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HOUSEHOLD FORMATIONS

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Household Formations

ABSTRACT

Between 1960 and 1980, the number of households in the U.S. increased by 50 percent and the proportion of the population that were household heads rose from 29.5 to 36.3. While some of this increase was due to the maturing of the "baby boom" population, over half was caused by rising age-specific headship rates. In contrast, between 1980 and 1983, headship rates fell sharply for the under 34 population. This paper explains household formations due to changes in headship rates in terms of changes in real income and the price of privacy.

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HOUSEHOLD FORMATIONS AND THE DEMAND FOR HOUSING

INTRODUCTION

Over a quarter of the nearly 10 trillion dollars net worth of Americans at the end of 1982 was in the form of residential structures. When the value of the land on which the structures rest is included, the ratio was over a third. Surprisingly, these ratios have not declined since 1960. One might have anticipated declines for two reasons. First, there seems to have been widespread belief over much of the last decade that housing has been unaffordable.¹ Second, real income per capita doubled in the last quarter century, and the income elasticity of housing demand is generally taken to be less than unity (Rosen 1979).²

The primary force preventing declines in the ratios has been a sharp increase in the ratio of households (groups occupying separate housing units) to population. In 1960, 29.5 percent of the population were household heads; in 1980, 36.3 percent were. Given a 1980 population of 218 million, this increase translates into nearly 15 million additional households. Substantial economies exist when people live together: a couple share a kitchen, dining room, and so forth; living separately, they each need these rooms. While two can't live as cheaply as one, together they can obtain housing services for less than twice what each could separately. Thus an increase in households, even holding population and income constant, raises the demand for housing. If the formation of one extra household, still holding income and population constant, increases the demand for housing by 5 to 10 thousand dollars, then 15 million additional households raised the aggregate demand for housing by 75 to 150 billion dollars.

The obvious question is why did the household/population ratio increase so markedly? Part of the increase was due to the movement of the post-World War II "baby boom" population into the prime household-forming age group. Even if the rate at which the population in different age groups formed households had remained constant between 1960 and 1980, the household/population ratio would have risen by 3 percentage points. The remaining 4 percentage point increase in the ratio reflects an increased demand by Americans for privacy. This increase could reflect rising real incomes, declining real costs of privacy (especially for low-income families with dependent children), improving health of the elderly and/or shifting tastes toward privacy (including a decreased aversion to divorce). The goal of this study is determination of the relative importance of these factors in explaining the increase in households.

This chapter is divided into three sections. The first develops the household-formation estimation equation, and the second presents and interprets the estimates. A summary concludes the chapter.

THE HOUSEHOLD FORMATION DECISION

From an accounting framework, household formations can be expressed in terms of two factors: the size and age structure of the population and age-specific headship rates. Age structure is important because persons in different age categories have differing likelihoods of being household heads. An age-specific headship rate refers to the rate at which the population in a specific age category forms itself into households; it is the ratio of the number of household heads in an age category to the number of people in that category. Age-specific headship rates change as the population varies its demand for privacy.

Headship rates for specific age categories are listed in Table 5-1 for March 31 of selected years. Also listed are the shares of the population in each age group (the p_i) in 1960 and 1983. As can be seen, headship rates for all categories rose dramatically between 1960 and 1980. The increases were

--Place Table 5-1 Near Here--

proportionally greatest for the young (under 35) and old (over 75). For the young, the increase was concentrated in the 1967-74 period. For the elderly, the increase was relatively steady, although the largest increase was again between 1967 and 1974. Between 1980 and 1983, a sharp divergence in headship rates occurred; those for the under 35 age categories fell sharply, while those for the over 44 age groups continued to rise.

The headship rate hh_i for the i th age category is defined as:

$$hh_i = \frac{HH_i}{POP_i}, \quad (1)$$

where HH_i is the number of households in the category and POP_i is the population in the category. The aggregate headship rate can be expressed as

$$hh = \sum hh_i p_i,$$

where p_i is share of the population in the i th age category, and the aggregate demographic-adjusted headship rate by

$$hh^* = \sum hh_i^* p_i^*,$$

TABLE 5-1. Headship Rates

<u>Age</u>	<u>P_i (1960)</u>	<u>1960</u>	<u>1967</u>	<u>1974</u>	<u>1980</u>	<u>1983</u>	<u>p_i (1983)</u>
15-19	.073	.017	.018	.026	.032	.021	.083
20-24	.059	.222	.242	.299	.287	.251	.092
25-29	.060	.401	.456	.478	.484	.459	.090
30-34	.066	.459	.476	.514	.533	.515	.081
35-44	.133	.488	.504	.518	.549	.542	.125
45-54	.115	.527	.532	.548	.556	.572	.097
55-64	.086	.559	.572	.580	.583	.605	.104
65-74	.056	.631	.639	.666	.658	.662	.070
75 & over	.028	.614	.628	.687	.719	.728	.042
All Ages		.295	.304	.336	.363	.366	
Demographic- adjusted		.295	.305	.321	.328	.321	

