At-Home Consumption of Cheese: A Purchase-Frequency Model

Brian W. Gould

American Journal of Agricultural Economics, Vol. 74, No. 2. (May, 1992), pp. 453-459.

Stable URL:

<http://links.jstor.org/sici?sici=0002-9092%28199205%2974%3A2%3C453%3AACOCAP%3E2.0.CO%3B2-2>

American Journal of Agricultural Economics is currently published by American Agricultural Economics Association.

Your use of the JSTOR archive indicates your acceptance of JSTOR's Terms and Conditions of Use, available at <http://www.jstor.org/about/terms.html>. JSTOR's Terms and Conditions of Use provides, in part, that unless you have obtained prior permission, you may not download an entire issue of a journal or multiple copies of articles, and you may use content in the JSTOR archive only for your personal, non-commercial use.

Please contact the publisher regarding any further use of this work. Publisher contact information may be obtained at <http://www.jstor.org/journals/aaea.html>.

Each copy of any part of a JSTOR transmission must contain the same copyright notice that appears on the screen or printed page of such transmission.

The JSTOR Archive is a trusted digital repository providing for long-term preservation and access to leading academic journals and scholarly literature from around the world. The Archive is supported by libraries, scholarly societies, publishers, and foundations. It is an initiative of JSTOR, a not-for-profit organization with a mission to help the scholarly community take advantage of advances in technology. For more information regarding JSTOR, please contact support@jstor.org.

At-Home Consumption of Cheese: A Purchase-Infrequency Model

Brian W. Gould

For many commodities, zero purchases are recorded in household budget surveys even though positive consumption occurs. This may reflect a survey period that is shorter than the purchase cycle. The present study estimates a purchase-infrequency model for cheese using the 1987 BLS Consumer Expenditure Survey. Appropriateness of the Tobit specification is examined along with the assumption of independence of the two-stage expenditure decision process.

Key words: cheese expenditures, Engel curve, purchase infrequency, Tobit model.

Applied consumption analyses often use household budget surveys with little concern as to survey-period length relative to the length over which consumption can occur. Many of these analyses use the Tobit model to account for censoring. Associated with use of this type of model are underlying assumptions that first, the same stochastic process affects both purchase decisions and consumption levels and second, a zero value of the dependent variable represents a true corner solution. However, when the commodity in question has a purchase cycle longer than the survey period length, a zero expenditure level may not correspond to zero consumption and the Tobit specification may be inappropriate (Blundell and Meghir, p. 197).

As a commodity, cheese may exhibit characteristics precluding use of a Tobit demand model. For many cheese varieties, consumption may occur many weeks after purchase. As evidence, the 1972 and 1987 Consumer Expenditure Surveys report that 48% and 42% of surveyed households, respectively, had purchased cheese over a one-week survey period. In contrast, the 1977 USDA Household Food Consumption Survey indicates over 75% of surveyed households had consumed cheese at home over a one-week period. This large difference

indicates that cheese purchases often take place less than weekly and that zero expenditures observed in the Consumer Expenditure Survey need not point to zero consumption.

Deaton and Irish, and Blundell and Meghir develop several models differentiating between true corner solutions (e.g., zero consumption) and zero expenditure values arising because of purchase infrequency. The present study uses a variant of these models to examine factors affecting at-home U.S. cheese consumption. Unlike previous examinations of these expenditures by Blaylock and Smallwood and by Smallwood and Blaylock, the model used here allows differentiation between variables affecting the probability of nonzero expenditure and those affecting expenditure level.

The double-hurdle model originally formulated by Cragg, and recently used by Haines, Guilkey, and Popkin, assumes the consumer will sequentially decide first whether to purchase a commodity and then how much to spend. No direct relationship is allowed between the error terms of the equations used to explain these two decision stages. We extend previous consumption analyses in two areas: estimating a purchase infrequency model based on the Cragg double-hurdle model, and parametrically testing for independence between the whether-to-purchase and how-much-to-purchase decisions.

Description of the Econometric Model

Define y_i as the i th household's cheese expenditure and y_i^* as the corresponding latent variable, cheese consumption. When the purchase-

Brian W. Gould is an associate scientist in the Center for Dairy Research and Department of Agricultural Economics, University of Wisconsin-Madison.

Research support was provided by the Wisconsin Milk Marketing Board and the College of Agriculture and Life Sciences, University of Wisconsin-Madison.

