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Projections of Housing Consumption in the U.S., 1980 to 2000, by a Cohort Method

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PROJECTIONS OF HOUSING CONSUMPTION IN THE U.S., 1980 TO 2000, BY A COHORT METHOD

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Data from the Annual Housing Surveys are available in joint HUD-Census publications, the Current Housing Reports series. The national data are published in Series H-150, comprising six reports, and the metropolitan data are published in Series H-170, with a separate report for each metropolitan area. Series H-171 is a supplementary summary report on the metropolitan areas surveyed each year. The published reports may be obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. These reports are also available in microfiche form from the Library, Bureau of the Census, Washington, D.C. 20233.

Micro data containing the responses of individual households are available on public use computer tapes from the Center for Social Sciences, Columbia University, 420 W. 118th Street, New York, N.Y. 10027.

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PREFACE

This paper extends our series of Annual Housing Survey (AHS) studies to include a striking example of the fact that AHS data are useful not only for monitoring and interpreting current developments in housing, neighborhood, and household characteristics, but also for helping to project likely future trends.

The Department of Housing and Urban Development has funded a national housing survey, performed by the Bureau of the Census, since 1973, with separate surveys for 60 metropolitan areas included since 1974. The survey provides current information on the size and composition of the housing inventory, characteristics of its occupants, changes in the inventory resulting from new construction and from losses, indicators of housing and neighborhood quality, and characteristics and dynamics of urban housing markets for the Nation and four census regions. Every third or fourth year, these data are also gathered for most of the largest metropolitan areas and for some smaller, fast-growing metropolitan areas.

The Annual Housing Survey is designed to help planners, policymakers and scholars understand and analyze changes in the housing inventory and its costs and changes in housing needs and demand. Longitudinal linkage of the annual national file provides unparalleled opportunities to study market processes and household mobility; the metropolitan surveys give greater detail on the housing and population characteristics of suburbs and cities in specified metropolitan areas.

Such data on past change are essential for understanding possible future trends. In seeking to ensure the availability of decent and affordable housing for all persons, for example, there is continuing need for current and comprehensive projections of future housing consumption, by size, structure type, and tenure. Although exact forecasts of housing consumption are impossible, HUD's responsibilities for monitoring housing needs and inventory and evaluating policy responses require information on the future implications of current trends, should they continue, as well as on the effects of possible changes.

This report, by John Pitkin and George Masnick of the Harvard-MIT Joint Center for Urban Studies, demonstrates the feasibility and importance of making housing projections based upon analysis of recent cohort trends in demographic and housing variables. The total future demand for housing is heavily dependent on household formation, while the demand for different types of housing is closely related to household characteristics, particularly size and age and marital status of head. Future housing consumption has traditionally been projected by applying assumed probabilities of occupying particular types of housing units to a population projection. Different age-specific consumption rates based on observed past rates, are usually used to reflect life-cycle variations in consumption patterns.

Analysis of recent AHS data in comparison with earlier experience, however, documents significant differences in the housing consumption of succeeding birth cohorts at a particular age, especially with respect to household headship, home ownership, and size of home. Such differences persist as the cohorts age, because of the inertia built in by life styles, income and wealth, and family size and location. Thus projections such as these made by the cohort method can be expected to provide a more reliable basis for gauging future household consumption than traditional projections based on cross-sectional data.

ABSTRACT

In this paper the development and application of a cohort model of national housing consumption is described and the results of projections made by this innovative method are presented.

There emerges a consistent picture of the direct impact on housing of impending changes in the size and age structure of the population due to the progression of the large baby boom generation through the age structure. This pattern shows a peak in the rate of growth in all types of housing units at some time between the late 1970s and late 1980s, followed by a more or less rapid decline in the rate of growth through the end of the century.

The growth in occupancy of small, rented apartments will be the first to experience a downturn and will be reduced most as the population ages, and the demand for larger single-family owned units will turn down later and be reduced least. The most important finding in relation to the projections is that the time paths of growth in housing consumption under a range of reasonable assumptions are virtually parallel.

Housing consumption, or the number of occupied housing units of each of 20 types, is projected using six different assumptions about housing and population patterns. The classes of housing units are defined by tenure, type of structure and number of rooms.

Using special tabulations of 1960 and 1970 Census Public Use Sample and 1975 Annual Housing Survey data, the projections are based upon an examination of the net cohort transitions, or life-cycle changes in housing consumption that actually occurred during the 15 years between 1960 and 1975. Although there were some differences in the patterns of transitions observed in the 1960s and the 1970-1975 period, the general consistency of these transitions in different time periods supports the application of the model to long-term projections of housing consumption.

The cohort method used here is distinguished from conventional methods of modeling housing consumption by its explicit treatment of the persistence over time of housing patterns established by actual birth cohorts (population groups born in the same year). This contrasts with the conventional approach, in which the housing consumption life-cycle is

identified by age alone. The cohort approach used here makes an important methodological advance over conventional cross-sectional and aggregate dynamic models of housing consumption. In this paper both the necessary data and analytic apparatus for modeling cohort effects on housing consumption are developed.

Projections of population, also based on a cohort method, are a second input to the projections of aggregate housing consumption. The range of population projections used here describes both the age structure of the future population and its distribution by sex, marital status and family size. These population characteristics are associated with variations in housing consumption; their distributions have changed rapidly in the past decade and may be expected exercise a strong influence on housing consumption in the future.

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I. Introduction

Future housing consumption has traditionally been projected by applying assumed rates or probabilities of occupying particular types of housing units to a population projection. Different consumption rates may be used for different population age groups to reflect life-cycle variations in consumption patterns. The choice of age-specific rates is based on observed past rates and may be adjusted in accordance either with their recent trends or with assumptions about the future level and impact of their underlying behavioral determinants. This projection methodology implies a close relationship between the housing consumption of people who are 60 years old today, for example, and those who will be 60 years old five, ten or more years in the future.

This study has made a significant improvement in this projection method through the use of historical information about the housing consumption of birth cohorts. In essence, the cohort method works by following separate population groups as they age, so that for example, the consumption of people who will be age 60 in five years is linked to the present consumption of the same people, who are now 55 years old. Their consumption of housing at age 60 may differ from that of today's 60 year olds, even if they behave similarly between the ages of 55 and 60, simply because their level was different from the older group's level of consumption when they were age 55.

Significant cohort variations in housing consumption patterns are likely to persist for a number of reasons, including the inertia built into life styles, income and wealth, family size and location, all of which have been shown to affect patterns of housing consumption. In this study, differences in the housing consumption of succeeding birth cohorts at particular ages have been documented, especially with respect to household headship, home ownership and size of owned house. These differences can be expected to persist as the cohorts age. Therefore, projections made by the cohort method can be expected to provide a more reliable basis for gauging the future housing consumption of the middle-aged and elderly than those based on traditional methods using cross-sectional data. However, for the population younger than 30, who have not yet established clear cohort patterns of housing consumption, traditional projection methods must be relied upon.

Projections of national housing consumption must take account of the powerful influence of population size and composition on aggregate housing consumption in addition to the

effects of variations in individual consumption within narrowly defined population classes. For this reason projections were made, also by a cohort method, of the likely future population, disaggregated by age, sex, marital status and family size.

The range of future housing consumption projected on the basis of cohort trends between 1960 and 1975 differs in important dimensions from projections based on the latest (1975) period rates. Three of these dimensions are the total number of households, number of owner occupier households and number of households occupying large housing units, with more than six rooms. The differences mainly reflect observed increases in the housing consumption of cohorts who are now in middle or old age relative to earlier cohorts, who were at the same ages in the recent past. As time passes, the forces of cohort inertia are likely to enable the later cohorts to maintain higher levels of housing consumption at successive ages in the future.

Thus, the cohort method projections indicate there will be between 92.7 and 97.6 million households in the United States in 1990, based on a population projection which assumes a continuation of recent demographic trends. Even the lower end of the projection range is substantially above the 89.9 million households implied by the 1975 period consumption rates and the same population projection. (In March 1979 there were 77.3 million households.[1])

According to the cohort method, between 59.5 and 65.4 million of the households in 1990 will be owner occupants, as compared with 55.8 million projected using the 1975 period ownership rates. (In October 1977 there were 48.8 million owner occupant households.[2])

The cohort method projections also show between 21.5 and 25.4 million households in 1990 occupying housing units with more than six rooms, while projections based on 1975 period rates show only 17.5 million. (In October 1977 there were 16.1 million households living in such large units.[3])

Further variations in projected housing consumption result from different population projections, although the range of variation tends to be a narrower than the range generated by alternate assumptions about cohort consumption rates.

By making use of cohort trends and detailed population projections, these housing projections have made a probably significant advance over projections based on conventional

methods. The large differences between the cohort and period rate projections show the effect of inferring the housing consumption of people as they age rather than inferring housing consumption at a particular age as different people pass through it. Where there are significant differences there are strong behavioral grounds for preferring the cohort method projections.

It should nonetheless be kept in mind that the cohort method projections represent only the first application of an innovative approach. The most promising avenues for improving on these initial projections are:

1) to lengthen the period of observed cohort trends in housing consumption beyond the 15-year period 1960-1975 to provide a more reliable statistical base for projections,
2) to refine the model of housing consumption of people under age 30, where housing consumption is more flexible than at later ages, and
3) to develop a model of the impacts of housing market conditions on cohort changes in housing consumption.

This last improvement is especially important because the projections presented here capture only the effects of population on housing demand but not the effects of supply or other factors which enter demand. Large changes in any of these factors can be expected to affect actual consumption in the future.

II. A Model of Housing Consumption

A. A Definition of Housing Consumption

Housing is perhaps the most heterogeneous good that is widely consumed. For this reason any operational measure of housing consumption represents an accomodation between analytic tractability and the complexity of the real world. For many purposes the most important dimension of housing consumption is the total number of households, which is, by definition, equal to the number of occupied housing units. Other important dimensions of housing consumption are mode of tenure, type of structure and size of unit. Operationally the model measures housing consumption by the number of households, or occupied housing units, and their tenure, type of structure and number of rooms. It should be clear that "housing consumption" as defined here is related, but by no means equivalent, to expenditure on housing, which is another common definition for housing consumption.

There is a direct relationship between aggregate housing consumption, the size of the population and individual consumption patterns. Population provides the link between individual and aggregate consumption: the number of households is jointly determined by the proportion of individuals and families who head households (headship rate) and the number of individuals (population); and the number of households occupying housing units of a particular type in turn is determined by the number of households and the proportion who occupy that type of housing unit (consumption rate). In discussing the micro-level consumption of individuals and families, the term "housing consumption" can also be used to refer to the headship and housing consumption rates, rather than numbers of households.

To be most useful, categories of the different dimensions of housing consumption should be selected to reflect distinctions perceived by consumers as most significant and at the same time to ensure that no type of housing unit defined is so rare and unusual as to be unimportant. These considerations lead to the following partition of the various dimensions of individual housing consumption:

Household headship - head/non-head;
Tenure - renter (including rent free)/owner (including cooperative and condominium);
Type of structure - mobile home/one-family structure/two to four-family structure/five or more-family structure (apartment);
Number of rooms - one to four rooms/five or six rooms/seven or more rooms.

In this scheme, housing unit characteristics are identified only for household heads, and the five and six room, and seven or more room categories are combined for units in mobile homes and apartments, due to the rarity of large units in either type of structure. This yields the following 21 housing consumption possibilities that define the range of alternatives available to families and individuals:[4]

1. Non-head
2. Head, owner-occupant, one-family house, 1 to 4 rooms,
3. Head, owner-occupant, one-family house, 5 or 6 rooms,
4. Head, owner-occupant, one-family house, 7 or more rooms,
5. Head, owner-occupant, 2 to 4-family house, 1 to 4 rooms,
6. Head, owner-occupant, 2 to 4-family house, 5 or 6 rooms,
7. Head, owner-occupant, 2 to 4-family house, 7 or more rooms,
8. Head, owner-occupant, 5 or more-family house, 1 to 4 rooms,
9. Head, owner-occupant, 5 or more-family house, 5 or more rooms,
10. Head, owner-occupant, mobile home, 1 to 4 rooms,
11. Head, owner-occupant, mobile home, 5 or more rooms,
12. Head, renter, one-family house, 1 to 4 rooms,
13. Head, renter, one-family house, 5 or 6 rooms,
14. Head, renter, one-family house, 7 or more rooms,
15. Head, renter, 2 to 4-family house, 1 to 4 rooms,
16. Head, renter, 2 to 4-family house, 5 or 6 rooms,
17. Head, renter, 2 to 4-family house, 7 or more rooms,
18. Head, renter, 5 or more-family house, 1 to 4 rooms,
19. Head, renter, 5 or more-family house, 5 or more rooms,
20. Head, renter, mobile home, 1 to 4 rooms,
21. Head, renter, mobile home, 5 or more rooms.

The number of families and individuals (housing consumers) in each category in selected years going back to 1960 is shown in Table 1.

B. The Determinants of Housing Consumption

It is apparent that the problem of modeling aggregate housing consumption can be divided into two distinct components, namely the determination of population and the determination of the rates of housing consumption, or the "pure consumption" problem. In this Section the focus is on the pure consumption component of the problem while the model of population is

Table 1: Housing Consumption of All Families and Individuals, 1960, 1965*, 1970, 1975

(in thousands)

	1960	1965	1970	1975
Non-head	25,317	24,465	31,116	33,778
Household Head				
Owner-Occupier				
Single family				
1-4 rooms	5,851	4,691	5,215	4,754
5-6 rooms	16,902	18,869	20,273	23,444
7+ rooms	7,063	8,744	9,995	13,111
2-4 family				
1-4 rooms	625	753	706	706
5-6 rooms	1,034	1,328	1,198	1,194
7+ rooms	248	342	258	242
5 or more family				
1-4 rooms	126	189	297	379
5+ rooms	124	171	163	210
Mobile home				
1-4 rooms	666	816	1,265	1,865
5+ rooms	0	233	483	989
Renter-Occupier				
Single family				
1-4 rooms	5,196	3,817	3,625	3,454
5-6 rooms	3,546	3,715	3,813	3,881
7+ rooms	999	1,092	1,081	1,093
2-4 family				
1-4 rooms	3,329	4,181	4,040	4,615
5-6 rooms	1,532	1,943	2,035	2,006
7+ rooms	133	194	156	138
5 or more family				
1-4 rooms	4,590	5,275	7,201	8,496
5+ rooms	743	904	1,287	1,425
Mobile home				
1-4 rooms	92	157	262	413
5+ rooms	0	22	48	101
T O T A L	78,116	81,901	94,517	106,294

*Estimated from 1966 Survey of Economic Opportunity data.

presented in Section III. It should be noted here that the division of analytic labor between a population and a housing consumption component carries with it an implicit assumption that the population and housing consumption processes are independent of one another. It is possible to hypothesize feedbacks by which housing conditions might affect marriage, divorce, fertility or even mortality rates. Such interactions are nevertheless assumed to be negligible.

Our model of housing consumption is characterized by its distinctive treatment of the relationship between the ages of individuals and families and their housing consumption. In order to understand accurately the significance of age as a determinant of housing choice it is helpful first to consider a simple behavioral model which excludes age and then to "add" age to the model. This purely conceptual exercise is useful because age is related to other important variables in an extremely complex manner and the relevance of these variables can be grasped most easily when they are separated from age.

In general, the choices of individuals and families among the 21 defined housing consumption possibilities will depend on their preference among housing and other goods, their ability to pay and the real prices of the housing consumption alternatives. Factors affecting consumer preferences include the following:

Family size - the perceived need for living space and privacy depends on the number of people occupying the space; evidence of this difference is seen in the fact that, in 1975, among married couple single-family home-owners, wife age 35 to 39, 50 percent of those with two or three children had seven or more rooms, but only 32 percent of those with no children had such large units;[5]

Marital status - because married couples include two people, family size is related to marital status; socially defined consumption norms are also related to marital status; the effect of marital status is indicated by the higher proportion of formerly married men than single men age 50 to 54 who rented units in two to four-family structures in 1975 (10 percent against 5 percent);[6]

Sex - interest in maintaining an independent residence, whether of social or biological origin is apparently greater among women than men; reflecting this difference, 43 percent of never married women with middle income at ages 25 to 29 headed a household in 1970 compared with only 36 percent of

never married men in the same age and income class;[7]

Labor force participation - individuals or families with high rates of labor force participation are likely to prefer small units or low maintenance housing units (rental or condominium) due to the limited time they have left for housekeeping, other upkeep, and maintenance activities;

Family or other ties - individuals who have close relatives or friends with whom they can share a residence have more attractive alternatives for doubling up than do others and therefore have lower preferences for household headship;[8]

Expectations of moving - the transactions costs of buying and selling housing tend to deter highly mobile families from owner occupancy; much higher rates of moving among renter than owner households are in some measure attributable to self-selection of the mobile households.[9]

The main factors which affect consumers' ability to pay for housing are the following:

Real current income - the annual flow of earnings and other income, adjusted for changes in the level of prices, is the source of the bulk of most families' and individuals' consumption expenditures, including housing expenses;

Expected future income - consumers can anticipate certain major future changes in their income, notably those associated with entering and leaving the labor force and accumulation of job seniority; consumers' willingness and ability to incur debt in general and mortgage debt in particular is strongly affected by their income expections;

Assets - families' and individuals' portfolios of assets, both monetary and real, can affect the level and mix of their consumption; equity in a house or savings that can be used for a downpayment on a mortgage have a particularly strong influence on home ownership and the price of owned housing that can be afforded.[10]

The real prices of the housing consumption alternatives determine the amount of non-housing consumption that must be foregone to obtain the different alternatives. The relative prices among the alternatives especially influence choices among them. For rental units, the price is equal to the rent plus the costs of heat and utilities (i.e., gross rent). In order to be comparable with rents the price of ownership units must be expressed as a flow. It includes the direct expenses

of home ownership, as well as the opportunity costs of income foregone on equity invested in a home, the net value of ownership-conditioned income tax deductions, e.g., property taxes and mortgage interest, and the value of capital appreciation (or loss) expected from changes in house prices.[11] In addition, the full costs of occupying a housing unit also include the real costs of finding a suitable unit, "search costs," and transactions costs, which can be substantial in connection with buying or selling a house (brokers' fees, title search, lawyers' fees, etc.).

Cast in these terms, the determination of housing consumption can be viewed as a conventional constrained optimization problem in which the family or individual maximizes its utility (defined by its preferences) given the prevailing prices for the different housing options and other goods and subject to limitations on its resources (i.e., budget, wealth, credit, and time constraints). This behavioral model can be translated into an empirical model in which the probability that a family or individual selects one of several consumption alternatives at a particular moment depends on some or all of the "right-hand" variables mentioned above.[12] With few exceptions the existing empirical studies of housing consumption also include the age of the individual or family head as an explanatory variable.

The effects of age on housing consumption are closely intertwined with the effects of many of the variables that have been mentioned. In fact, the partial effect of the age of consumer (of the head, in the case of a family), independent of the other variables, is seen to be rather modest in comparison with the total effect, which also includes impacts resulting from correlation and interaction with other variables. In particular, there are strong associations between age and family size, marital status, labor force participation, family ties, actual mobility, and hence, expectations of moving, current income, expected income and assets.[13] If some of these variables are omitted from an empirical model then age acts as a potentially powerful proxy measure of the excluded variables. In our model, as will be seen, age of a family head or individual consumer provides a surrogate index of labor force participation, family ties, mobility expectations, income and assets.

But age is not merely a surrogate for other variables. There are strong interactions between age and other explanatory variables, effects which can only be accurately modeled by age in conjunction with the variables with which it interacts.

Thus, for example, older parents tend to have older and larger children and greater need for space than young parents; never married people in their twenties have very different marriage prospects and housing preferences than those in their sixties; and the ties of twenty-year-olds to their parents are usually much stronger (and different from) the relationships between forty-year-olds and theirs. Also the meaning of a given expected future income or amount of assets depends on the age of the consumer, since most families expect to have more assets at retirement age than earlier in their life course and total expected future income almost by definition declines with age. Due to the subjective aspects of the "price" of homeowner units, even prices may vary among different age classes of consumers since expected appreciation in house values depends in part on the evaluator's knowledge of past changes in values and on the evaluator's time horizon, both of which are strongly correlated with the age of the evaluator/consumer. Because of these many interactions, the consumer's age substantially modifies or conditions the effects of other variables on housing consumption.

Not all of the impact of age derives from statistical associations and interactions with other variables. Age is itself perhaps the best indicator of two additional determinants of housing preferences. First, the socially determined norms for housing consumption standards vary at different ages; it is expected, for example, that a young adult will leave home by a certain age and that a family will become homeowners before middle age.[14] Second, the vigor that is required to maintain a separate house or apartment varies significantly with age; the physical disabilities associated with age first interfere with the capacity to keep up a large house and later with the capacity to live as an independent household.[15] However, these "pure" age effects seem small compared to those that result from interrelationships with other variables.

Most of the effects of age on housing consumption are therefore neither socially nor genetically determined. Rather in empirical models age serves primarily as a proxy for or modifier of other factors which are not easily measured and modeled.

The complexity of the relationship between age and housing consumption must be expressed appropriately in any empirical specification. Since the statistical association between age and other factors is neither linear nor reducible to a

simple non-linear mathematical function,[16] the relationship between age and housing consumption needs to be cast in a completely general form, e.g., by using "dummy variables" for the different age classes. Moreover, since the age of a consumer or family head has an impact on housing consumption that is interactive with other factors in the model, the effects of these other factors also must be allowed to vary among different age groups, e.g., by defining separate variables for each marital status in the different age groups.

With age added in this way the behavioral model becomes a life-cycle model in which age plays a major role as a proxy for omitted variables and as a qualifier of other included variables. A model of this kind implies that the net effect on housing consumption of "being a particular age" is measured by the net differences in housing consumption among age groups at a given time. Most empirical life-cycle models are cross-sectional. The working of such a model is illustrated by the joint effects of marital status and age on housing preferences and, indirectly, on consumption. At age 25 most women who are single expect sooner or later to be married and, we may assume, are therefore less inclined to make a commitment to home ownership, which would probably have to be given up after marriage, than are 50-year-old single women, most of whom expect to remain unmarried. The cross-sectional model says that the effects of "being single and 25," in contrast with "being single and 50," are accurately measured by the differences in the housing consumption of the two age groups in a particular census or survey sample and implies that after 25 years have passed the 50-year-olds who have remained single will have revised their expectations of marriage, and their housing preferences, to the level of the 50-year-olds in the original period of observation. Regardless of their level of expectations at age 25, there is assumed to be a complete adjustment to the "normal" level for 50-year-olds.

However, the true process by which age affects housing consumption is obscured by the conventional cross-section life-cycle model. Most of the effects of age may be assumed to come about through a rather different process consisting of a sequence of incremental age- and time-dependent adjustments in the variables that are proxied by age or in the interactive effects. In such a process the effect of a particular condition on housing consumption at a given age depends both on the adjustments made over the life-course of the consumer and on the initial situation of the consumer. The working of this process can be illustrated by the relationship between age, family ties and housing consumption. Suppose, for example, that

at age 20 an individual has an unusually good relationship with his or her parents and as a result is more favorably disposed than usual to live in the parents' home. With the passage of time, relationships between children and parents may tend to erode and our illustrative case is assumed to be no exception. But unless close relationships have a tendency to deteriorate more rapidly than others, this individual would be projected still to have an exceptionally good relationship at age 30 or 40 with his or her parents and therefore to be more inclined still to live at home than most 30 or 40-year-olds, even though the relationship and the associated effect on housing preferences may have weakened substantially since age 20. Enduring effects of this kind on variables proxied by or interactive with age can be thought of as a kind of inertia and give rise to a serial correlation over time of errors in projections generated by the model.

Of the other variables that can be proxy-measured by age, family ties, family size, labor force participation, mobility expectations, current income and assets would be expected to exhibit a high degree of continuity (or inertia) over the life course of a family or individual. Of the interactive effects involving age, those with family size, family ties, future income and assets would similarly be expected to exhibit considerable continuity over the life course. All of these effects characterized by substantial inertia can be largely captured by the addition of a single variable to the list of the determinants of housing consumption, namely the family's or individual's housing consumption in the preceding time period, i.e., "lagged consumption." This is possible because actual consumption in the preceding time period itself is determined by all of the proxied and age-interactive determinants; there is continuity in the values of these determinants which individually and collectively change over time in a way that is typical of a particular age but is neither observed nor modeled explicitly; the current values of these unobserved variables determine the family's or individual's current housing consumption; and there is therefore continuity from period to period in housing consumption while at the same time housing consumption changes in a way that is typical of a particular age (because the determinants proxied by age tend to change in certain ways at different ages). The inclusion of lagged values of the dependent variable housing consumption is a commonly used means of correcting for serially correlated errors. Our specification of age-dependent rates of adjustment in the dependent variable is somewhat more innovative and is the essence of the cohort approach.[17]

None of the reasons mentioned so far for considering the previous period's consumption of housing as a determinant of present housing consumption depends essentially on the many characteristics that distinguish housing from most other consumer goods. With minor modifications the same list of determinants could be used in a model of the consumption of clothing or food, although the effects, or coefficients of the variables would in general differ.

However, there is a peculiarity of housing consumption that makes it especially important to model the effect of lagged consumption on current consumption, namely the unusually high cost of adjusting housing consumption to changed circumstances or preferences. The costs of moving, in terms of money, difficulty of finding a new residence, disruption and sheer physical effort, are high enough significantly to impede mobility for many households.[18] Due to the extraordinary costs of changing housing consumption by moving, the effects of one period's consumption on consumption in the next period are probably stronger than on consumption of other goods, which are all affected by the approximate constancy of tastes and ability to pay.

Taken together, these considerations imply that a consumer's current housing choice will be similar to its housing choice in the recent past; first, because the two choices represent accommodations of a similar, if not identical, set of constraints on consumption expenditures to a similar, if not identical, set of preferences; and second, because the costs of mobility limit responses to any changes in tastes or resources that may have occurred.

The combined effects of these different types of inertia are indicated by the proportion of households who do not move over a period of several years. According to 1970 Census data a majority of 54 percent of household heads still lived in the same housing unit they had occupied five years earlier. (See Table 2.) Since virtually all of the stayers had unchanged housing consumption and since many of the movers can be expected to have changed houses without altering their housing consumption (with no change in room-count, tenure, structure type, etc.) much more than 54 percent of households probably occupied the same type of housing in 1970 as in 1965.

In summary, individual housing consumption is directly determined by twelve factors: family size, marital status, sex, labor force participation, family or other social ties, expectations of moving and age (all of which affect preferences);

Table 2: Proportion of Households Who Moved in Previous 5 Years* by Household Composition, Age of Head and Present Tenure, 1970

(*Defined as head moved in after April 1, 1965)

	Two-or-more-person households				
Age of head	Total	Male head, wife present no non-relatives	Other male head	Female head	One-person households
Owner-Occupiers					
Under 25 years	.844	.892	.625	.620	.620
25 to 29 years	.806	.823	.685	.615	.685
30 to 34 years	.621	.629	.577	.522	.595
35 to 44 years	.400	.402	.391	.369	.424
45 to 64 years	.218	.221	.214	.204	.211
65 years or over	.138	.158	.117	.099	.118
Renter-Occupiers					
Under 25 years	.959	.969	.951	.938	.944
25 to 29 years	.905	.914	.899	.859	.910
30 to 34 years	.805	.808	.798	.773	.831
35 to 44 years	.694	.691	.695	.681	.722
45 to 64 years	.547	.532	.553	.556	.565
65 years or over	.433	.428	.405	.391	.445
All Households					
Under 25 years	.935	.949	.907	.904	.914
25 to 29 years	.864	.870	.834	.809	.885
30 to 34 years	.698	.691	.691	.696	.792
35 to 44 years	.491	.469	.510	.545	.648
45 to 64 years	.309	.281	.324	.347	.405
65 years or over	.233	.216	.197	.187	.268

Source: U.S. Bureau of the Census, 1973

current income, expected future income and assets (which affect the ability to pay); relative housing prices; and previous housing consumption. This last determinant has a direct effect because of the high costs of moving. Due to the high amount of period-to-period continuity in most of the other direct determinants, previous housing consumption also provides an accurate indicator of effects that are not adequately measured in any static model. The rate and direction of period-to-period adjustments in individual housing consumption and its determinants vary markedly between different ages.