Source: The appendix.

where p_i^* is the i th population share in the base period. With 1960 as the base, hh^* rose from 0.295 in 1960 to 0.328 in 1980; with 1980 as the base, the increase was from 0.324 to 0.363. Because the age structure of the population over 14 is relatively exogenous (and there are few household heads under the age of 15), it is useful to partition the growth in households into that due to changes in age-specific headship rates and that due to the exogenous population age structure. The total number of households is:

$$HH = \sum_i HH_i, \quad (2)$$

and the change in households between periods o and t is:

$$\Delta HH = HH^t - HH^o. \quad (3)$$

Solving (1) for HH_i and substituting into (2) and the result into (3) yields:

$$\Delta HH = \sum_i hh_i^t POP_i^t - \sum_i hh_i^o POP_i^o. \quad (3')$$

This formula can be rewritten to reflect two distinct effects:

$$\Delta HH = \sum_i hh_i^o \Delta POP_i + \sum_i POP_i^t \Delta hh_i, \quad (3'')$$

where ΔX is, in general, defined as $X^t - X^o$. The first term indicates the effect of population growth and shifts and the second term the influence of changes in headship rates.

The effect of population growth and shifts is deduced by computation of the first summation in equation (3"). The population has been divided into ten age categories: 0-14 and the nine listed in Table 5-1. The 20-24 and 25-29 age groupings are the prime years during which individuals form new households (see Table 5-1). The computed variable, which indicates the change in households if headship rates remained at the previous year's level, is called exogenous household growth and is denoted by ΔHX .

Income and the Price of Housing

Economic variables appear to explain part of the nondemographic increase in headship rates. Most obvious among these variables are real income and the real price of housing services (Smith, et. al., 1982). As real incomes rise, potential households are better able to exercise their desire to establish a new household. Similarly, lower real prices of housing services enable groups which otherwise would not have been able or willing to acquire a housing unit to form a household.

The income variable utilized is real disposable income per capita. This variable has increased throughout the period from a level of \$2697 in 1960 to \$4545 in 1982. For the real price of housing services for rental housing, we employ the CPI rent component, as adjusted by Lowry (1981) to account adequately for depreciation and to treat utility costs consistently, deflated by the CPI net of shelter. This price series generally declined from 1.017 in the 1962-65 span to 0.947 in the middle to late 1970s and has since risen to near unity. For the real price of housing services from unsubsidized owner-occupied housing, the user cost series for households in the 15 percent tax bracket is approximately that computed by Hendershott and Shilling (1981).³ The 15 percent tax rate is close to that calculated by Hendershott and Slemrod

(1983) as the most relevant to the tenure choice decision in 1977.⁴ The user cost declined fairly steadily from 7.8 percent in 1960-63 to 3.9 percent in 1978 and then rose sharply to 12.7 percent in 1982.

Subsidized housing effectively lowers the real price of housing services for households selected to occupy such units. To the extent that subsidies go to groups that would not have been households in the absence of subsidies, household formations and the demand for housing units increases. Over three-quarters of subsidized housing during the 1961-1982 period has been rental,⁵ and the existence of below-market rents is reflected in the CPI rent index.⁶ Because owner subsidies have been small and have not been especially targeted to first-time buyers, no general attempt is made to relate household formations to owner subsidies.⁷