The author would like to thank J. P. Chavas and R. A. Douthitt, who reviewed earlier drafts of this manuscript. Any errors or omissions remain the author's responsibility.

Reviewed coordinated by Steve Buccola.

cycle length is less than or equal to the survey period length, a Tobit model can account for censoring of expenditures. Under the Tobit model the relationship between latent and observed variables for the i th household is

$$(1) \quad y_i = \begin{cases} y_i^* & \text{if } y_i^* > 0 \\ 0 & \text{otherwise} \end{cases}$$

The latent consumption variable is described by

$$(2) \quad y_i^* = x_i\beta + e_i$$

where $e_i \sim N(0, \sigma_e^2)$, x_i is the set of household characteristics determining consumption level and β is a vector of estimated coefficients. We can represent the resulting likelihood function as

$$(3) \quad \ln L = \sum_+ (-\ln \sigma_e + \ln f(y_i - x_i\beta)/\sigma_e) + \sum_0 \ln(1 - F(x_i\beta/\sigma_e)),$$

where Σ_+ is the summation for households with positive cheese expenditures, Σ_0 is the summation for households with no cheese purchases, $F(\cdot)$ and $f(\cdot)$ are density and distribution functions, respectively, and $F(x_i\beta/\sigma_e)$ is probability of positive consumption.

Under the Tobit specification, zero expenditures represent a true corner solution. We can alternatively define a new variable, w_i , to describe a household's decision to purchase (defined only for households that actually consume cheese; i.e., $y_i^* > 0$). Assuming independence of consumption level and purchase decision, we model the purchase decision by the following probit equation,

$$(4) \quad w_i = x_i\delta + \tau_i,$$

where $\tau_i \sim N(0, 1)$ and δ is a vector of estimated coefficients. The probability of observing a purchase can be obtained from (4) as $F(x_i\delta)$. Assuming that $F(x_i\delta)$ is positive for households that purchase the commodity (i.e., there is a positive purchase-cycle length), we can represent the relationship between expenditures and consumption as

$$(5) \quad y_i = y_i^*/F(x_i\delta) \text{ for } y_i > 0$$

(Blundell and Meghir, p. 189, and Deaton and Irish, p. 63).

Again assuming independence, zero expenditure occurs if consumption actually is zero

($y_i^* \leq 0$) or if consumption is positive but a purchase has not been made ($w_i = 0$) in the study period. The probability that consumption is zero can be represented as $[1 - F(x_i\beta/\sigma_e)]$. The probability that consumption is positive but with no purchase occurring over the study period can be represented as $[1 - F(x_i\delta)]F(x_i\beta/\sigma_e)$. We can represent the corresponding log-likelihood function for the purchase infrequency model under independence as

$$(6) \quad \ln L = \sum_+ (-\ln \sigma_e + 2\ln F(x_i\delta) + \ln f((F(x_i\delta)y_i - x_i\beta)/\sigma_e)) + \sum_0 \ln(1 - F(x_i\delta)F(x_i\beta/\sigma_e)).$$

The Tobit model is nested within the above model when $F(x_i\delta) = 1$.

The assumption of independence of the two-stage decision process can be examined by assuming that e_i and τ_i are jointly normal with variance-covariance matrix

$$(7) \quad \Gamma = \begin{bmatrix} \sigma^2 & \rho\sigma \\ \rho\sigma & 1 \end{bmatrix},$$

where ρ is the correlation coefficient between the two error terms in (2) and (4) (Blundell and Meghir, p. 188–189). With this covariance matrix, we can now represent the relationship between the observed expenditures and latent consumption levels as

$$(8) \quad y_i = y_i^*/F(x_i\delta|y_i^*) \text{ for } y_i > 0,$$

where $F(x_i\delta|y_i^*)$ is probability of observing a purchase conditional on consumption level.

