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The Demand for Housing, Household Headship Rates, and Household Formation: An International Analysis

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WORKING PAPER 82-55

THE DEMAND FOR HOUSING,  
HOUSEHOLD HEADSHIP RATES,  
AND HOUSEHOLD FORMATION:  
AN INTERNATIONAL ANALYSIS

BY

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THE DEMAND FOR HOUSING, HOUSEHOLD HEADSHIP RATES,  
AND HOUSEHOLD FORMATION: AN INTERNATIONAL ANALYSIS\*

by

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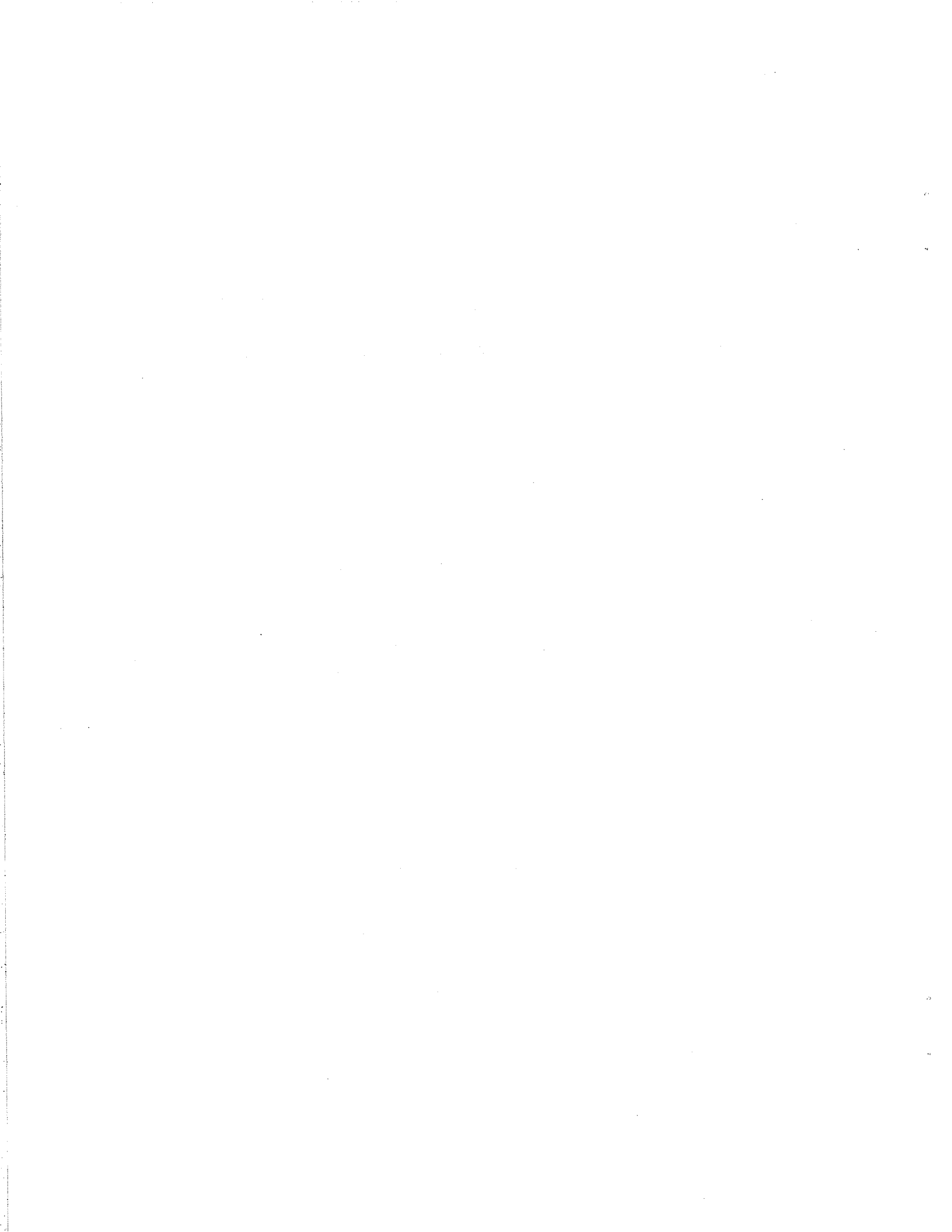
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THE DEMAND FOR HOUSING, HOUSEHOLD HEADSHIP RATES,  
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Abstract

This study investigates the influence of availability and affordability of housing on demographic changes through an international analysis of the relationship between age specific headship rates and housing availability and affordability. The researchers describe the basic trends in household formation and headship rates in Canada, France, Great Britain and the United States, investigate the economic determinants of age specific household headship rates in the four countries, and discuss the implications for future housing analysis.

