Canadian Studies in Population, Vol. 23(1), 1996. pp. 23-47.

The Application of Household Life Cycle Variables to Spending Patterns Using Canadian Data

Bill Marr
and
Doug McCready
WilfridLaurier University
Waterloo, Ontario, Canada

Abstract

This paper addresses the economic problem: to what extent can life cycle variables add to the explanation of Canadian household spending on food, shelter, transportation, and clothing? Using household data from four Surveys of Family Expenditures, we find that a revised household life cycle model is preferred to a traditional family life cycle model and life cycle variables do add to our understanding of different household spending patterns, but the majority of any explanation of those patterns emanate from other socio-economic variables. Life cycle variables play a secondary, although still important, explanatory role.

Résumé

Le présent article traite du problème économique suivant : à quel point les variables du cycle de vie contribuent-elles à expliquer les dépenses des ménages consacrées à la nourriture, au logement, au transport et aux vêtements? Fondé sur quatre Enquêtes sur les dépenses des familles, il conclut qu'un modèle de cycle de vie modifié est préférable à un modèle traditionnel, et que les variables du cycle de vie donnent une meilleure compréhension des différentes habitudes de dépense, mais que toute explication de tels régimes émane surtout d'autres variables socio-économiques. À cet égard, les variables du cycle de vie jouent donc un rôle secondaire, mais néanmoins important.

Key Words: life cycle, household, spending, Canada

Introduction

There have been several occasions during the last 40 years when the family or

household life cycle model has been used in studies of household or family expenditure patterns (see Arndt, 1979; Lansing and Morgan, 1955; Wells and Gubar, 1966; Wagner and Hanna, 1983; Danko and Schaninger, 1990; Wilkes, 1995). In all cases a set of variables that represent various stages in a family's or household's development is related to spending on one or more consumer goods and services. If stages in the family or household life cycle influence spending, then, after controlling for other explanatory variables like family income, the life cycle variables should have an independent influence all on their own.

However, there are critics of using life cycle models to explain family or household spending patterns. After holding constant the effects of other socioeconomic and demographic variables, life cycle variables may have little explanatory power (Ferber, 1979; Wagner and Hanna, 1983). Other researchers find that life cycle variables retain some influence even when income, for example, is controlled (Fritzsche, 1981; Frey and LaBay,1983; Marr and McCready, 1989). The empirical evidence is mixed and there has not been a test of the life cycle model using Canadian expenditure data that has fully incorporated life cycle variables.

In the past 30 years, the number and complexity of so-called non-traditional family households has increased. The "wife-husband with children living at home" household is no longer typical. There has been in Canada as elsewhere a rise in divorce rates, a postponement of marriage and childbearing, more couples with no children, a greater number of single-parent households (often with a female adult as head), and couples living for two or more decades after their children have left home (Beaujot, 1991). The present study will incorporate some of these changes into the life cycle, and relate them to household expenditure on some major spending items. As the household structure changes in Canada, and if the newer structures have different spending patterns than more traditional structures, then this has implications for consumer demands and overall expenditures on certain services and products. While we do not examine spending patterns on single products, the paper's results suggest that household structure does have an effect on those demands.

These changes in the makeup of the household have had important implications for the definition of the life cycle stages. The traditional family life cycle model as developed by Wells and Gubar (1966) has undergone profound changes as stages to represent non-traditional household forms such as lone-parent families and married couples who decide not to have children are added (Gilly and Enis, 1981; Murphy and Staples, 1979; Stampfl, 1978). These revised models are then tested to see how well they explain spending on consumer goods and services. But to date, the relative merits of the traditional and modified versions have not been tested using Canadian data. Both by using the traditional life cycle model and a modified version, it will be possible to examine an implicit

theory of products (Wilkes, 1995). If stages in a life cycle are evolutionary in the sense that households "move" through at least some of them, are there corresponding changes in expenditure on important components of household spending? If the answer is yes, this has implications for total spending in Canada. Even if households simply occupy a particular category of household structure at any point in time, the implications for spending are the same.

Besides comparing the effectiveness in predicting total household spending on selected goods and services of a traditional model to that of a revised model, the growth in non-traditional households suggests that it would be interesting to examine if they exhibit different expenditure patterns than traditional families. Studies in Canada by Marr and McCready (1989) suggest that non-traditional households do exhibit different spending patterns than, for example, traditional family households, but their research does not use a fully specified life cycle model. From a marketing point of view, changing household structures along with different spending patterns lead to the need for varying marketing strategies in order to sell products. In other words, markets may be segmented along life cycle lines (Danko andSchaninger, 1990).

Given the call for a "revised" or "modified" family life cycle model (Gilly and Enis, 1982; Glick, 1977; Murphy, 1984; Murphy and Staples, 1979), we use the term household life cycle to reflect the non-traditional as well as the traditional household structures (Bristor and Qualls, 1984; Wilkes, 1995) in a single set of structural categories.

The next section will briefly review existing research findings in support of the household life cycle model as it relates to consumer spending. This will be followed by a description of the Canadian data to be used in our study. Then traditional and revised versions of stages or categories in household life cycle models are developed in light of the data set used; the definitions of stages have to be modified according to the available data. Then the versions are tested for the most important aggregate types of consumer spending. We will also compare results with and without other socioeconomic and demographic variables such as real household income and educational level of the household's reference person.

Prior Research

Prior to the study by Wagner and Hanna published in 1983, researchers using data for the United States had mixed results in employing life cycle variables to explain household spending patterns. Several sectors had been studied: housing and durables (Lansing and Morgan, 1955), food and clothing (Wells and Gubar, 1966; Derrick and Lehfeld, 1980), services (Arndt, 1979), leisure (Landon and

Locander, 1979; Settle, Alreck and Belch, 1979), energy (Frey and LaBay, 1983; Fritzsche, 1981; Zimmerman, 1981), and shopping behaviour (Jain, 1975). Other studies examined specific stages rather than life cycle models in general (see Shipp, 1988; Lazer, 1985; Bloom and Bennett, 1986; Waldrop, 1989).

Wagner and Hanna's study (1983) is important because they compared the effectiveness in predicting total household clothing expenditures with a set of traditional family life cycle variables to that of a set of revised household life cycle variables, with and without controlling for other socioeconomic and demographic variables. Using data from the 1972-1973 Consumer Expenditure Survey, they concluded that (1) socioeconomic and demographic variables were much more successful in explaining expenditure on clothing than are any life cycle variables, (2) the effect of life cycle variables was very small when socioeconomic and demographic variables were controlled, and (3) a revised family life cycle model was no more successful in explaining clothing expenditure than a traditional life cycle model.

