Determinants of Household Expenditures for Services

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Data from the Bureau of Labor Statistics Consumer Expenditure Surveys were used to investigate factors influencing household expenditures for services in the United States. There were significant differences between families with full-time and part-time working wives in expenditures on child care, food away from home, and total services. Household production variables had a significant impact on service expenditures in most instances, while the effects of other variables such as family life cycle, education, race, and geographic location varied by service category and employment status of wife.

Increased labor-force participation by married women has been one of the major social and economic changes in the United States in the past two decades. Labor-force participation rates by married women increased from 31 percent in 1960 to 56 percent in 1987 (U.S. Department of Commerce 1987, p. 374). For married women ages 25–34 with husbands present, these rates have increased from 28 percent in 1960 to 68 percent in 1987. The corresponding figures for women ages 35–44 are 36 percent and 72 percent, respectively. Increases have also been obtained for married women with children under six. Labor-force participation rates for these women have increased from 19 percent in 1960 to 57 percent in 1987 (U.S. Department of Commerce 1987, p. 374). According to some analysts, the percentage of women in the labor force suggests that by 1995, more than 80 percent of all mothers with children at home will be working (Bureau of National Affairs 1986).

Senauer (1983) identified the increase in labor-force participation rates for women as one of the four major changes affecting consumer expenditures. Such a change has led to the recognition that time is a major resource constraint and to the identification of major strategies that might be used by working wives to reduce time pressures (Nickols and Fox 1983; Strober and Weinberg 1980), including the substitution of capital equipment for household labor and paid labor for household labor.

There have been several studies on the first strategy, which have indicated that working-wife and nonworking-wife households do not differ in their purchase of time-saving durables. Less work has been done on the second strategy, with the exception of studies on food away from home (FAFH). However, such studies provide information on the use of a time-buying strategy for only one household activity—meal preparation and cleanup. Moreover, it might be argued that FAFH may reflect a leisure as well as a time-saving component. An investigation of the substitution of paid labor for household labor should thus focus not only on meal preparation and cleanup, but also on major household activities such as cleaning, laundry, and child care. Such an approach permits an examination of variations in service expenditures by service category and provides more insight on the use of time-buying strategies by households. Public and private service providers could use the information to project future demand for services based on changes in labor-force participation rates (as well as other socioeconomic characteristics). Public administrators, who are concerned with the impact of changing social and economic conditions on families, could also use this information to assist families through tax or expenditure policies.

The objective of this research was to investigate factors—including the role of time and income constraints—influencing household expenditures for services in the United States. The analysis was confined to two-earner households in which both husband and wife worked, since complete work data were needed for both family members. Thus, the separate impact of all work-related variables on service expenditures could be investigated.

LITERATURE REVIEW

Wife's Employment Status and Major Family Expenditures

Strober and Weinberg (1977) examined working-wife and nonworking-wife families with respect to purchases of time-saving durables and other durables. Data were obtained from the 1968 Michigan Survey Research Center Panel Survey of Consumer Finances. The sample was confined to husband-wife families in which the husband was under age 65. The results indicated that the employment status of the wife was not significant in explaining purchase decisions for time-saving durables once total family income, which was significant, was held constant.

A later study by Weinberg and Winer (1983) was designed to update and replicate the study by Strober and Weinberg. Data were obtained from the 1977 Michigan Survey Research Center Survey of Consumer Credit. The sample was again confined to husband-wife families in which the husband was under age 65. The dependent variables were the purchase decisions and expenditures for time-saving durables and other durables. As in the earlier study, working-wife households did not differ significantly from nonworking-wife households with respect to purchase decisions or expenditures once the impact of family income was taken into account.

Similar results were obtained by Strober and Weinberg (1980) and Nickols and Fox (1983). Strober and Weinberg used data from a 1977 survey of 2,000 married women and found that income (followed by life-cycle state) was a significant determinant of the ownership and purchase of durables. They also concluded that neither the wife's employment status nor her recent entry into the labor force were significant determinants of ownership or purchase decisions once income and family life cycle were held constant.

Nickols and Fox (1983) used data from a study of household production activities conducted in 11 states from 1977 to 1979 for husband-wife families. Two measures were used to represent the employment status of the wife: the number of hours worked in the week prior to the interview and a dummy variable indicating whether the wife worked more than eight hours per week. Discriminant analysis of durable-goods ownership confirmed earlier findings that employed wives did not substitute capital equipment for household labor. However, the authors found that child care was a major strategy for many working-wife families.

A more recent study by Bryant (1988) investigated the relationship between expenditures on consumer durables and wives' employment status using data from the 1977–1978 Survey of Consumer Credit. Time spent in the labor force by wives was treated as an endogenous variable necessitating an instrumental variable approach. In contrast to earlier studies, Bryant's found that the wife's work hours had a negative and significant impact on durable-goods expenditures and concluded that durables and wives' home time were complements (Bryant 1988, p. 44). However, Bryant's sample of durable goods was extensive and included many durables related more to leisure activities than to time-buying or time-saving activities.

Three studies focused on the purchases of services as opposed to durables. The first study, by Bellante and Foster (1984), focused on the relationship between the wife's employment status and expenditures on time-saving services using data from the 1972–1973 Bureau of Labor Statistics Consumer Expenditure Survey (CES). The dependent variables were expenditures on FAFH, child care, clothing care, domestic services personal care, and total services. The results of the OLS regression analysis indicated that, in addition to family income and family life cycle, the education and labor-force participation of the wife were significant in determining expenditures for many service categories.

