigma f\left(\frac{\beta'X_i}{\sigma}\right) \text{ and}$$

$$E(Y^*_i|X_i) = E(Y_i|X_i,\ Y_i > 0)$$

$$= (\beta'X_i) + \sigma f\left(\frac{\beta'X_i}{\sigma}\right) \Big/ F\left(\frac{\beta'X_i}{\sigma}\right),$$

where $F(\cdot)$ and $f(\cdot)$ are the standard normal density and distribution functions, respectively. Then the effect of a change in an independent variable, X_i, on $E(Y_i|X_i)$ in elasticity form can be decomposed as

$$E_i = \frac{\partial F\left(\frac{\beta'X_i}{\sigma}\right)}{\partial X_i} \frac{X_i}{F\left(\frac{\beta'X_i}{\sigma}\right)} + \frac{\partial E(Y^*_i|X_i)}{\partial X_i} \frac{X_i}{E(Y^*_i|X_i)},$$

with the first component being the elasticity of the probability of consumption and the second being the elasticity of expected consumption of presently consuming households.

hold composition variables complicated the decomposition of the tobit estimates in table 2 for household size. Hence, an alternative model was used to calculate household size elasticities (McCracken and Brandt 1986a). This model includes household size but not household size squared and composition variables.

The results in table 3 indicate that elasticities for household size, income, and value of time differ substantially for expenditures at different types of eating places and over the range of the independent variables. In particular, household size elasticities increased steadily as household size increased and were greater at fast-food and other commercial facilities than at restaurants. Also the market participation effect was important for all levels of household size and by source of expenditure. The total household size elasticity for total household expenditures was .271, over twice the value reported by Smallwood and Blaylock. Their elasticity was based on OLS estimates, a procedure which does not account for the market participation component of the total elasticity.

For total expenditures on FAFH, the conditional quantity income elasticity component increased for all levels of income considered, but the market participation elasticity component increased only until household income reached $15,000 and then decreased with further income increases. Consistent with the discussion of the tobit estimates in table 2, the total elasticity for total expenditures increased as income increased but at a decreasing rate. The total household income elasticity for FAFH expenditures (at the sample mean income of $10,500) was about .24, considerably smaller than elasticities reported in other studies (Hiemstra and Eklund, Prochaska and Schrimper, Hassan and Johnson, Smallwood and Blaylock, Demousis and Wohlgenant). Fletcher reported slightly smaller elasticities than these other studies, based on two-step estimates of the tobit model. But .24 is similar to Kinsey's reported values (based on tobit estimates) for households in her medium income range. These differences in elasticities between studies could be due to the definition of FAFH, treatment of incomplete/missing observations, and estimation procedures used (OLS vs. tobit), as well as to differences in model specification. In particular, if the value of household time is a relevant variable and is positively correlated with income, then the income effect (hence elasticity) will be smaller in studies which include an explicit measure of the value of time.

These results indicate that income elasticities vary by expenditures at different types of eating places. At the average level of income, elasticities at restaurant and other commercial facilities were comparable (.34 and .36, respectively), but the elasticity at fast-food facilities was very small (.04). Hence, as household income increases while the value of time and other factors are held constant, households spend slightly more at fast-food facilities but increase expenditures more at restaurants and other commercial facilities.

Variations in household food manager's time value elasticities were not large, neither between levels of time value nor by type of eating facility. A slightly higher value for other commercial facilities is consistent with prior expectations. Several of these other commercial sources are associated with the workplace and therefore decrease the time component of eating. Also, the elasticity associated with fast-food eating is about 50% larger than that associated with restaurant consumption, indicating the importance of quicker service to those with higher opportunity costs of time.

Concluding Comments

Sociodemographic and economic factors which affect food consumption behavior through changes in expenditures for FAFH were analyzed in the context of household production theory. This framework stresses the allocation of household time between market and nonmarket activities. Hence, the value of household time was included in the empirical model. Because of the many households with zero expenditures on FAFH, tobit analysis was used to estimate the empirical model. Consistent with other studies, the results indicated the importance of household size and composition, income, and other sociodemographic variables in an FAFH demand model. In addition, the value of time was positively related to total household FAFH expenditures.