In a more recent test of household life cycle models, Danko and Schaninger (1990) used a modified version of the model suggested by Gilly and Enis (1982) to test if life cycle variables explain or differentiate spending on food and beverage consumption, major durable goods acquisition, major appliance ownership, minor appliance ownership, and spending on some services (maid, babysitting, day care, etc.). They collected their data from a questionnaire that was administered in urban areas in a middle Atlantic state during the mid-1980s. They found that the Gilly-Enis model revealed many consumption differences across household life cycle stages, and argued that this model was a good market segmentation tool.

Robert Wilkes (1995) used the above studies as a backdrop and moved on to explore a number of issues with respect to this topic: the value of the household life cycle as an indicator of the allocation of expenditures across several products and services, the usefulness of a relatively large data set, differences to results if the life cycle stages were based on the age of the wife rather then of the husband where both are present, and expenditure allocations for singles households which were excluded from traditional life-cycle models. In general, he found strong support for household life cycle variables as indicators of expenditure patterns for a relatively large array of services and products. Because Wilkes used a large set of data, a number of stages were included in his research that were omitted by others due to a small number of observations. The use of the wife's age instead of the husband's did not substantially change the empirical results. Thus, he found no support for Gilly and Enis's recommendation of using the wife's age.

To date there has only been a few studies of Canadian households that place life cycle variables in the context of explaining the spending patterns of those households. Marr and McCready (1989) came closest in their study of the effects of demographic structure on expenditure patterns of Canadian households. Using data from the 1978, 1982, and 1984 Surveys of Family Expenditures by Statistics Canada, they attempted to explain household spending on aggregate consumption categories (e.g., food, shelter, transportation, clothing, furniture) with a set of variables that included some that were life-cycle-like, namely family composition based on the numbers of adults and children, female reference person, divorced-separated-widowed, and the reference person's age. With age of the household reference person as a continuous variable, the proportion of total consumption allocated to food, shelter, and transportation increased with age, while the proportion allocated to clothing fell, all else the same. When age was measured by a set of binary variables, the pattern of spending allocation across age groups often became more complicated. For example, as age groups moved from ages (25-34) to ages (65+), the relationship to the proportion of total consumption allocated to shelter was like an "S" on its side. Looking at the size of the household as a continuous variable, as this size increased so did the proportion of total consumption allocated to food, while the opposite occurred for shelter, clothing, and transportation; there was no relationship between the proportion allocated to shelter and household size. Turning to the breakdown between adults and children in households, in adult-only households the proportion of total consumption allocated to food and clothing increased with more adults, while the opposite occurred in the case of shelter. One-adult households with at least one child present allocated proportionally less of total consumption to food and clothing, and more to shelter than two-adult households with the same number of children present. Finally, in two-adult households the presence of children raised the proportion of total consumption allocated to shelter, lowered the proportion on transportation, made no difference for the proportion on food.

Robin Douthitt and Joanne Fedyk (1988) examined the specific presence of children in a household on its expenditure on food eaten at home, food eaten away from home, adult clothing, children' clothing, shelter, transportation, and durables. Their data came from the 1982 Canadian Survey of Family Expenditures for a sample of Prairie families. When they compared childless couples with couples with two children, holding some other household characteristics constant, over the household's life cycle as defined by the age of the male adult, differences in the proportion of the budget spent on those items noted above were found. In particular, the presence of children initially increased budget proportions allocated to food eaten at home, children's clothing, shelter, transportation, and durables. While this increase persisted over the life cycle for food eaten at home and children' clothing, the budget proportion fell below that for childless couples for shelter, transportation, and

durables some way through the life cycle. Budget allocated to adult clothing in two-child households initially fell below that for childless couples, but rose above at some point during the cycle. It is clear from their study that the presence of children in a household influences budget allocations among consumption items.

To sum up these results, life-cycle-like variables are sometimes significant explanatory variables, but for some expenditure items they provide little explanatory effect after other variables are held constant. The present study is designed to provide a more direct test of two household life cycle models.

The Canadian Data

We require data that not only has spending by Canadian households on consumer goods and services but also contain enough information on the households to enable us to construct the life cycle stages. There must also be data on household income or some proxy for it as well as other socioeconomic and demographic variables that we may want to control. Therefore, we have drawn our data from four Surveys of Family Expenditures from Statistics Canada. They contain most relevant data for our purposes, although any data set has its limitations and problems. For example, spending on transportation includes the purchase of cars as well as of services to maintain vehicles, two quite different types of household expenditure.

In order to have enough observations for some of the household life cycle stages, we combine the surveys for 1982, 1984, 1986, and 1990 into one larger data set for the analysis that follows. In all there are 30,655 households. The number of households in each life cycle stage will be reported later after they have been defined. Since observations from four surveys are used, the regression analyses include a binary variable taking the value one for observations of the corresponding year and zero otherwise; 1986 is the control year (Kmenta, 1971). All monetary values are converted into real 1986 dollars by using standard price series from Statistics Canada.

It may be useful to provide a little descriptive information about the combined data set. Among the so-called reference person in each household, 64.6% are married or living common-law, 14.4% are single (never married), and 21.0% are classified as "other". For sex, 68.4% are male and 31.6% are female, and their average age is 46. For the age distribution, 6.3% are 24 years or younger, 36.8% are between 25 and 39, 32.4% are between 40 and 59, and 24.6% are 60 or older. For all households in real 1986 dollars, average income before taxes and average expenditure for consumer goods and services are $35,522.88 and $34,125.02 respectively; with respect to income distribution, 19.9% have

household incomes of $15,000 or less, 18.5% have incomes between $15,000.01 and $25,000, 18.2% between $25,000.01 and $35,000, 26.5% between $35,000.01 and $55,000, and 16.8% more than $55,000. The distribution of total expenditure is almost identical. Among the households, 57.5% own throughout the survey year, 39.0% rent, and the rest both own and rent. As for province of residence, 18.9% live in Atlantic Canada, 18.8% live in Quebec, 27.0% live in the Prairies, 12.5% live in British Columbia, and 22.8% live in Ontario. The reference person's level of education breaks down as follows: less than nine years of elementary education - 19.1%; some or completed secondary education - 43.0%; some post-secondary education - 11.1%; post-secondary certificate or diploma - 14.3%; university degree - 12.5%. By birthplace, 82.0% of the reference persons are born in Canada. In households with a spouse, 37.9% have that spouse working outside of the household for income. The distribution of households by life cycle stage will be noted later.