A model such as ours, that is based on age-dependent rates of change in its variables, is called a cohort model because it recognizes systematic differences in the behavior of groups of people who were born in different years. For example, the cohort born in 1945 had housing consumption at age 30, in 1975, that differed from the housing consumption of the cohort born in 1940 when it was age 30, in 1970. The cohort method recognizes that these differences, once established, may persist at later ages. This contrasts with the conventional life-cycle approach, which suppresses the important inter-cohort dimension of variation.[19] In the rest of this Section we describe the cohort method we have used in making projections, but first we must point out that our model admittedly focuses on the role of demand, and does not attempt to model realistically the supply side of the market.

It is important to bear in mind that the determination of pure consumption is, in essence, an economic question which can itself be split into three distinct elements, namely demand, supply and market clearing, or the adjustment of demand to supply and the reverse. Only the factors that affect demand are dealt with here. A complete model would also incorporate such supply factors as the technology of producing and maintaining different types of housing units (including the technology of producing one type of unit from another, via conversion), the costs of inputs, including capital, and the organization of the construction and residential operations industries; and such factors affecting market adjustment as the elasticities, or responsiveness, of demand and supply in both the short and long run, as well as the institutional framework of the housing market. The limitation of our model of housing consumption to certain demand-determining factors does not imply that other demand factors, supply or market adjustment are unimportant. The focus is narrow here so that it is possible to treat adequately the very important and complex population, life-cycle and cohort effects on housing consumption.

In view of this rather significant limitation of purpose it must be asked how the projections and other results of the model of housing consumption should be interpreted. The direct outputs of the model indicate the consumption patterns that would result if supply and market adjustment responded so completely and smoothly to changes in demand that there would be no change in the price or rent of any type of housing unit: all the adjustment is in the quantity of housing units supplied. In order for this to occur supply must be perfectly elastic. To the extent that supply is in fact less than perfectly elastic or changes in some way, a complete model of housing consumption should describe the supply and market clearing processes.

The model developed and applied here captures, or at least attempts to capture, the forces which drive the demand side of the "true" model. As an approximation to a complete model it is arguably more accurate than models which incorporate supply but fail to address the complex effects of population and cohort on demand. Until a complete empirical model is developed, the theoretical limitations of this model of housing consumption must be weighed when interpreting its projections or other results. Particular attention should be given to changes in the prices and other supply-induced changes in the availability of one or more types of housing units. In this paper the possible influences of supply factors are given consideration in evaluating the range of projections derived by the cohort method.

C. The Cohort Approach and Age

Thus far we have discussed the behavioral basis of a cohort approach to modeling housing consumption in terms of the choices of individual decision-making units among the various types of housing. A family's or individual's housing consumption in previous periods has been seen to be both a key determinant of its current housing consumption as well as an indicator, or proxy measure, of other important determinants. It is necessary to explore now the implications of this conceptual model for the groups of individuals and families who together make up birth cohorts.

Cast in aggregate terms, the housing consumption "problem" concerns the total numbers of different types of housing units occupied by a cohort or, when allowance is made for cohort size, the proportion of the cohort living in different types of units.

Following the conceptual model, the existence of a close relationship between a typical individual's consumption at two succeeding dates implies a similarly close relationship between the proportion of a cohort occupying (consuming) a particular type of housing at two succeeding dates. The conventional life-cycle model ignores this relationship: the consumption of a cohort at a particular age is related not to its own consumption at earlier ages but to the consumption of earlier cohorts at the same age. In so doing, the cross-sectional life cycle model loses all of the information embedded in a cohort's earlier consumption.

The essence of the cohort approach is, by contrast, to link each cohort's housing consumption at successive ages, thereby retaining the information contained in the lagged consumption of the cohort.

In the approach used here each cohort is split into sub-groups, according to sex, marital status and family size, each of whose consumption is separately linked at successive ages. Such disaggregation of cohorts is desirable because of the strength of these variables' effects on housing consumption and is feasible because of the substantial period-to-period continuity in the membership of these cohort sub-groups. This disaggregation is examined in the following subsection, but, in the interest of clarity, is not considered here in the initial presentation of the cohort approach.

Because it requires following groups of people over time, the cohort approach is dynamic. This fact has a number of ramifications that must be examined. The approach focuses on the shifts over time in the proportions of cohorts occupying particular types of housing units. These shifts can be thought of as net cohort transitions, since they are the net result of large numbers of individual transitions between pairs of housing consumption alternatives, some of which transitions increase and others of which decrease the proportion in a particular type of unit.

By modeling changes in cohort housing consumption over time, the cohort approach transforms the relationship between housing consumption and its other determinants. Here, cohort housing consumption is determined by cohort housing consumption in the previous period, as well as changes in the other demand and supply determinants, labor force participation, family or social ties, expectations of moving, age, current income, expected future income, assets, and housing prices. With the exception of housing prices, all of these determinants tend to

vary systematically and predictably with age, although the only exact relationship is between age and itself: labor force participation and current income normally increase sharply in early adulthood and decrease steadily around retirement age, family ties evolve in a complex manner, mobility expectations decline, expected income rises sharply then gradually declines, and assets tend to increase at least through retirement age.

As a result of these sytematic, but less than exact, relationships between age and changes in the determinants of housing consumption there is a strong tendency for the changes which occur at each age to exhibit regularity from cohort to cohort and, therefore, their total impact on changes in housing consumption will also tend to be similar. Moreover, these characteristic rates of change, or transition, in consumption will vary systematically among different ages. Thus, for example, a long succession of cohorts in their twenties have experienced increases in current income and assets which have enabled a high proportion of them to become homeowners by age 30. The regularity, and hence the predictability, of these changes at each age for different cohorts is the basis for including a life-cycle dimension in the cohort approach.[20]

To summarize, according to the cohort approach, the consumption of housing by the population in a particular age group at a particular time is equal to the cohort's previous consumption of housing modified by a set of consumption transition rates; these transition rates vary systematically with the age of the cohort and over time with other, non-life-cycle fluctuations in the determinants of housing consumption.

How do the net transitions in cohort consumption vary among age groups? In the period from 1960 to 1975, the only years for which data are available, the following patterns have prevailed:

Household headship has increased rapidly early in adulthood (through age 30) and risen less and less rapidly at older ages through at least age 80 to 84; it has fluctuated just below unity for married couples past age 30.

Rental occupancy has declined at all ages except the youngest (under 20) and oldest (over 75); it has declined sharply, mainly among married couples, between ages 20 and 30, then moderately through age 65 and thereafter negligibly through the early 70's; its increases before age 20 have been rapid and after age 75 have been slight.

Home ownership has increased most rapidly for cohorts in their 20's and less rapidly at successively higher ages, with most of the increase past age 40 concentrated in the never married and previously married population.

Single-family occupancy has increased in parallel with home ownership, although at a slower pace.

Apartment unit occupancy has paralleled rental occupancy, although at lower levels.

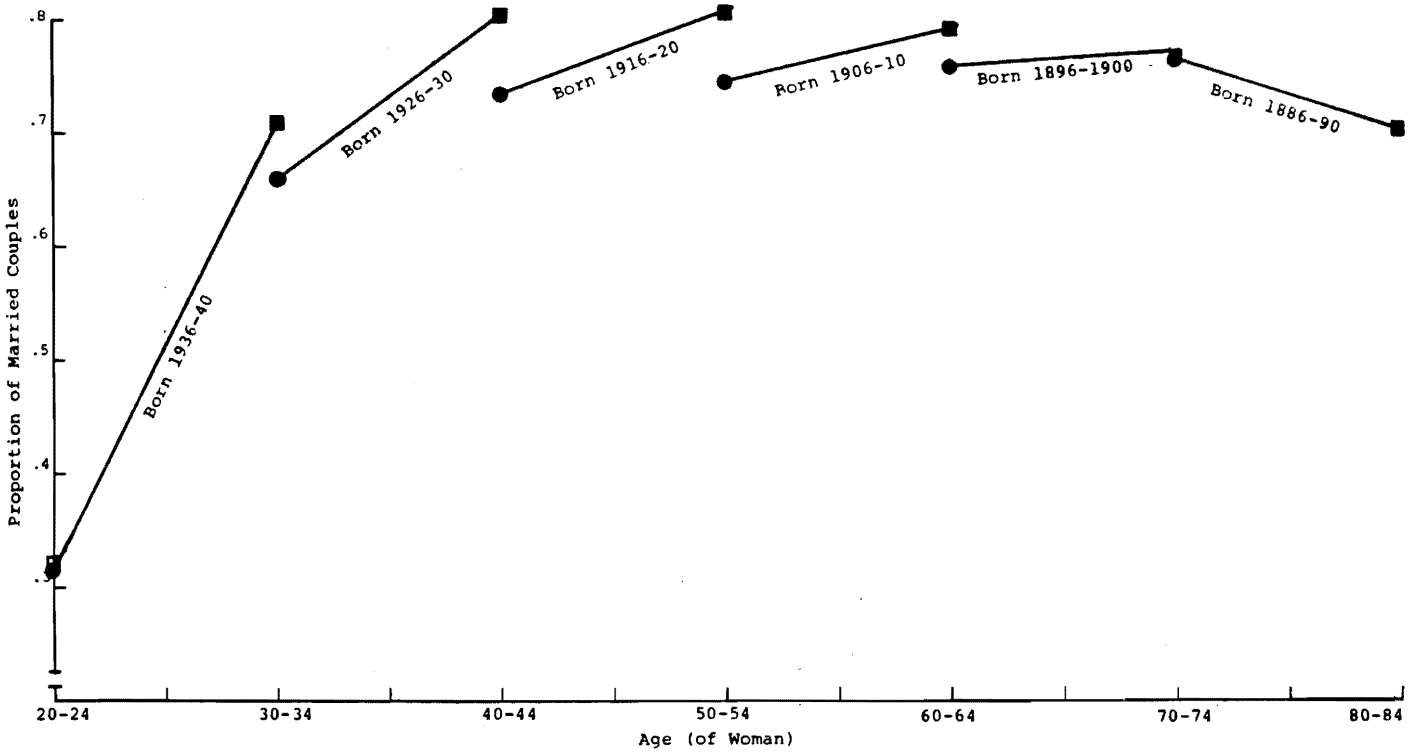
Size of unit occupied has grown steadily through age 35 and more slowly during the next ten years; beyond age 55 it fell during the 1960s, but not in the early 1970s.[21]

Thus, early in the life course, through age 35 or so, typical net transitions in housing consumption are especially rapid. At these ages, life-cycle events which affect housing consumption normally occur with considerable frequency: breaking away from the parental home, completion of education, settling into a job or launching a career, marriage, rising income, birth and growth of children, etc. Moves are made with relative frequency at this stage in order to adjust housing consumption and as a result, continuity in cohort housing consumption is caused more by the progression of housing consumption standards, from non-headship, to rental occupancy to ownership to larger units, than by actual immobility.

Later in the life course typical net cohort transitions in housing consumption are much more moderate. Important life-cycle events, the departure of grown children from home, major changes in income, retirement, disability, widowhood, etc., on average occur at much wider intervals than those of early adulthood. Mobility for the purpose of altering housing consumption declines. Consumption adjustments and mobility are further retarded at successively older ages by the increasing real and perceived costs of moving. The steep decline in mobility at higher ages is seen in Table 2, above.

Thus, as age increases, the factors which determine individual housing consumption change less frequently and fewer moves occur in response to the changes which do occur. As a result, net cohort transitions in housing consumption tend to become more gradual, or flatten, as cohorts progress through their life cycle. This pattern can be clearly seen in Figure 1, which shows the net transitions in home ownership for cohorts of married couples (women) between 1960 and 1970. Each line traces the proportion of married couples in a five-year birth cohort who owned their own home at different ages. The trajectories are clearly steepest before age 30 and level off markedly thereafter. As a rule the major dimensions of cohort housing consumption, headship, tenure, type of structure and size, exhibit increasing period-to-period stability at successively older ages.

Figure 1. Proportion of Married Couples Who Owner-Occupy Housing, by Age: Alternate Cohorts, 1960 and 1970



The life-course transitions in housing consumption we have discussed are assumed to be "typical" and, it is important to note,the actual transitions in any period may be altered by fluctuations in the determinants of housing consumption that are unrelated to the life-cycle. Such fluctuations include variations in income, assets and prices due to macro-economic conditions, changes in housing supply due to changes in building technology and changes in labor force participation due to secular changes in the structure of the work force. Because these fluctuations are limited to a particular period, their impacts can be termed "period effects," as distinguished from the impacts of lagged consumption, which can be termed "cohort effects," and the impacts of normal life-cycle events, which can be termed "age effects."[22]

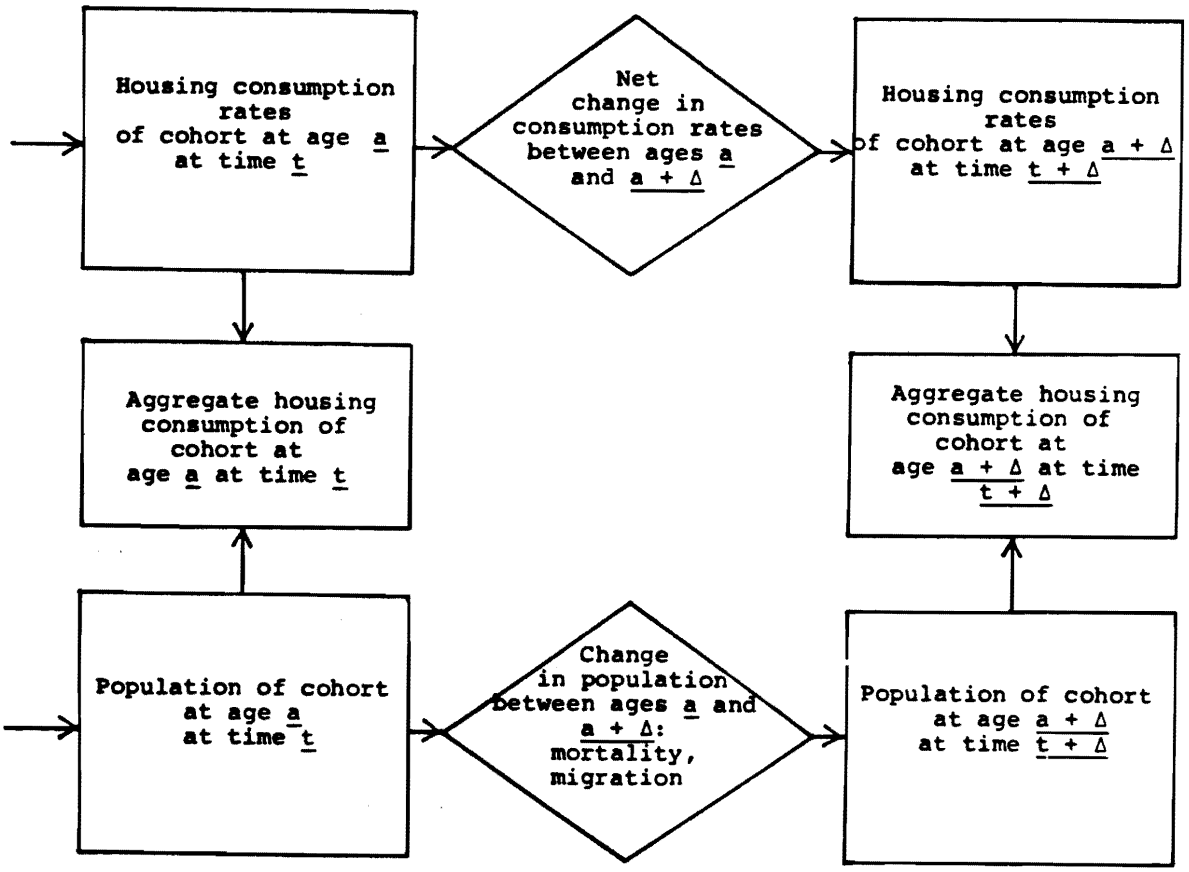
Although there is an approximate pattern of net transitions in housing consumption experienced by succeeding cohorts as they reach a particular age, the exact pattern of net transitions for a cohort is also conditioned by incomes and supply and price conditions in the housing market areas in

which the cohort is located. It is therefore not possible to observe a single set of "normal" net cohort transitions that can be projected to recur in the future. The net transitions at a particular age will be more nearly similar for succeeding cohorts the more nearly are the other factors the same for the different cohorts at that age.

Techniques for identifying and controlling for atypical period effects are considered later in this Section.

The relationships between housing consumption for a cohort at different dates in the simple cohort approach developed so far are summarized in Figure 2.

Figure 2



D. Marital Status, Sex and Family Size

In the simplified cohort approach described above the effects of all the determinants of housing consumption, other than age, are modeled implicitly insofar as they can be described by age and cohort effects. Each cohort is treated as if it were a homogeneous group. A more elaborate approach is now developed to reflect some of the important dimensions of diversity within cohorts. This approach attempts to capture variations in housing consumption associated with differences in the demographic variables, marital status, sex and family size. A number of considerations lead to this particular selection of variables from among the determinants of housing consumption.

First, each of these variables is associated with significant differences in both preferences and the other determinants of housing consumption. As a result, at any time, there are large variations in housing consumption patterns among different marital status, sex and family size groups. In many cases these variations are so substantial as to indicate that families or individuals who move from one group to another normally adjust their housing consumption in accordance with their new circumstances. For example, since large families typically have larger houses than young married couples without children and since almost all large families passed through a stage of being young couples without children, the observed differences in housing consumption between large families and young childless couples must be due to families adjusting their housing consumption as they grow. An especially significant set of adjustments are those associated with marriage: two individuals, who potentially head separate households, normally occupy a single housing unit that is larger than either would occupy alone. Thus, marriage and divorce have powerful impacts on the number and character of "housing consumers" in a cohort.[23]

A second reason for focusing on demographic variables is their ability to "trace" distinct subgroups within cohorts over time. Although it is not possible to follow a particular individual or family between censuses or surveys on different dates, the high degree of continuity in sex and, past a certain age, marital status groups, makes it possible to use sex and marital status to follow behaviorally distinct subgroups within cohorts over time. It is therefore possible to identify, to a reasonable approximation, net consumption transitions of cohorts of married couples, single women, etc.[24] To the extent that these transitions differ among demographic subgroups at a particular age, and our research indicates that they do, this demographic disaggregation strengthens the cohort approach.

Finally, because of welfare and distributional implications, there is interest on the part of policy makers in the housing consumption of different types of families. Legislative and administrative officials have been concerned with the housing patterns of single parent families, the elderly, large families and young couples. Were marital status, sex and family size groups within cohorts not treated separately, the cohort approach could not address these concerns.

For these reasons, each cohort's population is stratified into the following categories, which were selected with a view to both their numerical significance in the population and their distinctive patterns of housing consumption:

(1) Husband/wife with no children (under age 15) present
(2) Husband/wife with one child present
(3) Husband/wife with two or three children present
(4) Husband/wife with four or more children present
(5) Male never married
(6) Male ever married with no children present
(7) Male ever married with one or more children present
(8) Female never married with no children present
(9) Female never married with one or more children present
(10) Female separated, divorced and spouse absent with no children present
(11) Female separated, divorced and spouse absent with one child present
(12) Female separated, divorced and spouse absent with two or three children present
(13) Female separated, divorced and spouse absent with four or more children present
(14) Female widowed with no children present
(15) Female widowed with one child present
(16) Female widowed with two or more children present;

(In the empirical model we have adopted the convention of assigning married couples to cohorts by the age of the woman, rather than the man, due to the fact that data on childbearing experience provides an important link with family size. Also the woman is much more likely to survive into widowhood than the man.)

In the demographically disaggregated cohort approach these mutually exclusive groups within each cohort are treated separately instead of as a single large grouping. If, for example, cohorts with higher marriage rates own more one-family houses than those with lower marriage rates or cohorts with larger families on average choose larger housing units than those with fewer children this can be related to underlying differences in demographic patterns.

Once distinct marital and family status groupings emerge within a cohort, their housing transitions are separately modeled. Thus, the projected housing consumption of married couples with two or three children is derived by transforming the consumption of married couples with two or three children in the previous period by a set of net transitions that are specific both to the age in question and to couples with two or three children: each marital status-family size grouping is "linked" to the same grouping in the preceding period. The schematic diagram of the method shown in Figure 2 is now understood to refer to a particular marital status, sex and family size grouping within a cohort. (The complete diagram of the method would, of course, replicate this scheme for each demographic group at each age span in the life cycle.)

The demographic changes in the composition of the cohort group now include those resulting from marriage, divorce, widowhood, childbearing and children leaving home, in addition to mortality. It was argued above that there is a high degree of continuity or "inertia" in the housing consumption choices of families and individuals through their life courses. To what extent them, it might be asked, do shifts in the composition of cohort subgroups due to marital and family status changes tend to distort the apparent consumption transitions of these subgroups? In other words, if the new entrants into a cohort subgroup retain their housing consumption from before the shift, it might appear to be a transition in the consumption of the original members of the subgroup.

As a rule, distortions of this kind are likely to be minimal. One of the main reasons for splitting cohorts this way in the first place is that individuals and families experiencing life-course transitions in marital and family status adjust sharply their consumption patterns in accordance with their new status, i.e., so that they resemble the previous members of their new subgroup. Housing consumption patterns seem to be especially responsive to the shifts of marriage, family growth and divorce.

However, to the extent that families' and individuals' housing consumption responds less than completely to such shifts, there will be a distortion of the receiving subgroup's cohort transitions.[25] The possible severity of such distortion depends on the stability over time in the membership of the subgroup. There is a high continuity of membership in many subgroupings due to the pace of demographic transitions that govern the entrances and departures:

The never married group experiences only outflows, which are especially heavy in the early adult years. The married group receives large inflows in the early adult years and steady outflows to divorce in the early and middle years and to widowhood in the middle and late years; in the early and middle years there is also an expansion and contraction of family size, moving couples from smaller to larger, then from larger to smaller size classes.

The separated, divorced and married spouse absent group initially is dominated by inflows of formerly married and is the source of substantial but smaller outflows of remarried individuals but becomes far more stable at older ages due to lower rates of divorce and remarriage.[26]

The widowed group receives large inflows in the middle and late years, but the fraction of the group who have been widowed for less than five years declines below one-third after age 65.

All of the groups experience increasing outflows due to mortality at later ages.[27]

Where the continuity of membership in a cohort subgroup is high, it ensures the validity of a model which treats their housing transitions separately from other groups in their cohort.

There are however two major inter-group population flows, both past the middle of the life course, where consumption often does not adjust to the new status and the shift is large relative to the size of the receiving group. Married couples making the transition to the "empty nest" stage and individuals who enter widowhood usually keep the dwellings they occupied before the transition.[28] So that the consumption transitions of widows and no-child couples accurately reflect the retention of housing standards established earlier in life, the model links housing consumption patterns across subgroups at a particular age for each of these cases. Thus, the housing of married couples age 45 to 49 years with no children present under age 15 is linked to the consumption of all married couples age 40 to 44, five years earlier instead of to that of 40 to 44 year olds without children (who include a disproportionate number who never had children); and the consumption of widows age 50 to 54 is linked to that of all widows and married couples in the cohort five years earlier.[29] With this important modification the observed net cohort transitions of the marital status, sex and family groups correspond closely to the actual transitions made by the families and individuals who remain in the groups from period to period.

E. The Housing Consumption of Young Adults

The cohort approach to modeling housing consumption is most useful for tracing the evolution of housing patterns that have already been established in the housing market by cohorts. Younger cohorts, those under age 15 or 18, have not yet entered the housing market on their own and are still living in households headed by someone else, usually their parents. In a sense they have no housing consumption patterns of their own beyond those experienced in their parental homes (which may, of course, affect the formation of their preferences for different types of housing). As a result, once they do enter the housing market, the consumption of new cohorts of adults is dominated by the transitions made in one period, because the base of the change (transition) is essentially zero. For example, the cohort who was age 15 to 19 in 1975 had a headship rate of 11 percent at that time, an infinite increase over their headship rate of zero percent in 1970 and the cohort who was age 20 to 24 in 1975 had a headship rate of 62 percent at the time, over a 500 percent increase from their headship rate of 10 percent five years earlier. At least through age 25 and through age 30 for certain dimensions of housing consumption (e.g., home ownership) the normal net cohort transitions are so great relative to starting consumption levels that there is effectively no difference between modeling cohort transitions and the period rates of consumption at each age (i.e., since $0 + \Delta = \Delta$).[30]

Given the high rates of mobility and the speed of transitions relative to initial levels in early adulthood, a behavioral model which incorporates determinants of consumption other than lagged consumption, marital status, sex and family size is required. For the young, there are no cohort effects, only period effects, which become the next period's cohort effects. Until such a model can be developed, the use of constant or trended period rates is the best method available for describing consumption before age 25 or 30. In the projection model a cut-off of 30 years is used.

As aggregate housing consumption is projected over a longer and longer range, the future consumption of cohorts who have not yet entered the housing market plays a larger and larger role. Once the initial consumption pattern of a cohort is determined the pattern serves as a starting, or "jumping-off," point for all further transitions for the cohort. If a similar launching point is used for successive cohorts its effects on aggregate housing consumption tends to be cumulative, shaping the consumption of a progressively larger number of cohorts as projections are extended into the future. Long-range projections by the cohort method we have developed are therefore especially sensitive to the behavior of cohorts who will start their housing careers in the future.[31]

F. The Working of the Model

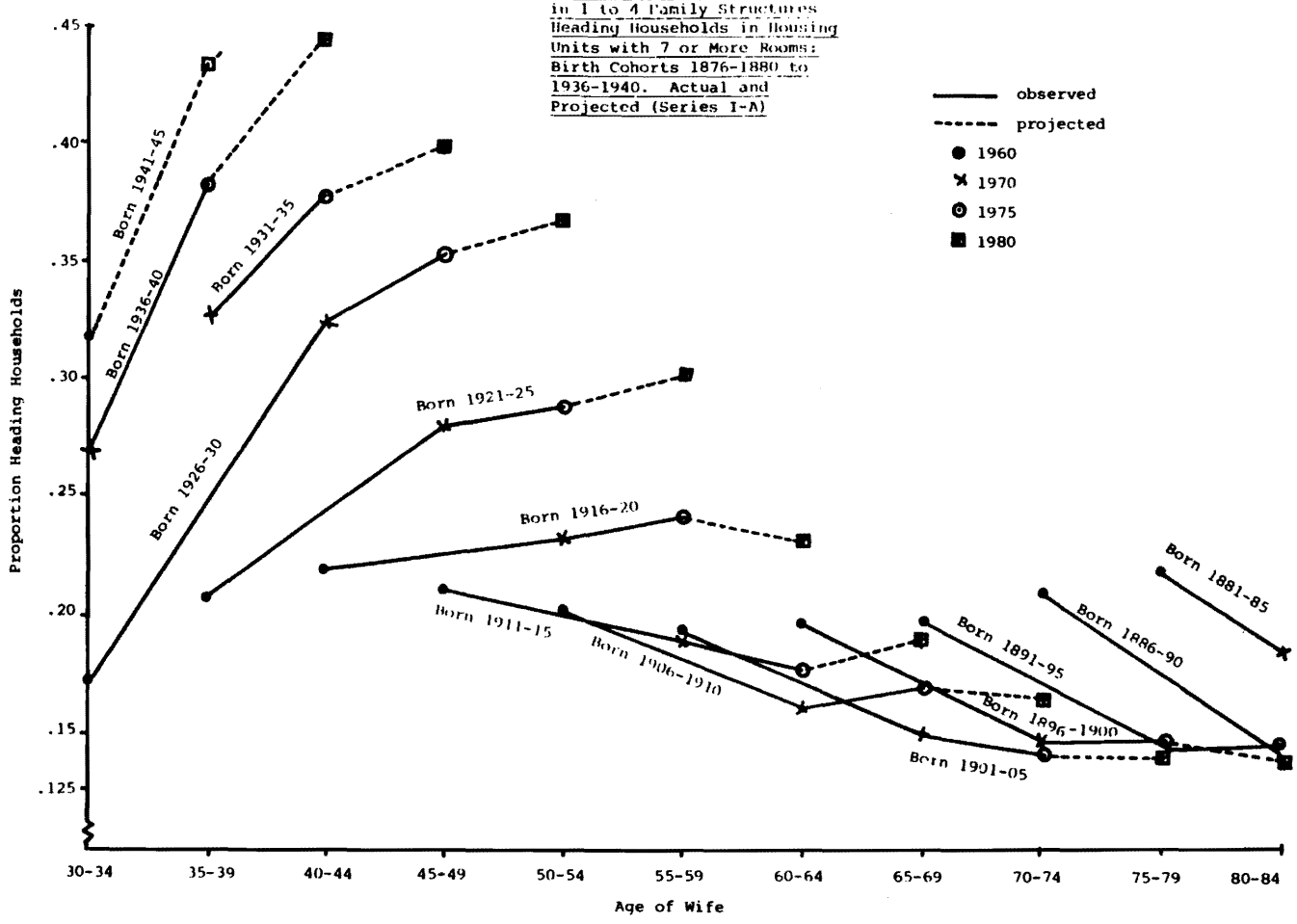
Figure 3 illustrates the cohort approach to analysis and projection for the case of married couples heading households who live in large units, with seven or more rooms. This graph shows how, during the 1960s, successive young married cohorts (according to the woman's age) sharply increased their consumption of large units and how, during the early 1970s, later cohorts continued to increase their consumption at approximately the same rate at each age. Because of the rapid rises during the 1960s the starting point for each cohorts in 1970 was much higher than the starting levels for cohorts at the same age at the beginning of the 1960s. The rates of net transition correspond to the slopes of the solid lines connecting the observed rates in 1960, 1970 and 1975 for each cohort. If allowance is made for the fact that the lines for the 1960s combine two five-year transitions,[32] the slopes of the observed transitions are seen to be quite similar across the different ages up to 45 to 49, and therefore provide a consistent indicator of transitions in this age range.