An additional possible determinant of household formations is the real initial mortgage payment burden. With the standard fixed-rate mortgage, nominal mortgage payments are fixed over time, while real mortgage payments decline at the rate of inflation. Moreover, the higher is anticipated inflation and thus the nominal mortgage rate, the larger is the initial mortgage payment. As attractive as expected future inflationary gains may be, young wealth-constrained households may find the initial mortgage payments to be "unaffordable" and thus be compelled to purchase a smaller house than they would if inflation did not tilt the real mortgage payment stream forward in time (Kearl 1979; Follain 1982, Schwab 1983). More importantly, from our perspective, some persons may not move away from parents, other relatives, or group quarters to form households until they can attain ownership of a "reasonably" sized house. As a result, high initial mortgage payments relative to income could reduce the level of household formations. The real-mortgage-payment-to-income variable is defined as the real net-of-tax mortgage

payment on a constant quality house (the average new house constructed in 1974), assuming 75 percent financing at the current mortgage rate or 12 percent, whichever is lower. The truncation of the mortgage rate reflects the widespread use of owner financing and builder buy downs in the 1980s when interest rates exceeded 12 percent. The tax rate employed is the same as that for the real user cost of homeownership. This variable generally increased during the 1960-82 period and increased especially rapidly from 21 percent in 1978 to 28 percent in 1981 and 1982.

Summarizing the above, the dependency of the age specific headship rates on economic variables can be expressed as

$$hh_i = hh_i^+(\bar{y}, \bar{r}, \bar{o}, m), \quad (4)$$

where y = real per capita disposable personal income
 r = real price of rental housing
 o = real price of owner housing
 m = real mortgage payment burden

for the particular age category, and the signs above the arguments denote the expected signs of the partial derivatives. From equation (3"), the endogenous change in households is the sum of the product of changes in age-specific headship rates and the population in the age groups. The relevant independent variables, based on (4), are thus changes in the price of housing services (rental and owner), income, and the mortgage-payment burden for each age group times the populations in the groups. We approximate these variables by the products of total population and changes in the economy-wide variables.

Other Variables

Among social variables, the increase in divorce (the divorce rate per thousand U.S. residents jumped from 2.2 in 1960 to 5.2 in 1980) is sometimes cited as a major factor causing the increase in household formations during the 1960s and 1970s (Rosen and Jaffee 1981: 21). The effect of increases in the number of divorces on formations is uncertain, however. While the number of primary individual households will certainly increase (these households increased from under 8 million in 1960 to 20 million in 1980), the impact on total households is ambiguous. If both husband and wife form separate households after a divorce, then one additional household is created. Alternatively, if both husband and wife move back with family or friends, one household is lost. To complicate matters further, the decision the divorcing couple makes will likely be determined in part by the real incomes of the couple, the real price of housing services and, possibly, the form welfare takes (see below).

Nonetheless, four divorce variables are tested in the household-formations equation: the total number of divorces each year, the change during the year in the total number of divorced persons (the first variable less remarriages and deaths of single previously divorced persons), the change in the total number of divorced persons over 34 years of age, and the change in the number of households headed by divorced women with children under age 18. The latter two variables reflect our presumption that older people and those with at least one minor child are less likely to move in with family or friends (Carliner 1975). To put these variables in perspective, the increases in their annual values between the early 1960s and late 1970s were 800,000, 600,000, 300,000, and 50,000.

A likely factor affecting household formations in the late 1960s and early 1970s was the change in the aid for families with dependent children (AFDC). This aid has both income and price dimensions. An increase in real benefits should, like increases in any form of income, raise the demand for privacy and thus increase household formations. However, insofar as the actual benefits received are negatively related to total household income, the effective benefit level can be raised (often from zero) by a single parent establishing a separate household. Thus an increase in scheduled real benefits also lowers the price of establishing a separate household. In fact, the price effect would be expected to far outweigh the income effect.

Between 1960 and 1980, the number of families receiving AFDC rose by 3 million (from 0.8 to 3.8 million). Two-thirds of the increase came in the 1967-74 period. This sharp jump reflected a 30 percent increase in real benefits per recipient (in the 1964-70 period) and a substantial reduction in eligibility requirements. The latter, part of 1967 legislation, required states (after July 1, 1969) to disregard the first \$30 of monthly earnings plus one-third of the remainder in computing benefits. The former was largely attributable to the federal government offering in mid-1966 to pay at least one-half of whatever the state paid to AFDC families, provided the state offered Medicaid. Given the substantial increase in incentives to establish a single parent household, the surge in the divorce rate between 1967 and 1973 -- 60 percent of the increase observed over the entire 1960-80 span occurred in these six years -- and the bulge in household formations are hardly surprising. The change in the number of families on AFDC is added to our list of explanatory variables.