A later study used logit analysis to analyze purchases of 12 home-producible commodities, including car repair, home repair, house cleaning, food preparation, clothing repair, and day care (Weagley and Norum 1989). The authors used a more detailed version of the household production model, and their independent variables included wages and hours worked of both husband and wife, net worth, age of wife, number of young children and teenagers, and health satisfaction. The authors found that wages, in particular the wife's wages, were an important determinant of expenditures for six of the 12 commodities. They also noted that local market conditions might affect the degree to which the commodities could be purchased in the marketplace and hence substituted for home-producible commodities.

Jacobs, Shipp, and Brown (1989) used data from the 1984–1986 CES to analyze expenditure patterns of working- and nonworking-wife families. They found that the working status of the wife had a significant impact on child care and FAFH once other explanatory variables such as income, family life cycle, and location were held constant. The impact on child-care expenditures was large (17–18 percent) compared to the impact on FAFH (2–3 percent).

In summary, most studies found that the employment status of the wife did not have a significant impact on the purchase or ownership of durables, while income and family life cycle did. For the purchase of services, income and family life cycle were again significant, but the employment status of the wife and the wife's wages were also significant in many instances, in particular for child care. One explanation for these apparently contradictory findings is that the decision to purchase or own household durables is not solely a labor-saving decision. The quality and performance characteristics of most household durables have improved over time so that newer models

would be equally desirable to working-wife and non-working-wife households. Thus, it is not surprising that income is a primary factor in the purchase or ownership of household durables.

Food Away from Home

Recent studies on the determinants of expenditures on FAFH are reviewed in this section. Prochaska and Schrimper (1973) used data for about 6,000 households from the 1965–1966 U.S. Department of Agriculture Household Food Consumption Survey to study the effect of the opportunity cost of time and other variables on food consumption away from home. Prochaska and Schrimper found that households in which employed homemakers had a high value of time consumed more meals away from home.

Redman (1980) and Derrick, Lehfeld, and Dardis (1982) used data from the 1972–1973 and 1973–1974 Bureau of Labor Statistics CES to analyze expenditures on FAFH. In Redman's study, family income had a positive and significant effect on FAFH expenditures, while family size had a negative effect on it. However, the wife's employment status was not significant. Similar results for income were obtained by Derrick et al., although the effect of family size depended on whether the total-consumption-expenditures or disposable-income measure was used. In contrast to Redman's results, Derrick et al.'s showed that working-wife households spent significantly more on FAFH than other households. Race was also significant, with black households spending less on FAFH than other households.

Kinsey (1983) used data for about 5,000 households from the Panel Study of Income Dynamics to analyze the effect of labor-force participation of wives on household expenditures on FAFH. The independent variables were the incomes of the husband, wife and children, transfer income and household size, and race. Tobit analysis was used for estimation since 26 percent of households had no FAFH expenditures. Kinsey concluded that there was a significant difference between full-time and part-time working wives with respect to FAFH expenditures.

Two studies used data from the 1977–1978 U.S. Department of Agriculture Nationwide Food Consumption Survey. Smallwood and Blaylock (1981) used OLS regression analysis and obtained results similar to those obtained earlier with respect to family income and household size. McCracken and Brandt (1987) expanded on the work of other researchers by examining FAFH expenditures by type of facility. They hypothesized that the increased value of household time would increase expenditures at fast-food facilities more than at time-intensive full-service restaurants. The results indicated that the value of time was positively related to total expenditures on FAFH but had a stronger effect on fast-food expenditures than

on restaurant expenditures. The value of the homemaker's time was more important than family income in determining expenditures at fast-food facilities.

In summary, the independent variables used by most FAFH researchers included income, family life cycle, the education and employment status of the homemaker, race, and geographic location. The education of the homemaker and income had a significant and positive impact on expenditures. Race was also significant, with black families spending less on FAFH than other families. Families with pre-school-age children and families living in rural areas also spent less than other families. The value of time had a positive and significant impact in two instances, while the effect of the wife's employment status varied.

The results of these empirical studies were used to identify the various explanatory variables that might be used to explain and predict the service-expenditure decisions of households. In addition, provision was made for specific work-related variables based on the household production model, which is discussed in the next section.

PROCEDURE

Household Production Model

The household production model was used to identify the major explanatory variables for services expenditures (Becker 1965; Michael and Becker 1973). The model used in this study differs from that proposed by Becker in one major respect: the household decision process is treated as sequential (i.e., household members first enter the labor force to achieve a certain income level and then make expenditure decisions in accordance with income and time constraints). Thus, hours worked by both husband and wife are treated as exogenous variables. This procedure is based on the fact that many workers face institutional constraints on hours of work and cannot change jobs readily because of imperfect mobility or imperfect information (Deaton and Muellbauer 1980, p. 286; Killingsworth 1983, pp. 46–66; Mishan 1967, p. 115; 1977, p. 210). It could also be argued that social and economic changes in the past decades have affected the employment decisions of husbands and wives so that both are made simultaneously. The earnings of wives are treated as permanent rather than as secondary or transitory in this simultaneous decision.

The characteristics of the model are as follows:

$$\text{utility function } U = U(Z_1, Z_2, \ldots, Z_n), \quad \textbf{(1)}$$

$$\text{production function } Z_i = z_i(x_i, t_i, E), \quad \textbf{(2)}$$

$$\text{market goods constraint } \sum p_i x_i = w t_w + V = Y, \quad \textbf{(3)}$$

and

$$\text{time constraints } T_k = t_{wk} + \sum t_{ik}, \qquad (4)$$

where

Z_i = commodity or activity produced in the household, $i = 1, 2, \ldots, n$,

x_i = vector of market goods used in the production of Z_i,

t_i = vector of time inputs used in the production of Z_i,

t_{ik} = time spent in the production of Z_i by individual k, $k = 1, 2, \ldots, m$,

t_w = vector of time inputs used in market production,

t_{wk} = time spent in market production by individual k,

T_k = total time available to each household member for household and market production, $T_1 = T_2 = \cdots = T_m$,

p_i = price vector for x_i,

w = wage rate vector,

V = unearned income,

Y = household income,

and

E = technology of household production.