The results also indicate the importance of distinguishing between FAFH expenditures at different types of eating places. For example, increased income significantly increased expenditures at restaurants and other commercial food facilities but not at fast-food facili-

Table 3. Household Size, Income, and Time Value Elasticities for Total Expenditures on FAFH, and by Source of Expenditure

Independent Variable	Conditional Quantity Elasticity	Market Participation Elasticity	Total Elasticity[a]
Household Size (number)		Total Expenditures on FAFH	
1–2 persons	.046[b]	.133	.179
3–4 persons	.197	.197	.394
5 or more persons	.344	.287	.631
Average	.087	.184	.271
		Restaurant Expenditures	
Average	.005	.014	.019
		Fast-Food Expenditures	
Average	.062	.197	.259
		Other Commercial Expenditures	
Average	.100	.114	.214
Income ($/year)		Total Expenditures on FAFH	
< $5,000	.023	.073	.096
$5,000–$10,000	.081	.183	.264
$10,000–$15,000	.118	.193	.311
$15,000–$20,000	.147	.181	.328
≥ $20,000	.178	.169	.347
Average	.059	.185	.244
		Restaurant Expenditures	
Average	.086	.254	.340
		Fast-Food Expenditures	
Average	.010	.031	.041
		Other Commercial Expenditures	
Average	.089	.267	.356
Value of Food Manager's Time ($/year)		Total Expenditures on FAFH	
< $400	.027	.053	.080
$400–$1,800	.025	.078	.103
$1,800–$8,100	.059	.042	.101
≥ $8,100	.060	.040	.100
Average	.028	.047	.075
		Restaurant Expenditures	
Average	.014	.048	.062
		Fast-Food Expenditures	
Average	.020	.069	.091
		Other Commercial Expenditures	
Average	.027	.082	.109

[a] The total elasticity is the sum of the conditional and market participation elasticities. The conditional or quantity elasticity is the elasticity of expected consumption of consuming households with respect to the independent variable and the market participation elasticity is the elasticity of the probability of consumption with respect to the independent variable.
[b] The elasticities are evaluated at the mean values for all relevant variables for the subsample defined by the specified level of the independent variable. For the average values in the table, the elasticities are evaluated at the overall sample mean values for all relevant variables.

ties. Conversely, increased value of the food manager's time increased fast-food and other commercial expenditures more than restaurant expenditures.

The decomposition of the tobit elasticities indicated the differential importance of market participation effects (relative to total effects) of household size, income, and value of time. These effects varied by level of the variable and by place of expenditure. Almost without exception, the market participation response (elasticity) is the more important component

of the total elasticity. That is, entry to and exit from the away-from-home food market accounted for more of the market response than did the quantity factor. Consequently, studies reporting elasticities calculated on the basis of OLS estimates from cross-sectional data sets may significantly underestimate the total FAFH response to income, household size and composition, and value of food manager's time changes.

The differential impacts of these adjustments have important implications. They suggest that marketing efforts by the food service industry should generally focus on households which do not currently consume FAFH, and more specifically on larger households and households in the middle income class. These differential impacts are also important in light of the changes in the population's eating habits due to changing lifestyles, income levels, and household size, and age distribution. As more married women enter the labor force and their value of time increases, more food will be eaten away from home. Fast-food and other commercial establishments, more so than restaurants, likely will benefit from this change.

Restaurants, fast-food establishments, and other eating places should examine the effects of the conditional quantity and market participation components of the elasticity coefficient to forecast more accurately future consumption patterns. Likewise, retail food stores must monitor these changes, since less food may flow through retail grocery stores. Finally, although affected less directly, differential impacts on the demand for farm commodities will occur with changes in food consumption patterns in the retail and food service sectors.

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References

Anderson, R. L., D. M. Allen, and F. B. Cady. "Selection of Predictor Variables in Linear Multiple Regression." *Statistical Papers in Honor of George W. Snedecor*, ed. T. A. Bancroft, pp. 3–17. Ames: Iowa State University Press, 1976.

Capps, Oral, Jr., John R. Tedford, and Joseph Havlicek, Jr. "Household Demand for Convenience and Nonconvenience Foods." *Amer. J. Agr. Econ.* 67 (1985):862–69.

Deaton, A., and J. Muellbauer. *Economics and Consumer Behavior*. Cambridge: Cambridge University Press, 1980.

Demousis, Michael P., and Michael K. Wohlgenant. "Food Consumption and Household Time: A Test of the Weak Separability Hypothesis." Dep. Econ. and Business, North Carolina State University, April 1981.

Fletcher, Stanley M. "Economic Implications of Changing Household Food Expenditure Patterns." Ph.D. thesis, North Carolina State University, 1981.

Friedman, M. *A Theory of the Consumption Function*. Princeton NJ: Princeton University Press, 1957.

Haidacher, Richard D., John A. Craven, Kuo S. Huang, David M. Smallwood, and James R. Blaylock. *Consumer Demand for Red Meats, Poultry, and Fish*. Washington DC: U.S. Department of Agriculture, Econ. Res. Serv. NED AGES 820818, 1982.

Hassan, Zuhair A., and S. R. Johnson. *Consumer Demand for Major Foods in Canada*. Agriculture Canada, Economics Branch Pub. No. 76/2, April 1976.

Heckman, James J. "Shadow-Price Market Wages and Labor Supply." *Econometrica* 42(1974):679–94.

Hiemstra, S. J., and H. M. Eklund. "Food Expenditures in 1960–1961." *Nat. Food Situation* 17(1966):34–47.