The Estimation Equation

The estimation equation is the result of replacing the first sum in equation (3") by $\alpha_1 \Delta HX$ and the second sum by a linear function of total population (POP) times the changes in the variables in the functional of (4), the change in some divorce variable, and the change in families on AFDC. The equation for the change in households is thus:

$$\begin{aligned} \Delta HH = & \alpha_0 + \alpha_1 \Delta HX + \alpha_2 \text{POP} \Delta y + \alpha_3 \text{POP} \Delta r + \alpha_4 \text{POP} \Delta o + \alpha_5 \text{POP} \Delta m + \alpha_6 \Delta \text{DIV} \\ & + \alpha_7 \Delta \text{AFDC}, \end{aligned} \quad (5)$$

where ΔDIV equals one of the four divorce variables tested. The expected signs, and magnitudes where readily known, of the coefficients are

$$\begin{aligned} \alpha_0 &= 0 & \alpha_1 &= 1.0 & \alpha_2 &> 0 \\ \alpha_3, \alpha_4, \alpha_5 &< 0 & 0 &< \alpha_6, \alpha_7 &< 1.0 \end{aligned}$$

The means, high and low values, and scaling of each of the series utilized are listed in Table 5-2. Figure 5-1 contains plots of a few of the

--Place Table 5-2 Near Here

series, namely endogenous household formations ($\Delta HH - \Delta HX$), the income variable ($\text{POP} \Delta y$), the negative of the user cost variable ($-\text{POP} \Delta o$) and the change in families on AFDC. The positive correlations between endogenous

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household formations and the other variables can be discerned by close inspection of the figure.

TABLE 5-2. Data Summary

	Mean	Low	High	Scale
y (income)	3739	2725	4545	real dollars per capita
Δy	84	-89	225	
r (rent)	98.8	101.7	94.7	ratio of indexes (1967=100)
Δr	-0.03	-1.50	3.00	
o (owner cost)	6.52	3.52	12.75	percent per annum
Δo	0.23	-1.10	3.28	
POP (population)	207	181	230	millions
m (mortgage payment to income ratio)	18.58	14.10	28.40	percent
Δm	0.46	-1.10	3.60	
Total divorces	789	393	1219	thousands
Change in number of divorced	411	82	1066	thousands
Change in number of divorced over 35	256	23	654	thousands
Change in number of divorced females with child under 18	86	9	207	thousands
Families on AFDC	2486	853	3876	thousands
Δ AFDC	125	-315	677	thousands
Change in households (Δ HH)	1401	619	2051	thousands
Exogenous change in households (Δ HX)	1162	457	1644	thousands

