3-2007

Factors Affecting Food Away from Home: Are Food-Secure and Food-Insecure Households Different?

Suwen Pan
Texas Tech University

Helen H. Jensen
Iowa State University, hhjensen@iastate.edu

Jaime Malaga
Texas Tech University

Factors Affecting Food Away from Home: Are Food-Secure and Food-Insecure Households Different?

Suwen Pan, Helen H. Jensen, and Jaime Malaga

Expenditures on food away from home by food-secure and food-insecure households are compared. The analysis, based on data from the Current Population Survey (CPS), finds that female labor force participation, household income, Food Stamp Program (FSP) participation, education, and other socio-demographic variables have different effects on the food expenditures made by households classified as food-secure in comparison to food-insecure households.

Household food security and food insecurity are used to describe households' access—or lack of access—to adequate food (Nord, Andrews, and Carlson 2001, 2005). Based on reports from the Economic Research Service, U.S. Department of Agriculture, the prevalence of food insecurity rose from 11.2 percent of households in 2003 to 11.9 percent in 2004; the percentage of food insecurity in 1999 was 10.1 percent.

This study investigates whether food security status has impacted food-away-from-home (FAFH) consumption. We are particularly interested in understanding whether the factors affecting FAFH consumption for food-insecure households and food-secure households depend on family composition and labor-force participation. The effects of food-security status on FAFH are complicated due to the effects of food stamp program (FSP) participation and other social-welfare-program participation on food choices and outcomes. The FSP provides resources to households only for foods eaten at home. As most of the work done previously shows, the FSP has negative effects on FAFH due to the restrictions in the use of the food stamp coupon in comparison to cash (Senauer and Young 1986). At the same time, based on other literature such as Kuhn et al. (1996), the food stamp recipient population is primarily composed of recipients of other government benefits such as AFDC, Medicaid, and Supplemental Security Income. Recent changes in these social-assistance-program rules also contribute to the food-choice dilemma faced by low-income households: under recent welfare reform, low income households face increased pressures to join the labor force, which forces households with less time for preparation of meals to substitute home-prepared foods with FAFH to meet basic food needs.

The following sections present the methodology, describe the data source and sample, provide empirical estimation results, and summarize major findings.

Pan is research scientist and Malaga is assistant professor, Department of Agricultural and Applied Economics, Texas Tech University, Lubbock. Jensen is professor, Department of Economics, Iowa State University, Ames.

Methodology

In the first step, a probit model is used to estimate the effects of demographic variables on FSP participation. In the second and third steps, the predicted probability of FSP participation is used to estimate the effects of FSP on food expenditure and FAFH consumption. The Almost Ideal Demand System (AIDS) (Deaton and Muellbauer 1980) can be interpreted as a first-order approximation to any demand system. Its use allows tractable estimation of the second-stage (i.e., within-group) allocation process without the imposition of restrictive a priori assumptions with regard to expenditure effects. For estimation purposes, we employ a non-linear quadratic Almost Ideal Demand System (NLQAIDS) in our FAFH and FAH estimation (Banks, Blundell, and Lewbel 1997). Given the adding-up restriction of the Linear Quadratic Almost Ideal Demand System (LQAIDS), it is only necessary to estimate one equation of the two-equation system. Because all of the households in the sample consume some type of FAH, estimation of FAH instead of FAFH can avoid the censored-data problem. The FAFH equation is dropped from the estimation, with its parameters estimated from the symmetry and homogeneity conditions. The three equations need to be estimated are as follows.

First, the decision for a household i to participate in the FSP can be formulated as

$$(1)\quad I_i = \begin{cases} 1 \text{ if household } I \text{ in the FSP} \\ 0 \text{ otherwise} \end{cases}.$$

The reduced form is

$$(2)\quad P^* = \beta \boldsymbol{X} + \varepsilon_I .$$

where X is a vector of explanatory variables (the food expenditure is not included due to the endogenous problem), β is vector of the corresponding estimates, and ε_I is assumed to be *i.i.d.* normal with unit variance.

Second, a food-expenditure equation is estimated based on a linear relationship. Let Exp_i and INC_i represent the ith household's food expenditures and income, respectively. The model to be estimated is

$$(3)\quad Exp = a_0 + \sum_k a_k s_{ki} + b\log(INC_i) + \varepsilon_I ,$$

where the s_{ki}'s are ith household and kth demographic and socioeconomic variables, the a's and b's are parameters to be estimated, and ε is the usual disturbance term (the ε's are independent $N(0,\sigma^2)$).