Household Life Cycle Models

The initial discussion of life cycle models was written in terms of the assumption that families passed through a set of well-defined stages, each with its own specified characteristics that translated into spending patterns. Those patterns were approximated by expenditures on food, clothing, shelter, and other services and goods (Hawkins, Best, and Coney, 1989; Engel, Blackwell, and Miniard, 1993). In these models, families went through a series of transitions or stages that allowed researchers to link the household's needs and requirements to those patterns. However, as noted already in this paper, the traditional set of family stages is no longer sufficient to capture the range of households present in Canadian society. In fact, it is likely inappropriate to think of the idea of passing through an orderly progression of stages. Some people remain single, never married, by choice throughout their lives. Can it be said that divorce follows along in an orderly fashion after some other stage? It can probably not. Thus it is more appropriate to think of the life cycle household model as a set of categories and that each household at some point in time just happens to fall into one of those categories; at another time, an individual may be in a different category. Each category has its own consumption needs and requirements, its own financial constraints, and these influence the households' spending on a range of products and services.

Three life cycle models have become popular in most of the empirical literature and testing of the influence of life cycle stages on spending. They are the models of Wells and Gubar (1966), Murphy and Staples (1979), and Gilly and Enis (1982). Their stages are summarized in Table 1, which is taken from an article by Danko and Schaniger (1990). We use a modified version of the Wells-Gubar

model to represent one approach to traditional family life cycle models. We then modify the Gilly-Enis model as our representation of a more contemporary household life cycle model. What are the stages in our models and what are those modifications?

Table 1

Comparison of the Gilly-Enis to the Murphy-Staples and Wells-Gubar Models

Gilly-Enis (1982)	Murphy-Staples (1979)	Wells-Gubar (1966)
1. Bachelor I (<35), unmarried,[a,b] no children	1. Young single (<35), never married, no children	1. Bachelor, young (<45), single never married, no children
	3a. Young (<35), divorced, no children ever	
2. Newlywed, female HH < 35, no children	2. Young (HH < 35) married, no children ever	2. Newly married, HH < 45, no children
3. Full-nest I, female HH < 35, child < 6	3b. Young married (HH < 35), with children (<18)[d]	3. Full-nest I, married, HH < 35, child < 6
4. Full-nest II, female HH < 35, youngest child ≥ 6		4. Full-nest II, married, HH < 35, youngest child ≥ 6
5. Single parent I,[a] HH < 35, child < 6 at home	3c. Young (<35), divorced with children[e]	
6. Single-parent II,[a] HH < 35, youngest child at home ≥ 6		
7. Bachelor II,[a,b] HH 35-64, no dependent children home	4. Middle-aged (HH 35-64) b. Divorced, no children ever c. Divorced w.o. dependent children	8. Solitary survivor, ≥ 45, in labor force, widowed/divorced
8. Childless couples,[c] female HH 35-64, no children home	a. Married no children ever b. Married, no dependent children[f]	6. Empty-nest I, HH ≥ 45, no children home[f,g]
9. Delayed full-nest,[c] female HH 35-64, youngest child < 6	c. Married with children (<18)	5. Full-nest III, HH ≥ 45, dependent children home
10. Full-nest III,[c] female HH 35-64, youngest child ≥ 6		
11. Single-parent III, HH 35-64 children present	d. Middle aged divorced with young or adolescent children[e]	
12. Bachelor III,[a,b] HH ≥ 65, no dependent children home	5.b. Older unmarried, HH ≥ 65, no children home[f]	9. Solitary survivor, HH ≥ 45, divorced/widowed, retired, no children home
13. Older couple,[c] female HH ≥ 65, no children home	5.a. Older married, HH ≥ 65, no children home[f]	7. Empty-nest II, HH ≥ 45, married, no children home,[f,g] HH retired
Other Older married or unmarried with dependent children home	Other Never married and widowed single parents Widowed under 65 Bachelors, 35-64, 65+ years old Households with all children home 18 or over Older married or unmarried with children home	Other Single parents of any age Widowed under 45 Bachelors ≥ 45 years old Households with all children home 18 or over Retired married or older unmarrieds with children at home

Note: Number presented in front of life cycle stages correspond to those presented in Gilly and Enis (1982).
[a] Single, widowed, separated, or divorced.
[b] Noncustodial divorced parents would be included, as would single parents whose children have left home.
[c] Married or cohabitating.
[d] This could include couples with no children in the current household for remarried noncustodial parents.
[e] At home or away from home, thus technically including noncustodial as well as custodial parents.
[f] Couples in which children have left the nest.
[g] It is unclear whether couples who have never had children or included.

Since we want to compare the effectiveness in predicting total household spending on various goods and services of a set of traditional family life cycle variables to that of a set of revised household life cycle variables, we need to define the stages in a traditional model. For the most part, this is done using four variables from the Survey of Family Expenditures: (1) the marital status of the reference person, which is categorized into married or living common-law, single (never married), and "Other", (2) the composition of the household, which includes among its attributes one-person households, married-couple households with and without children and other relatives and non-relatives, lone-parent households, and "other" households, (3) the age of the reference person, and (4) the presence of children and their ages. Although Gilly and Enis (1982) suggest using the age of the spouse when present to define those stages, since Wilkes (1995) finds no difference in the results whether the wife's or husband's age is used, the reference person's age is used in this study when a spouse is present. We use the Wells and Gubar (1966) model as a guide, but it must be modified in light of the Survey of Family Expenditures; the modifications are all necessary because of the way that the attributes of variables are defined by that survey. The following are our stage's definitions:

Bachelor Head:	less than 45 years of age, never married, no children: n=3006
Newly Married Head:	less than 45 years of age, married-couple only, no children: n=2538
Full Nest 1a Head:	less than 45 years of age, married, youngest child less than 7 years of age: n=4930
Full Nest 1b Head:	less than 45 years of age, married, youngest child 7 years or older: n=2836
Full Nest 2 Head:	45 years of age or older, married, youngest child 7 or older: n=3824
Empty Nest 1 Head:	45 years of age or older, married, head working, no children: n=2106
Empty Nest 2 Head:	45 years of age or older, married, head not working, children: n=2203
Survivor 1 Head:	45 years of age or older, "other" marital status, one-person household, no children, head working: n=798

Survivor 2 Head:	45 years of age or older, "other" marital status, one-person household, no children, head not working: n=2375
Other:	lone-parent households of any age, "other" marital status under age 45, bachelors 45 years or older, married-couple households with all children age 18 or older, households with two or more unrelated people: n=6038

Note that the word "Head" refers in the Survey's data to the household's reference person: the member of the household listed on the questionnaire as mainly responsible for its financial maintenance or, where all persons share equally in financial maintenance, any member may be designated the reference person. In the married-couple households, the male is listed as the reference person in more than 90% of the cases.