The demand for household services based on the household production model is as follows:

$$p_i x_i = x_i(t_w, w, V, D_1, D_2, L, E), \qquad (5)$$

where

$p_i x_i$ = expenditures on service i,

D_1 = vector of preferences,

D_2 = vector of service needs,

L = location, a proxy for service costs,

and the other terms are as defined earlier.[1]

The three variables, D_1, D_2, and L, are designed to hold preferences, service needs, and service costs constant since these may vary across households. Their inclusion is required to achieve the "ceteris paribus" conditions when data from different households in different locations are used (Phlips 1983).

Following the procedure used by Pollak (1969), we may decompose the effect of the three household production variables as follows:

$$\delta p_i x_i / \delta t_w = (\delta p_i x_i / \delta Y)(\delta Y / \delta t_w) + (\delta p_i x_i / \delta t_w) \mid Y, \qquad (6)$$

$$\delta p_i x_i / \delta w = (\delta p_i x_i / \delta Y)(\delta Y / \delta w), \qquad (7)$$

and

$$\delta p_i x_i / \delta V = (\delta p_i x_i / \delta Y)(\delta Y / \delta V). \qquad (8)$$

According to Equation 6, the impact of a change in the

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time spent in market production may be decomposed into two effects. The first term represents the income effect, and the second term represents the substitution of purchased services for household production due to time constraints. The total effect is the sum of income and substitution effects, assuming that services are normal goods. The substitution effect $(\delta p_i x_i / \delta t_w) \mid Y$ is of interest since a positive sign will indicate whether x_i is a substitute for t_i (i.e., whether paid labor is substituted for household labor).[2] A positive relationship might be expected for working wives. However, the substitution effect may be insignificant for husbands in view of their limited contribution to household production (Blau and Ferber 1986, pp. 125–130; Peskin 1982).

In contrast to the two effects in Equation 6, there is only an income effect for a change in wages, since workers are no longer free to change the number of work hours at will. Income is hypothesized to have a positive impact on service expenditures, assuming that Z is a normal commodity or activity and that the market goods (x_i) are not inferior factors of production (Varian 1978, p. 50). Thus, an increase in income will increase the demand for Z_i and encourage the substitution of x_i for t_i since the total time for household production (and leisure activities) is limited (Becker 1965; Michael and Becker 1973).[3]

Selection of Dependent Variables

The dependent variables are household expenditures on total services as well as expenditures on major service categories, such as child care, clothing care, domestic services, FAFH, and personal care. These are the same service categories that were used by Bellante and Foster (1984).

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[1] The authors are indebted to an anonymous reviewer for his assistance in the development of the service expenditure model.

[2] The substitution effect, in this instance, is the substitution that occurs when the household moves from one level of market work time to another, since market hours worked are treated as exogenous variables.

[3] An alternative approach is to derive input demand functions from the cost function (Deaton and Muelbauer 1980, pp. 245–247). In this approach, the household produces an output vector Z from a vector of market inputs x, a vector of labor inputs t, and a vector of capital inputs k (human capital and consumer durables). The objective is to minimize the short-run cost, $C = px + wt$, subject to the constraints imposed by the technology for a given Z and k. Solution of this lower-stage optimization problem results in the following cost function:

$$C = C(p, Z; w, k).$$

The price derivatives of this cost function are the input demand functions for market inputs conditional upon the output and capital vectors. Thus, the demand for x_i is as follows:

$$x_i = \delta C / \delta p_i = x_i(p, Z; w, k).$$

The demand for market goods and services is a function of input prices (p), wages (w) and commodities produced in the household (Z). This approach was not used in the present study due to lack of data for Z.

TABLE 1

EFFECT OF INDEPENDENT VARIABLES
ON SERVICE EXPENDITURES

Category and independent variable	Impact on service expenditures
Household production:	
Wage rate	Positive
Work hours, total effect	Positive
Work hours (with income held constant)	Positive for wives
Unearned income	Positive
Family life cycle:	
Family size	Positive
Children under six	Positive for child care
Age of wife	Varies by service category
Preference:	
Education of wife	Positive
Race	Black families will spend more on clothing/personal care, less on FAFH
Location:	
Urban/rural	Urban households will spend more
Home ownership:	
Owners/renters	Renters will spend more on nonshelter items

Selection of Independent Variables

The primary variables of interest are the household production variables. However, a rigorous analysis of the effects of these variables on service expenditures requires that allowances be made for variations in preferences, service needs, and service costs of households. These demand shifters were identified in the literature review and include family life cycle, the education of the wife, the race of the household head, geographic location, and home ownership. The hypothesized effects of the independent variables on service expenditures are summarized in Table 1 and discussed in the following section.

Household Production Variables. These variables include the wage rate, time spent in market production, and unearned income. Unearned income includes rental and interest income, unemployment insurance, welfare payments and food stamps, and pensions. The coefficients for the wage rate, work hours (total effect), and unearned income are expected to be positive. The estimated coefficients for work hours (with income held constant) are also expected to be positive for wives.