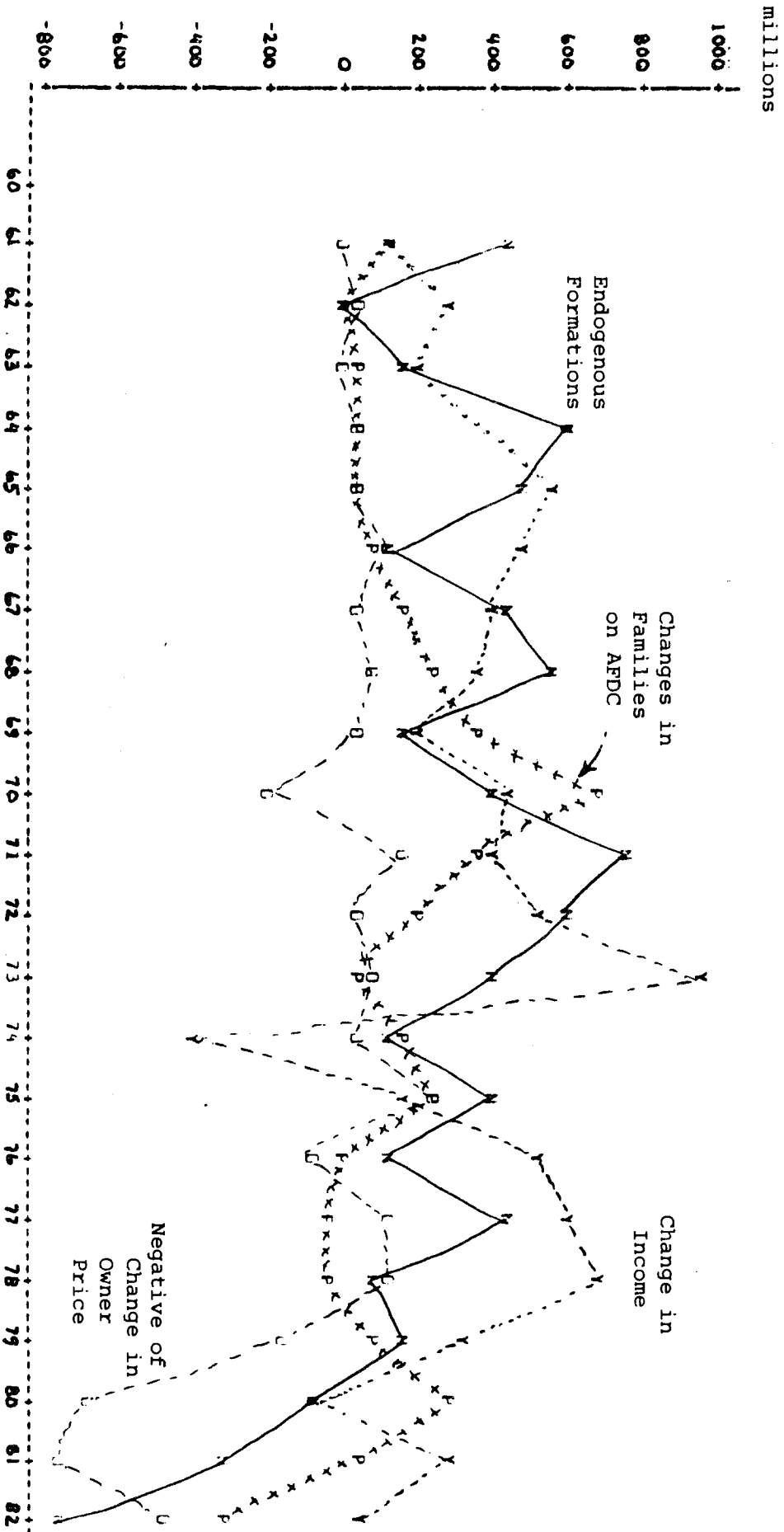


Figure 5-1. Endogenous Household Formations and Some Key Determinants, 1960-82

EXPLANTION OF HOUSEHOLD FORMATIONS

Nine different household equations are presented in Table 5-3. The first equation includes exogenous households and the four basic economic variables: real income, real prices of owner and renter housing, and the real mortgage-

--Place Table 5-3 Near Here--

payment burden. The exogenous household formations variable, which measures the effect of population growth and changing age structure on household formations, is expected to have a coefficient of one and is about a half standard deviation less than this value. All the other variables are correctly signed, but only the real owner price is significantly different from zero. The adjusted R^2 indicates substantial unexplained variation.

Addition of the AFDC variable improves the relation in numerous respects. Not only does the variable enter appropriately and the explanatory power rise sharply, but the coefficient on endogenous household formations is very close to unity and the constant is much closer to its expected value of zero. Further, the income coefficient rises slightly and is now statistically greater than zero.

Equations 3 through 6 test different divorce variables. The total number of divorces each year has an unexpected negative coefficient in equation 3, and the annual change in the total number of divorced persons (equation 4), the change in divorced persons over the age of 35 (equation 5), and the change in the total number of divorced females with children under 18 (equation 6) all have coefficients smaller than their standard errors. In general, the coefficients on other variables are insensitive to inclusion of the divorce variables.

TABLE 5-3. Household Formations, 1961-82

	1	2	3	4	5	6	7	8	9
Intercept	296.2 (216.2)	103.1 (177.9)	117.7 (181.3)	149.1 (193.1)	108.5 (187.8)	114.3 (193.1)	215.6 (180.0)	133.3 (84.0)	74.7 (85.1)
Δ HX	.894 (.190)	.973 (.150)	1.123 (.734)	.851 (.238)	.948 (.233)	.950 (.194)	.916 (.162)	1.0	1.0
POP Δ y	.00628 (.00459)	.00670 (.00356)	.00671 (.00371)	.00688 (.00365)	.00681 (.00377)	.00672 (.00370)	.00659 (.00378)	.00623 (.00364)	.00661 (.00343)
POP Δ r	-.155 (.236)	-.070 (.185)	-.055 (.200)	-.031 (.198)	-.062 (.201)	-.066 (.193)	-.092 (.192)	-.130 (.173)	-.082 (.170)
POP Δ o	-.712 (.267)	-.664 (.208)	-.642 (.260)	-.757 (.255)	-.695 (.305)	-.649 (.229)	-.700 (.215)	-.722 (.207)	-.670 (.200)
POP Δ m	-.028 (.283)	-.131 (.223)	-.070 (.240)	-.130 (.227)	-.128 (.232)	-.131 (.231)	-.033 (.248)	-.112 (.192)	-.154 (.178)
Δ AFDC		.822 (.244)	.810 (.271)	.841 (.250)	.836 (.271)	.795 (.289)	0.4	0.4	.829 (.233)
Δ DIV			-.242 (1.011)	.232 (.347)	.083 (.585)	.193 (1.014)			
Specification of Divorce Variable			Number of Divorces	Change in Total Stock	Change in Over 35 Stock	With Child Under 18			
SEE	260	203	204	206	210	209	212	208	203
R ⁻²	.616	.767	.763	.758	.751	.751	.744	.755	.781
DW	1.74	2.15	2.31	2.16	2.15	2.16	2.17	2.17	2.13