Following Blundell and Meghir, and Jones (1989), the log-likelihood function under dependence takes the form

$$(9) \quad \ln L = \sum \ln(1 - f(x_i\delta|y_i^*)F(x_i\beta/\sigma_e)) + \sum_0 [\ln J_i + \ln F(x_i\delta|y_i^*) - \ln \sigma_e + \ln f((y_i^*(y_i, x_i\delta, \rho, \sigma_e) - x_i\beta)/\sigma_e)],$$

where the Jacobian, J_i , is calculated as

$$(10) \quad J_i = \frac{dy_i^*}{dy_i} = \frac{F(x_i\delta|y_i^*)}{1 - f(x_i\delta|y_i^*)y_i\rho/(\sigma_e\sqrt{1 - \rho^2})}.$$

Table 1. Selected Characteristics of 1987 BLS Consumer Expenditure Survey

Variable	Name	Mean	Std. Dev.
Dairy product purchaser (0-1)	<i>DAIRYDUM</i>	0.83	
Unconditional weekly dairy product expend (\$)	<i>DAIRYEXP</i>	5.46	5.66
Conditional weekly dairy product expend (\$)	<i>DAIRYEXP2</i>	6.61	5.58
Cheese purchaser (0-1)	<i>CHDUM</i>	0.41	
Unconditional weekly cheese expenditure (\$)	<i>CHEXP</i>	1.50	2.38
Conditional weekly cheese expenditure (\$)	<i>CHEXP2</i>	3.63	2.44
Total household income (\$)	<i>INCOME</i>	27919	21570
Dairy adult equivalent scale (#)	<i>DAIRYTCH</i>	2.94	1.44
Black households (0-1)	<i>BLACK</i>	0.10	
Asian/Pacific Island households (0-1)	<i>ASIAN</i>	0.02	
Household used food stamps (0-1)	<i>FDSTAMP</i>	0.06	
Urban household (0-1)	<i>URBAN</i>	0.88	

Source: 1987 Bureau of Labor Statistics, Consumer Expenditure Survey.

The conditional probability of observing a purchase can be shown to equal (Anderson p. 27-28)

$$(11) \quad F(x_i \delta | y_i^*) = F((x_i \delta + \rho(e_i / \sigma_i)) / \sqrt{1 - \rho^2}).$$

The purchase-infrequency model under independence is nested in (9) when $\rho = 0$.

The above model resembles Jones' (1989) double-hurdle model of cigarette consumption where the second stage (e.g., consumption) is conditional on purchasing. In the present model, the purchase decision is conditional on the household's consumption.

Data Used in the Analysis

The principal source of U.S. household expenditure data for small, frequently purchased items is the Dairy Component of the Bureau of Labor Statistic's (BLS) Continuing Consumer Expenditure Survey. This data has been collected annually since 1979; we use 1987 survey data. Because not all households reported two full weeks of data, we used expenditure data for one week only.¹ The analysis omits households in which the reference person resides in college housing, transient housing, or rooming houses. After

omitting such households and those with missing data, 5,017 households were ultimately included in the analysis.

Table 1 presents means of variables used in the analysis. Over 41% of households purchased cheese over the survey period, with an unconditional mean expenditure of \$1.50 and a conditional mean of \$3.63. Total family income (*INCOME*) is defined as annual household pre-tax income. *BLACK* and *ASIAN* are dummy variables identifying the respondent's ethnicity (black and Asian or Pacific islander, respectively). The variable *FDSTAMP* is set equal to 1 if the household received food stamps during the previous month. *URBAN* identifies households located in urban areas.²

Family size and composition are incorporated in the analysis through an adult equivalent scale variable (*DAIRYTCH*) estimated using procedures similar to Tedford, Capps, and Havlicek. This equivalence scale variable shows how each household member (of a given age and gender) contributes to total household at-home dairy product expenditures relative to a predefined standard household member. In this study, the standard household member is defined as a male between ages 17 and 22.³

¹ The BLS sampling scheme is designed such that the two weeks data for a household are treated as two statistically independent observations. Thus the number of independent housing units desired to be surveyed is twice the number of households actually surveyed. Bureau of Labor Statistics (1989) contains more detail concerning the sampling procedures. In order to avoid sample selection problems, we use one week's data from each household. For households with two weeks' data, we use survey responses from the first week.

² Earlier versions of the model included regional dummy variables. These regional variables were defined for urban area households only. Urban areas are defined as areas in metropolitan statistical areas (MSAs) or in urban places of 2,500 persons or more outside of MSAs. Because of this definition, the variable *URBAN* is used in place of regional variables. Little difference was obtained under either specification.

³ The dairy-product adult-equivalent scale is estimated using a Tobit specification which is nonlinear in the equivalence scale parameters. Upon request, the author will provide more detail with respect to estimation procedures used and estimated parameters.