These stages are very close to the Wells-Gubar traditional model with the following differences: (1) since the Survey indicates the presence of children under age 7 rather than age 6, which they used, age 7 rather than age 6 is used to demarcate the youngest child, (2) since the Survey does not have a question related directly to labour force activity, for Empty Nest and Survivor categories, it had to be indicated by a question about how many weeks a person worked, (3) since the Survey classifies reference people who are legally married but the spouse is not a member of the household on December 31 as "Other" marital status, that category contains households other than ones where the reference person is either divorced/separated or widowed, which a direct comparison with the Wells-Gubar study would require. Note that the "n"s above are the number of households in each category.

For comparison purposes, we need to define stages for a revised or "modern" household life cycle model; again the same four variables noted above are used to demarcate these stages. Here we follow the model of Gilly and Enis (1982) but once again modify it to suit our data: (1) age 7 rather than age 6 is used to identify the youngest child, (2) instead of using the wife's age to define stages when both a husband and wife are present, the reference person's age is used (in most cases this is the male person), (3) since the data enable us to identify married-couple households where all children still at home are at least 18 years old, a fourth "Full Nest" category is added, and (4) the last modification is included also for lone-parent families. Note that the alternative of the Murphy-Staples stages is not used for a number of reasons: (1) they require the divorced to be identified but the Survey of Family Expenditures does not enable us to do that, (2) that data set allows the identification of bachelor households where the reference person is age 35 to 64 or more than 64 which Murphy and Staples

could not identify, and (3) the Survey of Family Expenditures allows the identification of single-parents in line with Gilly and Enis that is more specific than was possible for Murphy and Staples. The following are our stages:

Bachelor 1 Head:	less than 35 years of age, single never married, no children: n=2115
Bachelor 2 Head:	between 35 and 64 years of age, single never married, no children: n=2387
Bachelor 3 Head:	more than 64 years of age, single never married, no children: n=2413
Newly Married Head:	less than 35 years of age, married-couple only (no children): n=2013
Full Nest 1 Head:	less than 35 years of age, married, youngest child less than 7 years of age: n=3323
Full Nest 2 Head:	less than 35 years of age, married, youngest child 7 years or older: n=461
Full Nest 3 Head:	between 35 and 64 years of age, married, youngest child between 7 and 17 years of age: n=4175
Full Nest 4 Head:	of any age, married, youngest child 18 years or older: n=2130
Single 1 Head:	less than 35 years of age, lone-parent family, youngest child less than 7 years of age: n=461
Single 2 Head:	less than 35 years of age, lone-parent family, youngest child 7 years or older: n=211
Single 3 Head:	between 35 and 64 years of age, lone-parent family, youngest child 17 years or less: n=840
Single 4 Head:	of any age, lone-parent family, youngest child 18 years or older: n=696
Childless Head:	between 35 and 64 years of age, married, no children: n=2725

Delay Head:	between 35 and 64 years of age, married, youngest child less than 7 years of age: n=1790
Older Head:	more than 64 years of age, married, no children: n=2109
Other:	non-one-person or non-married-couple households with other relatives or with unrelated people, married couples with relatives only or with at least one non-relative,: n=2805

Since stages or categories have been explicitly identified to capture a greater range of household types, the "Other" stage has far fewer households now than in the traditional life cycle model. Also remember that in all cases children must be at home in order to be enumerated and counted, and the word "Head" refers to the household's reference person.

We can now do the following analysis:

(1) compare the effectiveness in predicting total household spending on selected goods and services of our traditional model to that of our revised model,

(2) determine the size of the effect of household life cycle variables in models controlling for socioeconomic and demographic variables, including total real household expenditures (a proxy for permanent real income), and

(3) compare the predictive ability of socioeconomic and demographic variables alone to the household life cycle variables.

Regression Models

After some empirical testing, where the test criterion was the proportion of the dependent variable explained by the set of independent variables, it was decided that the dependent variables would be the natural log of the real amount that a household spent on a category of expenditure to be defined below; this accords with previous research with life cycle models (e.g., Wagner and Hanna, 1983). In the present study this amounts to using a semi-log specification in the regressions without control variables and a double-log functional form in the regressions with control variables. As noted in the next paragraph the same functional form is required here for all regressions in a particular set of

expenditure relationships, but it is recognized that other studies have used other forms and the use of the above specifications has limitations and assumptions built into them (Abdel-Ghany and Schwenk, 1993). The dependent variables are regressed against a set of binary variables representing the traditional life cycle stages and then the revised life cycle categories. The dependent variables are also regressed alone against a set of socioeconomic and demographic variables (i.e., the control variables) that are defined below. Finally the dependent variables are regressed against the traditional or the revised life cycle categories plus the set of control variables.

The expenditure functions for various items of household expenditure are estimated using ordinary least squares. Clearly, expenditures on several products are determined jointly by households; therefore the disturbance term in the expenditure equation for commodity A is likely to be correlated with the disturbance terms in the expenditure equations for commodities B, C, etc. It would seem that some Generalized Least Squares or simultaneous estimation technique ought to be used. But since the same independent variables appear in the set of expenditure regressions, those techniques collapse to ordinary least squares (Zellner, 1962; Kmenta, 1971, 520-521; Ketkar and Cho, 1982; Ketkar and Ketkar, 1987). As well, if a "large" proportion of households have zero expenditure in the spending groups that are examined then a limited dependent variable problem exists and a technique such as Tobit analysis should be used. In the case of the data used here, only expenditure on education has more than 10% of the households with zero expenditure. It was decided that the limited dependent variable problem did not exist.

The Survey of Family Expenditures contains 12 spending groups, namely food, shelter, household operation, household furnishings, clothing, transportation, health care, personal care, recreation, reading materials, education, and tobacco and alcohol products. Regressions were run for each of those as the dependent variable. However for the sake of economy, only the results for the four most important groups, as defined by the percentage of total household spending allocated to them, are presented in our paper; they are the following with the mean percentage of household spending on the group in parentheses: food (16.6%), shelter (20.1%), transportation (11.4%), and clothing (5.8%). The regressions for the other spending groups are available from the authors.