Since the cohort approach to modeling housing consumption is based on the similarity of the transitions made at each age by different cohorts, the approximate stability of these rates for a period of 15 years confirms the usefulness of the approach. A systematic comparison of the key transition rates in the 1960s and early 1970s reveals a high degree of consistency in most of the rates at a given age and marital status.[33]

From Figure 3 it can also be seen that the consumption rates, or the levels of the data points and connecting lines, differ substantially between cohorts at given ages in the lower half of the age range. Such variations reflect differences in the housing consumption "legacies" of cohorts due to differences in housing market conditions, incomes, etc., earlier in their life course. The existence of substantial inter-cohort variations in the levels of consumption at particular ages further confirms the usefulness of the cohort approach, since this approach is needed to carry forward these differences to later ages.

Our survey of housing consumption patterns in the 1960-1975 periods reveals substantial inter-cohort diversity in many dimensions. In general the most pronounced inter-cohort differences in housing consumption are found between the cohorts born before 1925 and those born after 1930, although there is also substantial variation within these two broad groups of cohorts.

Figure 3. Proportions of Married Couples in 1 to 4 Family Structures Heading Households in Housing Units with 7 or More Rooms: Birth Cohorts 1876-1880 to 1936-1940. Actual and Projected (Series I-A)



In sum, the cohort-to-cohort consistency of transition rates (age effects) and the cohort-to-cohort diversity of consumption rates (cohort effects) strongly support of the simple cohort approach proposed here: together these patterns imply that succeeding cohorts as they age will trace out approximately parallel consumption paths, or trajectories, at different levels, with the same shape.

There are, however, some exceptions to the regularity of transition rates. The most significant of these is shown in Figure 3, which shows substantial changes between the net transition rates observed at ages over 50 in the 1960s and those observed in the following five years: while the cohorts born before 1910 and especially those born before 1900 on net moved out of large housing units at a significant rate in the earlier period, the out-movement all but stopped in the later period. Acording to the behavioral theory, the deceleration in "trading down" is attributable to differences in the income of the cohorts, housing market (supply) conditions, etc., in the two periods, for marital status remains unchanged, by definition. In other words, the period effects differ.

A more sophisticated version of the cohort approach is required to model behaviorally such intertemporal fluctuations in transition rates. Because only two sets of observed transitions can be derived from presently available data, it is not feasible to model statistically these fluctuations.[34] For this reason the authors intend to study the sensitivity of important transition rates to variations in the other determinants of housing consumption by estimating a cross-SMSA model of net cohort consumption transitions. The parameters of such a behavioral model can be used to infer the causes of intertemporal fluctuations in national transition rates and also, for projection purposes, to infer the effects on housing consumption of hypothetical future changes in incomes, prices, etc. They can also be used to model the consumption of adults too young to have formed cohort patterns.

Until such a model can provide estimates of long-run "normal" transition rates,the appropriate modeling strategy is to measure the range of observed cohort transitions rates. As the number of observations of these rates increases, both their expected values and averages can be estimated more accurately. In our application of the approach to projections, the two sets of transition rates, 1960 to 1970 and 1970 to 1975, are used to generate separate projection series which indicate a range of possible future consumption.

The use of the cohort method to project housi. consumption to 1980, using the 1970-1975 transition rates, is illustrated by the dotted lines for each cohort. These dotted lines are parallel to the solid lines for the next earlier cohorts at different ages. In this example it is clear that the cohort born 1916-1920 would have to "trade down" to smaller housing units at an apparently unprecedented rate in order to reduce its consumption of large units to the level of 1911-1915 cohort at age 60 to 64 or to the level of any reasonable extrapolation of the period rates observed at that age.[35]

In situations such as this, where succeeding cohorts have very different patterns of housing consumption at a particular age, projections made using <u>any</u> observed cohort transition rate will diverge from projections made by other methods and in general, will be far more plausible. Moreover, under these conditions, the discrepancy between projections by the two approaches increases markedly with the length of projection, affecting progressively more cohorts as the projection lengthens.

In order to extend these illustrative projections to 1985 or beyond it is only necessary to apply the next age-interval's transition rates from the base period to the projected 1980 consumption rates of each cohort. Thus the transition rates at different ages are linked together to obtain the total transitions over longer periods. <u>For this reason, the approach can be described as one of age-linked extrapolation of net cohort transition rates.</u>

Having described the working of a simple cohort model of housing consumption and indicated how it can be used to generate meaningful projections, we turn in the next two Sections to consider the substantive inputs to the projections, namely the transitions in cohort housing consumption observed between 1960 and 1975 and the detailed projections of population in different age, marital status, sex and family size categories.

III. Cohort Trends in Housing Consumption, 1960-1975

The first empirical application of the cohort approach to housing consumption is our analysis of net cohort consumption transitions during the period 1960-1975. In this section we summarize the major findings of this analysis. The set of transition rates observed in this period serves as the basis for the long-term projections. The second set of inputs to the projections of aggregate housing consumption are the population projections, which enable us to convert individual consumption rates into total numbers of occupied units. In the next section we summarize the methodology used to project the population.

To the extent that these observed transition rates embody ephemeral period effects, due to fluctuations in housing prices, incomes, etc., the actual future course of housing consumption will differ from projections based on the unadjusted past rates. Therefore we also survey the main factors that may have contributed to important period effects on consumption transitions between 1960 and 1975. These factors provide the analyst with valuable clues about possible deviations from projections based on past transition rates.

Before we discuss the cohort consumption trends, the nature of the data on housing consumption and the trends in aggregate housing consumption should be noted. A family's or individual's housing consumption in previous periods has been seen to be both a key determinant of its current housing consumption as well as an indicator, or proxy measure, of other important determinants. To model the relationship between an individual's past and present housing consumption one must have panel data on individual consumption over time. Some data of this type is available, but it is too limited in scope to provide a basis for long-run projections.[36]

For the population as a whole, however, age provides an indicator which enables us to track over time the housing consumption of groups of people who were born in the same year, or birth cohorts. Provided only that age is reported accurately, all of the individuals who were a particular age in 1975, for example, were five years younger in 1970; thus a cross-sectional data base, the 1970 Census, contains information on the previous period's housing consumption for birth cohorts in particular five-year ago intervals as of 1975, given that a "period" is defined as five years.[37] This empirical approach requires a sufficient number of time points, and adequate detail with respect to data on age, marital status, family size and housing characteristics for clear trends to be discerned over the life courses of different cohorts. These data requirements

for pursuing cohort analysis of housing consumption are sufficiently, although not ideally, met in the record of the U.S. experience. While the kinds of data needed for this type of analysis have been collected in the U.S. decennial censuses sufficiently far back in time, the necessary detail in cross-tabulation of variables has not been published, and it is only for the 1960 and 1970 Censuses that 1:100 samples are available on computer tape to be appropriately retabulated. Beginning in 1973, the Annual Housing Survey became available, giving a data point for the mid-1970s.[38] The three data points, 1960, 1970 and 1975, provide a valid, though far from ideal, statistical basis for estimating net cohort transitions. In order to obtain as much information as possible about period-to-period variations in transition rates, these rates are separately measured for the periods 1960 to 1970 and 1970 to 1975.[39]

Major changes in total housing consumption took place between 1960 and 1975 (Table 1). The rapid increase in the overall number of housing units that occurred in the 1960's accelerated in the first half of the 1970s. As the result of more rapid growth, owner-occupied units increased from 61.8 percent of the stock in 1960 to 64.7 percent in 1975. Among structure types, single family homes accounted for more growth than all other types of structure combined. In terms of percentage gain over previous levels, the largest increase over the 15-year period was in mobile homes, which grew over 340 percent, and apartments in buildings of five or more units, which grew by 88 percent. Small units of under five rooms increased only modestly, by a little more than four million units. Larger units of five or more rooms on the other hand increased by fully 15.5 million units, rising from 61 percent to almost two-thirds of the total stock. In all but two of the nine structural characteristics of the housing stock appearing in Table 1, the rate of growth was significantly faster in the 1970-75 period than in the pre-1970 period. The two exceptions are 2-4 family houses, which grew at a rate in the 1970s that was not quite half the rate of growth of the 1960s decade, and apartment houses, which increased at a more than 50 percent greater pace in the 1960s than the early 1970s.

One significant factor underlying the growth in total housing consumption was the increase in young adult population that occurred between 1960 and 1975. During this period the first wave of the baby boom cohorts born after World War II entered adulthood.

According to the cohort model, the other major determinants of changes in aggregate consumption are the net cohort transition rates at different ages. There were six important deviations

of the 1960 to 1975 patterns of cohort rates of transition from the observed age-to-age patterns at a point in time. These deviations indicate major changes in the housing consumption of broad age groups.[40]

A. Higher Household Headship

Among never married and previously married individuals and heads of families there was a strong, consistent trend toward higher headship rates (proportion heading own household) among later cohorts at each age. Also, among the same groups, the within-cohort net transitions to headship at each age tended to be slightly more rapid toward the end of the 15-year period. As a result of these complementary shifts, the cohort model implies a continuation of increases in headship at all ages.

Similar patterns obtain for young and old married couples (woman under age 30 or over age 70), but not for the large, intermediate group of married couples, for which almost universal headship is the rule and among which there were no important inter-cohort divergences in headship rates.

B. Higher Rates of Home Ownership

Within all marital status groups, including married couples, higher proportions of later cohorts attained owner-occupancy than had earlier cohorts at each age. Only young never-marrieds (under 30) did not share in this rise. On average the cohort transitions to owner-occupancy at different ages were somewhat faster after 1970 than before. As for household headship, the cohort model implies continued future increases in the proportion at each age who are owner-occupants.

A very different, but complementary, pattern of transitions occurred for occupancy of rental housing units. While there was a pronounced upward trend from cohort to cohort in the proportion of renters at each age for young never-married individuals (under age 45) and a moderate trend in the same direction for old (over 70) never-married and previously married individuals and heads of families, these shifts were more than offset by steady cohort-to-cohort declines in renting by married couples at all ages.

C. Move to larger Units

Changes in the distribution of households among different sized housing units were dominated by the changes shown for large units occupied by married couples in Figure 3 above. During the 1960s, among cohorts of married couples who were younger than 45 (woman's age) in 1960, there was a sharp cohort-

to-cohort move toward large, seven or more-room housing units and a complementary strong move out of small units with fewer than five rooms. Simultaneously, older cohorts were moderately reducing their consumption of large units and maintaining their occupancy of small units. In contrast to this pattern, during the 1970s the younger cohorts of married couples continued their shift from smaller to larger housing units, while the older cohorts ceased moving from larger to smaller units. These patterns were also reflected in the transitions of elderly widows. Because the transitions of the older generation tended to cancel out those of the younger generation during the 1960s[41] but not during the 1970s, the net effect of the 1970-1975 pattern of transitions is a much more rapid movement to occupancy of large units. It should be noted that the great majority of large housing units are in single family owner-occupied structures.

D. Decline of Small Single-Family Houses

Although the shift away from small size 1-family units is part of the broad movement from smaller to larger units, it is more extreme than the overall general tendency to shift away from small units. The general trend combines opposite and unequal trends toward small apartments and away from small houses. This latter type of unit was the only type studied which fell in absolute numbers between 1960 and 1975 in spite of the substantial increase in households and population. This steep drop in consumption was largely concentrated among the cohorts of married couples and previously married individuals who were over 55 years old in 1960 or single individuals of any age. Recurrence of these past cohort consumption transitions would lead to much lower consumption of such small houses at successively older ages, the greatest declines resulting from the 1970-1975 regime.

E. Increase in Apartment Units

Over the 15-year period steep cohort-to-cohort rises in consumption of apartment units occurred among young married couples (under 30), individuals younger than forty and all marital status groups older than 70. Couples and individuals in the intermediate age categories experienced much more modest increases, and, in some instances, marginal declines. On average for all groups the pace of cohort transitions to apartment units was notably faster in the first decade than over the last five years.

F. Emergence of Mobile Homes

Between 1960 and 1975 the mobile home first emerged as a major type of structure: the proportion of all households occupying mobile homes more than tripled, from 1.4 to 4.6 percent. This expansion was made up of an across-the-board increase in consumption of mobile homes by all marital status groups at all ages. It accompanied the emergence of the manufactured housing industry which, during these 15 years, maintained an average annual rate of production equal to 12 percent of the stock of existing occupied mobile homes.[42] The period was also one of rapid technological innovation in the industry. Thus the more than tripling in the consumption of mobile homes reflects an adaptation to a new consumption alternative rather than a set of "normal" life-cycle transitions.[43] The leveling off of the trend in mobile home shipments since 1974[44] suggests that the stage of most rapid diffusion may now be past and that the market for mobile homes is near a point of saturation after which consumption rates at a particular age will increase less rapidly from cohort to cohort. The cohort transitions observed through 1975 do not reflect such a retarding of the rate of diffusion.

G. Period Effects on Consumption

We have argued that these patterns of change in housing consumption were shaped by three forces: established differences in housing consumption across cohorts, normal cohort rates of net transition of housing consumption and period effects that are peculiar to one time span. Although historical changes in such factors need not presage future changes, it is useful to indicate the apparent effects of the main features of the 1960 to 1975 period on past consumption transitions. A short survey can suggest the potential deviation of observed from "normal" housing consumption transition rates due to fluctuations in income, housing supply, prices or family size, although quantitative estimates of these impacts are not presently feasible.[45]

General growth in real income was especially rapid during the 1960s, when the mean income of men over 14 years increased at an average annual rate of 2.5 percent and that of all families at a rate of 3.3 percent. During the five years from 1970 to 1975 the comparable rates were 0.1 and 0.6 percent respectively.[46] These increases contributed to the growth in household headship and home ownership and the movement toward larger units, and out of small, one-family houses, having their largest impact before 1970.[47]

Income redistribution via the Social Security and welfare systems disproportionately lifted the real incomes of the population with the lowest incomes. During the 1960s the real income at the 20th percentile of the income distribution for women over age 65, a measure of the incomes of those with the least income, rose at an average annual rate of 3.9 percent and over the next five years at a rate of 6.4 percent.[48] These above average income increases enabled a steadily larger proportion of elderly widows and divorced women of all ages to maintain their own households and ownership of their units, thereby contributing to the overall trend to greater household headship and home ownership.

Favorable supply conditions for rental apartments resulted in a high rate of new production of such units (in five or more-unit structures) coupled with only moderate increases in real rents. New production of rental apartments averaged approximately 4.7 percent of the existing occupied stock of such units each year between 1960 and 1970 and 3.7 percent between 1970 and 1975, while the constant dollar median gross rents of 1 to 4-room apartments in metropolitan areas rose at annual rates of only 1.7 and 0.6 percent during the same periods.[49] These supply conditions were conducive to the trends toward occupancy of apartment units and higher household headship rates, especially during the 1960s.[50]

Growth in the values (prices) of large single family units, at an average rate, relative to all goods other than housing, of 2.7 percent per year occurred over the 15 year period.[51] These increases stimulated demand by consumers who could afford the out-of-pocket costs of such units, since rises in value are expected to be recouped when the house is ultimately sold. For some periods of as long as five years, appreciation in value has apparently exceeded the typical current out-of-pocket costs of purchase and occupancy.[52] These conditions contributed importantly to the trend toward occupancy of larger owned units and away from small one-family houses, and also possibly to the trend toward home ownership.

Growth in the values of medium-size single-family units, at an average annual rate of 4.1 percent between 1970 and 1975, in constant dollars, favored the expansion of home ownership at the expense of rental occupancy for the same reason as appreciating values stimulated consumption of larger units.[53]

Following the high birth rates of the 1950s and early 1960s and the subsequent decline, the size of families headed by young adults increased between 1960 and 1970 and fell during the next five years.[54] Since larger families are more likely to own their homes and to live in more spacious housing units

than smaller families,[55] these changes in family size contributed to the more rapid transitions to home ownership and into large units during the 1960s, but thereafter had less of an effect.

Although other forces also influenced net consumption transitions between 1960 and 1975, these factors appear to have played a dominant role in shaping the "period effects" of the recent past. Variations in the main factors probably also account for much of the observed differences in cohort transitions between the 1960s and early 1970s. This brief survey of the major sources of past period effects provides a context for assessing qualitatively the possible impacts of future changes in the determinants of consumption. (Condominium conversions did not emerge as an important phenomenon until after 1975. Their effects on the projections are discussed below in Section V-C.)

The cohort rates of net transition in housing consumption are a necessary input to the projections; the population projections are the other necessary element. In the next section we describe the methodology of the population projections. Readers who are not interested in the working of the demographic model may wish to skip reading this section.

IV. Population Projections

To project total housing consumption from the consumption rates of families and individuals requires detailed projections of the number of consumers in each demographic category. The range of population projections used here describes both the age structure of the future population and its distribution by sex, marital status and family size.

All of these population characteristics are associated with variations in housing consumption. Their distributions have been undergoing rapid changes in the past decade and may be expected to continue to change in the next few decades.

A. Trends in Fertility, Mortality and Age Structure

In constructing alternative projection series, the aim has been to select trends which represent modest but significant departures from present levels, to help us see whether such reasonable variation in demographic trends is important for the conclusions we reach about housing consumption. The purpose of the alternative projection series is to facilitate such a sensitivity analysis, and not to establish a "safe" range of forecasts *per se*. Actual trends, particularly toward the end of the projection period, could move outside the range established by our projection series.

The population projections contain three series based on high, medium and low assumptions about future trends in marriage and fertility. Four steps are involved in making the projections: (1) projecting the population in each age group; (2) calculating family size (children ever born) for each cohort of women; (3) estimating the marital status trend for each cohort; and; (4) estimating the actual presence of own children under the age of 15 in the household at each age in the life course of the cohort. While each of these steps is done independently, the high, medium and low series match up consistent assumptions about each variable. For example, the low fertility series is combined with the low marriage and high divorce series when producing the low population series.

Three fertility levels are chosen to project the number of individuals of each age at five year intervals between 1975 and 2000. The medium level reflects the current fertility rate of approximately 1.8 births. A low series based on a total fertility rate of 1.5 and a high series based on a rate of 2.1 children per woman reflect the impact of variations in fertility over a range that is reasonable in the short run yet substantial enough to result in significant variation in population structure.[56]

With regard to mortality, the projections assume the same ultimate level of life expectancy as employed by the Census Bureau, but accelerate the rate of increase so that this level is attained by 2025 rather than 2050 in the Census Population Series 2 (U.S. Bureau of the Census, 1977).

A comparison of the projection of males in the year 2000 in our medium and low series and Census Series II (medium) is shown in Figure 4 . This comparison shows both the effects of the alternative assumptions and methodology on the population already born in 1975 who are over the age of 25 in the year 2000, and the effects of alternative fertility assumptions affecting those under the age of 25.[57]

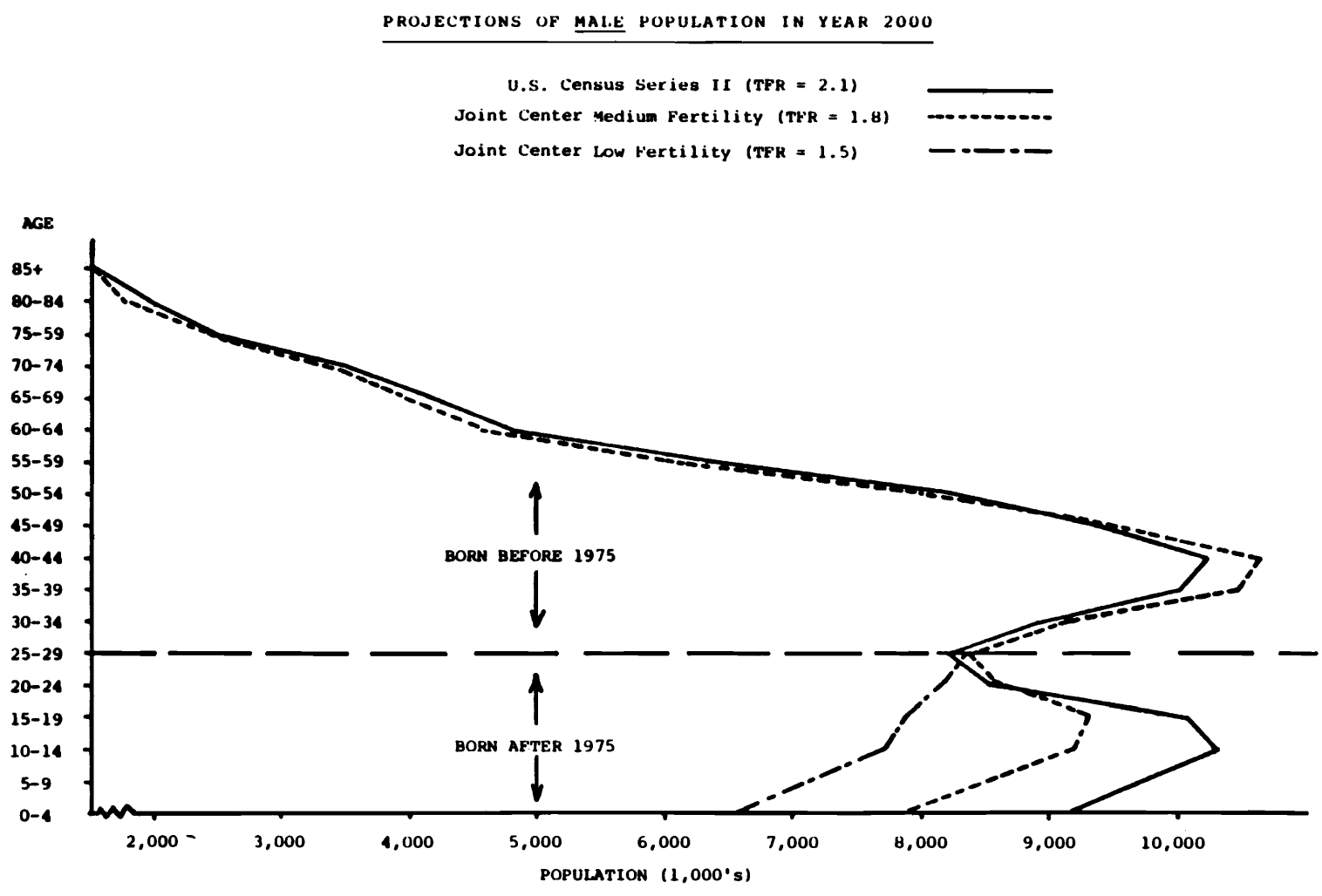
The large differences in the number of children under the three projection series will cause variation in the number of children in the household and affect housing consumption through the effect on type of housing chosen by families with different numbers of children. It will not be until the turn of the 21st century that these possible fertility differences will have a major impact on the number of new households being formed.

The influence of fertility trends on family size is evaluated by translating total fertility levels into parity distributions. Analysis of past cohort trends in cumulative fertility reveals both a high degree of association between early fertility and completed family size and between cumulative fertility at a particular age and the proportion of a cohort falling into each of four categories of children ever born (zero, one, two or three and four or more). Once fertility levels for each cohort at age 20-24 are projected these levels serve as the basis for estimating cohort cumulative fertility at later ages. The proportional increase in cumulative cohort fertility at each age is assumed equal to the average experienced by previous cohorts since 1890.

With estimates of cohort cumulative fertility at each age, parity distributions are estimated based on regression estimates of the observed past association between total fertility and the proportion of the cohort falling into one of the four categories of children ever born.[58]

The range of fertility used in the projections translates into parity distributions in which, under the low assumption, slightly over 50 percent of the lowest fertility cohort end up with zero or one child, under 40 percent with two or three children, and about 10 percent with four or more. Under the high fertility assumption 40 percent will have zero or one and 18 percent four or more children.

Figure 4. Comparison of Census Bureau Medium Population Projection with Joint Center Medium and Low Fertility Projection: Males in the Year 2000



B. Marital Status Trends

In order to project the future distribution of the population among marital status categories, the proportion of men and women never married is first projected for each age. Then the ever-married proportion is allocated among the widowed and the divorced or separated. The currently married is a residual category. The projected distribution among marital statuses is based on an analysis of the cohort trends in marital status for cohorts who married between 1890 and 1978.[59]

Never Married

The projections of future trends for proportions never married differ significantly for women and for men. For women there are three alternative trajectories: (1) a continuation of the trend to later marriage until the early 1980s, when the proportions never married level out; (2) a more immediate dampening out of the present trend, and; (3) a reversal of the present trend placing the future levels of proportions single close to their pre-WWII levels.[60] The low-marriage series results in 37.3 percent never married at ages 25 to 29 in 2000, compared with 28.4 percent in the medium series, 21.5 percent in the high marriage series and the actual (1978) level of 18.0 percent. The historical patterns and projected levels at selected ages are shown in Figure 5.