Table 2. Estimated Purchase Infrequency and Tobit Model Coefficients

Variable	Purchase Infrequency				Tobit	
	With independence		With dependence		Coef	Std. error
	Coef	Std. error	Coef	Std. error		
Latent consumption parameters (β)						
<i>INTERCEPT</i>	-0.1111 ^a	0.0194	-0.1097 ^a	0.0234	-0.3352 ^a	0.0242
<i>DAIRYTC</i>	0.1909 ^a	0.0225	0.1958 ^a	0.0261	0.3152 ^a	0.0297
<i>DAIRYTC</i> ²	-0.0360 ^a	0.0078	-0.0345 ^a	0.0091	-0.0603 ^a	0.0103
<i>INCOME</i>	0.0544 ^a	0.0122	0.0552 ^a	0.0137	0.0781 ^a	0.0176
<i>INCOME</i> ²	-0.0104 ^a	0.0032	-0.0116 ^a	0.0037	-0.0152 ^a	0.0046
<i>BLACK</i>	-0.0677 ^a	0.0136	-0.0657 ^a	0.0144	-0.1211 ^a	0.0176
<i>ASIAN</i>	-0.1437 ^a	0.0317	-0.1424 ^a	0.0316	-0.2381 ^a	0.0369
<i>FDSTAMP</i>	-0.0410 ^b	0.0180	-0.0420 ^b	0.0186	-0.0841 ^a	0.0234
<i>URBAN</i>	0.0010	0.0100	0.0048	0.0110	0.0008	0.0152
Purchase probability parameters (δ)						
<i>INTERCEPT</i>	0.0111	0.1124	0.0111	0.0926		
<i>DAIRYTC</i>	0.5393 ^a	0.1199	0.5368 ^a	0.1121		
<i>DAIRYTC</i> ²	-0.1217 ^a	0.0418	-0.1219 ^a	0.0376		
<i>INCOME</i>	0.0144	0.0626	0.0137	0.0640		
<i>INCOME</i> ²	-0.0054	0.0164	-0.0088	0.0175		
<i>BLACK</i>	-0.2605 ^a	0.0735	-0.2598 ^a	0.0655		
<i>ASIAN</i>	-0.3759	0.2022	-0.3751 ^b	0.1610		
<i>FDSTAMP</i>	-0.2360 ^b	0.1007	-0.2360 ^a	0.0859		
<i>URBAN</i>	-0.0374	0.0555	-0.0371	0.0572		
σ	0.1472 ^a	0.0088	0.1585 ^a	0.0122	0.2971 ^a	0.0053
ρ			0.2200 ^b	0.0600		
Log-Likelihood Function:						
	-2088.20		-1860.32		-2120.84	

Note: Standard errors are presented in parentheses. The superscripts refer to estimated coefficients' degree of significance:

a = 0.01%

b = 0.05%

Empirical Results

We use maximum-likelihood procedures to estimate the parameters of the likelihood functions presented in (3), (6), and (9). Table 2 presents the parameter estimates.⁴ A likelihood ratio test comparing the Tobit and purchase infrequency model under independence produces a χ^2 statistic of 65.3 which is significant at the 1% level. The rejection of the Tobit specification is similar to results presented by Haines, Guilkey, and Popkin in their analysis of the two-stage purchase decision process.

The first four columns of table 2 present parameter estimates of the purchase infrequency model under independence and dependence assumptions. Unlike Jones (1990), we find a significant ρ coefficient, implying it is inappro-

prate to assume independence of consumption stages. Estimated parameters are similar across dependence assumptions. Comparing likelihood-functions values for (6) and (9), the resulting χ^2 statistic of 445.8 is significant at the 1% level. This figure indicates significant improvement in explanatory power with adoption of the dependence assumption.

Under the dependence regime, all latent consumption parameters except *URBAN* are statistically significant. Consumption increases with the number of dairy adult equivalents (*DAIRYTC*) and with household income, but at decreasing rates. Households classified as nonwhite and those using food stamps have lower consumption levels.

In contrast to the model's consumption component, income is not a significant factor in determining the probability of purchasing cheese.⁵

⁴ As noted by an anonymous reviewer, including predicted adult equivalence scale variables in the consumption and purchase equations implies that the standard errors are conditional standard errors. We have not attempted to correct for this, thus the calculated standard errors may overstate the significance of the parameters.

⁵ A version of the model was estimated where the *INCOME*² variable was omitted. The resulting income coefficient was still insignificant.