It was found that the considerable increase in household headship rate during the recent postwar period has been facilitated in these four countries by the increasing real affordability of housing. In addition, there was a clear relationship between the household age category and the responsiveness to economic variables.

This analysis has important implications for the housing market. Since, by definition, the growth in the demand for housing stock equals the growth in the number of households, the growth in housing demand can be analyzed in terms of population growth and projected household headship rates. By shedding light on the determination of age specific headship rates, which is the major uncertainty in forecasting future housing needs, this study should considerably improve understanding of the nature of housing demand, both in the aggregate and in particular submarkets.



THE DEMAND FOR HOUSING, HOUSEHOLD HEADSHIP RATES,  
AND HOUSEHOLD FORMATION: AN INTERNATIONAL ANALYSIS

In recent years most industrialized western countries have undergone a significant structural shift in the composition of their housing demand as non-family household formation, once a relatively minor component of housing demand, has grown rapidly and become a major engine of growth for the residential construction industry. During the nineteen sixties and seventies non-family households as a percentage of all households rose from 12.6 percent to 23.2 percent in Canada, from 19.6 percent to 24.0 percent in France, from 17.3 percent to 26.3 percent in Great Britain, and from 15.1 percent to 25.6 percent in the United States. Although demographic variables rarely explicitly enter short-term models of new residential construction,<sup>(1)</sup> the relationship between demographic forces and housing demand is well established.<sup>(2)</sup> Consequently, variations in population and age specific headship rates, the major demographic building blocks of housing demand, have a profound impact on the housing sector, and an understanding of them is essential for understanding housing market behavior.

The relationship between housing and demographic variables, however, may not be uni-directional. Rather, the availability and affordability of housing may influence demographic changes, especially the formation of non-family households.<sup>(3)</sup> The purpose of this paper is to investigate this influence through



an international analysis of the relationship between age specific headship rates and housing affordability and availability. The paper begins in Section I with a description of the basic trends in household formation and headship rates in Canada, France, Great Britain and the United States. Section II empirically investigates the economic determinants of age specific household headship rates in the four countries, and Section III discusses the implications of the investigation for future housing analysis

#### I. TRENDS IN AGE SPECIFIC HEADSHIP RATES

A phenomenon of the recent postwar period has been the rising propensity of the population to group themselves into smaller housing demand units. Since a household refers to a person or a group of persons who occupy a dwelling unit, this propensity is reflected in the sharp rise in the number of households for a given population, or more formally, in the rise in the household headship rate. The headship rate  $hh_{ij}$  for a given household type  $i$  and age group  $j$  is defined as the number of households  $HH_{ij}$  of type  $i$  and age group  $j$  per 100 persons in the population  $POP_j$  in age group  $j$ , as defined in equation (1)

$$hh_{ij} = \frac{HH_{ij}}{POP_j} \quad (1)$$

The age specific family and non-family headship rates for Canada, France, Great Britain and the United States are set out in Table I for five-year intervals since 1960.<sup>(4)</sup> The Table shows a strong upward trend in non-family headship rates during