Marital status patterns for men are projected to be consistent with those projected for women: females "dominate" the system. By choosing the three paths for single women, and applying certain assumptions about the trends in the fractions of the ever married that remain widowed and who are divorced or separated at each age, the fraction of each age group that is currently married spouse present is derived as a residual. Those trends in the proportions of men never married were then chosen which, when combined with certain assumptions about the fractions widowed and divorced/separated/spouse absent, yield approximately the same <u>total</u> number of currently married men as currently married women in each year of the projection period.[61]

These trends in the proportion single men are plotted in Figure 6. Whereas only about 55 percent of 20-24 year old men were single in 1960, by 1995 we can expect this fraction to be somewhere in the range of 80 to 90 percent. Likewise, the upcoming marriage squeeze should affect the 25-29 year old men by raising the fraction of never marrieds from 28 percent in 1960 to between 45 and 60 percent by the end of the century.[60]

Figure 5. Observed and Projected Proportions Never Married Females, 1890 to 2000, Under High, Medium and Low Assumptions

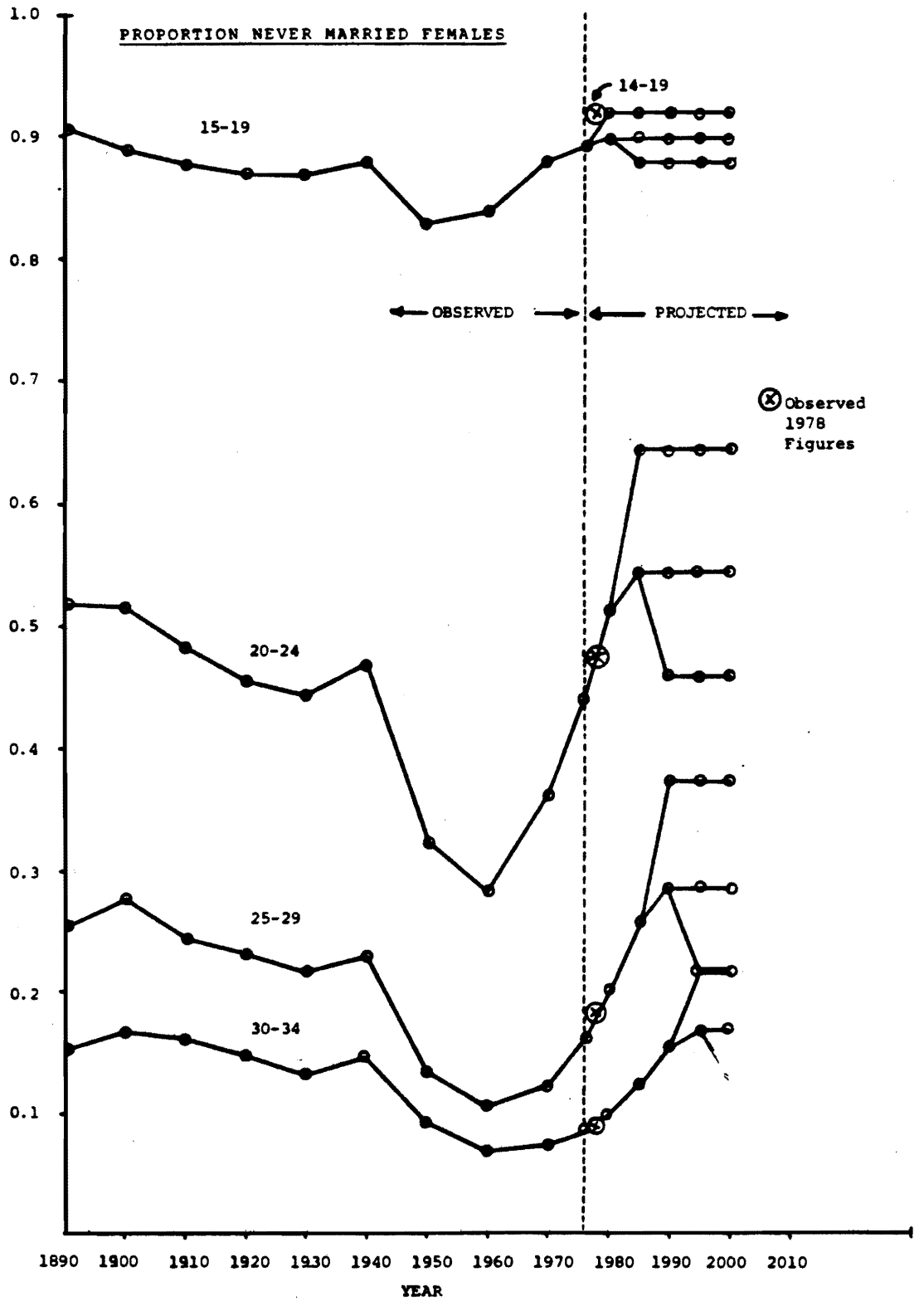
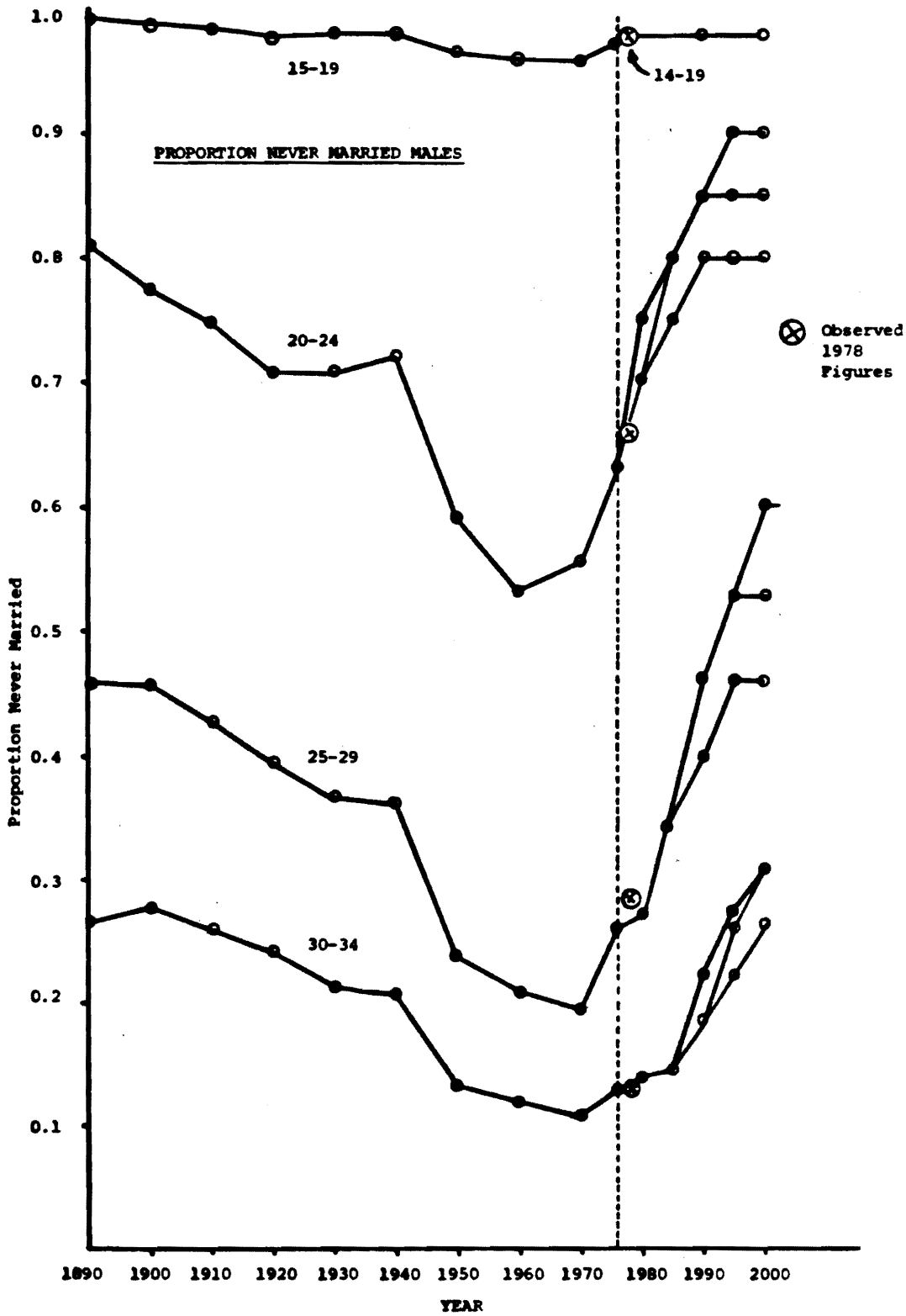


Figure 6. Observed and Projected Never Married Males, 1890 to 2000, Under High, Medium and Low Assumptions



Widowhood

In the projections, the proportions of ever married at each age who are widows are held constant at the 1975 levels. The fraction of ever married in the total population in 1975 who were widows was estimated by inflating the June 1975 CPS fraction by the ratio of total to household population of widows in the 1970 census. Cohort trajectories of the proportion of currently married plus widowed who were currently widowed in each age group 15-19 to 55-64 over the period 1860-1970 reveal that the decline in this fraction, which paralleled increases in life expectancy, had more or less leveled out for cohorts approaching the age of widowhood at mid 20th century. While it is true that life expectancy is projected to increase for both men and women, this trend is approximately cancelled out by an opposite trend in the remarriage of widowed persons.

Divorced or Separated

The cohort trends toward increasing divorce for both men and women are sufficiently consistent to justify only increases in the fraction of divorced or separated (or married, spouse absent) in the future. The assumptions of increases over 1976 levels (identical for each age group) are reported in Table 3 . The low divorce trajectory assumes increases in the year 2,000 of 1.35 times the 1976 levels for women and 1.65 for men. The high series places these ratios at 1.95 for women and 3.0 for men.[62] These figures can be compared to the range of between 25 and 60 percent increase in divorced as a fraction of ever married for different age groups between 1960 and 1970.

Currently Married Spouse Present

The fraction of the population who are currently married spouse present, for both men and women, is derived as a residual of the other categories. The assumptions of an increase in the fraction never married and divorced/separated/spouse absent, with widowhood held constant, means a decrease over time in the fraction of the ever married who are currently married. Under the medium assumptions of Population Series 2, for example, the fraction of 35-39 year old men who are currently married falls to 70.8 percent in the year 2,000 from 82.6 percent in 1976. For the 30-34 age group this fraction falls from 77.8 to 55.3 percent over the same time period. Women in these age groups show a decline in the percentage currently married of

Table 3. Population Projection Assumptions

		1976	1980	1985	1990	1995	2000
SERIES I	Women						
	- Total Fertility Rate	1.77	1.55	1.50	1.50	1.50	1.50
	- % Single 15-19	89.2	92.0	92.0	92.0	92.0	92.0
	- Divorced/Separated/ Spouse Absent as a Ratio of 1976 Levels	1.00	1.40	1.65	1.85	1.90	1.95
	Men						
	- % Single 20-24	63.2	75.0	80.0	85.0	90.0	90.0
	- Divorced/Separated/ Spouse Absent as a Ratio of 1976 Levels	1.00	1.50	1.75	2.00	2.50	3.0
SERIES II	Women						
	- Total Fertility Rate	1.77	1.80	1.80	1.80	1.80	1.80
	- % Single 15-19	89.2	90.0	90.0	90.0	90.0	90.0
	- Divorced/Separated/ Spouse Absent as a Ratio of 1976 Levels	1.0	1.35	1.50	1.60	1.65	1.65
	Men						
	- % Single 20-24	63.2	70.0	80.0	85.0	85.0	85.0
	- Divorced/Separated/ Spouse Absent as a Ratio of 1976 Levels	1.0	1.40	1.65	1.85	1.90	1.95

Table 3. Population Projection Assumptions (Cont'd)

		1976	1980	1985	1990	1995	2000
SERIES III	Women						
	- Total Fertility Rate	1.77	1.82	2.10	2.10	2.10	2.10
	- % Single 15-19	89.2	88.0	88.0	88.0	88.0	88.0
	- Divorced/Separated/ Spouse Absent as a Ratio of 1976 Levels	1.0	1.35	1.35	1.35	1.35	1.35
	Men						
	- % Single	63.2	70.0	75.0	80.0	80.0	80.0
	- Divorced/Separated/ Spouse Absent as a Ratio of 1976 Levels	1.0	1.35	1.50	1.60	1.65	1.65

only about ten percentage points, approximately half the decline for men, for the 25 year period. Under the low fertility assumptions this decline in percent currently married is approximately seven percent below the medium assumptions for both men and women. Under the high assumptions of Series 3 the married men decline to 74.5 and 61.1 percent while the women fall from 77.8 and 71.4 percent currently married in the 35-39 and 30-34 age groups in 1976 to 70.7 and 69.4 percent in the same age groups in the year 2000.

C. Children Present in the Household by Marital Status

The marginal distributions of children ever born and marital status were converted to a joint distribution by an iterative scaling procedure fitting the marginals to the 1970 pattern. Lack of data for 1960 prevented an analysis of trends in the relationship between fertility and marital status.[63] Future applications of the projection model will certainly want to examine the sensitivity of the dependent variables to alternative assumptions about this relationship.

The final link between fertility and family size for women in each marital status is the proportion of children ever born who have survived and are still in the family. These proportions, too, are held constant at the levels tabulated in the 1970 census.[64] Past the age of 15, children are at risk of marrying or forming a separate household and therefore, in these projections are no longer counted in their parents' family even though they may still be living at home.

The Output of the Population Projection

For purposes of analysis and projection the population is partitioned into 18 age groups (0-4, 5-9,...,80-84, 85 and over) and the 16 categories of sex, marital status and family size defined in Section II.D, above.

Widowed women are separated from other ever-married spouse-absent females because of their distinctive patterns of housing consumption, while widowed men are combined with other formerly married men because of the small size of the latter category at older ages.

The final output of the population projections, then, is the number of married couples and single and formerly married men and women having given numbers of children under age 15 in their household. These categories are divided among the 15 age groups likely to form separate households (15 to 19 up to 85 and over), giving a total of 240 population groups at five-year intervals from 1980 to 2000. However, in this report the projections are aggregated across age groups,as in Table 4 , which illustrates for 1985 and 1995 the impact of the various demographic assumptions on the total number of families and individuals falling into each of the 16 defined categories. In this Table it is seen, for example, that the total number of married couples with two or three children under 15 in 1995 varies from 10.1 million in Series 1 to 12.4 million in Series 2 and 13.7 million in Series 3, while the number of childless single women (age 15 or over) ranges from a high of 19.3 million in Series 1 to a low of 16.4 million in Series 3.

Table 4. Families and Individuals, by Marital Status and Number of Children Under Age 15, in 1975 (Actual), 1985 and 1995 (Projected)

Projected Total Fertility Rate =	Series 1	Series 2	Series 3
	1.5	1.8	2.1

	Married Couples				Males			Females									TOTAL
	Number of Children:				Single	Previously married*		Single		Separated, Divorced, Spouse Absent				Widowed			
	None	One	2 or 3	4 or more	None	None	One or more	None	One or more	None	One	2 or 3	4 or more	None	One	2 or more	
1975	25,000	9,322	11,699	1,944	19,999	5,574	462	16,799	540	4,187	1,410	1,539	330	9,105	286	294	105,646
1985																	
Series 1	24,074	9,934	11,491	2,230	22,043	8,644	839	18,409	1,150	6,913	2,249	2,093	586	10,985	349	280	122,275
Series 2	24,460	10,017	12,950	2,465	21,482	8,361	807	17,339	1,183	6,184	2,026	2,142	596	10,977	349	291	121,635
Series 3	24,976	10,289	13,349	2,551	21,094	7,844	744	17,164	1,219	5,564	1,824	1,933	542	10,977	348	291	120,717
1995																	
Series 1	26,397	10,833	10,057	1,651	23,601	12,188	1,223	19,262	1,319	9,127	2,825	2,033	483	12,747	408	271	134,434
Series 2	27,038	11,123	12,411	2,219	23,487	9,926	952	17,604	1,214	7,786	2,450	2,210	591	12,726	411	299	132,455
Series 3	28,552	11,662	13,667	2,600	22,244	9,123	862	16,405	1,127	6,428	1,996	1,913	453	12,726	410	305	130,583

*Includes separated, divorced, spouse and widowed.

V. Projections of Aggregate Housing Consumption

A. The Six Projection Series

The three projections of population, reflecting different assumptions about future marital and fertility patterns, serve as inputs to the projections of aggregate housing consumption. In order to develop a range of projections that reflects the known variations in net rates of cohort transition in housing consumption, two projections of individual housing consumption patterns are in turn applied to each of the population series: Housing Series A, reflecting age-linked extrapolations of the 1970-1975 cohort transition rates in each dimension of housing consumption, and Housing Series B, reflecting age-linked extrapolations of the 1960-1970 transition rates in each dimension of housing consumption.[65] Within each series, with two exceptions, consumption rates for each marital status, sex and family size class are linked directly to the rates for the same demographic class in the cohort in the following period. In both consumption projections, married couples age 45 to 49 with no minor children present are linked with all married couples age 40 to 44 in the same cohort five years earlier and widows age 50 to 54 with no children are linked with all widows and married couples age 45 to 49 five years earlier. (See Section II-D, above).

Different sets of consumption rates for cohorts in early adulthood are linked with the two series of projections of individual housing consumption. Constant age-specific rates for the population under 30 are coupled with the projections based on 1960-1970 cohort transition rates in older age groups; trended age-specific rates for the young population are coupled with the projections based on 1970-1975 cohort transition rates. These rates provide the starting points for the consumption transitions of all cohorts born after 1950. The constant-rate assumption is more consistent with the transition patterns in the 1960's and the trended-rate assumption better implies a continuation of trends which produced the most recent cohort transitions. Since an indefinite trending of consumption rates implies an ultimate consumption pattern that would substantially differ from any that has been observed, the rates are extrapolated at a constant rate only to 1985, after which time the rate of change in the rates is reduced by one half of the preceding period, or "damped".

The different combinations of housing and population assumptions yield the following six series:

1) Low marriage, high divorce and low fertility rates coupled with the 1970-1975 cohort housing consumption transitions: Series 1-A;

2) Moderate marriage, divorce and fertility rates coupled with the 1970-1975 cohort housing consumption transitions: Series 2-A;

3) High marriage, low divorce and high fertility rates coupled with the 1970-1975 cohort housing consumption transitions: Series 3-A;

4) Low marriage, high divorce and low fertility rates coupled with the 1960-1970 cohort housing consumption transitions: Series 1-B;

5) Moderate marriage, divorce and fertility rates coupled with the 1960-1970 cohort housing consumption transitions: Series 2-B;

6) High marriage, low divorce and high fertility rates coupled with the 1960-1970 cohort housing consumption transitions: Series 3-B.

For purely analytic purposes a seventh set of projections, based on the fixed 1975 consumption rates for different age, marital and family status categories, was developed. This consumption series is applied to the Series 2 population projections and is therefore denoted Series 2-C. The differences between this series and Series 2-A and 2-B indicate the effect of using a cohort approach rather than the conventional fixed life-cycle rate method of projection.

Each housing series distributes the population of families or individuals in each of the 240 different age, marital status and family size classes among the 21 housing consumption alternatives (listed on p.5,above).

All of the projections are made for consumption at five year intervals from 1980 to 2000.[66]

The projections of total consumption for 1980 to 2000 for the 21 housing consumption alternatives are summarized in Tables 5 through 18 (at the end of this paper). These tables also show the projected net 5-year changes in total consumption and the distribution of households among types of housing units in each year.

B. Overview of the Aggregate Housing Projections

In this paper the discussion of the projections deals with the aggregate changes in the number of occupied housing units of different types through 1995. Because housing needs, policies and construction requirements are more closely related to changes in the number of occupied housing units than to the absolute numbers of units, this presentation concentrates on the projected average annual additions to the stock.[67] In order actually to calculate housing needs or construction requirements it is of course also necessary to take account of losses from the stock and changes in vacancy rates. The increasingly speculative nature of long extrapolations into the future prompts a narrowing of our focus here to the period through 1995.

There is much interest in the projections for less aggregated age and marital status categories, but within the scope of this paper it is not possible to present the projections in such detail.[68]

The differences in the projected series of changes in consumption indicate the effects of possible future shifts in cohort transition rates of the same order of magnitude as shifts that have recently occurred. More extreme shifts in transition rates should be considered much less likely. Therefore, the rate of change in total housing consumption may fluctuate between or even outside the range of these series; but it is quite improbable that aggregate consumption would shift from the level of one series in 1985 or beyond, to the level of another series at a later date unless the implied changes are within the approximate range of the projected annual rates of change of aggregate consumption. Catching up or slowing down from one level of consumption to another, late in the period of projection, is unlikely since the implied rates of change must be far outside the ranges used here. The cohort approach models adjustments (transitions) and therefore the projections should be thought of as a sequence of possible future changes in consumption.

Two characteristics of the different projections of changes in housing consumption are of most interest, their time patterns, or the timing and magnitude of increases, decreases and peaks, and their level, or long-term average rate of growth.

In general, the time-pattern of future growth in housing consumption is similar under the two cohort consumption series, but there are marked differences in the amount, or level, of

growth projected for certain classes of housing units. By contrast, under the different population series, the amounts of projected growth are more nearly the same, but the time-paths are much less so. The average annual increases in future periods are plotted in Figures 7-a and 7-b through 16-a and 16-b, which show the effects of holding constant either the population assumptions (-a Figures) or housing consumption (-b Figures).

There is broad similarity in the timing of future growth projected in the major components of housing consumption in the two cohort-based consumption series. These time patterns are attributable to impending shifts in the size and age-composition of the population and variations among age groups in housing consumption, notwithstanding the inter-cohort differences. Even if consumption rates are held constant at 1975 levels, a remarkably consistent time path of the growth in housing consumption emerges (in the Series 2-C projections). In the next fifteen years the aging of the population will have its greatest proportional impacts on the growth in the occupancy of rental housing, small units and units in two to four-family structures and its smallest impacts on owner-occupied units and units with seven or more rooms.

On the other hand, there are marked differences between Series A and B in the long-term rate of growth of particular components of housing consumption. These differences are a consequence of the cohort transitions implied by the two trended cohort series. Of the several types of housing considered, five are projected to increase substantially more rapidly under the 1970-1975 regime of cohort transitions: mobile homes, units with seven or more rooms, owner-occupied units, single-family units and the total number of households; two, rental units, and apartments, are projected to increase more rapidly under the 1960-1970 regime; and the others are projected to grow at about the same pace in both series. In view of these differences, Series A can be characterized as a "high" housing projection and Series B as a "moderate" projection. The latter series clearly cannot be termed a "low" one, for although older cohorts did trade down to smaller units during the 1960s and household headship and home ownership rose less rapidly between 1960 and 1970 than between 1970 and 1975, there was still significant movement by almost all cohorts toward greater housing consumption during the 1960s.

When consumption rates are held constant at 1975 levels for all ages (Series 2-C), four of the ten major dimensions of housing consumption are projected to experience slower growth over the next fifteen years than under either cohort-method projection: total households, owner-occupier households and

Figure 7-a

Average Annual Increase in Number of Households

1960-1975 (Actual) and 1975-2000 (Projected)

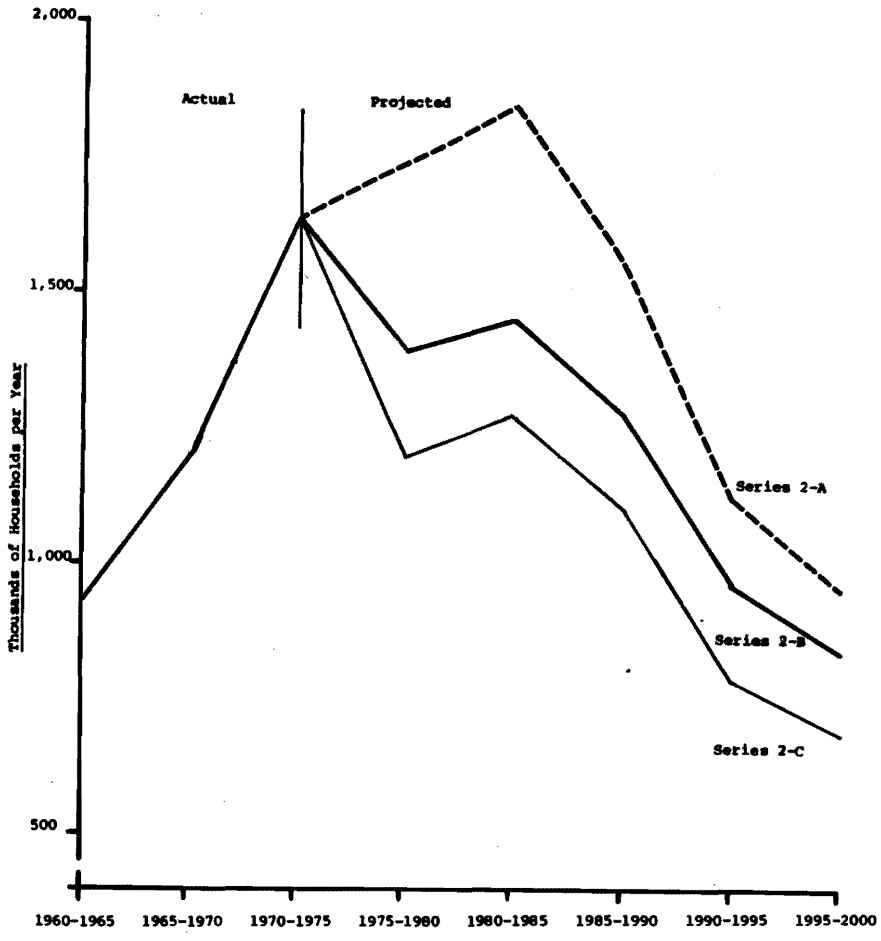


Figure 7-b

Average Annual Increase in Number of Households

1960-1975 (Actual) and 1975-2000 (Projected)

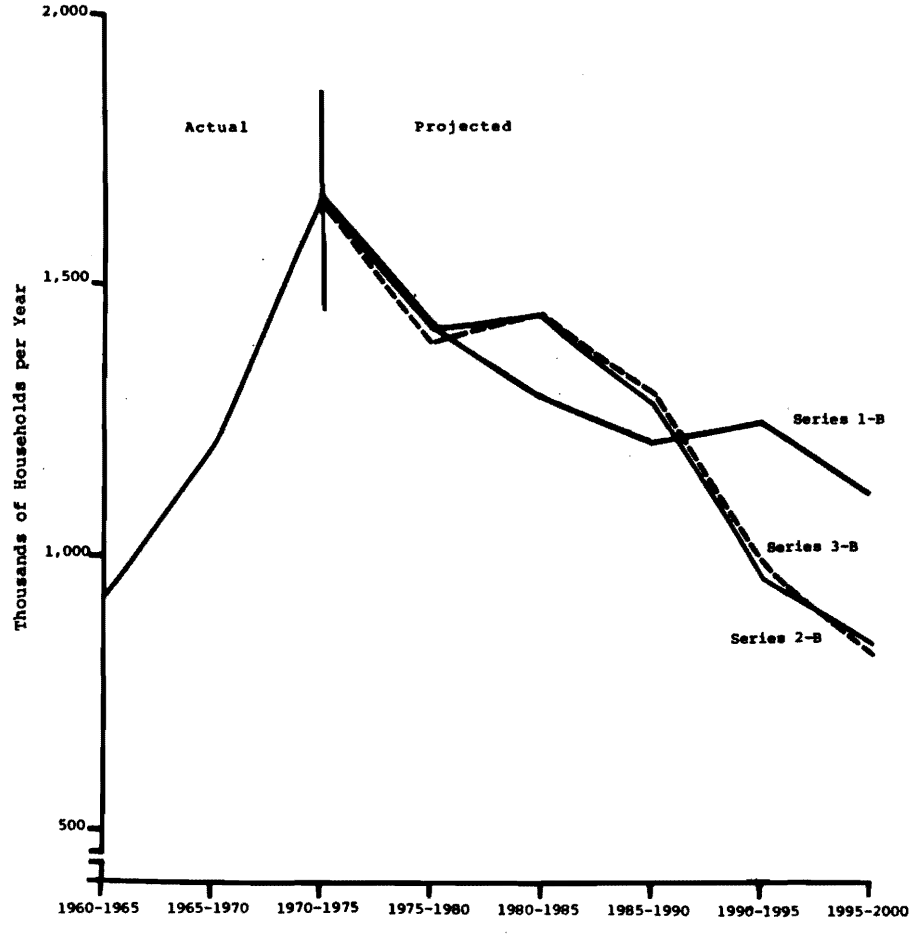


Figure 8-a

Average Annual Increase in Number of Owner Households

1960-1975 (Actual) and 1975-2000 (Projected)

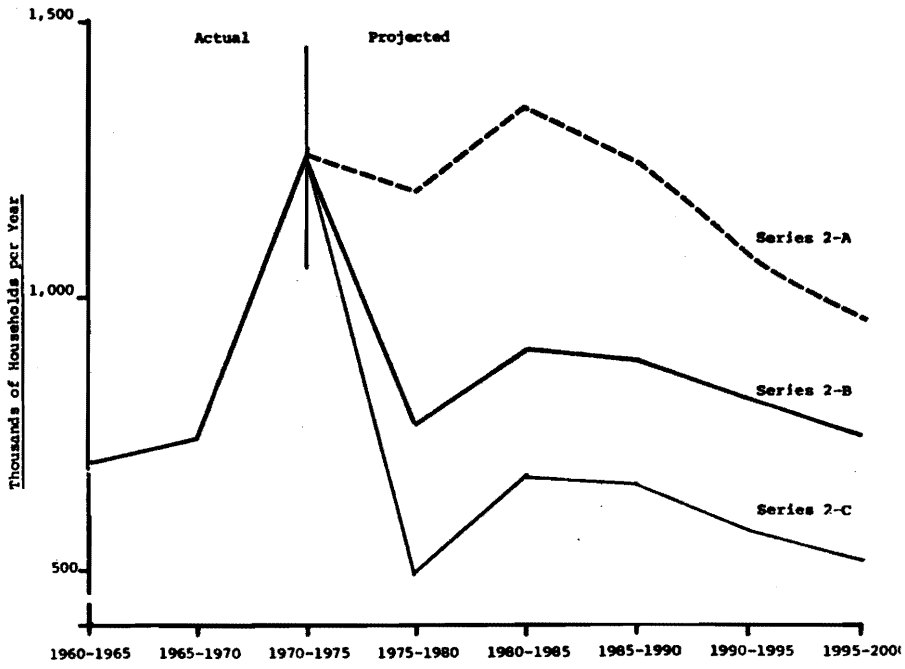


Figure 8-b

Average Annual Increase in Number of Owner Households

1960-1975 (Actual) and 1975-2000 (Projected)