Given the income result, it is surprising that food stamp use has a significant negative impact on this probability. The sign and significance of the remaining estimated coefficients in the probability component follow that of the latent consumption component. Households with a non-white reference person are less likely to purchase cheese than is a household with a white reference person. The number of dairy adult equivalents present in the household positively affects the probability of purchase but at a decreasing rate.

Assuming dependence and using (9), we calculate dairy adult equivalent and income-consumption and purchase-probability elasticities. Similar to McDonald and Moffit, the expected value of conditional consumption can be calculated as

$$(12) \quad E(y_i^*) = x_i\beta + \sigma_e \frac{f(x_i\beta/\sigma_e)}{F(x_i\beta/\sigma_e)}.$$

From (5) we can estimate expected expenditures for consuming households as

$$(13) \quad E(y_i) = \frac{E(y_i^*)}{F(x_i\delta|y_i^*)}.$$

Finally, unconditional expected expenditures are

$$(14) \quad E(y_i) = F(x_i\beta/\sigma_e)E(y_i).$$

From (12), the marginal impact of changes in the j th explanatory variable (x_{ij}) on expected conditional consumption for the i th household is

$$(15) \quad \frac{\partial E(y_i^*)}{\partial x_{ij}} = \beta_j \left[1 - \frac{x_{ij} f(x_i\beta/\sigma_e)}{\sigma_e F(x_i\beta/\sigma_e)} - \frac{f(x_i\beta/\sigma_e)^2}{F(x_i\beta/\sigma_e)^2} \right].$$

The marginal impact on consumption probability is

$$(16) \quad \frac{\partial F(x_i\beta/\sigma_e)}{\partial x_{ij}} = f(x_i\beta/\sigma_e) \frac{\beta_j}{\sigma_e}.$$

From (11) the marginal impact on the conditional purchase probability is

$$(17) \quad \frac{\partial F(x_i|y^*)}{\partial x_{ij}} = f(\Omega) \frac{[\delta_j + \rho/\sigma_e(f(x_i\delta)\delta_j y_i - \beta_j)]}{\sqrt{1 - \rho^2}},$$

where $\Omega = (z_i\delta + \rho(e_i/\sigma_e))/(1 - \rho)^{1/2}$.

Under the Tobit specification, the conditional consumption elasticity (ε_{y^*}) and the elasticity of having positive consumption ($\varepsilon_{y^*>0}$) sum to the unconditional-expenditure elasticity ($\varepsilon_y = \varepsilon_{y^*} + \varepsilon_{y^*>0}$), with respect to a change in an explanatory variable. Similarly, with equation (14) the conditional-consumption elasticity ($\cap_{y^*}$) obtained from (15) plus the consumption-probability elasticity ($\cap_{y^*>0}$) estimated from (16) minus the conditional-purchase-probability elasticity ($\cap_{w=1|y^*}$) estimated from (17) sum to the unconditional-expenditure elasticity ($\cap_y = \cap_{y^*} + \cap_{y^*>0} - \cap_{w=1|y^*}$).

Table 3 compares various *DAIRY*TCH and *INCOME* elasticities calculated under purchase infrequency assuming dependence (*P*-Tobit) and the Tobit model. When evaluated at the mean of the independent variables, the estimated unconditional *DAIRY*TCH expenditure elasticity is 0.693 under the purchase infrequency model. The unconditional *INCOME* expenditure elasticity is estimated at 0.226. These resemble elasticity estimates obtained under the Tobit specification.

The income and "household size" elasticities presented here are similar to those of previous researchers. Salathe used the 1972 Consumer

Table 3. Estimated Income and Equivalence Scale Elasticities From Purchase Infrequency and Tobit Models

Variable	Model	Conditional consumption	Probability $Y^* > 0$		Unconditional expenditures
		($\cap_{y^*}$)	($\cap_{y^*>0}$)	($\cap_{w=1 y^*}$)	($\cap_y$)
Equivalence scale	<i>P</i> -Tobit	0.387	0.388	0.082	0.693
	Tobit	0.292	0.579		0.871
Income	<i>P</i> -Tobit	0.098	0.098	-0.030	0.226
	Tobit	0.072	0.142		0.214

Note: These elasticities are calculated at the mean values of the independent variables over the entire sample.