TABLE I  
AGE SPECIFIC HEADSHIP RATES

YEAR*	A: NON-FAMILY HOUSEHOLDS																	
	CANADA				FRANCE**				GREAT BRITAIN***				UNITED STATES					
	AGE OF HEAD				AGE OF HEAD				AGE OF HEAD				AGE OF HEAD					
	15-24	25-34	35-64	> 64	TOTAL	15-24	25-34	35-64	> 64	TOTAL	Under Retirement	Over Retirement	TOTAL	15-24	25-34	35-64	> 64	TOTAL
1960	1.2	2.5	5.0	16.9	5.0	2.5	4.0	4.4	5.1	4.1	3.0	21.5	6.6	1.3	2.6	6.2	19.6	6.4
1965	2.1	3.4	5.7	19.8	6.0	2.5	4.7	4.4	5.2	4.2	3.6	27.1	8.3	1.7	3.1	6.6	22.9	7.2
1970	3.2	5.0	6.7	22.5	7.3	3.8	5.2	4.3	4.9	4.5	4.5	29.9	9.8	2.5	4.5	7.3	26.2	8.2
1975	5.2	7.6	7.7	25.8	9.1	5.1	6.3	4.6	5.0	5.1	4.1	35.3	11.0	4.3	7.6	8.0	27.9	9.8
1980	6.9	10.2	8.4	27.3	10.8	6.3	6.8	4.9	4.9	5.6	5.4	34.3	12.0	6.5	11.7	9.3	29.4	11.7

YEAR*	B: FAMILY HOUSEHOLDS																	
	CANADA				FRANCE**				GREAT BRITAIN***				UNITED STATES					
	AGE OF HEAD				AGE OF HEAD				AGE OF HEAD				AGE OF HEAD					
	15-24	25-34	35-64	> 64	TOTAL	15-24	25-34	35-64	> 64	TOTAL	Under Retirement	Over Retirement	TOTAL	15-24	25-34	35-64	> 64	TOTAL
1960	6.0	37.5	43.4	36.8	33.3	2.9	30.8	39.7	26.6	29.7	N/A	N/A	32.7	9.4	40.2	45.5	37.0	36.4
1965	6.0	37.5	44.3	35.5	32.6	3.7	32.7	40.2	26.4	29.7	N/A	N/A	32.3	9.7	41.7	45.9	36.8	35.8
1970	6.9	38.0	44.9	33.5	32.3	6.8	35.8	40.2	26.1	30.0	N/A	N/A	34.0	9.9	42.6	46.7	35.6	35.4
1975	7.8	38.8	45.6	33.2	32.8	7.6	37.3	40.7	27.0	30.7	N/A	N/A	34.1	10.3	41.4	46.7	36.7	35.1
1980	7.6	39.3	46.5	32.5	33.4	7.4	38.0	41.4	26.5	31.1	N/A	N/A	33.7	9.0	38.6	46.3	35.1	34.0

\* Years for Canada and Great Britain are 1961, 1966, 1971, 1976 and 1981 (1979). The last year for the U.S. is 1979

\*\* French data for non-family households refers only to households where the head of household is unmarried and not divorced or widowed, and data for family households refers only to married households and not a single parent with children.

\*\*\* Under retirement age for Great Britain refers to households headed by males under 65 and by females under 60.

the period in all four countries, but little or no change in family headship rates. Only the French data in the oldest non-family age category and youngest two family categories vary slightly from this pattern, and this is likely attributable to the difference in the French definitions which omit widowed and divorced households. In Canada, France and the United States, the rate of growth of non-family headship rates was inversely related to the age of the head of the household; the youngest age group having the fastest rate of growth, as the 15-24 headship rate rose 475 percent in Canada, 152 percent in France, and 400 percent in the United States, and the oldest age group having the slowest. This growth is in part attributable to the fact that the starting levels in 1960 were reversed with the youngest age group having the lowest headship rate. Both Canada and the United States appear to have had very similar experiences over these two decades with large increases in all age categories. Moreover, the relative differences in headship rates remained fairly stable, with the Canadian figures generally being slightly below the corresponding figures for the United States.

Direct comparisons between non-family headship rates in these two countries with France and Great Britain are rendered difficult because of incomparabilities of data. The French figures undoubtedly underestimate the increase in headship rates because they exclude widowed and divorced non-family heads of households and these have been increasing over time. Although data on French headship rates for these households are

available, a comparable series cannot be constructed because the data are not decomposed into family and non-family households. The British figures indicate the same trend as the others, with the non-retirement households having a faster rate of growth than retirement age households. The absolute levels of retirement age households are higher than in other countries because women between 60 and 65 are included in this age group and their headship rate is higher than the average for all persons over 65. Nevertheless, a comparison of age specific British and United States' data for 1971 indicates that the British headship rates were roughly comparable with those of the United States.