Family-Life-Cycle Variables. These variables include the age of the wife, the number of children ages 0–2 and 3–5, and the number of persons in the household excluding children under six. These variables are important in explaining differences in service expenditures (Bellante and Foster 1984). Family size is hypothesized to have a positive influence on all service

expenditures, while the presence of children under six is expected to affect the demand for child care.

Education of Wife. This variable is included to allow for differences in preferences and has been included in other expenditure studies (Bellante and Foster 1984; Frank 1985). Education will also influence occupation and hence service expenditures for categories such as child care, apparel care, and FAFH. In addition, higher levels of education are expected to increase efficiency in nonmarket production and the household's real income, which should, in turn, increase expenditures on services (Michael and Becker 1973).

Race of Household Head. This variable is also included to allow for differences in taste and preferences. Based on the literature, it is hypothesized that black families will spend more on clothing and personal care and less on FAFH than other families. (Alexis 1962; Barth 1969; Bellante and Foster 1984; Chern and Soberon-Ferrer 1987; Dardis, Derrick, and Lehfeld 1981; Derrick, Lehfeld, and Dardis 1982; McCracken and Brandt 1987).

Location. Urbanization is the only location variable, since data for regions are not provided for rural households. It is included to allow for variations in service costs (and service availability) in urban and rural areas. It is hypothesized that families living in urban areas will be more likely to substitute paid labor for household labor than families living in rural areas.

Home Ownership. According to Garman and Forgue (1988), the cash outflow of renters is usually smaller than that of homeowners. Thus, renters may be expected to spend more on nonshelter expenses such as clothing care, personal care, and FAFH than homeowners.

Analysis

Tobit analysis was used to examine the impact of explanatory variables on household expenditures on services. Tobit analysis is required in the case of a censored sample; that is, complete data are available for the independent variables while missing or zero observations exist for the dependent variable (Maddala 1983). The Wald statistic was used to determine whether the model was significant in explaining variations in service expenditures. The null hypothesis for the entire model is that all the B_i equal zero. The regression is first run with only a constant term and then with a constant term and all the variables. The Wald test was also used to test the significance of sets of regressors such as household production variables or family-life-cycle variables.

Separate analyses were performed for families with full-time and part-time working wives to determine whether there were differences between the two groups.

Full-time was defined as working 35 hours a week or more. The equality between the sets of coefficients in the two groups was tested by the Wald test. According to Green (1990), heteroskedasticity may be a problem in the analysis of cross-section data. For example, there may be greater variations in expenditures for high-income families than for low-income families because of greater discretionary income. The Wald test, which tends asymptotically to a chi-square distribution regardless of the distribution of the disturbances, is more appropriate than the Chow test in such instances. The two groups of families were combined or analyzed separately in the Tobit analysis, depending on the results of the Wald test.

The net effect of work hours on service expenditures was estimated from Equation 6 as follows:

$$\delta p_i x_i / \delta t_w / Y = \delta p_i x_i / \delta t_w - (\delta p_i x_i / \delta Y)(\delta Y / \delta t_w). \quad (9)$$

The first term on the right-hand side is the regression coefficient for hours of work, while the second term is the regression coefficient for unearned income times the hourly wage rate. The sample means were used for the hourly wage rates. This estimated net effect is a random variable and its statistical significance may be tested (Judge, Hill, and Lee 1980, pp. 29–31).

Data Used in the Analysis

Quarterly data from the 1984 and 1985 Bureau of Labor Statistics Interview Panel Consumer Expenditure Surveys (CES) were used in the analysis. A rotating panel of approximately 5,000 households is interviewed each quarter for five quarters. The first interview is not made public since it is made for statistical control purposes, with 20 percent of the sample being rotated out of the survey every quarter. Two years of data were required to yield an adequate sample size for this study. Unfortunately, the rotating-panel design was changed in 1986 so that it was not possible for public tape users to combine data for 1985 and 1986. Thus, the analysis was based on 1984 and 1985 data. According to Garner (1988), the CES is the most comprehensive source of information on household expenditures and income at the national level.

Survey households selected for the study were two-earner households, in which both husband and wife worked. In this manner, it was possible to investigate the impact of household production variables on service expenditures. Complete earnings and expenditure data for four successive quarters were available for 650 households.

RESULTS

Sample characteristics are presented first, followed by the results of the Tobit analysis. It should be noted that only working-wife households were included in the analysis, so that the findings are confined to such

TABLE 2

ANNUAL SERVICE EXPENDITURES BY SERVICE CATEGORY, 1984–85

Service category	Households with service expenditures		Mean annual expenditures[a] ($)
	Number	Percentage	
Full-time:			
Child care	162	36.6	1,135.69
Clothing care	343	77.4	123.55
Domestic services	165	37.2	229.04
FAFH	436	98.4	820.27
Personal care	414	93.5	248.33
Total services	443	100.0	1,635.70
Part-time:			
Child care	107	51.7	711.52
Clothing care	155	74.9	82.60
Domestic services	65	31.4	168.99
FAFH	206	99.5	735.36
Personal care	199	96.1	219.48
Total services	207	100.0	1,425.80

[a] "Mean" refers to households with expenditures greater than zero.

households. The fact that nonworking wives were excluded did not necessarily limit the analysis, since there were considerable variations between households with respect to the number of hours worked. The hours worked ranged from two to 34 for part-time working wives and from 35 to 84 for full-time working wives.

Sample Characteristics

The percentage of full-time and part-time working-wife households reporting expenditures on services and annual expenditures for these households are given in Table 2. The total sample size was 650, and 68 percent of households had full-time working wives. Nearly all households had expenditures on FAFH and personal care, while domestic services and child care were purchased by the fewest households. Average annual expenditures for full-time working-wife households ranged from $123 for clothing care to $1,136 for child care, while values for part-time working-wife households ranged from $83 for clothing care to $735 for FAFH.