The socioeconomic and demographic variables included in this study were:

(1) a set of binary variables representing the household head's education: less than 9 years of elementary education as the omitted category, some or completed secondary education, some post-secondary education, post-secondary certificate or diploma, university degree—included on the conceptual idea that

educational levels likely influence household spending patterns through changing preferences, and on the empirical evidence indicating that education is a significant variable in explaining spending patterns (Ketkar and Cho, 1982; Ketkar and Katkar, 1987; Marr andMcCready, 1989;Wilkes, 1995);

(2) a set of binary variables representing the household's region of residence: Ontario as the omitted category, Atlantic, Quebec, Prairie, British Columbia - included to be a proxy for a number of otherwise excluded concepts (for example, ethnic variations, urban-rural differences, supply-side availability) that reflect regional differences in Canada;

(3) a binary variable equal to one if the household head is born outside of Canada—there is some empirical evidence that the foreign-born has different spending patterns than the Canadian-born, all else the same (Marr andMcCready, 1988, 1989);

(4) a binary variable equal to one if the spouse is working - included because life style differences are likely to be present in husband-wife households where the spouse works outside of the home, and empirical evidence supports that contention (Marr and McCready, 1989; Wagner and Hanna, 1983); and

(5) the natural log of total real household expenditure as a proxy for the household's permanent income.

The use of total real household expenditure as a proxy for income can be defended on the basis that previous research on spending patterns has shown better fits with expenditure than with income (Dardis et al., 1981). The permanent income hypothesis can also be invoked to defend the use of total expenditure: households have more control over their expenditures than over their incomes, or spending decisions are based on a measure of permanent income and not on present income (Friedman, 1957; Houthakker and Taylor, 1970). There is also a long tradition of using total expenditure in these kinds of studies as a proxy for permanent income (Ketkar and Cho, 1982; Wagner and Hanna, 1983; Ketkar and Ketkar, 1987; Marr and McCready, 1989; Wilkes, 1995).

Results

The regression results in Tables 2 to 4 indicate that most coefficients are significant at the 5% level. However with such a large number of observations,

even small differences tend to be statistically significant (Hayduk, 1987). Therefore in the presentation of results, the sign and magnitude of the coefficients are usually more interesting than whether or not they are significant; of course there will be exceptions.

Table 2 presents the regression results for household expenditure on food, shelter, transportation, and clothing using the traditional family life cycle variables only (i.e., no controls) and those same variables with the socioeconomic and demographic control variables included (the regression results for those variables are not shown). Table 3 does the same using the revised household life cycle variables.

If we look at the results with no controls, there are at least two senses in which the revised model improves on the traditional model. First, the $\bar{R}^2$ is higher with the revised model, although the differences are still small. Second, and more important, the coefficients on the variables that reflect additional household types or stages (for example, the Bachelor or the Single categories) in the revised household life cycle model, but omitted from the traditional model, are always significant. This means that they add to our understanding of possible relationships between expenditures on food, shelter, transportation, and clothing and life cycle categories. Two examples from the results with controls in Table 3 will highlight this point. While the traditional model allocates all "bachelors" to one specific stage, the revised model's results in Table 3 show that the expenditure habits of the additional two Bachelor classes are often different from the relatively young Bachelor 1 category. The older Bachelor 2 and 3 groups spend less on food, shelter, transportation, and clothing than do those in the youngest group. Even more dramatic are the results for the lone-parent variables (i.e., the four variables called Single in Table 3). These coefficients are all significant and patterns emerge across the four lone-parent stages. As the youngest child gets older through Single 1 and Single 2, and as the reference person ages through Single 3, spending on food, shelter, and clothing rises as compared with the omitted household category; while those lone-parent types all spend less on transportation than the omitted class, the difference declines from Single 1 to Single 3. Single 4, with the youngest child 18 years or older, and likely an older lone-parent as well, has the same spending relationship to the omitted category as the other Single categories, although the magnitude of the coefficients tends to be smaller than for those other lone-parents types; this likely reflects the presence of older children and of children who have left home thus reducing household size.

The $\bar{R}^2$ values reported in Tables 2 and 3 show that the models that include socioeconomic and demographic variables are much more successful at explaining the variance in the dependent variables than the models with only life

Table 2

Regression Results for Traditional Family Life Cycle Variables

	Food		Shelter		Transportation		Clothing	
	No Controls	With Controls	No Controls	With Controls	No Controls	With Controls	No Controls	With Controls
Newly Married	.465* (.0131)	.159* (.0117)	.374* (.0184)	.073* (.0178)	.796* (.0402)	.053 (.037)	.661* (.0276)	.004 (.0249)
Full Nest 1a	.636* (.0113)	.337* (.0099)	.420* (.0158)	.139* (.015)	.639* (.0345)	-.092* (.031)	.535* (.0237)	-.067* (.0209)
Full Nest 1b	.845* (.0127)	.447* (.0113)	.421* (.0178)	.053* (.0171)	.810* (.0389)	-.176* (.036)	.926* (.0268)	.138* (.024)
Full Nest 2	.888* (.0119)	.455* (.0106)	.264* (.0166)	-.116* (.016)	1.056* (.0362)	.015 (.0332)	.878* (.0249)	.085* (.0224)
Empty Nest 1	.466* (.0138)	.207* (.0116)	.130* (.0194)	-.079* (.0176)	.637* (.042)	.044 (.0365)	.223* (.0291)	-.226* (.0247)
Empty Nest 2	.200* (.0136)	.263* (.0112)	-.127* (.0191)	.047* (.0169)	-.153* (.0417)	.198* (.0352)	-.487* (.0287)	-.214* (.0238)
Survivor 1	-.084* (.0194)	-.063* (.0154)	-.049* (.0271)	.027 (.0233)	-.249* (.0591)	-.116* (.0483)	-.340* (.0407)	-.215* (.0327)
Survivor 2	-.418* (.0134)	-.0151 (.0113)	-.328* (.0187)	.213* (.0172)	-2.214* (.0408)	-.900* (.0355)	-1.365* (.0281)	-.421* (.024)
Other	.325* (.0109)	.252* (.0089)	.081* (.0152)	.075* (.0134)	-.225* (.0332)	-.321* (.0278)	.076* (.0229)	.010 (.0188)
$\bar{R}^2$	.363	.601	.106	.344	.244	.501	.266	.532
F Value	1459.6	2006.6	302.4	699.3	819.4	1326.5	926.9	1516.9

Omitted Life Cycle Stage = Bachelor.
Standard errors in brackets.
* Significant at the 5% level.