Hymans, Saul H., and Harold T. Shapiro. "The Allocation of Household Income to Food Consumption." *J. Econometrics* 4(1976):167–88.

Judge, G. G., W. E. Griffiths, R. C. Hill, and T. C. Lee. *The Theory and Practice of Econometrics*. New York: John Wiley & Sons, 1980.

Kinsey, Jean. "Working Wives and the Marginal Propensity to Consume Food Away from Home." *Amer. J. Agr. Econ.* 65(1983):10–19.

Lancaster, Kelvin J. "A New Approach to Consumer Theory." *J. Polit. Econ.* 74(1966):132–57.

———. *Consumer Demand*. New York: Columbia University Press, 1971.

LeBovit, C. "Expenditures for Food Away From Home." *Nat. Food Situation* 152(1967):36–38.

Lee, Feng-Yao, and Keith E. Phillips. "Differences in Consumption Patterns of Farm and Nonfarm Households in the United States." *Amer. J. Agr. Econ.* 53(1971):573–82.

Liviatan, Nissan. "Errors in Variables and Engel Curve Analysis." *Econometrica* 29(1961):336–62.

Manchester, Alden C. "Eating Out." *Nat. Food Situation* 161(1977):25.

———. "Eating Out: Fast Foods." *Nat. Food Rev.* 1 (1978):33–34.

Mann, J. S. "An Allocation Model for Consumer Expenditures." *Agr. Econ. Res.* 32(1980):12–24.

McCracken, Vicki A., and Jon A. Brandt. *Analysis of Economic and Socio-Demographic Factors Affecting the Consumption of Food Away From Home*. Purdue University Agr. Exp. Sta. Bull. No. 480, 1986a.

———. *Methodological Considerations in Estimating Household Demand Models with Incomplete Data*. Purdue University Agr. Exp. Sta. Bull. No. 481, 1986b.

———. *The Value of Household Time and the Demand for Food Away From Home*. Purdue University Agr. Exp. Sta. Bull. No. 485, 1986c.

McDonald, John F., and Robert A. Moffitt. "The Uses of Tobit Analysis." *Rev. Econ. and Statist.* 62 (1980):318–21.

Michael, Robert T. *The Effect of Education on Efficiency in Consumption*. New York: National Bureau of Economic Research/Columbia University Press, 1972.

Mincer, Jacob. "Market Prices, Opportunity Costs, and Income Effects." *Measurement in Economics: Studies in Mathematical Economics and Econometrics in Memory of Yehuda Grunfeld*, ed. Carl F. Christ et al., pp. 67–87. Stanford CA: Stanford University Press, 1963.

Prochaska, Frederick J., and R. A. Schrimper. "Opportunity Cost of Time and Other Socioeconomic Effects on Away-From-Home Food Consumption." *Amer. J. Agr. Econ.* 55(1973):595–603.

Raunikar, Robert. *Summary of Food Purchases and Prices, Griffin, Georgia, April–June 1976 with Previous Periods*. Georgia State Exp. Sta. Res. Rep. No. 258, Oct. 1977.

Redman, Barbara J. "The Impact of Women's Time Allocation on Expenditure for Meals Away From Home and Prepared Foods." *Amer. J. Agr. Econ.* 62 (1980):234–37.

Salathe, Larry E. *Household Expenditure Patterns in the United States*. Washington DC: U.S. Department of Agriculture, ESCS Tech. Bull. No. 1603, 1979.

Sexauer, Benjamin. "The Effects of Demographic Shifts and Changes in the Income Distributions of Food-Away-From-Home Expenditure." *Amer. J. Agr. Econ.* 61(1979):1046–57.

Smallwood, David, and James Blaylock. *Impact of Household Size and Income on Food Spending Patterns*. Washington DC: U.S. Department of Agriculture, ESCS Tech. Bull. No. 1650, 1981.

Summers, R. "A Note on Least Squares Bias in Household Expenditure Analysis." *Econometrica* 27(1959): 121–26.

Theil, H. *Principles of Econometrics*. New York: John Wiley & Sons, 1971.

Tobin, J. "Estimation of Relationships for Limited Dependent Variables." *Econometrica* 26(1958):24–36.

Toyoda, T., and T. D. Wallace. "Pretesting on Part of the Data." Duke University, 1977.

U.S. Department of Agriculture. *Nationwide Food Consumption Survey*. Washington DC, spring 1977.

U.S. Department of Commerce, Bureau of the Census. *1982 Census of Retail Trade*. Washington DC, 1982.

Van Dress, Michael G. "An Overview of the Food Service Industry." *Nat. Food Rev.* 7(1979):12.

———. "Fast Food Industry Growth." *Nat. Food Rev.* 9(Winter 1980), pp. 35–37.

Wallace, T. Dudley. "A Pretest Estimation in Regression: A Survey." *Amer. J. Agr. Econ.* 59(1977):431–43.