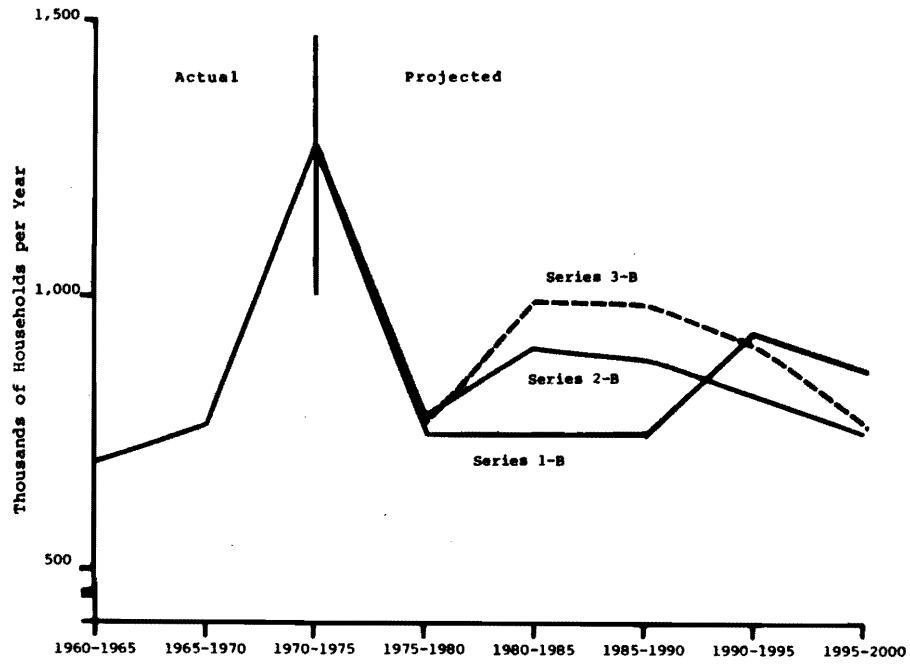


Figure 9-a

Average Annual Increase in Number of Renter Households

1960-1975 (Actual) and 1975-2000 (Projected)

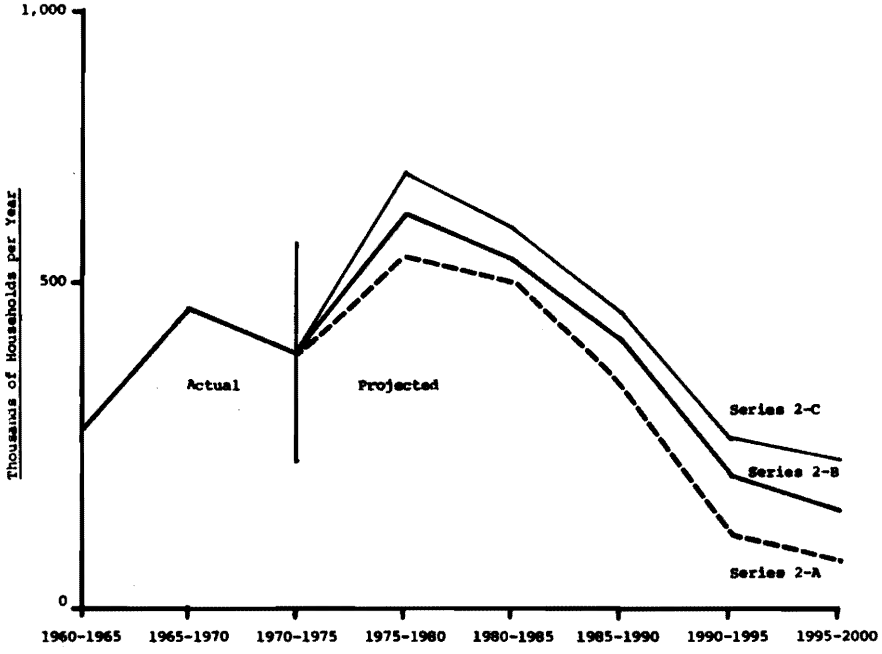


Figure 9-b

Average Annual Increase in Number of Renter Households

1960-1975 (Actual) and 1975-2000 (Projected)

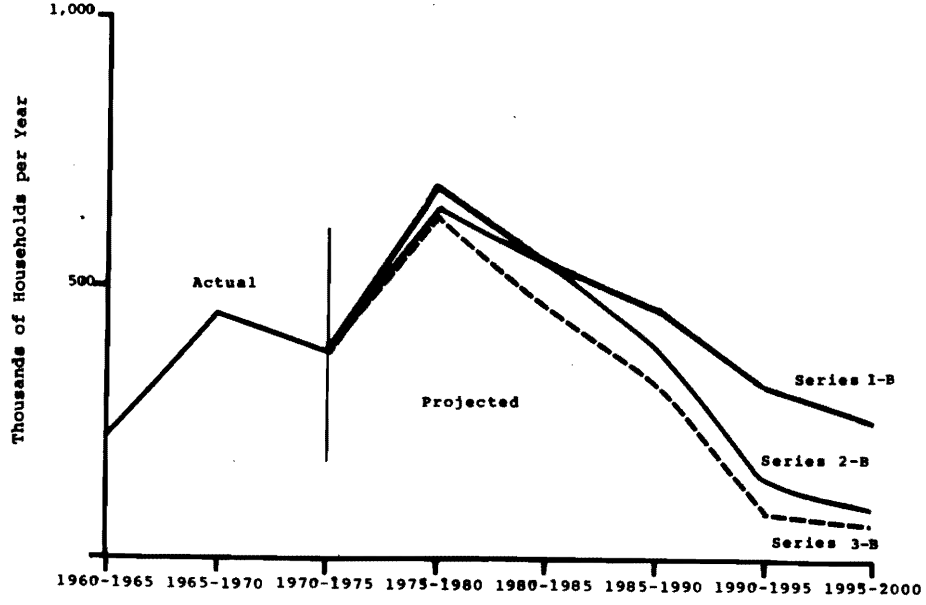


Figure 10-a

Average Annual Increase in Households

Occupying Mobile Homes

1960-1975 (Actual) and 1975-2000 (Projected)

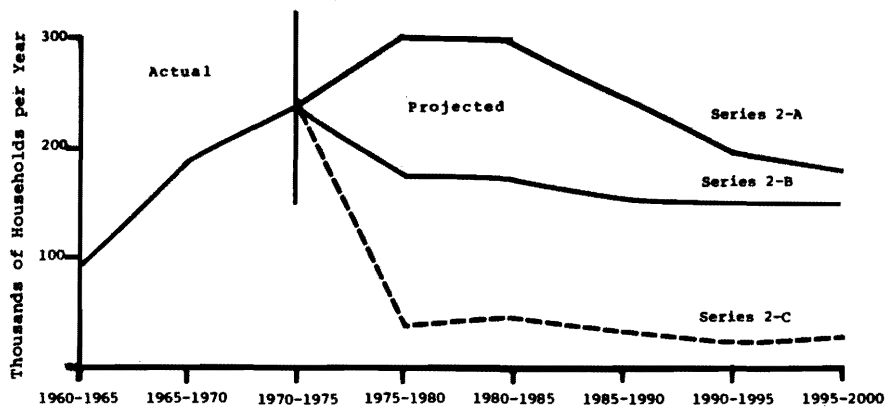


Figure 10-b

Average Annual Increase in Households

Occupying Mobile Homes

1960-1975 (Actual) and 1975-2000 (Projected)

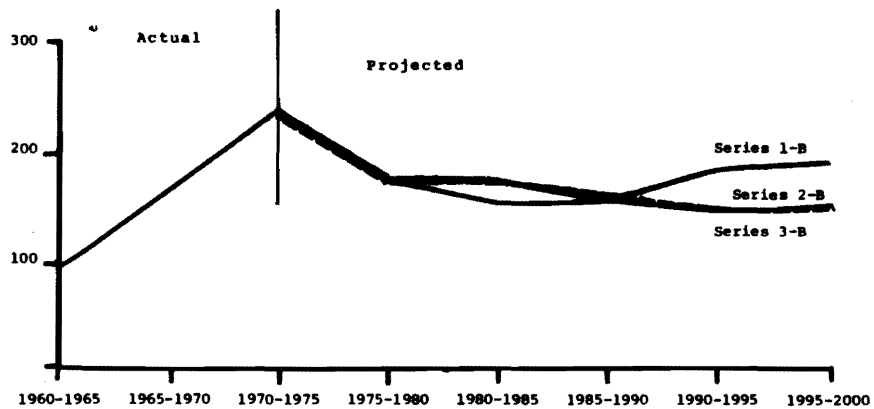


Figure 11-a

Average Annual Increase in Number of Households in One-Family Structures

1960-1975 (Actual) and 1975-2000 (Projected)

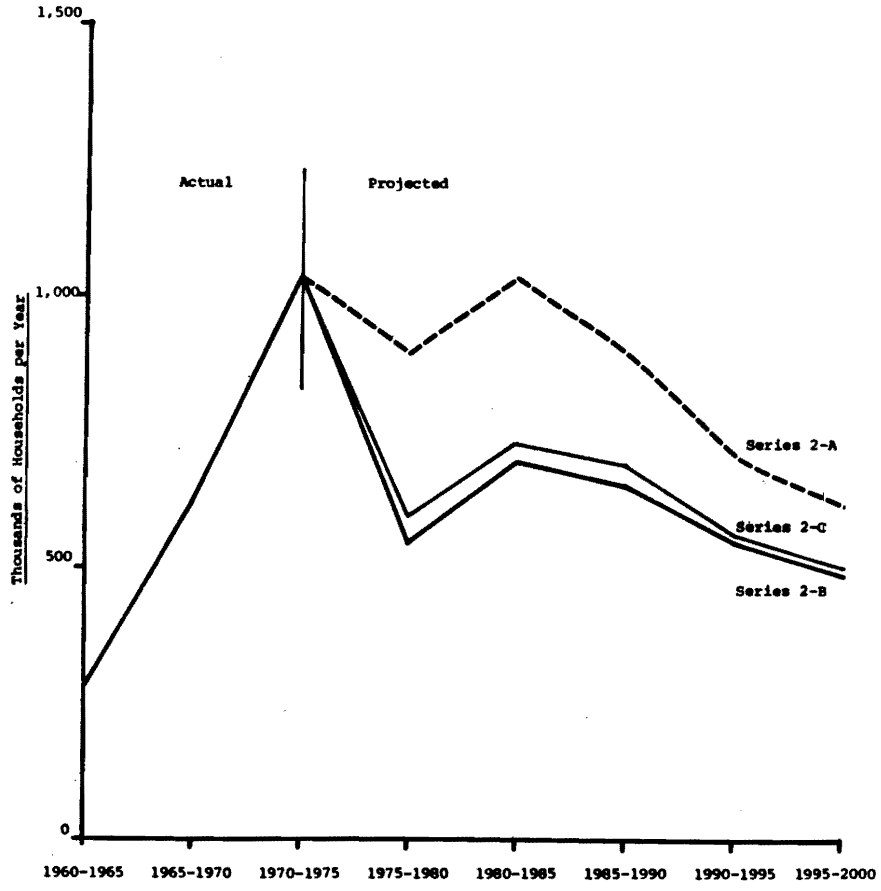


Figure 11-b

Average Annual Increase in Households Occupying

Single-Family Houses

1960-1975 (Actual) and 1975-2000 (Projected)

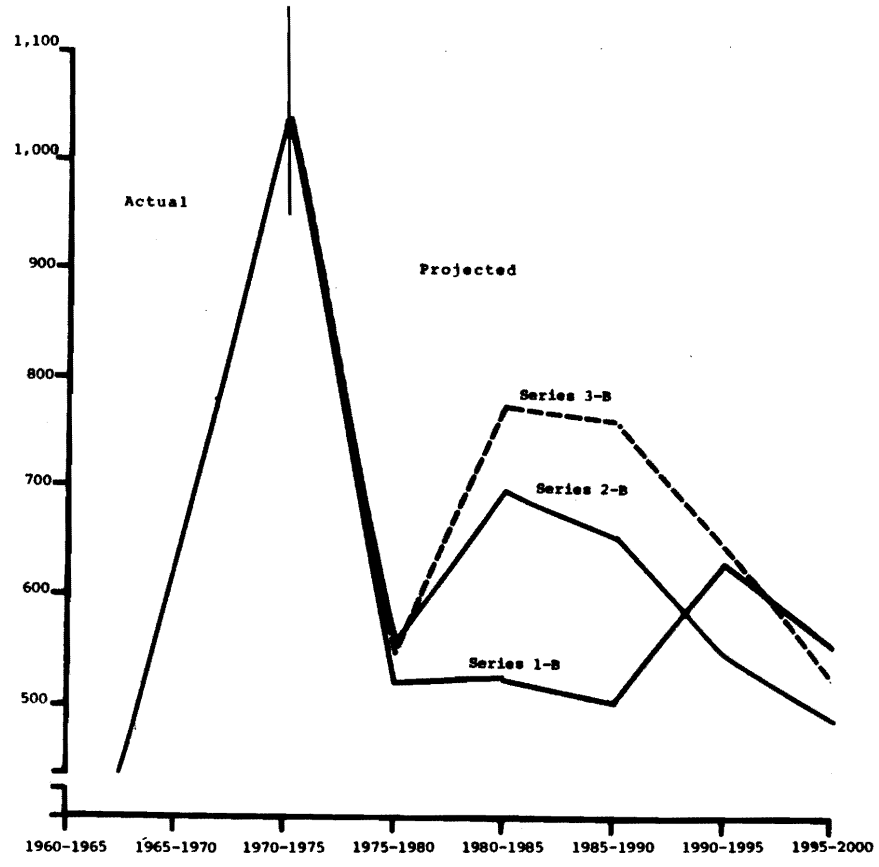


Figure 12-a

Average Annual Increase in Households Occupying Units in 2 to 4-Family Structures 1960-1975 (Actual) and 1975-2000 (Projected)

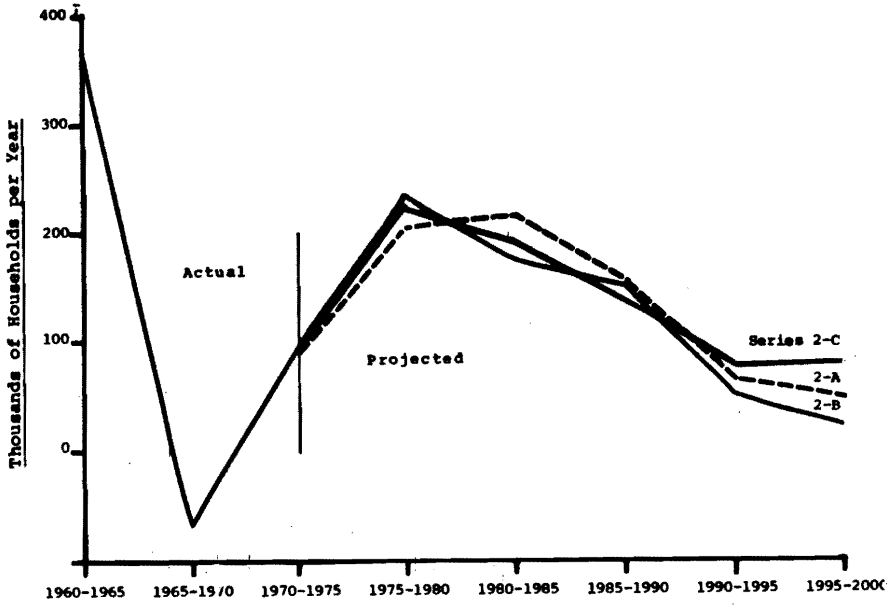


Figure 12-b

Average Annual Increase in Households Occupying Units In 2 to 4-Family Structures 1960-1975 (Actual) and 1975-2000 (Projected)

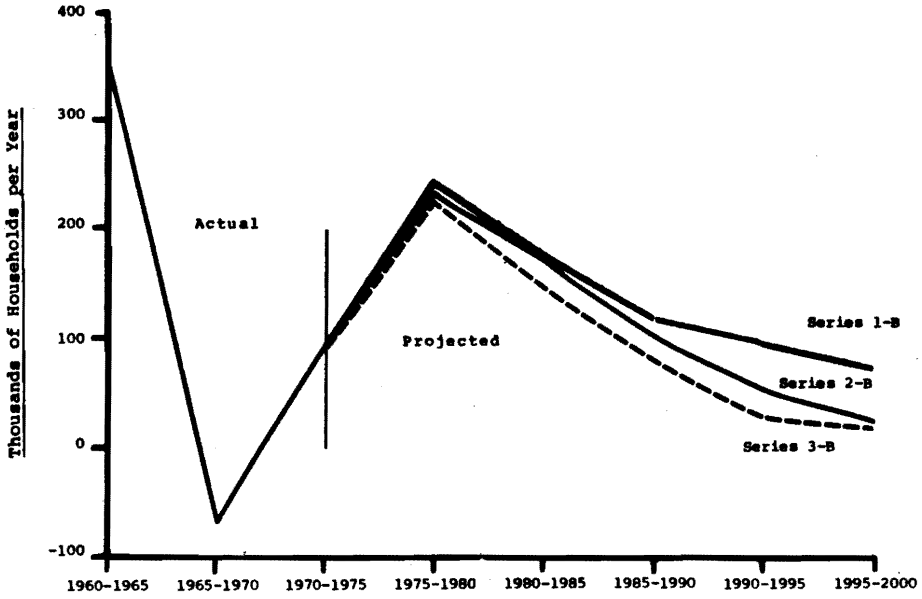


Figure 13-a

Average Annual Increase in Households Occupying Units in 5 or More-Family Structures 1960-1975 (Actual) and 1975-2000 (Projected)

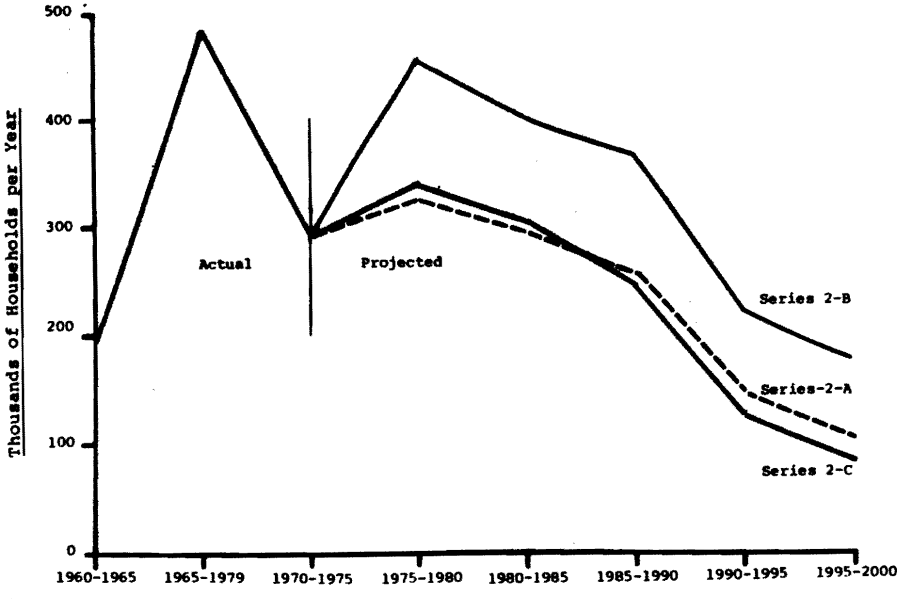


Figure 13-b

Average Annual Increase in Households Occupying Units In 5 or More-Family Structures 1960-1975 (Actual) and 1975-2000 (Projected)

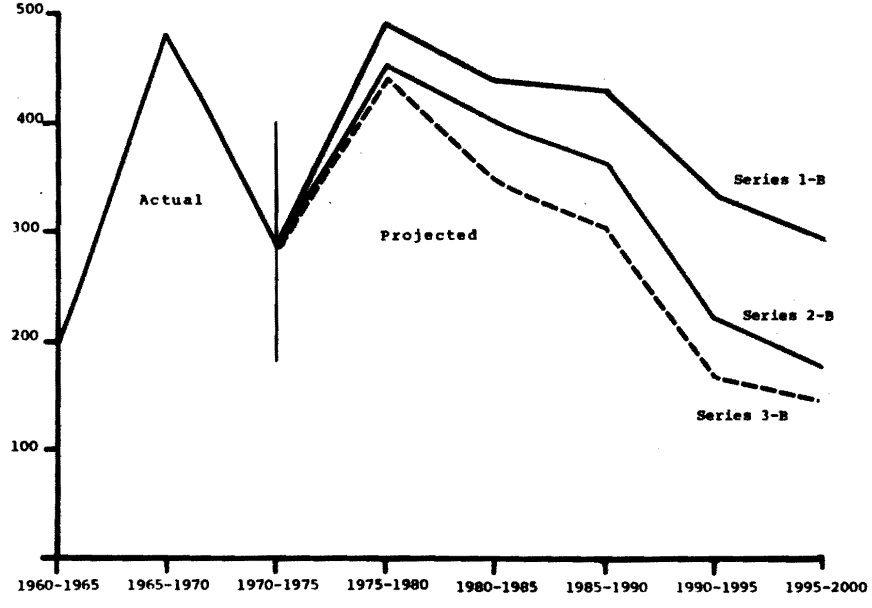


Figure 14-a

Average Annual Increase in Households Occupying Units

With 1 to 4 Rooms

1960-1975 (Actual) and 1975-2000 (Projected)

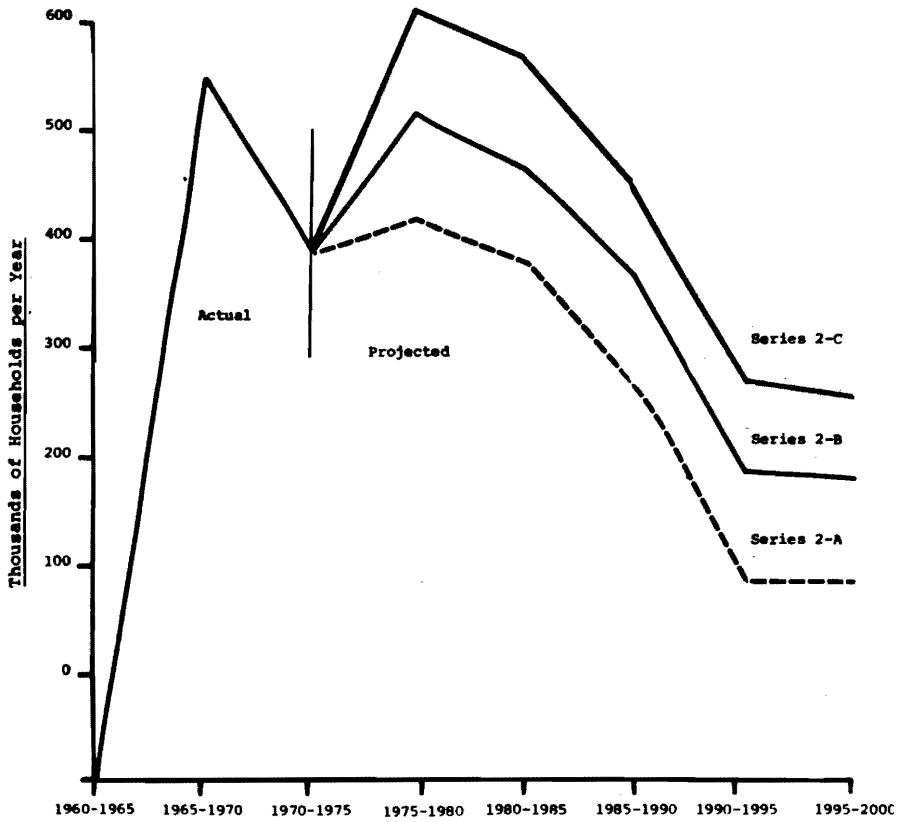


Figure 14-b

Average Annual Increase in Households Occupying Units

With 1 to 4 Rooms

1960-1975 (Actual) and 1975-2000 (Projected)

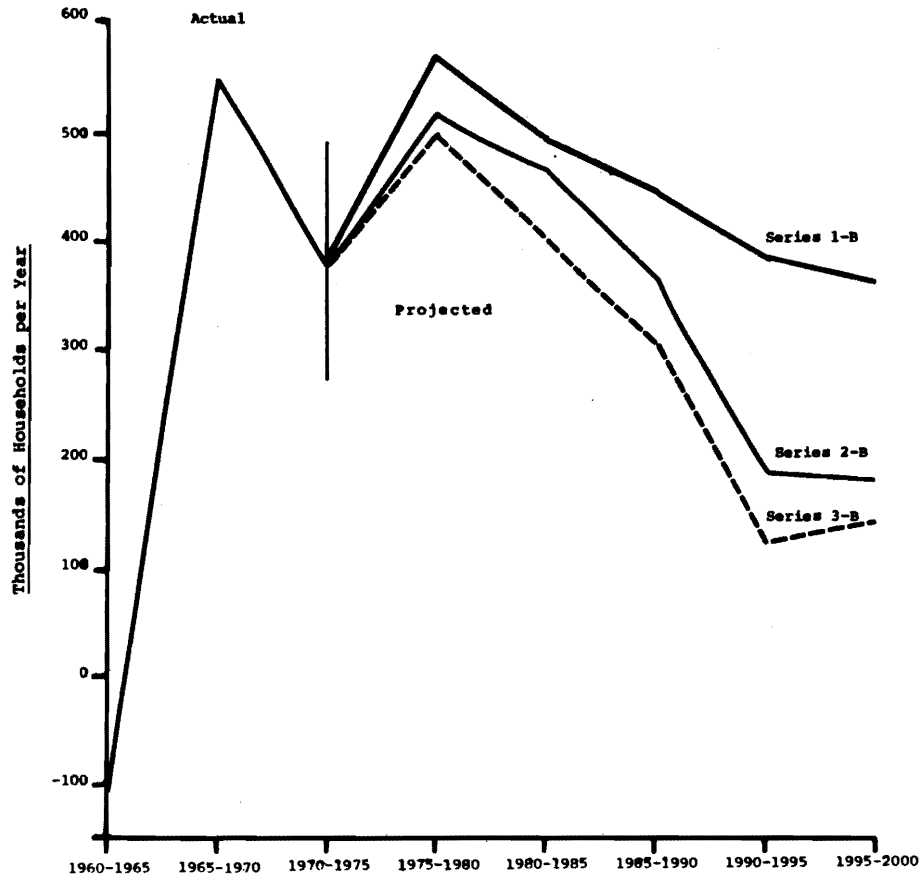


Figure 15-a

Average Annual Increase in Households Occupying Units

With 5 or 6 Rooms

1960-1975 (Actual) and 1975-2000 (Projected)

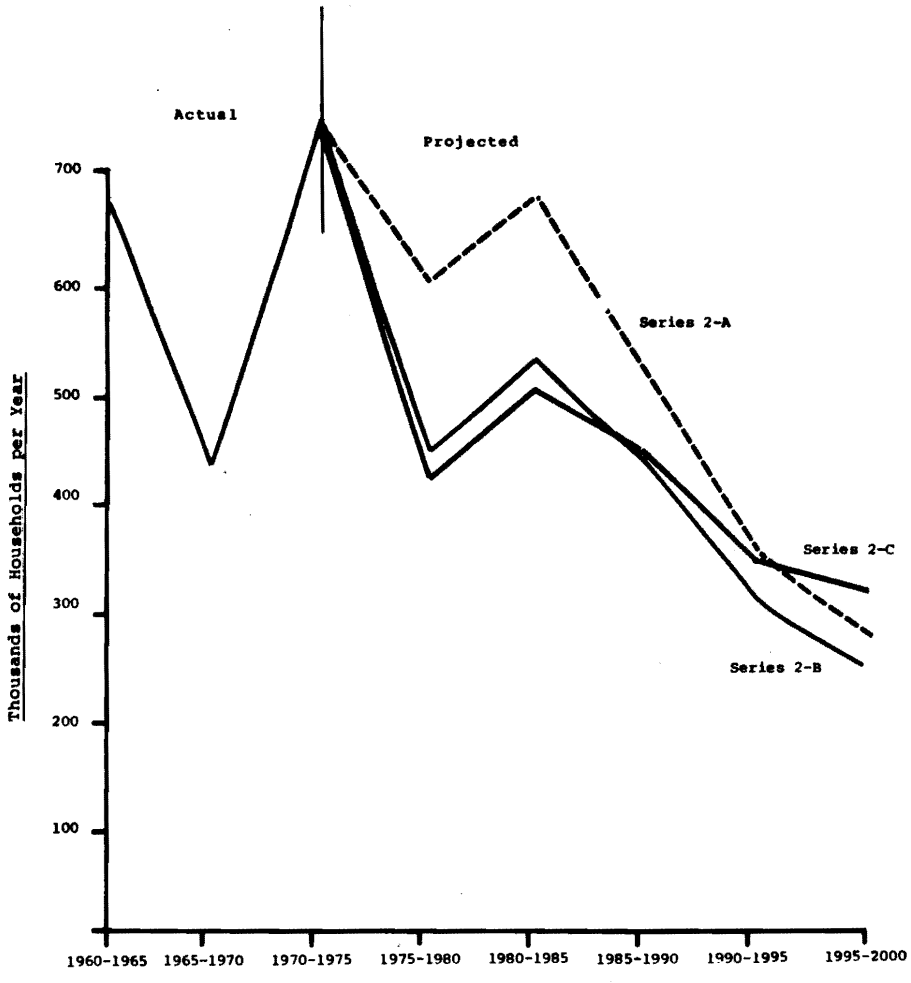


Figure 15-b

Average Annual Increase in Households Occupying Units

With 5 or 6 Rooms

1960-1975 (Actual) and 1975-2000 (Projected)