Table 4. Comparison of Estimated Elasticities from the Purchase Infrequency Model For Various Subgroups

Subgroup	Conditional consumption $(\cap_{y*})$	$Y^* > 0$ $(\cap_{y* > 0})$	Probability $W = 1 Y^*$ $(\cap_{w=1 y*})$	Unconditional expenditures $(\cap_y)$
Equivalence scale				
A	0.385	0.354	0.080	0.659
B	0.396	0.521	0.085	0.832
C	0.377	0.553	0.091	0.839
D	0.377	0.739	0.097	1.019
E	0.385	0.726	0.083	1.028
F	0.370	0.838	0.031	1.177
Income				
A	0.100	0.092	-0.030	0.222
B	0.048	0.063	-0.014	0.125
C	0.085	0.125	-0.029	0.239
D	0.040	0.078	-0.014	0.132
E	0.093	0.176	-0.040	0.309
F	0.039	0.087	-0.014	0.140

NOTE: The subgroups are defined with the following variable values:

A = BLACK = 0, ASIAN = 0, FDSTAMP = 0
 B = BLACK = 0, ASIAN = 0, FDSTAMP = 1
 C = BLACK = 1, ASIAN = 0, FDSTAMP = 0
 D = BLACK = 1, ASIAN = 0, FDSTAMP = 1
 E = BLACK = 0, ASIAN = 1, FDSTAMP = 0
 F = BLACK = 0, ASIAN = 1, FDSTAMP = 1

Elasticities are calculated using mean values of the independent variables for each subgroup.

Expenditure Survey to estimate a quadratic Engel function using an OLS estimator. He estimated household size and income elasticity values of 0.481 and 0.387. Blaylock and Smallwood used the 1980–81 record component of the Consumer Expenditure Survey to obtain an income elasticity of 0.317. In contrast, Smallwood and Blaylock used the 1977–78 USDA Nationwide Food Consumption Survey and a Tobit specification to obtain a household size elasticity of 0.563 and an income elasticity of 0.321.⁶

Table 4 evaluates income and dairy adult equivalence scale elasticities for various subgroups. The equivalence scale conditional-consumption elasticities $(\cap_{y*})$, column 2) do not vary appreciably across subpopulations. In contrast, differences exist in the consumption-probability elasticities $(\cap_{y* > 0})$, column 3). The smallest estimated $\cap_{y* > 0}$ value, 0.354, is for WHITE households not using food stamps. The largest value, 0.838, is for ASIAN households using food stamps. The value of $\cap_{w=1|y*}$ does not vary ap-

preciably across subgroups. The last column of table 4 presents the unconditional-expenditure elasticities, $\cap_y$. This elasticity increases from 0.659 for white households not using food stamps to 1.177 for ASIAN households using food stamps.

Table 4 also presents estimated-income elasticities. In contrast to the equivalence-scale elasticities, the income-unconditional expenditure elasticities decrease for households using food stamps.

Conclusions

For many durable and semi-durable commodities, the zero-expenditure values observed in frequently collected budget surveys may not indicate zero consumption. This may result from a survey period that is shorter than the purchase cycle. The model presented here applies a purchase infrequency model to analyze cheese consumption and uses the 1987 BLS Consumer Expenditure Survey. The estimated model points to rejection of the null hypothesis that the Tobit specification adequately models demand for cheese *vis-à-vis* the purchase infrequency model. In addition, we find that income significantly impacts consumption but does not influence

⁶ Comparing previous elasticity estimates with those presented here should be undertaken with caution, given (i) use of expenditure vs. value of consumption as the dependent variable, (ii) use of adult equivalence scales instead of household size, and (iii) the degree to which there is a differentiation between the consumption vs. the expenditure decision.

purchase probability. These results lend support to conclusions of previous analyses recommending multistage analysis of the consumption process (Haines, Guilkey, and Popkin).

We also examined the implied assumption that the decision to purchase is independent of consumption. We reject this hypothesis and find a significant correlation coefficient between error terms associated with the two stages of the infrequency-of-purchase paradigm.

Income and household composition elasticities estimated under the Tobit specification were similar to those obtained under the purchase-infrequency model. This similarity raises concerns about the benefits of estimating the purchase-infrequency model because Tobit estimators are widely available. However, the purchase-infrequency approach provides additional insights into the purchase-versus-consumption decision. In order to implement the approach, specialized likelihood functions need to be estimated which until recently have not been readily available. The similarity between Tobit and purchase-infrequency elasticities obtained here may not hold for other applications. Additional research is needed to examine the robustness of our results.

[Received July 1990; final revision received June 1991.]