Conversely, while non-family household headship rates soared, family headship rates remained relatively unchanged. In Canada, for example, the total headship rate rose less than 1.0 percent, and in Great Britain it rose by 3.1 percent. In the United States, it declined for all age categories, except the 35-64 age group where it showed a modest 1.8 percent increase. In France, there was a more noticeable increase for the bottom two age groups, especially for the 15-24 age group, with the two other groups remaining more or less static. From these numbers it is clear that most of the variation in the overall age specific headship rates is attributable to the growth of non-family households. Furthermore, much of the growth in the absolute number of households is also attributable to this, as non-family and single parent households accounted for 75 percent of household formation in the United States, for 50 percent in Canada, for

73 percent in Great Britain and for 42 percent in France during the nineteen seventies.<sup>(5)</sup> Consequently, the remainder of this paper focuses upon the determination of non-family household headship rates.

The growth in primary non-family households is a manifestation of individuals preferring to form their own households rather than being submembers of family households. The growth results from young individuals setting up their own households, delaying marriage, and/or living with an unrelated person; from the uncoupling of existing households by divorce or separation; and from an increasing tendency for surviving elderly spouses to retain their own dwelling units rather than revert to their childrens' homes. Although we do not propose that these various sociological changes are determined purely by economic forces, there appears little doubt that these household preferences may be made effective by various economic variables. Foremost among these is the increase in the real affordability of housing, defined as the real user cost of housing services relative to real income.<sup>(6)</sup> A general decline in real user costs, especially in North America, combined with a steady rise in real income to enable many younger and elderly persons to maintain their own dwelling units. Similarly, the increase in female participation rates in the labor force likely increased headship rates by providing a second income to increase the affordability of housing for married households, and by facilitating household formation for female-headed non-family households.

The increase in social security benefits, especially among pensioners, played a similar role in the oldest age group.<sup>(7)</sup>

Of potential significance, independent of the real price of housing within some critical zone, is the availability of housing in a rent controlled environment and/or one with a large supply of public housing. Under such conditions, household formation may be constrained by the unavailability of housing, especially for age categories with relatively low market or other power. For example, household formation among the elderly may be constrained by a long queuing time for subsidized public housing. An easing of such constraints, either through a private sector response to eased rent controls or increased construction of public housing, should result in increasing headship rates in those categories most strongly affected. Moreover, the more binding the non-price rationing and the deeper the housing subsidies for any group, the less important traditional economic variables are likely to be.

## II. EMPIRICAL INVESTIGATION OF HEADSHIP RATES

### A. The Model

The preceding discussion is summarized in the functional relationship in equation (2).

$$hh_{ij} = h(Y_{ij}, R_{-1}, APH, SOC), \quad (2)$$

where  $hh_{ij}$  is the headship rate for household type  $i$  and age

group  $j$ ,  $Y_{ij}$  is real personal disposable income for household type  $i$  and age group  $j$ ,  $R_{-1}$  is an index of the real user cost of housing services lagged one period to avoid simultaneity, APH is the availability of public housing, and SOC is a set of socio-economic variables embodying such influences as the divorce rate and the female participation rate.

Equation (2) in log-linear form was empirically investigated with annual data using OLS estimation over the estimation period indicated in Table II for each of the four countries, and the results are presented in that Table. For Canada, France and the United States, the headship age specific categories examined were 15-24, the main age category for children departing the family home; 25-34, the main age category for first time home purchases; 35-64; and over 65, the retirement and senior citizen age category. For Great Britain data limitations restricted us to using only two categories, the under retirement age, consisting of households headed by females under 60 and males under 65; and the over retirement age, consisting of households over these ages. Because the number of non-family households is only available for census years, intercensal estimates of non-family household headship rates were made by compound growth rate interpolation.

Although ideally the income variable should be age specific permanent real disposable income, data restrictions prevented this and necessitated the use of overall real per capita disposable income in Canada, France and the United States. Real net household income for each category of household was used in Great Britain.