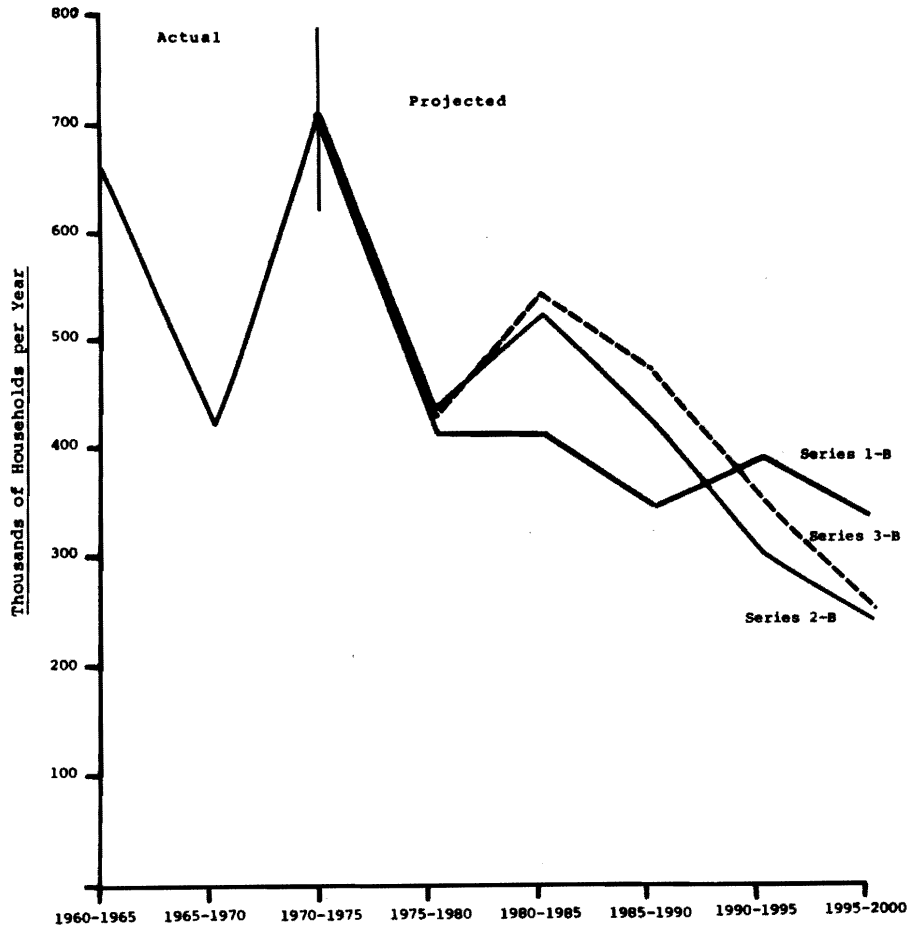


Figure 16-a

Average Annual Increase in Households Occupying Units

With 7 or More Rooms

1960-1975 (Actual) and 1975-2000 (Projected)

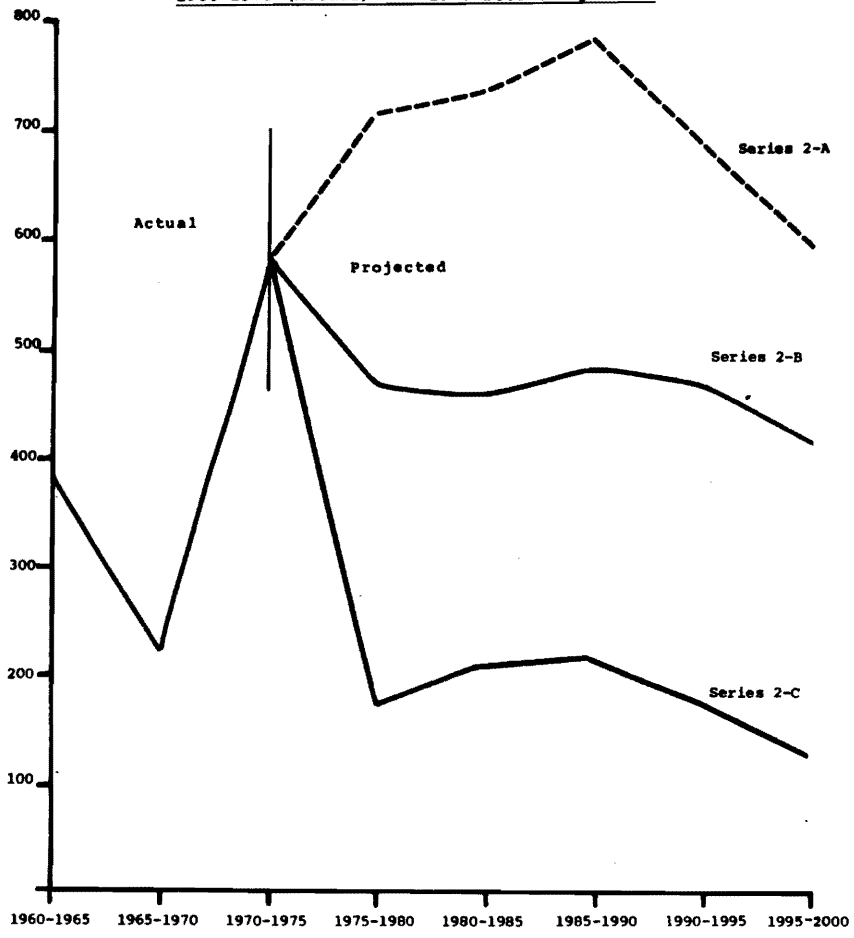
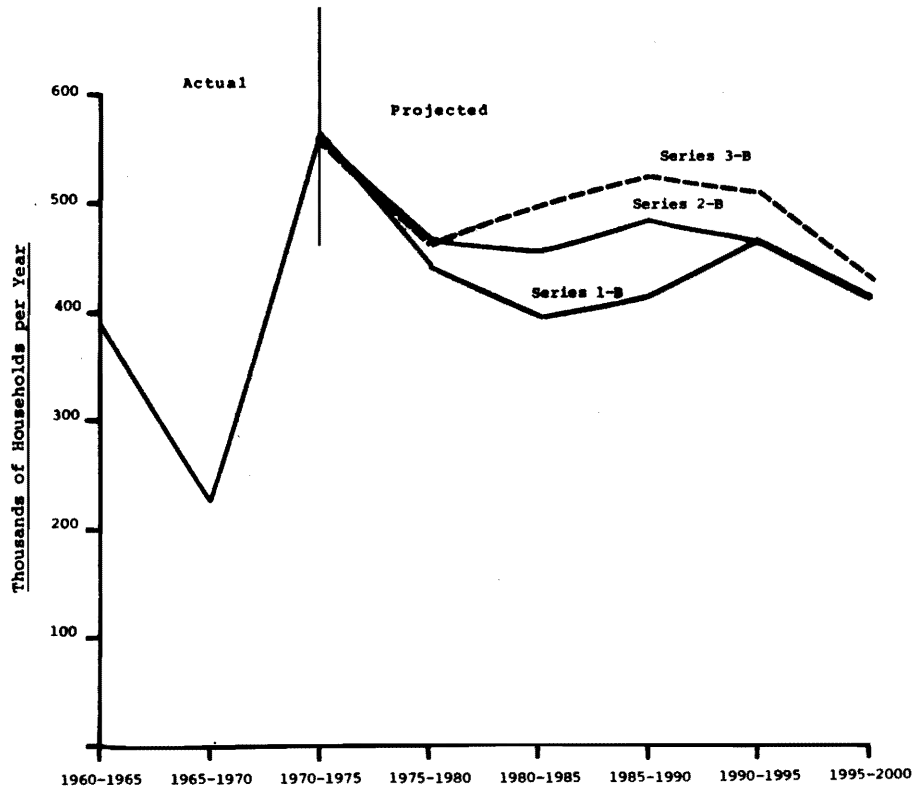


Figure 16-b

Average Annual Increase in Households Occupying Units

With 7 or More Rooms

1960-1975 (Actual) and 1975-2000 (Projected)



occupants of mobile homes and units with seven or more rooms. For this reason Series 2-C can be considered a "low" projection of aggregate housing consumption. It is important to note that use of Series 2-C in this way relies on an assumption that substantial projection errors in different parts of the age range would cancel each other out. In other words, the use of fixed consumption rates distorts the transitions projected for particular cohorts by Series A and B.[69]

Two important implications emerge from the comparison of different housing projection series:

First, the virtually parallel time patterns of growth projected under a variety of reasonable life-cycle assumptions give a consistent picture of the direct impact on housing consumption of impending changes in the size and age-structure of the population. The growth in occupancy of small, rented apartments units will be most depressed as the population ages and the growth in large single-family owned units will be reduced least.

Second, the wide variation in the projected long-term growth between even the two cohort-method series indicates that fluctuations in the determinants of housing consumption not captured by the cohort method have had, and may be expected to have, large effects on increases in housing consumption. The growth in occupancy of large single-family owned units has been especially subject to such variations.

Considerably smaller differences in the long-run growth of aggregate housing consumption result from different population projections than from different housing consumption projections. Unlike the two cohort housing consumption series, however, the three population projection series imply quite dissimilar time paths in the growth of particular components of total housing consumption. In general, population Series 2, with a total fertility rate of 1.8, moderate increases in proportion single and a 65 percent increase, above 1975, in divorce and separation for women, and population Series 3, with a fertility rate of 2.1, a stabilization for women in percent single and 35 percent increase in divorce and separation for women, yield very similar time paths for growth in housing consumption and only slight differences in the levels of growth. The major differences in timing are between these two series and population Series 1, which has a low fertility rate of 1.5, higher rates of singlehood and a 95 percent increase in divorce and separation for women.[70]

Series 1 projects very different, and much more stable, time paths for future increases in total households (Figure 7-b), owner-occupied units (Figure 8-b), single-family houses (Figure 11-b) and units with larger room counts (Figures 15-b, 16-b). In all of these dimensions of growth, Series 1 lags substantially behind the other two Series through the 1980s, and then either falls less rapidly or actually rises after 1990 when Series 2 and 3 show generally declining growth.

These major differences in the time pattern of growth in housing consumption can be explained by differences in marriage patterns of the bulge in the population distribution that is now between the ages of 20 and 30 and will be between 40 and 50 in the year 2000. Initially the effect of lower marriage and higher divorce rates would be to retard growth in housing consumption as those in the younger age groups are in family statuses with the lower consumption levels. Eventually, as the large cohorts age, they would move into higher consumption categories and tend to catch up in terms of total households formed, home ownership, etc. The discrepancies between the housing consumption of the single and divorced, on the one hand, and the married couples, on the other hand, are greatest at ages below 30 and narrow considerably at later ages. Indeed, the total number of households projected for the year 2000 is greater in Series 1-B than in Series 2-B and 3-B, because of the greater number of unmarried above age 30 under Series 1-B.

The most important implication of these relationships among the population series is perhaps that a continuation of recent trends toward delayed marriage and higher divorce rates would substantially smooth future growth in households and single-family owner-occupied units with five or more rooms. Such a continuation would also slow down, but not halt, the projected decline in the growth of small, renter-occupied apartments.

C. Major Components of Projected Housing Consumption

In this subsection we examine the causes of and likely sources of variation in the projected growth of six major components of housing consumption: number of households, home ownership, and occupancy of large housing units, small houses, mobile homes and units in apartment houses.

When one examines the projections, it is important to recall the assumption on which they are based (See Section II-B, above). Implicit in the use of either cohort-method projection is the assumption that those determinants of consumption that are not modeled, labor force participation, family/social ties, expectations of mobility, current income, expected income, assets and housing prices, will have the same net effect on cohort housing consumption transitions as they had in the base period, 1970-1975 for Series A, and 1960-1970 for Series B. Since there are no empirical estimates of the effects of possible changes in these determinants, including some already underway, this discussion includes some speculative remarks about the possible effects of changes in these factors.

1. Number of Households

The strong growth in total number of households observed between 1960 and 1975, especially during the last five years of this period, is expected to continue well into the mid-1980s as the baby boom cohorts reach their late 20s and early 30s where headship rates are rising. The anticipated trend toward delayed marriage will reinforce the growth in the number of households headed by those cohorts. However, in the latter part of the 1980s and especially in the 1990s, the increase in households of between 1.5 and 2.0 million a year that we have become accustomed to expect will begin to fall precipitously. By the latter part of the 1990s the rate of increase of households should be well under 1 million per year as the headship rate in the baby boom generation reaches its maximum levels and young cohorts entering their 20s and 30s shrink in numbers. (See Figures 7-a, 7-b). If fertility, and marriage, remains low for these shrunken cohorts born between 1960 and 1975, the fall in growth of households will be slowed, but only temporarily as more of these cohorts establish independent living arrangements. Eventually, however, low fertility will lead to smaller future cohorts and further decline in the rate of increase in the number of households.

The substantially elevated headship rates among birth cohorts approaching old age virtually guarantees that their headship rates will exceed those of today's elderly. The other forces that have raised headship since 1960 appear likely to moderate in the future. Recent trends in average real per capita income suggest there may be reduced growth or even decline during the next five to ten years. Attempts to balance the federal budget and maintain the fiscal stability of the Social Security Fund tend to slow further redistribution of income to population groups not now able to afford their own household relative to the recent past. Finally, unless there is a new boom in rental apartment construction and a halt in the conversion of rental stock into condominiums, the cost and supply conditions that in the recent past favored the formation and maintenance of small households will be reversed.[71] Instead, higher rents for small apartments would encourage the consolidation of the population into somewhat fewer and larger households. This appears a likely scenario for at least the near future. Since the negative influences affecting all ages appear, on balance, to more than compensate for the positive effect of cohort inertia on household headship among the elderly, the Series B projection of long-term growth in number of households should be given greater weight than the much higher Series A projection.

2. Home Ownership

Among the elderly, the high rates of home ownership established by cohorts younger than 65 in 1975 are likely to result in further increases at older ages as these cohorts grow older. For younger cohorts still moving into home ownership, income and cost factors will be more significant. Increases in real personal income have not been a strong stimulus for higher ownership since 1970 and appear unlikely to be in the near future. The strong positive influence of high rates of appreciation in house prices can be expected to continue for some time, but will be subject to sudden and sharp reversal should the housing market experience a slump severe enough to deflate expectations of future appreciation in values.[72] Since the growth in owner-occupied housing units will decline after 1985 according to all three projection series (even though the proportion of all households who own may continue to increase), the probability of a drastic long-term reversal of expectations will rise over time.

Two considerations point toward a higher rate of home ownership than implied by the 1960-1970 cohort trends. The recent spread of the condominium as a new vehicle for ownership

has greatly increased the opportunities for ownership in multi-unit structures. Second, older cohorts in the 1970s have not continued to switch from ownership to rental as cohorts of the same age did during the 1960s. For these reasons an ownership rate as low as that in Series B appears unlikely. Beyond this the range of projected growth in home ownership cannot be significantly narrowed, because of the instability of some of its key determinants. There is a continuing possibility of a precipitous shift from a high-growth trend to one much nearer the lower end of the projection range. Three alternative projections are shown in Figure 8-a.

3. Occupancy of Large One-Family Houses

Unless the cohorts who have already established a life style of occupying large houses move to smaller units much more rapidly than the elderly did during the 1960s, there will be a future shift in the housing patterns of the elderly toward larger houses (relative to past cohorts at the same age). The apparent pre-condition for a move to smaller units, a major rise in the price of large relative to medium-sized houses, does not appear to be in the offing.[73] If the experience of the 1960s is a valid precedent, this would require a growth in fertility, family sizes and the real incomes of young families or, alternatively, a revolutionary shift in the incentives provided by public policies. For this reason it should be assumed that as the cohorts already living in large houses age, they are likely to move to smaller housing units much less rapidly than cohorts of the same age in the 1960s, if at all. However, younger cohorts may progress into large units less rapidly than in the past because the rapidly rising costs of ownership may make ownership less attainable, no matter how great the incentive of capturing the appreciation in house prices.

On balance, the Series B projection of owned one-family houses with more than six rooms should probably be considered a lower limit of the range in the future. The Series 2-B projections are presented in Table 14.

4. Small Single-Family Homes

Single-family houses with one to four rooms experienced a sustained decline in numbers of between seven and nine percent over each five year period between 1960 and 1975. This decline is projected to continue throughout the remainder of the century,

with Series A and B showing approximately the same trend, resulting in about 6 million such units by the year 2000, down from about 8 million in 1975. (See Tables 8 and 14). In sharp contrast, this decline is not reflected in Series 2-C, which is not based on cohort transitions.

5. Mobile Homes

Because the increase in mobile homes has been so strong over the period 1960 to 1975 it would be impossible to expect anything but continued growth in this segment of the housing market between now and the end of the century. However, it is highly unlikely that the 12 percent annual growth in the number of mobile homes experienced, on average, every year since 1960 will be sustained for the last 25 years of the 20th century. Before 1970, changes in population growth and family structure, in addition to changes in consumption rates, contributed to the strong surge in mobile homes. After 1970, changes in family structure no longer favored occupancy of mobile homes, but rising consumption rates accounted for a 45 percent increase in mobile home ownership between 1970 and 1975, with the remaining 20 percent accounted for primarily by population growth. In the future, the demand created by population growth alone is expected to wane, so continued growth in mobile home occupancy must be sustained by growth in the demand for mobile homes over other types of housing. This, in turn, will depend upon factors such as the success in marketing such homes as well as the relative cost and availability of alternative housing choices. In sum, Series A trends should be viewed as an extreme upper limit of future growth in mobile home occupancy. (See Figure 10-a).

6. Rental Apartments

Until the mid-1980s, population change and changes in family structure should continue to keep the growth in demand for rental units in apartment buildings near present levels. After 1985, however, we should witness a marked slowdown in the rate of growth of rental apartments as population shifts result in a declining number of young adults. The fall-off in the demand for apartments should first be felt in the small units of one to four rooms, then in the larger units which can better accommodate the still growing cohorts over the age of 30. Our Series A projection shows an actual decline in the total number of one to four room rental apartments between 1995 and 2000. (See Table 8.) Recalling that Series A holds constant the 1970 to 1975 cohort housing trends, which in this case

reflect the depressed levels of apartment construction during the 1973-74 recession, we might view the Series A assumptions as "below normal" for the remainder of the 1970s and 1980s. However, since the latter part of the 1970 to 1975 period was also characterized by high rental vacancy rates and sluggish growth in rents compared to other housing costs, we might just as well view Series A as being above the likely demand for rental apartments in the future. Moreover, the rise in occupancy of rental apartments since 1970 is now being off-set by widespread conversion of such units into condominiums. If this process continues it will further retard the growth in occupancy of rental apartments.

Thus it is not difficult to devise scenarios in which long-term growth in rental apartments is below the rate of Series A.

VI. Conclusions

Projections of the numbers of housing units of different types that will be occupied five, ten, or more years in the future can be of use to a broad range of decision-makers. Due to the long economic life of residential structures, the size and nature of future demands for housing should inform the many decisions about the management of and investment in the housing stock that have long-range ramifications. Thus, housing projections are important to the Federal government when it designs housing finance, subsidy and assistance programs, to state and local governments when they implement land-use zoning and other growth-management policies, and to home owners and other real estate investors who are concerned with the long-term demand for and value of particular residential buildings. Because of the relationship between changes in the stock of occupied housing and the volume of new residential construction, projections of housing consumption also play an important role in long-range planning for the building industry and its suppliers.

In this paper we have developed projections of housing consumption by a new cohort method, which takes account of the strong behavioral linkages between the past and future housing consumption of population groups born in the same year. Because there emerged sharp differences between the housing consumption patterns of succeeding cohorts between 1960 and 1975, projections from the observed consumption of each cohort and its likely future transitions are an improvement over projections based on conventional methods, which fail to take account of cohort linkages. The aggregate cohort projections, presented in the tables and figures in this paper should therefore be useful inputs for a wide variety of forecasting and planning purposes. (If there is sufficient interest, the authors also hope to make available more detailed demographic breakdowns of the projections.)

The main conclusion to be drawn from our analysis and projections is that demand for additional housing units will peak sometime between the late 1970's and late 1980's. This conclusion holds under a variety of assumptions about future trends in population structure, family formation and rates of housing consumption. As the baby boom generation ages into mature adulthood over the next decade, demand for additional rental housing will drop precipitously. When this group achieves high levels of ownership, as we project they will by the early 1990s, the demand for new owned housing will also decline. Slightly different conclusions would follow if one adopts more extreme scenarios of future population

trends. Demand for both rented and owned housing will peak earlier and decline more rapidly if the present trend toward delayed marriage is sharply reversed and family formation takes place at younger ages. A continuation of the trend toward less marriage and childbearing, on the other hand, will tend to smooth out the variations over time and sustain higher demand for both rented and owned housing in the 1990s.

The use of the cohort approach is based on the regularity of the transitions made by succeeding cohorts at each age. In the 1960-1975 period, these transitions exhibited considerable consistency. However, the range of the projections also indicates that there were variations in these transitions as well as in the emerging consumption patterns of young adults. Therefore, this research also raises important questions that should be addressed in future research. Foremost among these issues is the extent to which the observed past - and likely future - variations in cohort transitions in housing consumption in different periods are attributable to demand factors, such as income growth, mobility and family relationships, or supply factors, such as changes in rents, house prices, mortgage terms, energy costs and the sheer availability of different types of units. A parallel question is the extent to which these same factors have influenced, and are expected to influence in the future, the formation of housing patterns by young adults. Only with a better understanding of these effects will it be possible to estimate the impacts of changes in economic conditions outside the range observed in the recent past.

The existence and significance of long-term cohort effects on consumption patterns have not previously been recognized in the behavioral models of housing choice. This omission is probably due more to analytic constraints imposed by the use of static, cross-sectional data bases than to a considered rejection of the importance of such effects. In this paper we have developed both the necessary data and analytic apparatus for modeling cohort effects on housing consumption. It is to be hoped that this study will serve as a stimulus for further research on housing consumption using cohort models.

Table 5

Summary of Projections of Population and Housing Consumption, 1980-2000

Population Series 1 (Low Fertility, TFR = 1.5)
Housing Series A (Extrapolation of 1970-1975 Cohort Housing Choice Trends)

	TOTAL	TENURE		STRUCTURE TYPE				NUMBER OF ROOMS	
	HOUSEHOLDS	OWNERS	RENTERS	MOBILE	1-FAMILY	2-4 FAMILY	5+ FAMILY	1-4 ROOMS	5+ ROOMS
ALL HOUSEHOLDS				NUMBER IN THOUSANDS					
1975	72482	46894	25588	3368	49737	8901	10510	24682	47800
1980	80701	52350	28350	4774	53802	9929	12195	26937	53764
1985	89405	58227	31178	6119	58205	11154	13927	29108	60298
1990	97107	63812	33296	7329	62034	12117	15627	30971	66136
1995	104412	70028	34384	8523	66227	12812	16850	32378	72034
2000	110783	75696	35088	9617	69926	13431	17809	33610	77173
PCT. OF YEAR TOTAL				PERCENT					
1975	100.0	64.7	35.3	4.6	68.6	12.3	14.5	34.1	65.9
1980	100.0	64.9	35.1	5.9	66.7	12.3	15.1	33.4	66.6
1985	100.0	65.1	34.9	6.8	65.1	12.5	15.6	32.6	67.4
1990	100.0	65.7	34.3	7.5	63.9	12.5	16.1	31.9	68.1
1995	100.0	67.1	32.9	8.2	63.4	12.3	16.1	31.0	69.0
2000	100.0	68.3	31.7	8.7	63.1	12.1	16.1	30.3	69.7
5-YEAR CHANGE#				NUMBER IN THOUSANDS					
1975-80	8219	5456	2762	1406	4065	1028	1685	2255	5964
1980-85	8704	5877	2828	1345	4403	1225	1731	2170	6534
1985-90	7702	5585	2118	1210	3829	963	1700	1864	5839
1990-95	7304	6216	1088	1194	4193	695	1223	1406	5898
1995-00	6372	5668	704	1094	3699	619	960	1233	5139
5-YEAR CHANGE%				PERCENT					
1975-80	11.3	11.6	10.8	41.8	8.2	11.6	16.0	9.1	12.5
1980-85	10.8	11.2	10.0	28.2	8.2	12.3	14.2	8.1	12.2
1985-90	8.6	9.6	6.8	19.8	6.6	8.6	12.2	6.4	9.7
1990-95	7.5	9.7	3.3	16.3	6.8	5.7	7.8	4.5	8.9
1995-00	6.1	8.1	2.0	12.8	5.6	4.8	5.7	3.8	7.1

Table 6

Summary of Projections of Population and Housing Consumption

by Detailed Housing Unit Types, 1980-2000

Population Series 1 (Low Fertility TFR = 1.5) Housing

Series A (Extrapolation of 1970-1975 Cohort Housing Choice Trends)

OWNER OCCUPANTS - (IN THOUSANDS)

MARITAL STATUS	NUMBER CHILDREN	SINGLE FAMILY 1-4 ROOMS	SINGLE FAMILY 5-6 ROOMS	SINGLE FAMILY 7+ ROOMS	2-4 FAMILY 1-4 ROOMS	2-4 FAMILY 5-6 ROOMS	2-4 FAMILY 7+ ROOMS	5+ FAMILY 1-4 ROOMS	5+ FAMILY 5+ ROOMS	MOBILE HOMES 1-4 ROOMS	MOBILE HOMES 5+ ROOMS
ALL HOUSEHOLDS											
	1975	4754	23444	13111	706	1194	242	379	210	1865	989
	1980	4295	24878	16078	754	1261	323	533	289	2387	1553
	1985	3907	26284	19281	784	1341	450	774	400	2803	2204
	1990	3594	27193	22455	825	1448	596	1122	589	3156	2831
	1995	3416	28184	25847	862	1581	773	1533	861	3509	3462
	2000	3303	28939	28895	892	1704	938	1941	1189	3879	4016
5-YEAR CHANGE #											
	1975-80	-459	1434	2967	48	67	81	154	79	522	564
	1980-85	-388	1405	3204	29	80	126	241	112	416	651
	1985-90	-311	909	3174	41	107	147	348	189	353	627
	1990-95	-180	991	3392	37	133	176	411	272	353	631
	1995-00	-113	755	3048	30	122	165	408	328	370	554
5-YEAR CHANGE %											
	1975-80	-9.7	6.1	22.6	6.9	5.6	33.6	40.7	37.5	28.0	57.0
	1980-85	-9.0	5.6	19.9	3.9	6.4	39.0	45.2	38.7	17.4	41.9
	1985-90	-8.0	3.5	16.5	5.2	8.0	32.7	45.0	47.2	12.6	28.5
	1990-95	-5.0	3.6	15.1	4.5	9.2	29.6	36.6	46.1	11.2	22.3
	1995-00	-3.3	2.7	11.8	3.5	7.7	21.4	26.6	38.0	10.6	16.0

RENTER OCCUPANTS - (IN THOUSANDS)