Characteristics of the sample are given in Table 3. Full-time working wives had higher wages than part-time working wives, but spouses of full-time working wives had lower wages than spouses of part-time working wives. Households with full-time working wives had fewer children under six and smaller-size families, as might be expected. The two groups were not too dissimilar with respect to other household characteristics. The dominant age groups for wives was 25–34 years, followed by 35–44 years. This distribution probably reflects the sample selection, which was confined to households where both husband and wife

TABLE 3

INDEPENDENT VARIABLES

Variable	Definition	Value for sample	
		Full-time (N = 443)	Part-time (N = 207)
Household production:			
UNINC	Annual unearned income (mean $)	1,558.60	1,417.40
WAGEW	Hourly wage rate of wife (mean $)	7.70	6.18
HOURW	Number of hours worked per year by wife	1,886.20	880.27
WAGEH	Hourly wage rate of husband (mean $)	10.65	11.34
HOURH	Number of hours worked per year by husband (mean)	2,111.90	2,194.50
Family composition:			
CHLD1	Number of children ages 0–2 (mean)	.19	.30
CHLD2	Number of children ages 3–5 (mean)	.20	.32
FSIZE	Number of persons in household minus the number of children under age six (mean)	2.63	2.89
Age of wife:			
AGEW1	Less than 25 (%)	9.3	7.2
AGEW2	25–34 (%)	44.5	52.7
AGEW3	35–44 (%)	27.2	23.7
AGEW4	45–54 (%)	11.1	8.7
AGEW5	Greater than 54 (%)	7.9	7.7
Education of wife:			
EDUW1	Never attended school or elementary or some high school (%)	9.5	8.2
EDUW2	High school graduate (%)	38.8	43.5
EDUW3	Some college (%)	23.7	25.1
EDUW4	College graduate (%)	14.2	14.5
EDUW5	Some graduate education (%)	13.8	8.7
Race of husband:			
RACE 1	Nonblack (%)	89.8	94.7
RACE 2	Black (%)	10.2	5.3
Location of household:			
URBAN	Urban (%)	83.5	93.7
RURAL	Rural (%)	16.5	6.3
Home ownership:			
OWNER	Own throughout year (%)	79.2	75.8
RENTER	Rent part or all of year (%)	20.8	24.2

worked. The dominant education category for wives was high school graduates, followed by those who had some college education. The wives in more than one-fifth of households in both groups were college graduates or had some graduate education. The race of the husband was used instead of the race of the wife, according to the procedure of Bellante and Foster (1984). However, the race of the husband was identical to that of the wife 99 percent of the time. Black households accounted for 5–10 percent of all households. The great majority of households were in urban areas and were home-owners.

Comparison of Full-Time and Part-Time Working-Wife Households

The results of the Wald test indicated that there were significant differences between full-time and part-time working-wife households regarding child care, FAFH, and total services. The results for FAFH are in agreement with those obtained by Kinsey (1983). Accord-

ingly, separate analyses were run for these three service categories. The two groups of households were combined for the clothing-care, domestic services, and personal care service categories.

Results of the Tobit Analysis: All Households

The results for the three service categories, where the two household groups were combined, are given in Table 4. The coefficients, asymptotic *t*-ratios, and Wald statistics are given for each of the three dependent variables. The Wald statistics indicate that the model is significant in explaining variations in service expenditures.

The results for the household production variables are of interest in several respects. First, the number of hours worked each year by both husband and wife and the husband's wage rate had a positive and significant impact on clothing care and personal care. Second, the wage of the wife was significant in the case of do-

TABLE 4

RESULTS OF TOBIT ANALYSIS FOR SERVICE EXPENDITURES:
ALL HOUSEHOLDS

Independent variable	Dependent variable		
	Clothing care	Domestic services	Personal care
INTERCEPT	-62.68	-552.74	-67.31
	(-1.41)	(-3.58)**	(-1.42)
Household production:			
UNINC	.00	.02	.00
	(.06)	(3.67)**	(1.34)
WAGEW	1.55	12.74	3.90
	(.98)	(2.50)*	(2.27)*
HOURW	.03	.04	.02
	(2.79)**	(1.18)	(2.33)*
WAGEH	4.16	5.20	6.34
	(3.57)**	(1.38)	(5.02)**
HOURH	.03	.04	.04
	(3.47)**	(1.27)	(3.88)**
Family composition:			
CHILD1	-21.01	-10.48	-10.76
	(-1.42)	(-.20)	(-.68)
CHILD2	-25.57	-7.98	6.01
	(-1.83)†	(-.17)	(.40)
FSIZE	-19.27	-2.99	18.13
	(-2.61)**	(-.12)	(2.32)**
Age:[a]			
AGEW1	-13.26	-73.61	31.53
	(-.52)	(-.81)	(1.13)
AGEW2	-21.32	68.75	-2.91
	(-1.38)	(-1.29)	(-.17)
AGEW4	-32.60	-11.09	53.83
	(-1.44)	(-.14)	(2.21)*
AGEW5	-9.93	66.83	101.49
	(-.37)	(.74)	(3.46)**
Education of wife:[b]			
EDUW1	5.65	-1.68	-5.40
	(.25)	(-.02)	(-.23)
EDUW3	31.57	46.71	11.14
	(2.07)*	(.87)	(.67)
EDUW4	32.79	62.61	19.01
	(1.78)†	(1.00)	(.95)
EDUW5	46.37	329.01	55.72
	(2.25)*	(4.97)**	(2.48)*
Race of husband:[c]			
BLACK	94.01	-152.31	63.06
	(4.56)**	(-1.91)†	(2.76)**
Location of household:[d]			
RURAL	-55.02	43.21	-63.94
	(-2.99)**	(.69)	(-3.32)**
Home ownership:[e]			
RENTER	55.07	69.61	-38.15
	(3.67)**	(1.35)	(-2.35)*
WALD statistics	123.16**	87.63**	151.70**