At the same time, demographic translating is important for this type of analysis due to the individual household effects on food consumption. To specify the effects of working status and different age-groups on food consumption, the number of household members is separated into several groups: number of children under 6, number of children between 6 and 13, number of children between 14 and 17, female and male adults between 18 and 64, and family members older than 64. N_s includes all the demographic and socioeconomic information, which include effective family members at different age groups, FSP participation indicator, region (Northeast, Midwest, South, and West), urbanization, education, Hispanic, white, and marriage status of household heads. The basic demand equation can be represented as

$$(4)\quad y_i = \alpha_i + \beta_i(\ln(e) - \ln P) + \frac{\lambda_i}{\prod_j P_i^{\beta_i}}(\ln(e) - \ln P)^2 + \gamma_{ij}\log\left(\frac{P_{FAFH}}{P_{FAH}}\right) + \Sigma_s \kappa_{is} N_s + v_i ,$$

where $P = \alpha_0 + \sum_j \alpha_j \ln P_j + \tfrac{1}{2}\sum_j \sum_i \gamma_{ij} \ln P_i \ln P_j$, y_i is the expenditure share of the FAH in food expenditure for household i, e is total food expenditures estimated in the first step, $\frac{P_{FAFH}}{P_{FAH}}$ is the ratio of inter-area price index (IRPI) between FAFH and FAH (which guarantee that the estimation satisfies the homogeneity and the symmetry restriction in the NQAIDS model), and the α's, β's, γ's, and k's are coefficients to be estimated. As usual, the adding-up restriction is imposed in the Equation (4).

Data

Data used in this study are compiled directly from the 1999 CPS-FSS data. For our purpose, we choose a sample with income less than 1.3 times of poverty line, which is the basic requirement for households eligible for the FSP. The poverty line for each household in the sample was determined based on the number of adults and number of children in the household and the age of the household reference person (older or younger than 65). The relevant poverty line comes from the Census Bureau. The highest-income extreme values were excluded. The total sample used in the analysis is 12,071 households. Of these households, 19.03% were food insecure, a little higher than the national level. Figure 1 presents some comparison between food-secure households and food-insecure households. Based on the Figure, one can see that FSP recipients have relatively lower food expenditures than do non-FSP participants.

Results

Tables 1–3 presents the parameter estimation based on the food-secure sample and food-insecure samples. Based on a two-sample t-test, the effects of location (whether living in south), race, minority, marital status of households, income, and number of females not in the labor force are the factors affecting the difference in FSP participation between food-secure and food-insecure households. Race and marriage status of household heads, number of females in the labor force, income, and probability of FSP are the factors causing total food expenditure to differ between food-secure and food-insecure households. Only location and education status of household heads affect the share of food-at-home expenditure.