TABLE II  
REGRESSION RESULTS-HOUSEHOLD HEADSHIP RATES

		Constant	R <sub>-1</sub>	Y	APH <sub>-1</sub> <sup>**</sup>	Estimation Period <sup>***</sup>	R <sup>2</sup>	DW	ρ
Canada	15-24	-20.40 (9.23)	-.80 (2.13)	2.12 (7.45)		1962-80	.99	1.47	.75
	25-34	-16.04 (9.59)	-.93 (3.25)	1.62 (7.54)		1962-80	.99	1.39	.71
	35-64	-8.33 (11.18)	-.21 (1.69)	.70 (7.32)		1962-80	.99	1.38	.77
	65+	-5.53 (6.56)	-.25 (2.20)	.50 (4.58)	.02 (1.86)	1962-80	.99	1.61	.79
France	15-24	-14.16 (4.59)	-.15 (.42)	1.13 (3.04)		1961-80	.96	.86	.97
	25-34	-11.33 (68.91)	-.33 (8.76)	.97 (38.48)		1961-80	.99	2.26	-.40
	35-64	-5.14 (38.41)	-.29 (9.48)	.35 (16.65)		1961-80	.95	1.64	--
	65+	-2.23 (10.68)	-.28 (3.73)	.06 (1.51)	.02 (.62)	1961-80	.76	1.76	--
Great Britain	under retirement age	-3.79 (9.96)	-.23 (.33)	.43 (1.76)		1962-79	.84	1.34	.86
	over retirement age	-2.16 (12.60)	.42* (2.97)	.49 (17.01)	.08 (2.38)	1962-79	.96	1.85	--
United States	15-24	-15.52 (5.03)	-3.36 (4.13)	1.44 (3.78)		1961-79	.97	1.83	.38
	25-34	-10.73 (4.23)	-4.06 (6.07)	.92 (2.94)		1961-79	.98	1.73	.29
	35-64	-6.91 (11.50)	-.64 (4.06)	.52 (7.03)		1961-79	.98	1.18	.08
	65+	-3.50 (3.07)	-.61 (3.10)	.22 (1.49)	.03 (4.49)	1967-79	.96	1.90	-.17

\* - wrong sign

\*\* - the APH variable was lagged two periods for Canada

\*\*\* - the 65+ regression for the United States was run over a shorter period because the APH variable was unavailable before 1966

bracketed values are the absolute value of the t statistic

ρ is the autoregressive parameter

R<sup>2</sup> refers to the untransformed regressions

DW is the Durbin-Watson statistic



Since theory suggests permanent income is the appropriate variable for long term housing decisions, a permanent income specification was tried along with a current income specification. However, the current income variable performed better for all countries and, thus, this specification was used.

Similarly, the cost of housing services variable should be a measure of the effective housing cost typically faced by each age category, primarily the cost of rental housing in the 15-24 and 25-34 age categories, and a weighted average of rental and homeownership costs in the other age categories.<sup>(8)</sup> However, data biases and unavailability required alternative approaches. Since the standard measure of the cost of homeownership housing services used in the CPI has been shown to have a severe upward bias and to be highly inappropriate in the United States and Canada,<sup>(9), (10)</sup> and the theoretically more appropriate measure, the real user cost of homeownership,<sup>(11)</sup> is heavily dependent on household expectations and is not readily available, homeownership costs were not measured directly. In contrast to the homeownership index, the rental component of the CPI is available and has been shown in the United States to have only a slight downward bias of 0.6 to 0.7 percent per year because of unmeasured depreciation.<sup>(12)</sup> Consequently, if we assume that over time the real user cost of obtaining equivalent housing services through renting and owning will be equated for the marginal household, then the rental index not only provides a reasonable measure of the variations

of the cost of rental housing, but also serves as a reasonable proxy for variations in the cost of homeownership housing services.<sup>(13)</sup> The rental component of the CPI thus was used as the price variable for Canada and the United States.