Table 3

Regression Results for Revised Household Life Cycle Variables

	Food		Shelter		Transportation		Clothing	
	No Controls	With Controls	No Controls	With Controls	No Controls	With Controls	No Controls	With Controls
Bachelor 2	-.035* (.0136)	.002 (.0113)	-.037* (.0202)	.063* (.0176)	-.491* (.0437)	-.272* (.0364)	-.453* (.030)	-.288* (.0245)
Bachelor 3	-.284* (.0136)	-.003 (.0117)	-.198* (.0202)	.237* (.0182)	-1.951* (.0436)	-.917* (.0376)	-1.166* (.030)	-.413* (.0253)
Newly Married	.557* (.0142)	.241* (.013)	.452* (.0211)	.088* (.0201)	.965* (.0457)	.137* (.0418)	.803* (.0313)	.052* (.028)
Full Nest 1	.689* (.0127)	.392* (.0114)	.483* (.0188)	.163* (.0177)	.784* (.0408)	-.009 (.0366)	.591* (.0279)	-.076* (.0246)
Full Nest 2	.819* (.0234)	.484* (.020)	.495* (.0348)	.146* (.0311)	.801* (.0751)	-.093 (.0642)	.811* (.0517)	.069 (.0433)
Full Nest 3	1.027* (.0122)	.581* (.0114)	.480* (.0181)	.005 (.0177)	1.081* (.0391)	-.108* (.0367)	1.114* (.0269)	.168* (.0247)
Full Nest 4	.954* (.014)	.505* (.0127)	.326* (.0208)	-.128* (.0197)	1.313* (.0449)	.132* (.0402)	.927* (.0308)	.022 (.0274)
Single 1	.109* (.0234)	.238* (.0194)	.059* (.0348)	.275* (.0301)	-1.292* (.0752)	-.838* (.0623)	-.111* (.0517)	.228* (.042)
Single 2	.291* (.0329)	.362* (.0272)	.113* (.0489)	.254* (.0422)	-.987* (.1053)	-.725* (.0869)	.175* (.0726)	.376* (.0587)
Single 3	.522* (.0186)	.429* (.0155)	.237* (.0276)	.197* (.0239)	-.269* (.0596)	-.447* (.0495)	.395* (.041)	.278* (.0334)
Single 4	.511* (.0199)	.354* (.0167)	.084* (.0296)	.0009 (.0259)	.207* (.0639)	-.130* (.0535)	.279* (.044)	.059* (.0361)
Childless	.590* (.0132)	.298* (.0117)	.268* (.0196)	-.018 (.0182)	.775* (.0425)	.049 (.0377)	.366* (.0292)	-.212* (.0253)
Delay	.900* (.0147)	.502* (.0129)	.574* (.0218)	.127* (.0201)	.871* (.0470)	-.192* (.0415)	.836* (.0323)	-.012 (.0279)
Older	.326* (.0141)	.305* (.0119)	-.018 (.0209)	.053* (.0185)	.086* (.045)	.187* (.0383)	-.294* (.031)	-.198* (.0258)
Other	.687* (.0132)	.403* (.0113)	.329* (.0195)	.059* (.0176)	.647* (.0422)	-.119* (.0365)	.598* (.0289)	.056* (.0245)
$\bar{R}^2$	.438	.620	.115	.345	.268	.504	.292	.539
F Value	1329.1	1725.6	221.5	557.5	619.7	1064.8	702.3	1237.6

Omitted Life Cycle Stage = Bachelor 1.
Standard errors in brackets.
* Significant at the 5% level.

Table 4

Regression Results Using Only Socioeconomic and Demographic Variables

	Food	Shelter	Transportation	Clothing
Log of Total Expenditure	.670* (.0042)	.555* (.0061)	1.777* (.0128)	1.217* (.0086)
Foreign-Born	.078* (.0063)	.034* (.0091)	-.006 (.019)	-.042* (.0128)
Atlantic	.046* (.0074)	-.123* (.0108)	.037 (.0225)	.046* (.0151)
Quebec	.072* (.0074)	-.046* (.0107)	-.048* (.0223)	.135* (.0149)
Prairie	-.044* (.0067)	-.029* (.0097)	.092* (.0202)	.048* (.0135)
British Columbia	-.008 (.0082)	.010 (.0097)	.120* (.0249)	-.138* (.0167)
Some of Completed Secondary Education	-.099* (.0067)	.091* (.0096)	.100* (.0201)	.077* (.0135)
Some Post-Secondary Education	-.176* (.0091)	.124* (.0132)	.078* (.0276)	.115* (.0185)
Post Secondary Certificate or Diploma	-.187* (.0086)	.128* (.0124)	.018 (.0259)	.108* (.0174)
University Degree	-.230* (.0092)	.176* (.0133)	-.183* (.0278)	-.005 (.0187)
Spouse Working	.085* (.0055)	.020* (.0079)	-.041* (.0167)	.126* (.0112)
Observations for 1984	-.0001 (.0071)	.023* (.0102)	-.019 (.0214)	-.004 (.0144)
Observations for 1986	-.025* (.0056)	-.016* (.0081)	-.002 (.0169)	.023* (.0114)
Observations for 1990	-.063* (.0073)	.066* (.015)	-.032 (.022)	-.111* (.0147)
Constant	1.55* (.042)	2.72* (.0607)	-10.65* (.127)	5.44* (.0852)
$\bar{R}^2$	.553	.330	.480	.520
F Value	2710.9	1077.9	2007.9	2376.6

* Significant at the 5% level.
Standard errors in brackets.

cycle variables. This applies to both the traditional and revised models. In fact there is little difference in the $\bar{R}^2$ values between the two life cycle models when the control variables are included. These results attest to the importance of the socioeconomic and demographic variables in explaining expenditures on food, shelter, transportation, and clothing.

Table 4 presents the regression results for the socioeconomic and demographic variables alone. Most of the coefficients are significant and the $\bar{R}^2$ values are only slightly below those in Tables 2 and 3 for the equations that include both the life cycle and control variables. However, just to demonstrate that household life cycle variables can make a difference, the $\bar{R}^2$ for the food regression that includes the revised household life cycle variables as well as the socioeconomic and demographic variables is .62, while in the regression with only the latter variables it is .55. It must be admitted that the increase in explained variance in the regressions for shelter, transportation, and clothing when the revised household life cycle variables are included is small as compared with using the socioeconomic variables alone.