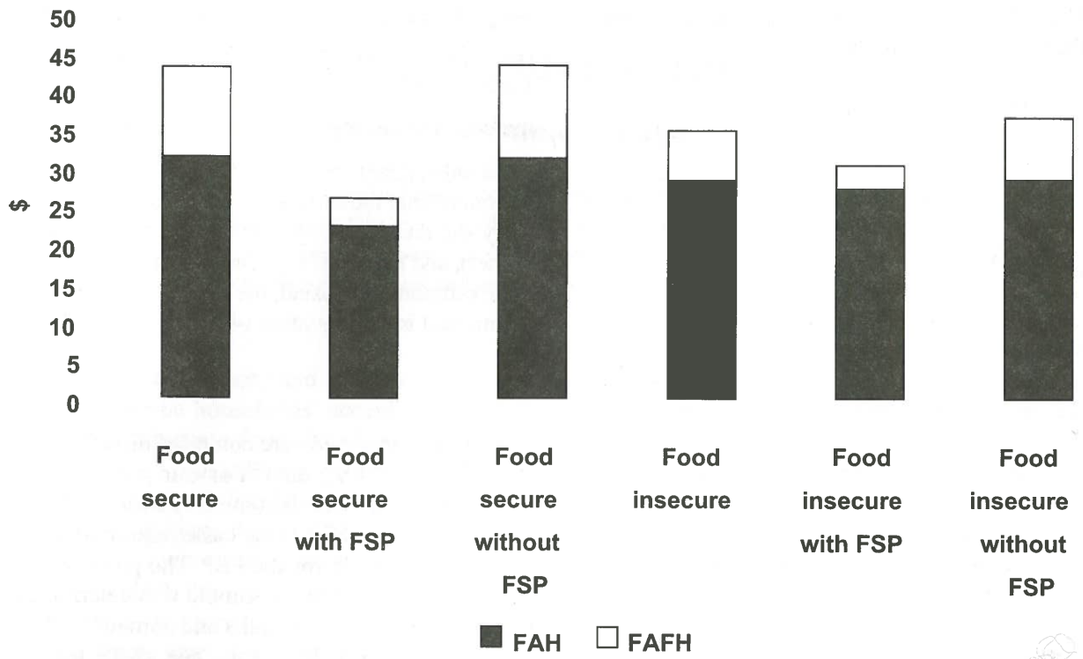

Figure 1. A Comparison of Food Expenditures per Person.

Table 4 presents income elasticity and marginal effects of FSP difference between food-secure and food-insecure households. It shows that food-insecure households have higher income elasticities than do food-secure households. It also shows that FSP participation affects food expenditure differently for food-secure and food-insecure households. Food-secure FSP participants are more likely to have a higher level of total food expenditures than are those not in the program, while food-insecure FSP recipients are more likely to have lower food expenditures and to consume less FAFH than are those not in the program.

Conclusion

The effects of family structure and demographic variables on FAFH consumption vary, to some degree, by food-security status. The results show that family structure, FSP participation, and demographic variables play significant roles in the decisions about how much to spend. At the same time, the effects of female labor-force participation, household income, Food Stamp Program (FSP) participation, education, and other socio-demographic variables have different effects on food consumption for food-secure and food-insecure households.

This study has several implications for government and for the FAFH industry. FAFH is important in food expenditures for both food-secure and food-insecure households. Demographic factors such as nonwhite, Hispanic, labor force participation of female workers, and marriage of household heads have different effects on FSP participation. The results suggest that those variables are very useful for identifying the targets of FSP. On the whole, the different economic and demographic effects on FAFH consumption and total food expenditure between food-secure and food-insecure households suggest that important differences in the role of household composition and food program have effects on food purchases.

Table 1. Parameter Estimates for FSP Participation.

	Household with food security	Household with food insecurity	Test for significance
Intercept	1.12*	0.62*	
	(0.22)	(0.14)	*
Metro	−0.07	0.18*	
	(0.07)	(0.04)	
Northeast	0.06	0.15*	
	(0.09)	(0.06)	
West	−0.07	0.06	
	(0.09)	(0.06)	
South	−0.15*	0.05*	
	(0.08)	(0.05)	*
Education	−0.21*	−0.20*	
	(0.07)	(0.04)	
White	−0.003	−0.44*	
	(0.07)	(0.05)	*
Hispanic	−0.23*	0.34*	
	(0.09)	(0.06)	*
Married	−0.27*	−0.51*	
	(0.07)	(0.04)	*
#Child under 6	0.38*	0.54*	
	(0.04)	(0.03)	
#Child between 7–13	0.32*	0.37*	
	(0.03)	(0.02)	
#child between 14–17	0.23*	0.18*	
	(0.05)	(0.04)	
#male working adults	−0.48*	−0.48*	
	(0.06)	(0.04)	
#male non-working adults	−0.08	0.19*	
	(0.12)	(0.10)	
#female working adults	−0.38*	−0.31*	
	(0.06)	(0.04)	
#female nonworking adults	−0.03	0.48*	
	(0.06)	(0.10)	*
Log income	−0.25*	−0.21	
	(0.04)	(0.02)	*

Table 2. Parameter Estimates for Total Food Expenditure.