NOTE.—Asymptotic *t*-ratios are given in parentheses.
[a] Reference group is 35–44.
[b] Reference group is high school graduates.
[c] Reference group is nonblack.
[d] Reference group is urban.
[e] Reference group owns throughout year.
† $p < .10$.
* $p < .05$.
** $p < .01$.

mestic services and personal care where its effect was positive as hypothesized. The fact that the wage rate of the wife was significant for domestic services is in keeping with the wife's responsibility for many household production activities (Peskin 1982) and the greater ability of wives with higher wages to buy time. Finally, unearned income was significant only for domestic services.

The number of children ages 3–5 and family size had a significant and negative impact on clothing-care expenditures. This result is not surprising, since households with more young children and a greater number of family members may sacrifice clothing-care expenditures for other expenditures, in particular child care. Family size was also significant for personal care, where its effect was positive.

The age of the wife was insignificant in all instances for clothing care and domestic services. In contrast, households with women ages 45–54 and more than 54 years spent more on personal care than did other households. These results are not surprising, since personal care expenditures are likely to increase with age in youth-dominated cultures, such as in the United States.

Higher levels of education were significant to clothing-care expenditures. Households with women who had some graduate education also spent more on domestic services and personal care than other households.

Race was significant in all instances, though its effect varied. Black families spent more on clothing care and personal care and less on domestic services than other families, which is in agreement with earlier studies.

The two remaining variables were urbanization and home ownership, which were significant in two out of three instances. Rural households spent less on clothing care and personal care than urban households while renters spent more than owners on clothing care, as hypothesized. However, renters spent less on personal care than owners, which was contrary to predictions.

Tobit Analysis: Two Household Groups

The results for the three service categories for which separate analyses were done for full-time and part-time working-wife households are given in Table 5. The coefficients, asymptotic *t*-ratios, and Wald statistics are given for each of the three dependent variables. The Wald statistics were significant in all instances.

In the case of full-time working-wife households, all household production variables were positively and significantly related to expenditures on FAFH and total services. In contrast, only the hours worked by the wife were significant for child-care expenditures. The significance of this variable is in keeping with the fact that child care is the primary responsibility of women (Peskin 1982). In the case of part-time working-wife households, none of the wife's work-related variables

TABLE 5

RESULTS OF TOBIT ANALYSIS FOR SERVICE EXPENDITURES: TWO HOUSEHOLD GROUPS

	Dependent variable					
	Child care		FAFH		Total services	
Independent variable	Full-time	Part-time	Full-time	Part-time	Full-time	Part-time
INTERCEPT	-2,261.92	1,299.01	41.36	-89.07	-362.48	-648.57
	(-3.85)**	(-2.85)	(-.21)	(-.37)	(-1.09)	(-1.52)
Household production:						
UNINC	.012	.036	.012	.025	.020	.061
	(.59)	(1.46)	(2.01)*	(2.51)*	(1.86)*	(3.42)**
WAGEW	.04	15.58	16.74	10.37	22.97	26.91
	(.00)	(.92)	(2.64)**	(1.02)	(2.11)*	(1.51)
HOURW	.37	.11	.12	.02	.34	.13
	(2.75)**	(.83)	(2.51)*	(.26)	(4.22)**	(.98)
WAGEH	-6.43	30.57	13.40	22.71	24.74	47.60
	(.47)	(2.14)*	(2.89)**	(2.93)**	(3.10)**	(3.49)**
HOURH	.01	.15	.20	.17	.27	.40
	(.07)	(1.26)	(4.84)**	(2.86)**	(3.87)**	(3.70)**
Family composition:						
CHILD1	1,237.65	693.07	-97.82	-40.53	416.80	299.32
	(8.16)**	(4.86)**	(-1.56)	(.50)	(3.88)**	(2.09)*
CHILD2	1,758.75	918.40	-46.35	-48.01	862.49	576.69
	(11.81)**	(7.63)**	(-.76)	(-.67)	(8.28)**	(4.60)**
FSIZE	249.61	-6.58	25.49	56.13	47.38	28.34
	(2.79)**	(-.09)	(.82)	(1.38)	(.89)	(.40)
Age.[a]						
AGEW1	151.02	-506.53	-107.13	-225.58	-199.52	-510.55
	(.55)	(-1.67)[+]	(-1.05)	(-1.37)	(-1.14)	(-1.76)[+]
AGEW2	245.14	-245.83	-165.94	-86.16	-145.02	-325.64
	(1.53)	(-1.61)	(-2.62)**	(-.96)	(-1.33)	(-2.06)*
AGEW4	-1,292.16	-294.04	-216.94	-217.95	287.44	-203.22
	(-2.61)**	(-1.09)	(-2.39)*	(-1.57)	(-1.84)[+]	(-.83)
AGEW5	-4,352.79	-4,001.50	-367.46	-207.82	-339.69	-285.96
	(-.08)	(-.08)	(-3.38)**	(-1.21)	(-1.82)[+]	(-.95)
Education of wife:[b]						
EDUW1	692.71	-67.14	-51.30	-52.55	-82.36	61.46
	(-2.14)*	(-.24)	(-.57)	(-.40)	(-.54)	(.27)
EDUW3	-20.65	184.77	127.77	83.72	216.94	236.04
	(-.12)	(1.21)	(2.01)*	(.95)	(1.99)*	(1.53)
EDUW4	299.91	255.00	107.49	24.25	304.93	306.36
	(1.47)	(1.36)	(1.42)	(.23)	(2.34)*	(1.62)
EDUW5	308.33	253.85	251.06	-127.22	649.99	383.71
	(1.41)	(1.15)	(2.99)**	(-.98)	(4.50)**	(1.68)[+]
Race of husband:[c]						
BLACK	-236.24	17.97	-153.29	10.54	-52.31	177.47
	(-1.05)	(.06)	(-1.87)[+]	(.07)	(-.37)	(.66)
Location of household:[d]						
RURAL	-580.91	483.90	-110.12	143.92	-354.42	509.21
	(-2.84)**	(2.02)*	(-1.64)[+]	(1.04)	(-3.08)**	(2.10)*
Home ownership:[e]						
RENTER	-146.13	20.13	-153.10	22.88	-137.57	43.28
	(-.86)	(.12)	(-2.46)*	(.26)	(-1.29)	(.28)
WALD statistics	203.05**	117.09**	160.39**	52.88**	248.25**	123.00**