MARITAL STATUS	NUMBER CHILDREN	SINGLE FAMILY 1-4 ROOMS	SINGLE FAMILY 5-6 ROOMS	SINGLE FAMILY 7+ ROOMS	2-4 FAMILY 1-4 ROOMS	2-4 FAMILY 5-6 ROOMS	2-4 FAMILY 7+ ROOMS	5+ FAMILY 1-4 ROOMS	5+ FAMILY 5+ ROOMS	MOBILE HOMES 1-4 ROOMS	MOBILE HOMES 5+ ROOMS	TOTAL HOUSEHOLDS	NON-HEADS
ALL HOUSEHOLDS													
	1975	3454	3881	1093	4615	2006	138	8496	1425	413	101	72482	33778
	1980	3362	4027	1162	5252	2144	196	9717	1656	637	198	80701	34580
	1985	3313	4160	1260	5919	2415	245	10815	1938	793	320	89405	32870
	1990	3265	4218	1307	6383	2580	285	11719	2197	906	437	97107	30951
	1995	3234	4227	1319	6679	2617	300	12139	2316	1006	547	104412	30023
	2000	3231	4254	1305	6955	2632	311	12327	2351	1082	639	110783	29219
5-YEAR CHANGE #													
	1975-80	-92	146	69	637	138	58	1221	231	224	97	8219	810
	1980-85	-49	133	98	667	272	50	1098	281	156	122	8704	-1719
	1985-90	-48	58	48	463	165	39	904	259	113	117	7702	-1919
	1990-95	-30	9	12	296	37	16	421	119	100	110	7304	-928
	1995-00	-3	27	-15	276	15	10	188	36	77	93	6372	-804
5-YEAR CHANGE %													
	1975-80	-2.7	3.8	6.3	13.8	6.9	41.7	14.4	16.2	54.2	96.5	11.3	2.4
	1980-85	-1.5	3.3	8.4	12.7	12.7	25.5	11.3	17.0	24.5	61.3	10.8	-5.0
	1985-90	-1.5	1.4	3.8	7.8	6.8	16.1	8.4	13.4	14.3	36.5	8.6	-5.8
	1990-95	-0.9	0.2	0.9	4.6	1.4	5.5	3.6	5.4	11.0	25.2	7.5	-3.0
	1995-00	-0.1	0.6	-1.1	4.1	0.6	3.3	1.6	1.5	7.6	16.9	6.1	-2.7

Table 7

Summary of Projections of Population and Housing Consumption, 1980-2000

Population Series 2 (Medium Fertility, TFR = 1.8)

Housing Series A (Extrapolation of 1970-75 Cohort Housing Choice Trends)

	TOTAL	TENURE		STRUCTURE TYPE				NUMBER OF ROOMS	
	HOUSEHOLDS	OWNERS	RENTERS	MOBILE	1-FAMILY	2-4 FAMILY	5+ FAMILY	1-4 ROOMS	5+ ROOMS
ALL HOUSEHOLDS				NUMBER IN THOUSANDS					
1975	72482	46894	25588	3368	49737	8901	10510	24682	47800
1980	80593	52448	28145	4780	53913	9870	12029	26678	53915
1985	89819	59142	30678	6277	59077	10961	13505	28568	61251
1990	97613	65367	32246	7512	63558	11747	14796	29887	67726
1995	103210	70748	32462	8490	67105	12082	15533	30327	72883
2000	107973	75536	32436	9390	70199	12327	16057	30755	77217
PCT. OF YEAR TOTAL				PERCENT					
1975	100.0	64.7	35.3	4.6	68.6	12.3	14.5	34.1	65.9
1980	100.0	65.1	34.9	5.9	66.9	12.2	14.9	33.1	66.9
1985	100.0	65.8	34.2	7.0	65.8	12.2	15.0	31.8	68.2
1990	100.0	67.0	33.0	7.7	65.1	12.0	15.2	30.6	69.4
1995	100.0	68.5	31.5	8.2	65.0	11.7	15.0	29.4	70.6
2000	100.0	70.0	30.0	8.7	65.0	11.4	14.9	28.5	71.5
5-YEAR CHANGE#				NUMBER IN THOUSANDS					
1975-80	8111	5554	2557	1412	4176	969	1519	1996	6115
1980-85	9226	6694	2532	1496	5163	1091	1475	1891	7335
1985-90	7794	6226	1568	1235	4481	786	1291	1319	6475
1990-95	5597	5381	216	978	3547	334	737	440	5157
1995-00	4762	4788	-26	900	3094	245	524	428	4334
5-YEAR CHANGE%				PERCENT					
1975-80	11.2	11.8	10.0	41.9	8.4	10.9	14.5	8.1	12.8
1980-85	11.4	12.8	9.0	31.3	9.6	11.1	12.3	7.1	13.6
1985-90	8.7	10.5	5.1	19.7	7.6	7.2	9.6	4.6	10.6
1990-95	5.7	8.2	0.7	13.0	5.6	2.8	5.0	1.5	7.6
1995-00	4.6	6.8	-0.1	10.6	4.6	2.0	3.4	1.4	5.9

Table 8

Summary of Projections of Population and Housing Consumption by Detailed Housing Unit Types, 1980-2000

Population Series 2 (Medium Fertility TFR = 1.8 Housing Series A (Extrapolation of 1970-1975 Cohort Housing Choice Trends)

OWNER OCCUPANTS - (IN THOUSANDS)

MARITAL STATUS	NUMBER CHILDREN	SINGLE FAMILY 1-4 ROOMS	SINGLE FAMILY 5-6 ROOMS	SINGLE FAMILY 7+ ROOMS	2-4 FAMILY 1-4 ROOMS	2-4 FAMILY 5-6 ROOMS	2-4 FAMILY 7+ ROOMS	5+ FAMILY 1-4 ROOMS	5+ FAMILY 5+ ROOMS	MOBILE HOMES 1-4 ROOMS	MOBILE HOMES 5+ ROOMS
ALL HOUSEHOLDS											
	1975	4754	23444	13111	706	1194	242	379	210	1865	989
	1980	4289	24928	16150	750	1260	322	522	286	2374	1568
	1985	3929	26737	19633	774	1348	446	730	395	2842	2308
	1990	3599	27945	23208	795	1458	587	1036	572	3185	2981
	1995	3336	28652	26514	793	1555	719	1363	806	3439	3571
	2000	3158	29143	29446	784	1633	819	1672	1067	3726	4088
5-YEAR CHANGE #											
	1975-80	-465	1484	3039	44	66	80	143	76	509	579
	1980-85	-360	1810	3484	25	88	123	208	109	468	740
	1985-90	-329	1208	3575	21	110	141	307	177	343	673
	1990-95	-263	707	3305	-2	97	133	326	234	254	590
	1995-00	-178	491	2932	-18	78	100	310	261	287	518
5-YEAR CHANGE %											
	1975-80	-9.8	6.3	23.2	6.2	5.5	33.2	37.7	36.1	27.3	58.6
	1980-85	-8.4	7.3	21.6	3.3	7.0	38.2	39.8	38.1	19.7	47.2
	1985-90	-8.4	4.5	18.2	2.7	8.2	31.6	42.1	44.9	12.1	29.2
	1990-95	-7.3	2.5	14.2	-0.2	6.7	22.6	31.5	40.8	8.0	19.8
	1995-00	-5.3	1.7	11.1	-1.2	5.0	13.9	22.7	32.4	8.3	14.5

RENTER OCCUPANTS - (IN THOUSANDS)

MARITAL STATUS	NUMBER CHILDREN	SINGLE FAMILY 1-4 ROOMS	SINGLE FAMILY 5-6 ROOMS	SINGLE FAMILY 7+ ROOMS	2-4 FAMILY 1-4 ROOMS	2-4 FAMILY 5-6 ROOMS	2-4 FAMILY 7+ ROOMS	5+ FAMILY 1-4 ROOMS	5+ FAMILY 5+ ROOMS	MOBILE HOMES 1-4 ROOMS	MOBILE HOMES 5+ ROOMS	TOTAL HOUSEHOLDS	NON-HEADS
ALL HOUSEHOLDS													
	1975	3454	3881	1893	4615	2806	138	8496	1425	413	1..	72482	33778
	1980	3350	4035	1163	5196	2145	197	9562	1660	637	202	80593	33971
	1985	3277	4207	1293	5763	2376	254	10449	1931	805	322	89819	31816
	1990	3218	4251	1336	6090	2526	292	11055	2132	908	438	97613	29805
	1995	3114	4176	1313	6184	2523	306	11146	2219	952	529	103210	29246
	2000	3033	4111	1306	6308	2471	312	11091	2227	983	593	107973	30132
5-YEAR CHANGE #													
	1975-80	-104	154	70	581	139	59	1066	235	224	101	8111	193
	1980-85	-73	173	130	567	231	57	888	271	168	121	9226	-2155
	1985-90	-58	43	43	326	150	38	606	202	104	115	7794	-2011
	1990-95	-105	-75	-23	95	-3	14	91	86	43	91	5597	-559
	1995-00	-80	-65	-7	123	-52	6	-55	8	32	64	4762	886
5-YEAR CHANGE %													
	1975-80	-3.0	4.0	6.4	12.6	6.9	42.6	12.5	16.5	54.1	99.9	11.2	0.6
	1980-85	-2.2	4.3	11.2	10.9	10.8	28.9	9.3	16.3	26.4	59.7	11.4	-6.3
	1985-90	-1.8	1.0	3.3	5.7	6.3	15.1	5.8	10.4	12.9	35.8	8.7	-6.3
	1990-95	-3.3	-1.8	-1.7	1.6	-0.1	4.9	0.8	4.0	4.8	20.8	5.7	-1.9
	1995-00	-2.6	-1.6	-0.5	2.0	-2.1	1.9	-0.5	0.4	3.3	12.1	4.6	3.0

Table 9: - Summary of Projections of Population and Housing Consumption, 1980-2000

Population Series 3 (High Fertility, TFR = 2.1)

Housing Series A (Extrapolation of 1970-1975 Cohort Housing Choice Trends)

	TOTAL	TENURE		STRUCTURE TYPE				NUMBER OF ROOMS	
	HOUSEHOLDS	OWNERS	RENTERS	MOBILE	1-FAMILY	2-4 FAMILY	5+ FAMILY	1-4 ROOMS	5+ ROOMS
ALL HOUSEHOLDS				NUMBER IN THOUSANDS					
1975	72482	46894	25588	3368	49737	8901	10510	24682	47800
1980	80440	52378	28062	4767	53840	9843	11990	26591	53849
1985	89526	59410	30115	6252	59302	10759	13212	28100	61425
1990	97193	66119	31074	7543	64210	11281	14159	28924	68269
1995	102718	71914	30804	8540	68163	11449	14566	28940	73778
2000	107304	76710	30594	9434	71341	11598	14931	29149	78156
PCT. OF YEAR TOTAL				PERCENT					
1975	100.0	64.7	35.3	4.6	68.6	12.3	14.5	34.1	65.9
1980	100.0	65.1	34.9	5.9	66.9	12.2	14.9	33.1	66.9
1985	100.0	66.4	33.6	7.0	66.2	12.0	14.8	31.4	68.6
1990	100.0	68.0	32.0	7.8	66.1	11.6	14.6	29.8	70.2
1995	100.0	70.0	30.0	8.3	66.4	11.1	14.2	28.2	71.8
2000	100.0	71.5	28.5	8.8	66.5	10.8	13.9	27.2	72.8
5-YEAR CHANGE#				NUMBER IN THOUSANDS					
1975-80	7958	5484	2474	1399	4103	942	1480	1909	6049
1980-85	9086	7032	2053	1485	5462	916	1222	1510	7576
1985-90	7667	6709	959	1291	4908	522	946	823	6844
1990-95	5525	5795	-270	996	3953	168	408	16	5509
1995-00	4586	4796	-210	894	3178	149	365	209	4377
5-YEAR CHANGE%				PERCENT					
1975-80	11.0	11.7	9.7	41.5	8.2	10.6	14.1	7.7	12.7
1980-85	11.3	13.4	7.3	31.2	10.1	9.3	10.2	5.7	14.1
1985-90	8.6	11.3	3.2	20.7	8.3	4.9	7.2	2.9	11.1
1990-95	5.7	8.8	-0.9	13.2	6.2	1.5	2.9	0.1	8.1
1995-00	4.5	6.7	-0.7	10.5	4.7	1.3	2.5	0.7	5.9

Table 10

Summary of Projections of Population and Housing Consumption

by Detailed Housing Unit Types, 1980-2000

Population Series 3 (High Fertility TFR = 2.1) Housing Series A (Extrapolation of 1970-1975 Cohort Housing Choice Trends)

OWNER OCCUPANTS - (IN THOUSANDS)

MARITAL STATUS	NUMBER CHILDREN	SINGLE FAMILY 1-4 ROOMS	SINGLE FAMILY 5-6 ROOMS	SINGLE FAMILY 7+ ROOMS	2-4 FAMILY 1-4 ROOMS	2-4 FAMILY 5-6 ROOMS	2-4 FAMILY 7+ ROOMS	5+ FAMILY 1-4 ROOMS	5+ FAMILY 5+ ROOMS	MOBILE HOMES 1-4 ROOMS	MOBILE HOMES 5+ ROOMS
ALL HOUSEHOLDS											
	1975	4754	23444	13111	706	1194	242	379	210	1865	989
	1980	4281	24898	16134	747	1258	321	520	285	2366	1566
	1985	3917	26862	19040	762	1343	435	714	392	2821	2325
	1990	3584	28330	23642	770	1449	558	983	562	3178	3062
	1995	3309	29226	27229	756	1543	680	1276	783	3433	3680
	2000	3115	29731	30262	737	1607	770	1545	1024	3711	4207
5-YEAR CHANGE #											
	1975-80	-473	1454	3023	41	64	79	141	75	501	577
	1980-85	-364	1963	3705	15	84	114	194	107	454	759
	1985-90	-333	1469	3602	8	106	123	269	170	358	737
	1990-95	-275	896	3587	-14	93	121	293	222	254	618
	1995-00	-194	505	3034	-19	65	91	269	241	278	527
5-YEAR CHANGE %											
	1975-80	-10.0	6.2	23.1	5.8	5.4	32.8	37.3	35.8	26.9	58.3
	1980-85	-8.5	7.9	23.0	2.0	6.7	35.5	37.3	37.4	19.2	48.5
	1985-90	-8.5	5.5	19.2	1.1	7.9	28.2	37.6	43.4	12.7	31.7
	1990-95	-7.7	3.2	15.2	-1.8	6.4	21.7	29.8	39.5	8.0	20.2
	1995-00	-5.9	1.7	11.1	-2.5	4.2	13.3	21.1	30.8	8.1	14.3

RENTER OCCUPANTS - (IN THOUSANDS)

MARITAL STATUS	NUMBER CHILDREN	SINGLE FAMILY 1-4 ROOMS	SINGLE FAMILY 5-6 ROOMS	SINGLE FAMILY 7+ ROOMS	2-4 FAMILY 1-4 ROOMS	2-4 FAMILY 5-6 ROOMS	2-4 FAMILY 7+ ROOMS	5+ FAMILY 1-4 ROOMS	5+ FAMILY 5+ ROOMS	MOBILE HOMES 1-4 ROOMS	MOBILE HOMES 5+ ROOMS	TOTAL HOUSEHOLDS	NON-HEADS
ALL HOUSEHOLDS													
	1975	3454	3881	1093	4615	2806	138	8496	1425	413	101	72482	33778
	1980	3338	4026	1162	5178	2142	196	9526	1658	633	201	80440	33924
	1985	3228	4174	1282	5643	2332	244	10229	1878	787	319	89526	31192
	1990	3117	4286	1331	5824	2400	279	10586	2028	881	422	97193	28589
	1995	2988	4189	1302	5815	2366	290	10442	2065	921	506	102718	27865
	2000	2904	4037	1292	5887	2301	295	10302	2060	948	568	107304	29521
5-YEAR CHANGE #													
	1975-80	-116	145	69	563	136	58	1030	233	220	100	7958	146
	1980-85	-111	148	120	465	190	47	702	219	154	118	9086	-2733
	1985-90	-111	31	49	182	68	35	357	151	94	103	7667	-2603
	1990-95	-129	-97	-29	-10	-34	12	-143	36	40	84	5525	-724
	1995-00	-85	-72	-10	72	-64	5	-141	-5	28	62	4586	1656
5-YEAR CHANGE %													
	1975-80	-3.3	3.7	6.3	12.2	6.0	42.4	12.1	16.4	53.3	99.2	11.0	0.4
	1980-85	-3.3	3.7	10.3	9.0	8.9	24.1	7.4	13.2	24.3	58.7	11.3	-8.1
	1985-90	-3.4	0.8	3.8	3.2	2.9	14.2	3.5	8.0	11.9	32.2	8.6	-8.3
	1990-95	-4.1	-2.3	-2.2	-0.2	-1.4	4.1	-1.4	1.8	4.5	19.9	5.7	-2.5
	1995-00	-2.8	-1.8	-0.8	1.2	-2.7	1.7	-1.3	-0.2	3.0	12.2	4.5	5.9

Table 11

Summary of Projections of Population and Housing Consumption, 1980-2000

Population Series 1 (Low Fertility, TFR = 1.5)

Housing Series B (Extrapolation of 1960-1970 Cohort Housing Choice Trends)

	TOTAL	TENURE		STRUCTURE TYPE				NUMBER OF ROOMS	
	HOUSEHOLDS	OWNERS	RENTERS	MOBILE	1-FAMILY	2-4 FAMILY	5+ FAMILY	1-4 ROOMS	5+ ROOMS
ALL HOUSEHOLDS				NUMBER IN THOUSANDS					
1975	72482	46894	25588	3368	49737	8901	10510	24682	47800
1980	79170	50405	28766	4188	52174	10041	12801	27340	51831
1985	85652	54148	31504	4956	54811	10924	14992	29747	55905
1990	91692	57890	33802	5732	57332	11516	17144	31975	59717
1995	97921	62540	35381	6656	60486	11984	18824	33902	64018
2000	103482	66834	36648	7597	63265	12344	20304	35709	67773
PCT. OF YEAR TOTAL				PERCENT					
1975	100.0	64.7	35.3	4.6	68.6	12.3	14.5	34.1	65.9
1980	100.0	63.7	36.3	5.3	65.9	12.7	16.2	34.5	65.5
1985	100.0	63.2	36.8	5.8	64.0	12.8	17.5	34.7	65.3
1990	100.0	63.1	36.9	6.3	62.5	12.6	18.7	34.9	65.1
1995	100.0	63.9	36.1	6.8	61.8	12.2	19.2	34.6	65.4
2000	100.0	64.6	35.4	7.3	61.1	11.9	19.6	34.5	65.5
5-YEAR CHANGE#				NUMBER IN THOUSANDS					
1975-80	6688	3511	3178	820	2437	1140	2291	2658	4031
1980-85	6481	3743	2738	768	2637	883	2191	2407	4074
1985-90	6041	3742	2299	776	2520	592	2152	2228	3812
1990-95	6229	4650	1579	924	3155	468	1681	1927	4301
1995-00	5561	4294	1268	941	2778	360	1480	1807	3754
5-YEAR CHANGE%				PERCENT					
1975-80	9.2	7.5	12.4	24.3	4.9	12.8	21.8	10.8	8.4
1980-85	8.2	7.4	9.5	18.3	5.1	8.8	17.1	8.8	7.9
1985-90	7.1	6.9	7.3	15.7	4.6	5.4	14.4	7.5	6.8
1990-95	6.8	8.0	4.7	16.1	5.5	4.1	9.8	6.0	7.2
1995-00	5.7	6.9	3.6	14.1	4.6	3.0	7.9	5.3	5.9

Table 12

Summary of Projections of Population and Housing Consumption by Detailed Housing Unit Types, 1980-2000

Population Series 1 (Low Fertility TFR = 1.5) Housing Series B (Extrapolation of 1960-1970 Cohort Housing Choice Trends)

OWNER OCCUPANTS - (IN THOUSANDS)

MARITAL STATUS	NUMBER CHILDREN	SINGLE FAMILY 1-4 ROOMS	SINGLE FAMILY 5-6 ROOMS	SINGLE FAMILY 7+ ROOMS	2-4 FAMILY 1-4 ROOMS	2-4 FAMILY 5-6 ROOMS	2-4 FAMILY 7+ ROOMS	5+ FAMILY 1-4 ROOMS	5+ FAMILY 5+ ROOMS	MOBILE HOMES 1-4 ROOMS	MOBILE HOMES 5+ ROOMS
ALL HOUSEHOLDS											
	1975	4754	23444	13111	706	1194	242	379	210	1865	989
	1980	4522	24207	15063	764	1313	276	509	245	2360	1145
	1985	4352	25210	16921	797	1420	317	659	291	2853	1329
	1990	4174	26049	18851	827	1536	354	841	376	3390	1494
	1995	4057	27186	21051	890	1699	409	1039	459	4030	1721
	2000	3917	28199	23806	949	1873	464	1234	558	4764	1869
5-YEAR CHANGE #											
	1975-80	-232	763	1952	58	119	34	130	35	495	156
	1980-85	-170	1004	1857	33	107	42	149	45	492	183
	1985-90	-178	838	1930	30	116	37	182	86	537	166
	1990-95	-117	1138	2201	63	164	55	198	83	640	226
	1995-00	-139	1013	1955	59	174	55	195	99	734	149
5-YEAR CHANGE %											
	1975-80	-4.9	3.3	14.9	8.2	9.9	14.0	34.4	16.7	26.6	15.8
	1980-85	-3.8	4.1	12.3	4.3	8.2	15.1	29.3	18.5	20.9	16.0
	1985-90	-4.1	3.3	11.4	3.7	8.1	11.5	27.6	29.4	18.8	12.5
	1990-95	-2.8	4.4	11.7	7.6	10.7	15.5	23.6	22.0	18.9	15.2
	1995-00	-3.4	3.7	9.3	6.6	10.2	13.5	18.8	21.5	18.2	8.6

RENTER OCCUPANTS - (IN THOUSANDS)

MARITAL STATUS	NUMBER CHILDREN	SINGLE FAMILY 1-4 ROOMS	SINGLE FAMILY 5-6 ROOMS	SINGLE FAMILY 7+ ROOMS	2-4 FAMILY 1-4 ROOMS	2-4 FAMILY 5-6 ROOMS	2-4 FAMILY 7+ ROOMS	5+ FAMILY 1-4 ROOMS	5+ FAMILY 5+ ROOMS	MOBILE HOMES 1-4 ROOMS	MOBILE HOMES 5+ ROOMS	TOTAL HOUSEHOLDS	NON-HEADS
ALL HOUSEHOLDS													
	1975	3454	3881	1093	4615	2806	138	8496	1425	413	101	72482	33778
	1980	3179	4064	1139	5175	2332	181	10273	1774	557	125	79170	36119
	1985	2945	4195	1189	5582	2586	221	11921	2122	639	136	85652	36623
	1990	2727	4266	1266	5818	2742	239	13499	2428	701	148	91692	36367
	1995	2543	4308	1342	5902	2833	250	14686	2641	756	150	97921	36514
	2000	2411	4333	1398	5915	2885	258	15706	2806	813	152	103482	36519
5-YEAR CHANGE #													
	1975-80	-275	183	46	560	326	43	1777	349	144	24	6688	2341
	1980-85	-235	131	50	408	253	40	1648	348	82	11	6481	505
	1985-90	-218	71	76	236	157	18	1578	306	62	12	6041	-257
	1990-95	-184	41	76	85	91	11	1187	212	56	2	6229	147
	1995-00	-132	25	56	13	52	8	1020	166	56	2	5561	6
5-YEAR CHANGE %													
	1975-80	-7.9	4.7	4.2	12.1	16.3	31.5	20.9	24.5	34.8	23.7	9.2	6.9
	1980-85	-7.4	3.2	4.4	7.9	10.9	22.0	16.0	19.6	14.7	8.6	8.2	1.4
	1985-90	-7.4	1.7	6.4	4.2	6.1	7.9	13.2	14.4	9.7	8.8	7.1	-0.7
	1990-95	-6.7	1.0	6.0	1.5	3.3	4.6	8.8	8.7	7.9	1.3	6.8	0.4
	1995-00	-5.2	0.6	4.2	0.2	1.8	3.1	6.9	6.3	7.5	1.4	5.7	0.0

Table 13

Summary of Projections of Population and Housing Consumption,

1980-2000

Population Series 2 (Medium Fertility, TFR = 1.8)

Housing Series B (Extrapolation of 1960-1970 Cohort Housing Choice Trends)

	TOTAL	TENURE		STRUCTURE TYPE				NUMBER OF ROOMS	
	HOUSEHOLDS	OWNERS	RENTERS	MOBILE	1-FAMILY	2-4 FAMILY	5+ FAMILY	1-4 ROOMS	5+ ROOMS
ALL HOUSEHOLDS				NUMBER IN THOUSANDS					
1975	72482	46894	25588	3368	49737	8901	10510	24682	47800
1980	79114	50535	28578	4188	52346	9990	12623	27092	52022
1985	86338	55052	31286	5049	55830	10862	14628	29412	56926
1990	92717	59468	33249	5818	59099	11368	16461	31247	61470
1995	97513	63546	33967	6557	61839	11578	17568	32185	65327
2000	101697	67275	34423	7301	64284	11688	18455	33080	68610
PCT. OF YEAR TOTAL				PERCENT					
1975	100.0	64.7	35.3	4.6	68.6	12.3	14.5	34.1	65.9
1980	100.0	63.9	36.1	5.3	66.2	12.6	16.0	34.2	65.8
1985	100.0	63.8	36.2	5.8	64.7	12.6	16.9	34.1	65.9
1990	100.0	64.1	35.9	6.3	63.7	12.3	17.8	33.7	66.3
1995	100.0	65.2	34.8	6.7	63.4	11.9	18.0	33.0	67.0
2000	100.0	66.2	33.8	7.2	63.2	11.5	18.1	32.5	67.5
5-YEAR CHANGE#				NUMBER IN THOUSANDS					
1975-80	6632	3641	2990	820	2609	1089	2113	2410	4222
1980-85	7225	4517	2708	861	3484	872	2005	2320	4905
1985-90	6379	4417	1962	769	3269	506	1633	1835	4544
1990-95	4796	4077	719	739	2739	210	1107	938	3857
1995-00	4184	3729	456	744	2446	110	887	902	3282
5-YEAR CHANGE%				PERCENT					
1975-80	9.1	7.8	11.7	24.3	5.2	12.2	20.1	9.8	8.8
1980-85	9.1	8.9	9.5	20.6	6.7	8.7	15.9	8.6	9.4
1985-90	7.4	8.0	6.3	15.2	5.9	4.7	12.5	6.2	8.0
1990-95	5.2	6.9	2.2	12.7	4.6	1.8	6.7	3.0	6.3
1995-00	4.3	5.9	1.3	11.3	4.0	0.9	5.0	2.8	5.0

Table 14

Summary of Projections of Population and Housing Consumption by Detailed Housing Unit Types, 1980-2000

Population Series 2 (Medium Fertility TFR = 1.8) Housing Series B (Extrapolation of 1960-1970 Cohort Housing Choice Trends)

OWNER OCCUPANTS - (IN THOUSANDS)

MARITAL STATUS	NUMBER CHILDREN	SINGLE FAMILY 1-4 ROOMS	SINGLE FAMILY 5-6 ROOMS	SINGLE FAMILY 7+ ROOMS	2-4 FAMILY 1-4 ROOMS	2-4 FAMILY 5-6 ROOMS	2-4 FAMILY 7+ ROOMS	5+ FAMILY 1-4 ROOMS	5+ FAMILY 5+ ROOMS	MOBILE HOMES 1-4 ROOMS	MOBILE HOMES 5+ ROOMS
ALL HOUSEHOLDS											
	1975	4754	23444	13111	706	1194	242	379	210	1865	989
	1980	4520	24273	15147	759	1313	276	502	243	2347	1156
	1985	4195	25657	17276	790	1430	319	640	286	2881	1379
	1990	4228	26827	19556	811	1554	356	810	366	3402	1560
	1995	4047	27718	21780	841	1675	404	978	435	3909	1761
	2000	3863	28518	23760	866	1788	451	1139	512	4487	1891
5-YEAR CHANGE #											
	1975-80	-234	829	2036	53	119	34	123	33	482	167
	1980-85	-125	1383	2130	31	117	42	138	43	534	223
	1985-90	-167	1171	2280	21	124	37	169	80	521	181
	1990-95	-181	890	2224	30	121	48	168	69	507	201
	1995-00	-184	801	1981	25	113	47	161	78	578	130
5-YEAR CHANGE %											
	1975-80	-4.9	3.5	15.5	7.5	10.0	14.1	32.4	15.7	25.8	16.9
	1980-85	-2.8	5.7	14.1	4.1	8.9	15.4	27.6	17.7	22.8	19.3
	1985-90	-3.8	4.6	13.2	2.7	8.7	11.7	26.4	27.8	18.1	13.1
	1990-95	-4.3	3.3	11.4	3.7	7.8	13.5	20.8	18.9	14.9	12.9
	1995-00	-4.6	2.9	9.1	3.0	6.7	11.5	16.5	17.9	14.8	7.4