Since the rental market does not function as efficiently and rents do not as truly reflect supply and demand conditions in France and Great Britain, alternative price specifications were used for these countries. For Britain, the housing component of the CPI was used although it is inclusive of both rents and house prices. This specification was used because this index does, in fact, track house prices very closely,<sup>(14)</sup> and because the rent index alone is not appropriate in a rent constrained situation. On the other hand, this measure probably substantially overestimates the true cost of housing services in recent years and is a less satisfactory measure of prices than that used for the other countries. The rent index provides a better indication of market conditions in France than in Great Britain, but because of market segmentation between owners and renters generally along age category lines, the marginal equivalence argument used for Canada and the United States is not as applicable for France. Consequently, the rent index was used for France for the age categories that were predominantly renters and the CPI homeownership component was used for the age categories that were predominantly homeowners.

Because housing availability was considered to be a problem only for the elderly, an availability of public housing variable was entered with a one period lag only in the over 64 age specific regressions. This variable was measured somewhat differently in different countries as a result of inconsistencies in international data. In Canada, the variable was specified as publicly financed new housing starts for the elderly, while in the other countries it was specified as total publicly financed new housing starts.

#### B. The Estimated Results

A recurring problem in estimating the model was the existence of positive serially correlated residuals. In an attempt to overcome this problem, autoregressive transformations using the Cochrane-Orcutt search procedure were conducted whenever serial correlation was indicated. The regression results presented in Table II are for the transformed regressions whenever a value for the autoregressive parameter  $\rho$  is shown in the last column of the Table. The  $\bar{R}^2$  is the corrected  $R^2$  for the untransformed regressions.

The regression results substantially support the hypothesis that economic variables have facilitated the growth in non-family headship rates as the model performs quite well across all age categories and countries. The only incorrect sign occurred for the price variable in the British over-retirement

age regression, probably, as indicated above, because the measure of the user cost of housing services for Britain was relatively unsatisfactory. The price variable was clearly significant in all the Canadian, French and United States' regressions, except for the 15 - 24 age regression in France where the sign was correct but insignificant. The sign was also correct but insignificant in the British under-retirement age regression. The real income variable was highly significant for all age groups in all countries, except for the 65+ age category for France and the United States where it was barely significant. In all three countries in which detailed age specific headship rates could be examined, the income elasticity was highest in the youngest age group and varied inversely with the age category of the household head.

The availability of public housing had a significant influence on the headship rate for the elderly in Canada, Great Britain and the United States. Although it had the correct sign, the availability of public housing variable was insignificant in the French regression. Finally, attempts to introduce sociological variables representing the divorced population or number of divorces in Canada, Great Britian and the United States, and the female participation rate in Canada were inconclusive. When entered separately, these variables were usually significant. However, because these variables tend to be highly collinear with income, when combined, both income and

these variables often became insignificant. Consequently, these sociological variables were omitted in our final specification.

### III. SUMMARY AND ANALYSIS IMPLICATIONS.

The preceding discussion indicates that the household headship rate has increased considerably in many western industrialized countries during the recent postwar period, with the major growth coming from the non-family component. While the growth of this component may be attributable to a variety of socio-economic influences, it has been facilitated in all four countries by the increasing real affordability of housing. In all four countries the non-family household headship rate varied directly with real per capita disposable income and inversely with the real cost of housing services. Moreover, there was a clear relationship between the household age category and the responsiveness to economic variables since the income elasticity varied inversely with the age category in Canada, France and the United States, the three countries in which such a comparison was possible; and the price elasticity for the 15-24 and 25-34 age categories was substantially larger than for the 35-64 and over 65 age categories for Canada and the United States.<sup>(15)</sup> The availability of subsidized public housing was also an important determinant of the headship rate for the over 65 age category, enabling senior citizens to live on their own when otherwise they would have been unable to form separate

households. To the extent that this availability constraint was binding for the elderly, it could explain the lower responsiveness of this group, compared to younger age groups within each country, to the traditional price and income variables.