NOTE.—Asymptotic t-ratios are given in parentheses.
[a] Reference group is 35–44.
[b] Reference group is high school graduates.
[c] Reference group is nonblack.
[d] Reference group is urban.
[e] Reference group owns throughout year.
[+] $p < .10$.
* $p < .05$.
** $p < .01$.

TABLE 6

WALD TEST FOR SETS OF VARIABLES

Variable set and category	Clothing	Domestic services	Personal care	Child care	FAFH	Total services
Household production	35.15**	23.85**	55.04**	...	...	...
Full-time	...	...	...	8.70+	47.40**	49.44**
Part-time	...	...	...	11.56'	27.96**	45.39**
Family life cycle	9.57	4.62	20.62**	...	...	...
Full-time	...	...	...	196.42*	17.72**	105.72**
Part-time	...	...	...	74.14**	3.88	29.80**
Wife's education	7.55+	26.70**	6.50	...	...	...
Full-time	...	...	...	9.33*	11.52*	22.91**
Part-time	...	...	...	3.01	2.96	4.79

+ $p < .10$.
* $p < .05$.
** $p < .01$.

were significant while those of the husband were significant in five out of six instances. These results suggest that only the husband's work-related variables are important for part-time working wife households while both sets of work-related variables are important for full-time working-wife households. There were little differences between the two groups of households with respect to unearned income.

There were also no differences between the two groups of households with respect to the number of children under six. Both variables (CHLD1 and CHLD2) had a positive and significant impact on the demand for child care and total services, as hypothesized. Family size was significant only in the case of child care, where it had a positive impact on expenditures of full-time working-wife households.

Few of the age variables were significant for child care. However, age was significant in several instances for FAFH in the case of full-time working-wife households. Families with women less than 25 and between 35 and 44 spent more on FAFH than other families. This may reflect greater social activities and/or greater family responsibilities for wives in these two age categories. There were also differences between the two groups of households for total services. Full-time working-wife households with women in the two oldest age groups spent less on total services than other households. However, part-time working-wife households with women in the two youngest age groups spent less on total services than other households. These results may reflect a variety of factors, since total services are the sum of the five service categories.

Education was insignificant in most instances for child care and FAFH. However, education was significant in four of eight instances for total services. Higher levels of education were associated with higher levels of expenditures, as hypothesized.

Race was not significant, except that black families with full-time working wives spent less on FAFH than

did non-black families, as hypothesized. However, race was not significant on FAFH in part-time working-wife families.

Urbanization was significant in five of six instances, though its effects varied for full-time and part-time working-wife households. Rural households with full-time working wives spent less on child care, FAFH, and total services than urban households, as hypothesized. However, different results were obtained for rural part-time working-wife households; rural households spent more on child care and total services than did urban households. This may reflect the lack of part-time day-care facilities in rural areas, necessitating higher expenditures for part-time child-care services in those areas.

The final variable, home ownership, was significant in only one instance. Renters spent less than homeowners on FAFH in the case of full-time working-wife households, which was contrary to predictions. One possible explanation for this result may be the desire of families that are renting to purchase a home, so that expenditures on discretionary items, such as FAFH, are curtailed.

Significance of Sets of Variables

The significance of sets of variables was also examined in view of possible multicollinearity between the individual variables related to household production, family life, and education. The results of the Wald test for sets of variables are reported in Table 6. The set of household production variables is significant in all instances while family life cycle is significant for personal care, child care, FAFH (full-time working-wife households), and total services. Education is significant for clothing care and domestic services while its significance varies for FAFH and total services depending on the work status of the wife. The different results obtained for full-time and part-time working-

wife households are in agreement with those obtained earlier for the individual variables and reinforce the need for conducting separate analyses for the two groups of households.