The results in Tables 2 and 3 indicate that the coefficients on the life cycle variables tend to remain significant after controls are added, although there are a few cases where that is not true. For the traditional life cycle model (Table 2), the Newly Married, Full Nest 2, and Empty Nest 1 no longer spend more on transportation than Bachelor types; the Newly Married also no longer spend more on clothing than Bachelor; and Survivor 1 no longer spends less on shelter than the Bachelor. In Table 3 with the revised household life cycle variables, the most notable situation is the Bachelor stages where the two older bachelor groups no longer spend less on food than Bachelor 1. Also two Full Nest groups no longer have higher spending on transportation than the excluded bachelor category. With the exception of Childless, there are no uniform shifts to insignificance for some stages across the four items; when control variables are added, Childless couples show insignificant differences to the omitted household group for spending on shelter, clothing, and transportation, suggesting that the initial differences were due to different income, education, residence, spouse working, or country of origin. Spending by those in the Delay group also changes the sign of the coefficient for transportation and clothing, suggesting again differences in the control variables. There is a general trend for the size of all coefficients on the life cycle variables to be smaller with the inclusion of the socioeconomic and demographic variables. This suggests that there is a systematic relationship between the two types of variables used in our study.

We can use the results in Table 3 for the revised household life cycle model (with controls) to describe summary profiles of each category across the four products. Bachelor 1, young bachelors under the age of 35, spend relatively less

on shelter and more on transportation than the older bachelor groups; however, they spend more on clothing than older bachelors but less than the Full Nest and Single stages. The middle aged and older bachelors also are low purchasers of food and spend less on clothing than the Full Nest and Single stages. However, Bachelors 2 and 3 spend more on shelter and less on transportation Bachelor 1, the youngest bachelors.

The Newly Married generally spend more on all four goods than the bachelor stages, but often less than the Full Nest and Single categories, although spending on transportation is the opposite where the Newly Married spend more. As we then move through the Full Nest classes spending on food tends to rise, spending on shelter rises for Full Nest 1 and then declines so that Full Nest 4 spends less than bachelors, while spending on clothing is erratic over the Full Nest groups, with some not significantly different from Bachelor 1. Single 3 and 4, the older lone-parent households, spend less on shelter and more on transportation than Single 1 and 2, the younger lone-parents; food spending rises and then falls for Single 4, while clothing expenditure is highest for Single 2 with younger heads but slightly older children than households in Single 1. It is interesting to compare, for example, Full Nest 1 with Single 1, namely married couple households and lone-parents, both with young children. The Single 1 spend less on food and transportation, and more on shelter and clothing. These patterns are also true for the comparisons of the other three Full Nest and Single households.

The Childless, middle aged, childless couples, spend more on food than the Bachelor categories, but less than most of the Full Nest and Single groups. They spend less on shelter than most other stages, and likewise less on clothing than Full Nest and Single categories. However, these childless couples spend more on transportation. If we compare the Childless to the Newly Married, the former spends more on food, but less on shelter, transportation, and clothing. Couples that have young children when the head is older (Delay) spend about the same on shelter as younger couples with young children (Full Nest 1). But they tend to spend more on food and clothing. Finally, couples with heads 65 years and older (Older) spend more on transportation and less on clothing then Single and Full Nest groups; they also spend less on food than most of those same groups except Newly Married and Single 1.

Wilkes's (1995) study using data for the United States forms a point of comparison for these Canadian results. The findings appear to be similar. The Newly Married and Full Nest 4 categories are especially disposed toward higher spending on transportation, while the lone-parent households are not. Spending on clothing is higher for young singles (Bachelor 1) and the Newly Married, as they found in the United States. However, there does appear to be more variation across the lone-parent groups in the Canadian data; Wilkes discovered that spending on several products was indistinguishable across the three types of

single parents in his study. But it should be kept in mind that his level of product disaggregation was much higher than in the present study.

Summary and Conclusions

When socioeconomic and demographic variables, especially total expenditure as a proxy for permanent income, are not included in household life cycle models, the life cycle models are somewhat successful in explaining the variance in expenditure on our four items. However, models that include the socioeconomic and demographic variables are much more successful in explaining this variation. In fact, when those variables are controlled, the additional variation of the dependent variables explained by the life cycle variables is small. Our study confirms the importance of the socioeconomic and non-life-cycle-demographic variables in expenditure analysis.

We tested two forms of the life cycle model. The revised household life cycle model explained slightly more of the variation of the dependent variables then the tradition family life cycle model. It remains to be seen if other definitions of the stages or categories would lead to different results. However, because of the comments noted in the previous paragraph, this would likely lead to little increase in the amount of total variation explained.

While the size of the effect of the life cycle variables is small, they are still significant. Our results support the inclusion of life cycle variables in models that try to explain household expenditure patterns. But those variables cannot be the only ones used. Our results also indicate that there are significant differences across life cycle categories, and it is useful to work with the revised household model of Table 3.

There does appear to be systematic variation in the results across the household life cycle stages or categories. These comments refer to the revised household life cycle model with controls since it is in many ways the most complete explanation of household spending patterns that is presented in this paper. The transition from young single (Bachelor 1) to Newly Married has important spending effects: spending on all four product groups studied here rises. The next transition is to young families with children (Full Nest 1): not surprisingly spending on food and shelter rise again, while expenditure on transportation and clothing declines. As the children get older in the other Full Nest categories, they require greater spending on clothing, transportation and food, but, perhaps unexpectedly spending on shelter declines comparatively; the later may reflect scale economies.

Our results clearly indicate the need to include lone-parent households in any analysis of spending patterns in a household context. Spending on food rises to Single 3 as children and the parent get older; on the other hand, expenditure on shelter declines relatively over the lone-parent households. Spending on clothing rises through Single 1 and 2, and then falls relatively.

There are at least two types of important limitations to this study, both of which suggest avenues for further research. First, the operational definitions of the household life cycle categories are a compromise in that the data limited the definitions and the amount of variation that could be introduced into those categories. Second, the spending groups presented here are highly aggregated. There is a great deal of room to repeat this kind of study for much more specific goods and services; the influence of life cycle stages at that level is hidden behind the present aggregates. For example, spending on children's clothing would likely react differently to life cycle changes than expenditure on adults' clothing. These are both important avenues for more study.

Acknowledgements

This is a revised version of a paper presented at the meetings of the Eastern Economics Association, March 1995. The authors thank the staff of the Canadian Studies Center at Duke University for their generous hospitality during the early stages of work on this paper, and the anonymous reviews of this journal for their helpful comments.