One might argue that the 0.8 coefficient on the change in AFDC households is too large. First, part of the increase in AFDC families must have been broken families who were separate households prior to going on AFDC. Second, some of the husbands who separated from their families undoubtedly did not establish new households themselves. Moreover, because the change in households on AFDC is part of the independent variable, this coefficient is likely biased toward unity.⁹ The AFDC coefficient is arbitrarily constrained to 0.4 in equations 7 and 8 to determine the sensitivity of the other coefficients to changes in the AFDC response. As can be seen by comparing equations 2 and 7, the decline in explanatory power is small, and the only marked change in coefficients is a doubling of the constant term. In equation 2, the constant accounts for 2 1/4 million household formations over the 1961-82 period (103 times 22); in equation 7, the constant accounts for 4 3/4 million.

In both equations 2 and 7, the coefficient on exogenous household formations is less than the expected unity value. This is not surprising because the variable is obviously measured with error and thus its coefficient will be biased toward zero. To compensate, the unity coefficient has been imposed in equations 8 and 9; the 0.4 coefficient on AFDC is also enforced in equation 8. The constant terms in the equations decline to compensate for the increased coefficient on exogenous household formations.

Table 5-4 contains elasticities, based on equations 8 and 9, of aggregate headship rates with respect to real income, rent, owner price, and

--Place Table 5-4 Near Here--

the mortgage constraint. The elasticities are evaluated, in turn, at both the sample mean and 1982 value. The income elasticity is 0.075 to 0.08; the "price" elasticities are somewhat smaller, -0.03 for rent (but with a large standard error), -0.015 to -0.025 for the owner user cost, and -0.01 for the mortgage-payment burden (again with a large standard error).

TABLE 5-4. Elasticities of Headship Rates

	Evaluated at	
	Mean	1982 Value
Real Income	.075	.08
Real Rent	-.03	-.03
Real Owner Price	-.015	-.025
Mortgage Payment Burden	-.01	-.01

Table 5-5 details the sources of changes in the number of households for two periods, 1961-78 and 1979-82, based on equations 8 and 9.¹⁰ During the

--Place Table 5-5 Near Here--

1961-78 period, steady increases in headship rates induced the formation of 8 million households or nearly a third of the total 25 1/2 million households formed. These are attributable to the rise in real income per capita (3 million), to the decline in the real price of owner housing (3/4 million, 1/4 of which was offset by the increase in the mortgage-payment burden), to the expansion of the AFDC program (1 1/2 to 2 1/2 million), and to the constant term or trend (2 to 3 million). In the 1979-82 period, headship rates fell; the number of households was a million less than that which would have occurred with constant headship rates. The cause was the sharp rise in the owner user cost which triggered a 1 1/2 million decline in households.

The most perplexing problem is the interpretation of the growth in households "caused" by the constant term. To understand the source of the positive constant term, it is useful to examine the age-specific headship rates more closely. This is accomplished by computations of changes in headship rates by five year intervals (see Table 5-6). Two obvious points stand out. First, the over 75 age category experienced the largest increase in headship rate over the two decades, 0.138, followed by the 25-44 age

--Place Table 5-6 Near Here--

categories (see the far right column). Second, the changes in the demographic-adjusted headship rate (bottom row of Table 5-6) indicate that headship rates increased far more in the 1967-72 period than in the other five year spans. Consistent with this, six of the nine age groups experienced their largest five-year increases in the 1967-72 period.