Condition indexes were also obtained to determine where multicollinearity might be a serious problem and affect the results of this analysis (Belsley, Kuh, and Welsch 1980). The largest condition index is called the condition number of the $X'X$ matrix and indicates serious collinearity if it is greater than 30 (Kennedy 1985). The condition numbers obtained for our sample were all less than 30.[4]

Impact of Time Constraints on Service Expenditures

The net impact of work hours on service expenditures (Equation 9), given in Table 7, is somewhat mixed and contrary to the substitution hypothesis in some instances. Work hours are significant in four out of six instances when both groups of households are combined. The substitution effect is positive for clothing care for both husbands and wives, but is negative for domestic services. The finding that domestic services are complements rather than substitutes for home time is contrary to expectations. One possible explanation is that this particular household activity may be curtailed or deferred to weekends in contrast to child care or food preparation. It may also reflect supply constraints that could not be investigated in this analysis. The importance of local market conditions for service-expenditure decisions was noted by Weagley and Norum (1989). The lack of significance for personal care may reflect the fact that this service is time intensive for individuals irrespective of whether it is produced at home or purchased in the marketplace.

There were no significant results for part-time working wives in the case of child care, FAFH, and total services, which is contrary to expectations. However, these results are in agreement with the decision of part-time working wives to conserve some home time for essential household production activities, such as child care and food preparation. Thus, there is less incentive to substitute paid labor for household labor.

Work hours of full-time working wives had a significant impact on total service expenditures, while they were insignificant for child care and FAFH. The results for child care differ from those obtained by Bellante and Foster (1984), who found that hours worked per week by full-time working wives had a significant impact on child care expenditures (holding income constant). However, Bellante and Foster used different data (1972–1973) and a different method of analysis (OLS as opposed to Tobit). Another possible expla-

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TABLE 7

IMPACT OF WORK HOURS ON SERVICE EXPENDITURES

Service category	Male		Female	
	$\delta p_i x_i / \delta t_w$	t-Ratio	$\delta p_i x_i / \delta t_w$	t-Ratio
All households:				
Clothing	.034	2.037*	.030	1.851+
Domestic	−.144	2.593**	−.083	1.992*
Personal	.017	.907	.006	.424
Part-time:				
Child care	−.260	.839	−.110	.599
FAFH	−.110	.935	−.134	1.497
Total services	−.290	.137	−.250	1.543
Full-time:				
Child care	−.120	.530	.280	1.374
FAFH	.720	.991	.020	.317
Total services	.064	.547	.184	1.651+

NOTE.—Income was held constant.
+ $p < .10$.
* $p < .05$.
** $p < .01$.

nation might be changes in the supply of child care. Many day-care providers today charge a set fee for full-time day care irrespective of the actual number of hours a child may spend in the facility. Thus, variations in work hours for full-time working wives may have little impact on child-care costs. This possibility, which would be a departure from the marginal assumptions of the Becker model, could not be tested in the present study. The results for FAFH may be due to the fact that such expenditures involve both a leisure activity as well as a time-saving activity. It was not possible to separate these two effects, which may offset each other, in the analysis.

The insignificance of the husband's work hours for child care, FAFH, and total services is as hypothesized and is in agreement with the fact that the wife has the primary responsibility for major household production activities such as child care and food preparation (Blau and Ferber 1986, pp. 125–130; Peskin 1982). These results do not necessarily contradict those obtained in Table 5, where the coefficients for the husband's work hours reflect both an income effect and a substitution effect.

DISCUSSION

There were significant differences between full-time and part-time working-wife households in the case of child care, FAFH, and total services. Thus, separate analyses were done for these three service categories. For clothing care, domestic services, and personal care, the two groups of households were combined for analysis.

Household production variables had a significant impact on most service expenditures, both individually

and as a set, which is in agreement with the results of earlier expenditure studies. However, there were differences between full-time and part-time working-wife households for child care, FAFH, and total services. Only the husband's work-related variables were important in the case of part-time working-wife households, while both sets of variables were important for full-time working-wife households. The net impact of work hours on total service expenditures was also significant for full-time working wives in contrast to part-time working wives, for which it was insignificant.

The other major set of explanatory variables was family life cycle, which had a significant impact on child care, personal care, FAFH (full-time working-wife households), and total services. In addition, the number of children under six was significant for child care, clothing care, and total services. Similar results were obtained by Bellante and Foster (1984) and Weagley and Norum (1989).

Education and race, which were used to account for differences in tastes and preferences, were significant in many instances. In general, higher levels of education were associated with higher levels of service expenditures. These results provide some support for the greater efficiency in consumption in families where the wife has a higher level of education (Michael and Becker 1973). The results for race were in agreement with earlier studies; black households spend more on clothing care and personal care and less on FAFH (full-time working-wife households).

In summary, a major finding of this research was that the significance of variables (or variable sets) varied by service category and the employment status of the wife. These findings are reinforced by the fact that there were differences between full-time and part-time working-wife households for two service categories (child care and FAFH) as well as for total service expenditures. These differences were not investigated in earlier studies in which data on both full-time and part-time working-wife households were combined. The results of this study appear reasonable in view of the wife's primary responsibility for child care and food preparation and the greater time availability of part-time working wives. There was no difference between part-time and full-time working-wife households with respect to the other service categories, which was somewhat surprising in the case of domestic services. However, this household activity may be curtailed or deferred to weekends, and that is not a choice for child care or food preparation.

Changes in the employment status of wives and their earning will thus have a greater impact on the demand for certain service categories than for others. Marketers should be sensitive to these changes, which have already had an impact on child-care services, convenience foods, and fast-food outlets. The fact that income continues to play a major role in service-expenditure decisions should stimulate the supply of time-saving, low-cost services that address both the time and income constraints of working wives.

An extension of the analysis to nonworking-wife households would provide more information concerning the impact of such constraints. It would be of particular interest to determine whether part-time working-wife households were similar to nonworking-wife households with respect to time constraints. Finally, it should be recognized that the independent variables used in this study were of necessity limited. Thus, variables such as service costs/availability and habit could not be investigated, though both undoubtedly play a role in service-expenditure decisions.

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