References

- Anderson, T. W. *An Introduction to Multivariate Statistical Analysis*, John Wiley and Sons, Inc., New York 1974.
- Blaylock, J. R., and D. M. Smallwood, 1986. *U.S. Demand for Food: Household Expenditures, Demographics and Projections*, Economic Research Service, U.S. Department of Agriculture.
- Blundell, R., and C. Meghir. "Bivariate Alternatives to the Tobit Model," *J. Econometrics*, 34(1987):179-200.
- Bureau of Labor Statistics, 1989. "1987 Dairy Survey Public Use Tape Documentation," unpublished manuscript, Washington D.C., September 15.
- Cragg, J. G. "Some Statistical Models for Limited Dependent Variables with Application to the Demand for Durable Goods," *Econometrica*, 39(1971):829-844.
- Deaton, A., and M. Irish. "Statistical Models for Zero Expenditures in Household Budgets." *J. Public Econ.*, Vol 23(1984):59-80.
- Haines, P. S., D. K. Guilkey, and B. M. Popkin. "Modeling Food Consumption Decisions as a Two-Step Process." *Amer. J. Agr. Econ.*, 70(1988):543-552.
- Jones, A. "A Double-Hurdle Model of Cigarette Consumption," *J. Appl. Econometrics*, 4(1989):23-39.
- Jones, A. "A Note on Computation of the Double-Hurdle Model with Dependence with an Application to Tobacco Expenditure," unpublished paper, Department of Economics and Related Studies, University of York, 1990.
- McDonald, J. F. and R. A. Moffit, "The Uses of Tobit Analysis," *Rev. Econ. and Statist.*, 62:318-321.
- Salathe, L. E. *Household Expenditure Patterns in the United States*, Economics Statistics, and Cooperatives Services, U.S. Department of Agriculture, Technical Bulletin No. 1603, 1979.
- Smallwood, D. and J. Blaylock, *Impact of Household Size and Income Food Spending Patterns*, Economic Research Service, U.S. Department of Agriculture, Technical Bulletin 1650, 1981.
- Tedford, J. R., O. Capps, and J. Havlicek. "Adult Equivalent Scales Once More: A Developmental Approach." *Amer. J. Agr. Econ.* 68(1986):322-333.

LINKED CITATIONS

- Page 1 of 1 -

You have printed the following article:

At-Home Consumption of Cheese: A Purchase-Infrequency Model

Brian W. Gould

American Journal of Agricultural Economics, Vol. 74, No. 2. (May, 1992), pp. 453-459.

Stable URL:

<http://links.jstor.org/sici?sici=0002-9092%28199205%2974%3A2%3C453%3AACOCAP%3E2.0.CO%3B2-2>

This article references the following linked citations. If you are trying to access articles from an off-campus location, you may be required to first logon via your library web site to access JSTOR. Please visit your library's website or contact a librarian to learn about options for remote access to JSTOR.

References

Modeling Food Consumption Decisions as a Two-Step Process

Pamela S. Haines; David K. Guilkey; Barry M. Popkin

American Journal of Agricultural Economics, Vol. 70, No. 3. (Aug., 1988), pp. 543-552.

Stable URL:

<http://links.jstor.org/sici?sici=0002-9092%28198808%2970%3A3%3C543%3AMFCDA%3E2.0.CO%3B2-E>

A Double-Hurdle Model of Cigarette Consumption

Andrew M. Jones

Journal of Applied Econometrics, Vol. 4, No. 1. (Jan. - Mar., 1989), pp. 23-39.

Stable URL:

<http://links.jstor.org/sici?sici=0883-7252%28198901%2F03%294%3A1%3C23%3AADMOC%3E2.0.CO%3B2-W>

The Uses of Tobit Analysis

John F. McDonald; Robert A. Moffitt

The Review of Economics and Statistics, Vol. 62, No. 2. (May, 1980), pp. 318-321.

Stable URL:

<http://links.jstor.org/sici?sici=0034-6535%28198005%2962%3A2%3C318%3ATUOTA%3E2.0.CO%3B2-2>

Adult Equivalent Scales Once More: A Developmental Approach

John R. Tedford; Oral Capps, Jr.; Joseph Havlicek, Jr.

American Journal of Agricultural Economics, Vol. 68, No. 2. (May, 1986), pp. 322-333.

Stable URL:

<http://links.jstor.org/sici?sici=0002-9092%28198605%2968%3A2%3C322%3AAESOMA%3E2.0.CO%3B2-P>