TABLE 5-5. Increase in Households, 1961-82
(millions)

	1961-78	1979-82
Total Increase	25½	5¼
Due to Population Growth and Age Structure Changes	17½	6¼
Due to Other Factors	8	-1
Real Income	3	¼
Real Cost of Housing	¾	-1½
Mortgage Payment Burden	-¼	-¼
AFDC	1½ to 2 ¾	-
"Trend"	1 ¾ to 3	¼ to ½

TABLE 5-6. Changes in Headship Rates

Age	1962-67	1967-72	1972-77	1977-82	1962-82
15-19	-.002	.006	.001	-.001	.004
20-24	.001	.032	.011	-.017	.027
25-29	.044	.006	.018	-.008	.060
30-34	-.001	.031	.018	.005	.053
35-44	.013	.006	.030	.019	.068
45-54	.009	.014	.008	.006	.037
55-64	-.001	.019	-.004	.005	.019
65-74	.007	.017	-.005	.010	.029
75 & over	.039	.063	.013	.023	.138
Demographic- adjusted	.007	.012	.008	.004	.029

Source: The appendix.

The positive constant term, which accounts for 2 to 3½ million of the increase in households between 1960 and 1982, probably stems in part from the steady increase in household heads over age 75. The increase in this headship rate, along with the growth in population in this age category, accounted for the formation of over a million households. Much of the million is likely attributable to a continuing increase in the health and life span of the elderly. A second factor the constant term may reflect is an apparent increase in the taste for headship by people born after about 1937. These people were 24 and younger in 1961. Note how their movement into the 25-29 age group in the 1962-67 period sharply raised that headship rate. Later, in 1967-72, they raised the 30-34 headship rate, and, again in 1972-82, they continually pushed the 35-44 headship rate upward. People born in even later years maintained this desire for headship (note that the 20-24 rate did not fall in 1962-67, the 25-29 rate did not fall in 1967-72 and the 30-34 rate did not decline in 1972-77). Why people born after 1937 have a greater desire for headship is unclear, but they certainly have it. Possibly they have substantially greater future income prospects owing to greater investment in human capital (Johnson 1985) and our income variable picks this up. But we expect that the positive constant reflects, in part, people born after 1937 continually constituting a larger proportion of the adult population.

SUMMARY

Between 1961 and 1978, the number of households grew by 25½ million or nearly 50 percent. Of this increase about a third was due to population growth, another third to changes in the age structure of the population (the aging of the postwar baby boom) and the last third to an increase in age-specific headship rates. A doubling of real per capita income and a halving of the real price of owner-occupied housing (the real after-tax mortgage rate) caused

headship rates to increase for all age categories. The increases were the greatest for the young (under 35) and the old (over 75). The sharply higher headship rates of the young were a response to (1) the abrupt increase in real benefits and lower eligibility standards of the aid to families with dependent children (AFDC) program in the late 1960s and (2) a greater propensity for headship by the population born after 1937. The enormous (over ten percentage point) increase in the over-75 headship rate reflected better health and real incomes that are far greater (due to a 75 percent increase in real social security payments) and more certain (due to indexation) than existed in the early 1960s.

In the early 1980s, a sharp divergence in headship rates has occurred; those for population under age 35 have fallen, while those for the population over age 44 have continued to rise. The reduced headship rates for the young reflect both the marked increase in the real price of owner-occupied housing (real after-tax mortgage rate) and the cutback in real benefits and increased eligibility standards for the AFDC program.¹⁰ Each of these tends to fall more heavily on younger households who are more mobile (and thus are more likely to have to pay the market mortgage rate) and are more likely to have dependent children.

Specific numbers of household formations can be attributed to the various factors that have altered headship rates. Increased headship rates between 1960 and 1978 resulted in 8 million additional households, about half of which were induced by rising real incomes (3 million) and falling real prices of owner housing (3/4 million). Another 1½ to 2 3/4 million is attributable to the increased real benefits and lower eligibility standards of the AFDC program. Because actual AFDC benefits received are negatively related to total household income, the effective benefit level can easily be raised by a

low-income single parent establishing a separate household. It should not be surprising that a 30 percent increase in real scheduled benefits and significant reduction in eligibility standards in the late 1960s coincided with: a jump in the divorce rate, unprecedented increases in families on AFDC, and a surge in household formations. Another 1 3/4 to 3 million of the 8 million increase is likely explained by both the steadily rising longevity and health of older people and the increasing importance to household formations of those born after the late 1930s.

Between 1979 and 1983, household growth continued at a high level, owing to the further maturation of the baby boom. However, the above-noted sharp rise in real after-tax interest rates, and thus the cost of owner housing, reduced formations (of those under age 34) by 1½ million relative to what would have otherwise occurred.

APPENDIX 5

CONSTRUCTION OF THE HOUSEHOLD SERIES

Data on the number of households and population in the respective age groups are available through two annual U.S. Bureau of the Census, Current Population Survey (CPS) reports: "Household and Family Characteristics" and "Marital Status and Living Arrangements". Numerous adjustments were necessary, however, to develop consistent household and exogenous household series for the 1960-82 period.