	Household with food security	Household with food insecurity	Test for significance
Intercept	0.17	2.40*	
	(7.50)	(3.13)	
Metro	2.61	4.40*	
	(1.71)	(0.77)	
Northeast	4.68*	3.80*	
	(2.35)	(0.98)	
West	0.87	2.43*	
	(2.20)	(0.97)	
South	−1.09	1.40*	
	(2.01)	(0.86)	
Education	−1.94	1.49*	
	(1.60)	(0.72)	
White	−1.25	5.15*	*
	(1.67)	(1.04)	
Hispanic	−2.48*	−3.52*	
	(2.04)	(1.23)	
Married	16.95*	27.87*	*
	(1.71)	(0.91)	
#Child under 6	15.09*	13.50*	
	(1.02)	(0.81)	
#Child between 7–13	17.82*	16.75*	
	(0.81)	(0.62)	
#child between 14–17	18.48*	18.02*	
	(1.29)	(0.71)	
#male working adults	16.12*	17.30*	
	(1.56)	(0.75)	
#male non-working adults	9.96*	11.26*	
	(3.06)	(1.96)	
#female working adults	8.62*	11.22*	
	(1.45)	(0.67)	
#female nonworking adults	6.87*	9.53*	*
	(2.87)	(2.06)	
Inter FPI	0.009	−0.04*	
	(0.04)	(0.02)	
Inter NFPI	−0.01	0.06*	
	(0.05)	(0.02)	
Probability of FSP	−27.37*	13.89*	*
	(11.60)	(7.90)	
Log income	10.60*	6.30*	*
	(1.02)	(0.38)	
R^2	0.39	0.35	

Table 3. Parameter Estimation for QAIDS Model (FAH).

	Households without food security	Households with food security	Test for significance
Intercept	0.80*	0.51*	
	(0.20)	(0.10)	
Metro	0.006	−0.02*	
	(0.01)	(0.01)	
Northeast	0.04*	0.02*	
	(0.02)	(0.01)	
West	0.02	0.006	
	(0.02)	(0.01)	
South	0.05*	0.006	*
	(0.01)	(0.01)	
Education	−0.05*	−0.12*	*
	(0.02)	(0.01)	
White	−0.008	0.005	
	(0.01)	(0.01)	
Hispanic	0.02	0.02	
	(0.02)	(0.02)	
Married	0.07*	0.08*	
	(0.01)	(0.01)	
#Child under 6	0.01	0.02*	
	(0.008)	(0.01)	
#Child between 7–13	0.01	0.01	
	(0.007)	(0.01)	
#child between 14–17	−0.0005	0.008	
	(0.01)	(0.009)	
#male working adults	−0.05*	−0.07*	
	(0.01)	(0.01)	
#male non-working adults	0.01	−0.03	
	(0.02)	(0.03)	
#female working adults	−0.03*	−0.03*	
	(0.01)	(0.01)	
#female nonworking adults	0.01	−0.002	
	(0.02)	(0.03)	
Log IAPRI FAH/FAFH	−0.01	−0.03*	
	(0.02)	(0.01)	
(Log(exp)-lnP)	−0.04	0.10*	
	(0.08)	(0.04)	
$(Log(exp)-lnP)^2$	0.007	−0.007*	
	(0.01)	(0.004)	
Probability of FSP participation	0.17*	0.33*	
	(0.09)	(0.10)	

Table 4. Income Elasticities and Marginal Effects of FSP.

		Income	FSP
Total	Food secure	0.07	0.023
	Food insecure	0.12	−0.03
FAH	Food secure	0.08	0.06
	Food insecure	0.12	0.02
FAFH	Food secure	0.04	−0.23
	Food insecure	0.14	−0.14

References

Banks, J., R. Blundell, and A. Lewbel. 1997. "Quadratic Engel Curves And Consumer Demand," *The Review of Economics and Statistics* 79(4): 527–539.

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

Kuhn, B. A., P. A. Dunn, D. Smallwood, K. Hanson, J. Blaylock, and S. Vogel. 1996. "Policy Watch: The Food Stamp Program and Welfare Reform." *The Journal of Economic Perspectives* 10(Spring):189–198.

Nord, M., M. Andrews, and S, Carlson. 2005. "Household Food Security in the United States, 2004." USDA ERS Economic Report #11-2005.

———. 2002. "Household Food Security in the United States, 2001." ERS Food Assistance and Nutrition Research Report No. FANRR29.

Senauer, B., and N. Young. 1986. "The Impact of Food Stamps on Food Expenditures: Rejection of the Traditional Model." *American Journal of Agricultural Economics* 68:37–43.