References

Abdel-Ghany, M. and F.N. Schwenk. 1993. Functional forms of household expenditure patterns in the United States. *Journal of Consumer Studies and Home Economics* 17: 325-342.

Arndt, J. 1979. Family life cycle as a determinant of size and composition of household expenditures. In W. Wilkie (ed.) *Advances in Consumer Research*, pp. 128-132. AnnArbor: Association for Consumer Research.

Beaujot, R. 1991. *Population Change in Canada.* Toronto: McClelland & Stewart.

Bloom, D. and N. Bennett. 1986. Childless couples. *American Demographics* 8: 23-25, 54-55.

Bristor, J. and W. Qualls. 1984. The household life cycle: Implications for family decisionmaking. In M.L. Roberts and L. Wortzel (eds.) *Marketing to the Changing Household*, pp. 25-39. Cambridge, MA.Ballinger.

Canada. Statistics Canada. 1982. 1984. 1986. 1990. *Survey of Family Expenditures*. Ottawa.

Danko, W. and C. Schaninger. 1990. An empirical evaluation of the Gilly-Enis updated household life cycle model*Journal of Business Research* 21: 39-57.

Dardis, R., F. Derrick, and A. 1981. Clothing demand in the United States: A cross-sectional analysis.*Home Economics Research Journal* 10: 212-222.

Derrick, F. and A. Lehfeld. 1980. The family life cycle: An alternate approach. *The Journal of Consumer Research* 7: 214-217.

Douthitt, R. and J. Fedyk. 1988. The influence of children on family life cycle spending behavior: Theory and applications. *The Journal of Consumer Affairs* 22: 220-248.

Engel, J., Blackwell, R. and P. Miniard. 1993. *Consumer Behaviour*. Seventh Edition. Toronto:Dryden Press.

Ferber, R. 1979. Comments on papers on life cycle analysis. In W. Wilkie (ed.) *Advances in Consumer Research*, Vol. 8, pp. 146-148. Ann Arbor: Association for Consumer Research.

Frey, C. and D. LaBay. 1983. A comparative study of energy consumption and conservation across the family life cycle. In R. Bagozzi and A. Tybout (eds.) *Advances in Consumer Research*, Vol. 10, pp. 641-646. Ann Arbor: Association for Consumer Research.

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

Fritzsche, D. 1981. An analysis of energy consumption patterns by stage of family life cycle.*Journal of Marketing Research* 28: 227-232.

Gilly, M. and B. Enis. 1982. Recycling the family life cycle: A proposal for redefinition. In A. Mitchell (ed.) *Advances in Consumer Research*, Vol. 9, 271-276. Ann Arbor: Association for Consumer Research.

Glick, P. 1977. Updating the life cycle of the family. *Journal of Marriage and the Family* 39: 5-13.

Halvorsen, R. and R. Palmquist. 1980. The interpretation of dummy variables in semilogarithmic equations*American Economic Review* 70: 474-475.

Hawkins, D., R. Best and K. Coney. 1989. *Consumer Behavior* (4th. Edition). Boston: Irwin.

Houthakker, H.S., and C.D. Taylor. 1970. *Consumer Demand in the United States.* Cambridge: Harvard University Press.

Hayduk, L. 1987. *Structural Equation Modeling with LISREL: Essentials and Advances.* Baltimore: JohnsHopkins University Press.

Jain, S. 1975. Life cycle revisited: Applications in consumer research. In M.J. Schlinger (ed.) *Advances in Consumer Research,* Vol. 2, pp. 39-49. Ann Arbor: Association for Consumer Research.

Ketkar, K.W., and S.L. Ketkar. 1987. Socio-demographic dynamics and household demand. *Eastern Economic Journal* 13: 55-62.

Ketkar, S.L., and W. Cho. 1982. Demographic factors and the pattern of household expenditures in the United States. *Atlantic Economic Journal:* 16-27.

Kennedy, P. 1981. Estimation with correctly interpreted dummy variables in semilogarithmic equations.*American Economic Review* 71: 801.

Kmenta, J. 1971.*Elements of Econometrics.* New York, NY: Macmillan.

Landon, L. and W. Locander. 1979. Family life cycle and leisure behavior research. In W. Wilkie (ed.) *Advances in Consumer Research,* Vol. 6, pp. 133-138. AnnArbor: Association for Consumer Research.

Lansing, J. and J. Morgan. 1955. Consumer finances over the life cycle. In L. Clark (ed.) *Consumer Behavior,* Vol. 2, pp. 36-50. New York: NY: University Press.

Lazer, W. 1985. Inside the Mature Market. *American Demographics* 7: 23-25, 48-49.

Marr, W. and D. McCready. 1989. The effects of Demographic Structure on Expenditure Patterns in Canada. Discussion Paper 89.A.1. Ottawa: Institute for Research on Public Policy.

Murphy, P. 1984. Family and household changes: Developments and implications. In M.L. Roberts and L. Wortzel (eds.) *Marketing to the Changing Household,* pp. 3-23. Cambridge, MA:Ballinger.

Murphy, P. and W. Staples. 1979. A modernized family life cycle. *Journal of Consumer Research* 6: 12-22.

Settle, R., P. Alreck and M. Belch. 1979. Social class determinants of leisure activity. In W. Wilkie (ed.) *Advances in Consumer Research,* Vol. 6, pp.139-145. Ann Arbor: Association for Consumer Research.

Shipp, S. 1988. How singles spend.*American Demographics* 10: 22-27.
Stampfl, R. 1978. The consumer life cycle. *The Journal of Consumer Affairs* 12: 209-219.

Wagner, J. and S. Hanna. 1983. The effectiveness of family life cycle variables in consumer expenditure research. *Journal of Consumer Research* 10: 281-291.

Waldrop, J. 1989. A lesson in home economics. *American Demographics* 11: 26-30, 61.

Wells, W. and G. Gubar. 1966. Life cycle concept in marketing research. *Journal of Marketing Research* 3: 355-363.

Wilkes, R. 1995. Household life-cycle stages, transitions, and product expenditures. *Journal of Consumer Research* 22: 27-42.

Zellner, A. 1962. An efficient model of estimating seemingly unrelated regressions and tests for aggregation bias. *Journal of the American Statistical Association* 57: 348-368.

Zimmerman, C. 1981. Household travel patterns by life cycle stage. In J. Claxton (ed.) *Consumers and Energy Conservation: International Perspectives on Research and Policy Options,* 81-95. New York, NY: Praeger.

Received May 1995; revised September 1996.