This analysis has important implications for the housing market since an understanding of the process by which the population establishes or breaks family ties and groups itself into housing units is essential for understanding housing demand. A recent study for the United States, for example, demonstrated that the aggregate owner-occupancy rate would have risen by approximately 7.0 percentage points during the nineteen seventies, rather than the reported 2.0 percentage points, if the household composition of 1970 had been maintained. (16)

Since by definition the growth in the demand for the housing stock equals the growth in the number of households, the growth in housing demand can be analyzed in terms of population growth and projected household headship rates. Moreover, since the change in the age specific population can, abstracting from immigration and emigration, be relatively easily forecast in the relevant age categories from the existing population profile and mortality rates, the specification of age specific headship rates is the major uncertainty in forecasting future housing needs. Consequently, by shedding light on the determination of age specific headship rates, this paper should considerably improve our understanding of the nature of housing demand, both in the aggregate and in particular housing submarkets.

FOOTNOTES

- \* The authors are respectively Professor of Economics, University of Toronto; Professor of Economic Analysis and Policy, University of California, Berkeley; Lecturer in Economics, University of London (England); and Research Assistant, University of California, Berkeley. The research was conducted while the first and third authors were visitors at the Center for Real Estate and Urban Economics, University of California, Berkeley.
1. Most short-run models focus on financing variables and short-term profitability as the driving variables in their models. However, demographic forces underlie many of these models; for example, Maisel (1963); Jaffee and Rosen (1979); and Smith (1969).
  2. See, for example, Gordon (1956); Grebler, Blank and Winnick (1956); Jaffee and Rosen (1979); and Rosen and Jaffee (1981).
  3. The hypothesized relationship between household formation and economic variables is not new. For example, Maisel (1960) analyzed the relationship between marriages and unemployment, and Hickman (1974) examined the relationship between aggregate household formation and real income.
  4. The aggregate age specific household headship rates for each country are the sum of the age specific family and non-family headship rates.
  5. These figures are for 1970-1980 for Canada and the United States, and for 1971-1979 for France and Great Britain.
  6. For a discussion of the increase in the real affordability of housing, see Diamond (1978); Dougherty and Van Order (1982); and Hendershott (1980).
  7. For pensioners, changes in their life cycle wealth holdings could affect their decisions to maintain separate households. As more and more such people hold significant real estate, an increase in the price of such housing could encourage household formation for them as they "trade down" to smaller dwelling units on retirement.
  8. The owner-occupied percentages for primary non-family households in 1970 in the United States were 7 percent, 14 percent, 43 percent and 56 percent and in 1976 in Canada were 6 percent, 15 percent, 40 percent and 49 percent for the under 25, 25-34, 35-64 and over 65 age categories respectively.

9. See Dougherty and Van Order (1982) for a discussion of the United States' bias; and McFadyen and Hobart (1978) for a discussion of the Canadian bias.
10. This probably also holds for France and Great Britain.
11. The user cost of homeownership UCH may be defined as:

$$UCH = o + d + (1 - \phi)(t + m + Ei) - \Delta^ePH$$

where  $o$  is the expected operating costs,  $d$  is the expected economic depreciation,  $\phi$  is the household expected marginal tax rate,  $t$  is the expected property tax,  $m$  is the expected mortgage interest,  $Ei$  is the expected foregone interest at rate  $i$  and homeowner equity  $E$ , and  $\Delta^ePH$  is the expected capital appreciation of a house from its depreciated value, assuming mortgage interest and property taxes are tax deductible and there is no tax on realized capital gains on owner-occupied housing. For a discussion of user costs of homeownership, see Diamond (1978); Hendershott (1980); and Rosen and Rosen (1980).

12. See Ozanne (1981), p. 109. This downward bias compares to an upward bias of approximately 8.0 percent annually in the CPI homeownership index implicit in Dougherty and Van Order (1982).
13. However, this measure overestimates the increase in real housing costs for households in upper tax brackets and underestimates the increase for households in lower tax brackets. Assuming the normal pattern in life cycle earnings, our measure probably overestimates the increase in housing costs in the 35-64 age bracket and underestimates the increase in the 15-24 and over 65 age bracket. It is also slightly downward biased toward the end of the estimation period in Canada because of the implementation of rent controls.
14. For Great Britain the direct correlation coefficient between the housing component of CPI and new house prices is .992, with both series moving closely together.
15. A valid comparison cannot be made for France because the definition of the price variable was different for the lower two and older two age categories.
16. Jaffee and Rosen (1979), pp. 346-47.



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