For most years the CPS reports contain data on the number of households by age for nine age groups: under 20, 20-24, 25-29, 30-34, 35-44, 45-54, 55-64, 65-74, and 75 and over. In the years 1968-1975, however, the four youngest age groups are combined into two groups: under 25 and 25-34. Because those age groupings comprise the prime household forming years in which large changes in headship rates occur, an attempt was made to divide the number of households in these two broader age groups into the smaller subdivisions. First, the proportion of under 25 households which were under 20 and 20-24 (and the proportion of 25-34 households which were 25-29 and 30-34) were averaged for the three years prior to 1968 and the three years following 1975. The assumed proportions over the 1968-75 period were then obtained by extrapolating linearly between the pre1968 and post1975 averages.

A larger problem with the CPS is the reconciliation of the CPS data to the 1970 and 1980 Census counts. When the Census data became available, the CPS population controls were adjusted upward to compensate for the excess of the Census count over the CPS estimates. Thus a large jump in the household data occurs in the year of adjustment. However, various issues of the CPS Series P-25 provide yearly estimates that have been adjusted to correspond to

the decennial Census counts. Yearly change in households (and in exogenous households) that are consistent with the decennial data are calculated using the revised population data in equation (3"). To apply equation (3"), headship rates were first calculated using the unadjusted household and population numbers from the CPS reports, and then these rates and the adjusted population data were employed.

A further problem in this calculation was that prior to 1972, inmates of institutions (which includes, for example, the elderly living in nursing homes) were included in the unadjusted population count; in 1972 and thereafter, they were excluded. All population and thus household data have been converted to a noninstitutionalized basis, that is, inmates of institutions were deleted from the population data prior to 1972. Because the adjusted population series includes inmates of institutions, the sum of the change in household series computed from equation (3") for the 1961-80 period was 800,000 greater than the actual change in households between the 1960 and 1980 decennial counts. The computed change in household series was multiplied by the average ratio of population excluding inmates of institutions to total population in order to make the change series consistent with the decennial counts.

The CPS data are reported for March 31 of each year. To convert the data to an annual basis, we have assumed that an households grew linearly between March 31 dates. Thus the calendar year change in households consists of 75 percent of the change in households in one year and 25 percent of the preceding year (for example, the 1964 change would be 75 percent of the change from March 64 to March 1965 and 25 percent of the change from March 1963 to March 1964).

NOTES 5

1. See Modigliani and Lessard (1975) and The President's Commission on Housing (1982): 73-77.
2. For a simulation analysis of the impact of affordability and the below unity income elasticity on the allocation of capital between residential and industrial uses, see Hendershott and Hu (1983).
3. We thank James Shilling for updating this series for us and for modifying it to incorporate the changing property tax rate presented in Buckley and Simonson (1984).
4. This tax bracket is roughly appropriate throughout the study period because the effects of bracket creep and increases in mortgage interest deductions have roughly offset each other, leaving the typical new homeowner in approximately the same tax bracket.
5. Owner subsidies were not available until the Section 235 program began in 1969. While owner subsidized units rose to 41 percent of total subsidized starts in 1972, they averaged only 27 percent of total subsidized starts between 1969 and 1982.
6. The CPI rent component is constructed by asking consumers how much they pay each month for rent. If they are receiving subsidy assistance, they would report only the portion of total rent which they pay. The CPI rental component therefore would reflect the impact of subsidy programs on tenant rental payments.

7. There was significant use of tax-exempt mortgage revenue bonds to assist first-time homebuyers in 1980 and 1982.
8. See Burke (1974) for a fascinating discussion of the politics surrounding the development of the ADFC program (and welfare policy generally).
9. In future work, it would be useful to attempt to relate household formations to changes in AFDC real benefits and eligibility standards.
10. The calculation of the change in the number of households due to demographic changes holds headship rates for each age group constant at their 1960 and 1978 levels for the respective periods. In the model, however, the exogenous household formations variable is calculated each year based on the preceding years headship rate. Given that headship rates rose (fell) between 1960 and 1978 (1978 and 1982), the sum of the exogenous household formations variable over time would exceed (fall short of) the demographic change in the Table. This difference is distributed proportionately across the other variables in Table 5-4.
11. The AFDC changes resulted from passage of the Omnibus Budget Reconciliation Act of 1981, Public Law 97-35.

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