RENTER OCCUPANTS - (IN THOUSANDS)

MARITAL STATUS	NUMBER CHILDREN	SINGLE FAMILY 1-4 ROOMS	SINGLE FAMILY 5-6 ROOMS	SINGLE FAMILY 7+ ROOMS	2-4 FAMILY 1-4 ROOMS	2-4 FAMILY 5-6 ROOMS	2-4 FAMILY 7+ ROOMS	5+ FAMILY 1-4 ROOMS	5+ FAMILY 5+ ROOMS	MOBILE HOMES 1-4 ROOMS	MOBILE HOMES 5+ ROOMS	TOTAL HOUSEHOLDS	NON-HEADS
ALL HOUSEHOLDS													
	1975	3454	3881	1093	4615	2006	138	8496	1425	413	101	72482	33778
	1980	3181	4082	1144	5125	2336	182	10102	1776	556	128	79114	35451
	1985	2982	4302	1219	5503	2599	223	11576	2126	646	143	86338	35297
	1990	2772	4416	1380	5650	2758	240	12876	2410	699	157	92717	34701
	1995	2537	4399	1359	5574	2829	255	13569	2587	730	157	97513	34944
	2000	2388	4359	1396	5473	2849	261	14106	2698	766	157	101697	36407
5-YEAR CHANGE #													
	1975-80	-273	201	51	510	330	44	1606	351	143	27	6632	1673
	1980-85	-199	221	75	378	263	41	1474	350	89	15	7224	-154
	1985-90	-209	114	81	147	159	17	1300	284	53	14	6379	-596
	1990-95	-235	-17	59	-75	71	15	693	177	31	-0	4796	243
	1995-00	-149	-40	37	-101	20	6	537	111	35	0	4184	1464
5-YEAR CHANGE %													
	1975-80	-7.9	5.2	4.6	11.0	16.4	31.9	18.9	24.6	34.7	27.1	9.1	5.0
	1980-85	-6.3	5.4	6.6	7.4	11.3	22.4	14.6	19.7	16.0	11.5	9.1	-0.4
	1985-90	-7.0	2.6	6.7	2.7	6.1	7.8	11.2	13.4	8.3	9.9	7.4	-1.7
	1990-95	-8.5	-0.4	4.5	-1.3	2.6	6.2	5.4	7.3	4.5	-0.1	5.2	0.7
	1995-00	-5.9	-0.9	2.7	-1.8	0.7	2.3	4.0	4.3	4.8	0.1	4.3	4.2

Table 15: Summary of Projections of Population and Housing Consumption, 1980-2000

Population Series 3 (High Fertility, TFR = 2.1)

Housing Series B (Extrapolation of 1960-1970 Cohort Housing Choice Trends)

	TOTAL	TENURE		STRUCTURE TYPE				NUMBER OF ROOMS	
	HOUSEHOLDS	OWNERS	RENTERS	MOBILE	1-FAMILY	2-4 FAMILY	5+ FAMILY	1-4 ROOMS	5+ ROOMS
ALL HOUSEHOLDS				NUMBER IN THOUSANDS					
1975	72482	46894	25588	3368	49737	8901	10510	24682	47800
1980	78966	50470	28496	4175	52277	9966	12580	27005	51961
1985	86178	55392	30785	5033	56153	10700	14322	29004	57173
1990	92706	60301	32405	5834	59959	11099	15844	30537	62169
1995	97656	64827	32830	6577	63193	11233	16683	31173	66483
2000	101787	68636	33152	7301	65800	11312	17406	31877	69910
PCT. OF YEAR TOTAL				PERCENT					
1975	100.0	64.7	35.3	4.6	68.6	12.3	14.5	34.1	65.9
1980	100.0	63.9	36.1	5.3	66.2	12.6	15.9	34.2	65.8
1985	100.0	64.3	35.7	5.8	65.2	12.4	16.6	33.7	66.3
1990	100.0	65.0	35.0	6.3	64.7	12.0	17.1	32.9	67.1
1995	100.0	66.4	33.6	6.7	64.7	11.5	17.1	31.9	68.1
2000	100.0	67.4	32.6	7.2	64.6	11.1	17.1	31.3	68.7
5-YEAR CHANGE#				NUMBER IN THOUSANDS					
1975-80	6484	3576	2908	807	2540	1065	2070	2323	4161
1980-85	7212	4923	2289	857	3876	734	1742	2000	5212
1985-90	6528	4908	1620	801	3806	399	1521	1532	4996
1990-95	4950	4526	424	743	3234	134	839	636	4314
1995-00	4131	3809	322	725	2608	79	723	705	3427
5-YEAR CHANGE%				PERCENT					
1975-80	8.9	7.6	11.4	24.0	5.1	12.0	19.7	9.4	8.7
1980-85	9.1	9.8	8.0	20.5	7.4	7.4	13.8	7.4	10.0
1985-90	7.6	8.9	5.3	15.9	6.8	3.7	10.6	5.3	8.7
1990-95	5.3	7.5	1.3	12.7	5.4	1.2	5.3	2.1	6.9
1995-00	4.2	5.9	1.0	11.0	4.1	0.7	4.3	2.3	5.2

Table 16

Summary of Projections of Population and Housing Consumption by Detailed Housing Unit Types, 1980-2000

Population Series 3 (High Fertility TFR = 2.1) Housing Series B (Extrapolation of 1960-1970 Cohort Housing Choice Trends)

OWNER OCCUPANTS - (IN THOUSANDS)

MARITAL STATUS	NUMBER CHILDREN	SINGLE FAMILY 1-4 ROOMS	SINGLE FAMILY 5-6 ROOMS	SINGLE FAMILY 7+ ROOMS	2-4 FAMILY 1-4 ROOMS	2-4 FAMILY 5-6 ROOMS	2-4 FAMILY 7+ ROOMS	5+ FAMILY 1-4 ROOMS	5+ FAMILY 5+ ROOMS	MOBILE HOMES 1-4 ROOMS	MOBILE HOMES 5+ ROOMS
ALL HOUSEHOLDS											
	1975	4754	23444	13111	706	1194	242	379	210	1865	989
	1980	4511	24244	15134	757	1311	276	501	242	2339	1155
	1985	4397	25622	17480	780	1427	317	634	282	2862	1392
	1990	4251	27248	19969	792	1550	354	794	354	3394	1596
	1995	4081	28377	22403	816	1673	402	954	416	3893	1810
	2000	3891	29228	24477	834	1779	447	1104	487	4446	1944
5-YEAR CHANGE #											
	1975-80	-243	800	2023	51	117	34	122	32	474	166
	1980-85	-115	1577	2346	23	117	42	134	39	523	237
	1985-90	-146	1426	2489	12	123	36	160	72	532	204
	1990-95	-169	1129	2434	25	123	48	160	63	499	214
	1995-00	-191	851	2073	17	106	45	150	70	553	134
5-YEAR CHANGE %											
	1975-80	-5.1	3.4	15.4	7.2	9.8	13.9	32.1	15.5	25.4	16.8
	1980-85	-2.5	6.5	15.5	3.0	8.9	15.1	26.7	16.1	22.4	20.5
	1985-90	-3.3	5.5	14.2	1.5	8.6	11.5	25.2	25.6	18.6	14.7
	1990-95	-4.0	4.1	12.2	3.1	8.0	13.7	20.2	17.7	14.7	13.4
	1995-00	-4.7	3.0	9.3	2.1	6.3	11.3	15.7	16.9	14.2	7.4

RENTER OCCUPANTS - (IN THOUSANDS)

MARITAL STATUS	NUMBER CHILDREN	SINGLE FAMILY 1-4 ROOMS	SINGLE FAMILY 5-6 ROOMS	SINGLE FAMILY 7+ ROOMS	2-4 FAMILY 1-4 ROOMS	2-4 FAMILY 5-6 ROOMS	2-4 FAMILY 7+ ROOMS	5+ FAMILY 1-4 ROOMS	5+ FAMILY 5+ ROOMS	MOBILE HOMES 1-4 ROOMS	MOBILE HOMES 5+ ROOMS	TOTAL HOUSEHOLDS	NON-HEADS
ALL HOUSEHOLDS													
	1975	3454	3881	1893	4615	2006	138	8496	1425	413	101	72482	33778
	1980	3171	4074	1142	5109	2332	182	10864	1774	554	128	78966	35399
	1985	2964	4279	1211	5407	2557	212	11326	2081	635	144	86178	34540
	1990	2772	4425	1294	5486	2694	224	12365	2332	684	160	92706	33076
	1995	2542	4437	1351	5346	2759	237	12828	2484	712	162	97656	32927
	2000	2405	4412	1388	5223	2783	246	13226	2589	748	163	101787	35838
5-YEAR CHANGE #													
	1975-80	-283	193	49	494	326	44	1568	349	141	27	6484	1621
	1980-85	-207	205	69	298	224	31	1262	307	82	16	7212	-859
	1985-90	-193	146	83	79	137	12	1039	250	49	16	6528	-1464
	1990-95	-229	12	57	-140	65	13	463	153	27	2	4950	-149
	1995-00	-137	-25	36	-123	24	9	398	104	36	1	4131	2111
5-YEAR CHANGE %													
	1975-80	-8.2	5.0	4.5	10.7	16.3	31.7	18.5	24.5	34.1	26.9	8.9	4.8
	1980-85	-6.5	5.0	6.1	5.8	9.6	16.8	12.5	17.3	14.7	12.3	9.1	-2.4
	1985-90	-6.5	3.4	6.8	1.5	5.4	5.5	9.2	12.0	7.7	11.8	7.6	-4.2
	1990-95	-8.3	8.3	4.4	-2.6	2.4	6.0	3.7	6.6	4.8	1.2	5.3	-0.5
	1995-00	-5.4	-0.6	2.7	-2.3	0.9	3.7	3.1	4.2	5.1	0.8	4.2	6.4

Table 17: Summary of Projections of Population and Housing Consumption, 1980-2000

Population Series 2 (Medium Fertility, TFR = 1.8)

Housing Series C (1975 Consumption Rates Held Constant)

	TOTAL	TENURE		STRUCTURE TYPE				NUMBER OF ROOMS	
	HOUSEHOLDS	OWNERS	RENTERS	MOBILE	1-FAMILY	2-4 FAMILY	5+ FAMILY	1-4 ROOMS	5+ ROOMS
ALL HOUSEHOLDS				NUMBER IN THOUSANDS					
1975	72517	46893	25624	3368	49738	8901	10510	24683	47834
1980	78087	49190	28897	3546	52523	9955	12095	27539	50548
1985	84433	52541	31892	3762	56159	10917	13623	30364	54069
1990	89936	55029	34107	3918	59593	11612	14830	32598	57338
1995	93373	58691	35181	4024	62400	11995	15479	33950	59922
2000	97352	61295	36057	4155	64924	12390	15912	35230	62122
PCT. OF YEAR TOTAL				PERCENT					
1975	100.0	64.7	35.3	4.6	68.6	12.3	14.5	34.0	66.0
1980	100.0	63.0	37.0	4.5	67.3	12.7	15.5	35.3	64.7
1985	100.0	62.2	37.8	4.5	66.5	12.9	16.1	36.0	64.0
1990	100.0	62.1	37.9	4.4	66.3	12.9	16.5	36.2	63.8
1995	100.0	62.5	37.5	4.3	66.5	12.8	16.5	36.2	63.8
2000	100.0	63.0	37.0	4.3	66.7	12.7	16.3	36.2	63.8
5-YEAR CHANGE#				NUMBER IN THOUSANDS					
1975-80	5570	2297	3273	178	2785	1054	1585	2856	2714
1980-85	6346	3351	2995	216	3636	962	1527	2825	3521
1985-90	5503	3288	2215	156	3434	695	1215	2234	3269
1990-95	3937	2863	1074	106	2807	393	641	1353	2584
1995-00	3479	2604	876	130	2524	395	433	1280	2199
5-YEAR CHANGE%				PERCENT					
1975-80	7.7	4.9	12.8	5.3	5.6	11.8	15.1	11.6	5.7
1980-85	8.1	6.8	10.4	6.1	6.9	9.7	12.6	10.3	7.0
1985-90	6.5	6.3	6.9	4.2	6.1	6.4	8.9	7.4	6.8
1990-95	4.4	5.1	3.2	2.7	4.7	3.3	4.3	4.1	4.5
1995-00	3.7	4.4	2.5	3.2	4.0	3.3	2.8	3.8	3.7

Table 18: Summary of Projections of Population and Housing Consumption by Detailed Housing Unit Types, 1980-2000

Population Series 2 (Medium Fertility, TFR = 1.8)

Housing Series C (1975 Consumption Rates Held Constant)

OWNER OCCUPANTS - (IN THOUSANDS)

MARITAL STATUS	NUMBER CHILDREN	SINGLE FAMILY 1-4 ROOMS	SINGLE FAMILY 5-6 ROOMS	SINGLE FAMILY 7+ ROOMS	2-4 FAMILY 1-4 ROOMS	2-4 FAMILY 5-6 ROOMS	2-4 FAMILY 7+ ROOMS	5+ FAMILY 1-4 ROOMS	5+ FAMILY 5+ ROOMS	MOBILE HOMES 1-4 ROOMS	MOBILE HOMES 5+ ROOMS
ALL HOUSEHOLDS											
1975		4754	23444	13111	.706	1194	242	379	210	1865	989
1980		5051	24471	13762	765	1275	262	411	221	1953	1020
1985		5420	26111	14687	836	1369	282	456	241	2060	1071
1990		5762	27706	15682	898	1452	302	496	261	2160	1108
1995		6071	29131	16523	947	1530	319	530	281	2233	1127
2000		6405	30474	17136	1003	1612	330	557	297	2333	1147
5-YEAR CHANGE #											
1975-80		297	1026	650	59	82	20	33	11	89	31
1980-85		369	1640	925	71	93	20	44	20	115	52
1985-90		343	1594	995	63	83	20	42	20	92	36
1990-95		309	1425	841	48	78	17	32	20	73	19
1995-00		334	1343	613	57	82	11	26	16	100	20
5-YEAR CHANGE %											
1975-80		6.2	4.4	5.0	8.3	6.9	8.2	8.6	5.2	4.8	3.1
1980-85		7.3	6.7	6.7	9.3	7.3	7.7	10.8	9.3	5.9	5.1
1985-90		6.3	6.1	6.8	7.5	6.1	7.0	9.3	8.1	4.4	3.4
1990-95		5.4	5.1	5.4	5.4	5.4	5.6	6.4	7.8	3.4	1.7
1995-00		5.5	4.6	3.7	6.0	5.4	3.6	5.0	5.8	4.5	1.8

RENTER OCCUPANTS - (IN THOUSANDS)

MARITAL STATUS	NUMBER CHILDREN	SINGLE FAMILY 1-4 ROOMS	SINGLE FAMILY 5-6 ROOMS	SINGLE FAMILY 7+ ROOMS	2-4 FAMILY 1-4 ROOMS	2-4 FAMILY 5-6 ROOMS	2-4 FAMILY 7+ ROOMS	5+ FAMILY 1-4 ROOMS	5+ FAMILY 5+ ROOMS	MOBILE HOMES 1-4 ROOMS	MOBILE HOMES 5+ ROOMS	TOTAL HOUSEHOLDS	NON-HEADS
ALL HOUSEHOLDS													
1975		3454	3881	1093	4615	2006	138	8496	1425	413	101	72517	33770
1980		3823	4222	1195	5243	2245	165	9829	1634	464	109	78887	36477
1985		4146	4517	1278	5813	2437	181	11118	1808	507	115	84433	37202
1990		4389	4709	1345	6217	2558	193	12140	1939	533	117	89936	37482
1995		4528	4777	1378	6483	2581	196	12679	1990	548	116	93873	38581
2000		4669	4833	1406	6643	2606	198	13059	1999	560	114	97352	40753
5-YEAR CHANGE #													
1975-80		369	341	102	628	239	27	1333	209	50	8	5870	2699
1980-85		323	295	83	570	192	16	1289	174	44	5	6346	725
1985-90		243	192	67	404	113	13	1022	131	26	2	5503	280
1990-95		131	68	33	266	32	2	539	51	15	-1	3937	1101
1995-00		149	56	28	220	25	-0	381	10	12	-2	3479	2169
5-YEAR CHANGE %													
1975-80		10.7	8.8	9.3	13.6	11.9	19.4	15.7	14.7	12.2	8.0	7.7	8.0
1980-85		8.5	7.0	7.0	10.9	8.6	9.5	13.1	10.6	9.5	4.8	8.1	2.0
1985-90		5.9	4.3	5.2	6.9	4.6	7.1	9.2	7.3	5.1	2.1	6.5	0.8
1990-95		3.0	1.4	2.4	3.3	1.2	1.2	4.4	2.6	2.9	-0.7	4.4	2.9
1995-00		3.3	1.2	2.0	3.4	1.0	-0.2	3.0	0.5	2.1	-1.7	3.7	5.6

FOOTNOTES

1. Source: U.S. Bureau of the Census (1979,c).

2. Source: U.S. Bureau of the Census (1979,d).

3. Source: U.S. Bureau of the Census (1979,d).

4. Note that the "non-head" category does not indicate the type of unit or the relationship of the family or individual to head of the household in which it/he lives, nor do the "head" categories indicate the presence of related or unrelated adults in the household. A full description of consumption alternatives would include information about household composition but would create a typology so large that it would impede rather than facilitate analysis.

5. Source: Tabulations of the 1975 Annual Housing Survey (National).

6. Source: ibid.

7. Income range (1969) is $5,000 to $9,999. Source: Tabulations of the 1970 Census 1:100 Public Use Sample.

8. Direct evidence of this relationship is scant. However, in 1960, for example, 36 percent of elderly widows who had had exactly one child lived in a household headed by a relative, while 40 percent of widows who had borne four children did so. Source: Tabulations of the 1960 Census 1:100 Public Use Sample.

9. According to the 1977 Annual Housing Survey, renter households are between three and four times as likely to move as owner-occupiers: almost two-thirds of the households who had recently moved (and who had the same head after and before the move) had rented their previous unit, although renter occupants made up only slightly more than one-third of all households. Source: U.S. Bureau of the Census (1979,a), Table A-2.

10. Current income, expected income and assets are synthesized in the concept of "permanent income" developed by Friedman, 1957, and applied to housing consumption by Reid, 1962, and others. Though useful for other purposes, the integration of current income, future (expected) income and past income (assets) into a single variable badly obscures the nature of the relationship between age and housing consumption.

11. The user prices of owner occupied houses are a function of many factors besides house values. Among these are mortgage interest rates, property tax rates, income tax rates and regulations, household income and maintenance costs.

12. Beresford and Rivlin, 1966, Kobrin, 1973, and Carliner, 1975, model cross-sectional variations in household headship; Li, 1977, and Struyk, 1976, model cross-sectional choice of tenure; and Schafer, 1974, and McCarthy, 1976, model the occupancy of apartment units cross-sectionally.

13. In general, the form of these relationships with age is highly non-linear. For example, family size typically rises to a maximum between about age 30 and 40 and falls gradually at higher ages.

14. The movement of elderly people to "retirement" homes in Florida and the Southwest is as much attributable to the migrants' new freedom from their place of employment as to any prevailing notion that such moves are "expected" or acceptable for people of their age. By contrast, occupancy of public housing for the elderly is conditioned purely and simply on age.

15. Most disabilities are only weakly associated with age, although they do tend to accumulate overtime, and therefore should perhaps be modeled as a separate, age-correlated determinant of housing consumption.

16. The complexity of the functional relation between the age of an individual or family head and housing consumption follows from the fact that the total relationship reflects the sum of a number of dissimilar, non-linear relationships, such as between age and labor force participation, age and family ties, etc.

17. It is important to note that even if the proxied or age-interactive variables are only weakly correlated with age, the lagged housing consumption variables will accurately reflect their influence as long as there is a high degree of intertemporal inertia in these variables for a particular consumer. This ability of a cohort approach to model accurately the impacts of many omitted and unmeasurable factors constitutes an advantage over the conventional cross-sectional model that is perhaps decisive.

18. It should be noted that households can sometimes alter their consumption of housing without actually moving. A renter-occupier may buy his present unit, thus changing his tenure; the size of a unit can be increased by building an addition; and by partitioning off a separate apartment, it is possible for an owner simultaneously to reduce the size of his unit and change his structure from a one-family to a two-family. The many obstacles to such modifications ensure that housing consumption is normally altered by moving.

19. The stipulation that the housing life cycle does not vary overtime is relaxed in extrapolated consumption rate life cycle models, such as that used by the Bureau of the Census to project numbers of households. In this type of model the past rate of change in the consumption patterns of each age group is assumed to continue in the future. The theoretical basis of this approach is at best unclear, for consumption (headship) rates at a particular age are related to past rates at that age instead of the past rates of the people at that age. The Census household projections apply extrapolated headship rates to population strata defined by age, sex and marital and family status. (U.S. Bureau of the Census, 1979). Siegel, 1972, assesses the accuracy of prior household projections and finds a continuing need for projections of this type. A similar method is employed by Jones, 1972, in projecting median expenditures on housing.

20. Otherwise the method would indicate no net change in the housing consumption of a cohort as it ages.

21. Transitions are calculated from tabulations of the 1960 and 1970 Census 1:100 Public Use Sample and 1975 Annual Housing Survey tapes.

22. The identification of age, period and cohort effects has been a central issue in the development of cohort analysis. See, for example, Mason, et.al., 1973.

23. Indeed, differences in preferences and "needs" associated with variations in family composition are so great as to lead some investigators to employ elaborate procedures to standardize measures of economic well-being for variations in family composition (Moon and Smolensky, 1977). This is part of a growing body of evidence that the relationship between income and consumption cannot be modeled independently of family composition.

24. Race could similarly be used to isolate stable subgroups within cohorts over time. The modeling and analysis of racial variations in cohort housing transitions is a subject for future research.

25. There will be a corresponding distortion of the origin subgroup's consumption transitions if the families and individuals making the shift have housing patterns that are different from the whole subgroup's pattern.

26. Both the divorced and widowed groups undergo a growth and decline in family size due to the larger numbers of children accumulated by new entrants past age 30 than by earlier entrants and to the eventual departure of most children in their adulthood.

27. Immigration and emigration also affect all groups but have been modest in comparison with the major flows.

28. Tabulations of the Michigan Panel Study of Income Dynamics data, which follow a panel of individuals overtime, show that 64 percent of the women who were widowed in the late 1960s and early 1970s had not moved within five years of their transition to widowhood. This finding is reported to us by Susan Bartlett of the Joint Center for Urban Studies of Harvard University and M.I.T. The available evidence that couples entering the "empty nest" stage retain their pre-transition housing is less direct but nonetheless persuasive: In 1970, 19.1 percent of the couples age 40 to 44 with no children under age 15 owner-occupied a one-family house with more than six rooms; at the same time 34.0 percent of couples in the cohort with children lived in such units; five years later, when the aging and departure of children had swelled the number of currently childless couples in the cohort from 1.6 million to 2.9 million, the proportion of this larger grouping who owner-occupied a large one-family house had increased to 28.4 percent. This increase indicates that a high proportion of the transitional couples retained their earlier housing. (Data are from tabulations from the 1970 Census Public Use Sample and the 1975 Annual Housing Survey [National].

29. The ages at which multiple groups are linked with a single one are those at which the proportions of the receiving category comprised of transitional couples or individuals are at a maximum. In the future, linking procedures can be devised to reflect the size of the flow into the receiving category and possibly to span a larger number of age and marital status categories (e.g., many middle-aged divorced women keep the couple's house).

30. It is of course possible, in principle, to model cohort transitions of young adults for shorter periods than five years. This would also have the benefit of reducing possible errors in consumption due to changes in the age-distribution within five-year age groups as cohort sizes change. However, this is cumbersome for a cohort model covering the entire age range, since more numerous transitions would greatly increase the complexity of the model without significantly improving its explanatory power at older ages; moreover it further limits the time periods for which appropriate data are available.

31. In other words the cohort approach does not have the same advantage over non-dynamic models with regard to new entrants to the housing as it has for cohorts with established housing patterns.

32. At least up to age 40 the rate of increase in the consumption of these units increases fairly rapidly with the age of the cohort. Therefore, when two five-year transitions are combined into a single ten-year transition, such as from 30 to 34 to 40 to 44, the true rate of change during the first five years is likely to be understated and during the second five years correspondingly overstated.

33. See forthcoming Joint Center for Urban Studies working paper by Pitkin.

34. Sample tapes are required for computing net transitions in housing consumption, because published tabulations do not contain sufficient detail. Within the next three years both the 1980 Census Public Use Sample tapes and the sample tapes for the 1940 and 1950 censuses now being compiled from the Census archives at the University of Wisconsin are expected to be available. They will make it possible to more than double the number of observed transitions on which an intertemporal model can be estimated. Yet even this increased number of observations will provide only a scant basis for statistical purposes.

35. The reader may verify this by fitting various trends to the 1960, 1970 and 1975 data points for 60 to 64 year olds.

36. The University of Michigan Panel Survey of Income Dynamics has followed the moves of some 5000 families for more than eight years and the Annual Housing Survey has recorded the previous housing consumption of household heads who recently moved. The usefulness of the former survey is limited by its small sample size and that of the latter by the short time span over which consumption changes are measured. As the Annual Housing Survey extends to cover more years its micro-level data on year-to-year changes promise to provide a more reliable basis for long-term projections of national housing consumption.

37. For long-term models and projections a lag of five years seems approximately optimal: a one-year lag is likely to show more "noise" than actual changes in consumption, while a ten-year lag blurs shorter run changes in consumption.

38. We have explored the possibility of using several special purpose surveys taken in the mid-1960s, particularly the 1966 Survey of Economic Opportunity, in order to allow us to establish a mid-decade observation and thus have four points in time over which to trace the progress of different cohorts, but we discovered inconsistencies, probably due to sampling biases, which render these data sources incompatible with the Census and Housing Survey series.

39. See note 32 regarding the comparability of five and ten-year transitions.

40. A much more detailed analysis of housing consumption by birth cohorts between 1960 and 1975 is the subject of a forthcoming Joint Center for Urban Studies working paper by Pitkin.

41. These opposite net movements indicate that the older generation were selling large houses to some of the many members of the younger generation who needed spacious residences to accommodate large families.

42. Annual rate of production based on data on year structure built from the Census and the Annual Housing Survey. Sources: U.S. Bureau of the Census,1963, 1972, 1977.

43. Normal life-cycle net cohort rates of transition to mobile home occupancy can only be observed by means of observation after the phase of rapid technological improvement and expanding product acceptance is completed.

44. Between 1971 and 1974, manufacturers' shipments of new mobile homes averaged 492,000 per year and between 1975 and 1978, only 253,000. Source: U.S. Bureau of the Census, 1979e.

45. Marital status patterns also changed dramatically during this period and undoubtedly affected aggregate housing consumption as well as consumption for entire cohorts. However, such changes probably had a negligible effect on the cohort consumption transitions within marital status groups with which we are concerned here.

46. Sources: U.S. Bureau of the Census, 1967, 1971, 1973, 1976, 1977.

47. Tabulations of cross-sectional Census Public Use Sample and Annual Housing Survey data by the authors indicate broad effects of income on household-to-household variation in housing consumption at a given time. Using different methodologies on similar data, other researchers have found similar effects of income on household headship (Carliner, 1975, and Beresford and Rivlin, 1966) and on home ownership (Struyk, 1976).

48. Sources: U.S. Bureau of the Census, 1967, 1971, 1976.

49. Sources: Tabulations of the 1960 and 1970 Census Public Use Sample and 1975 Annual Housing Survey (National) tapes and U.S. Bureau of the Census, 1963a, 1972, 1977.

50. A high proportion of individuals at the margin between living with someone else and heading a separate household, e.g., young singles and elderly widows, live in small, rented apartments when they do head their own household. Thus the "cost of headship" is closely linked with the rents of such apartments. This hypothesis is supported by econometric estimates of a model of cross-SMSA variations in headship (estimates by Pitkin and Professor Roberton Williams of Williams College.

51. Sources: Tabulations of the 1960 and 1970 Census Public Use Sample and 1975 Annual Housing Survey (National) tapes.

52. The authors' estimates of out-of-pocket costs incurred by recent purchases are based on Census and FHA data and are available upon request.

53. This growth rate is based on the median value of 5 and 6-room single family houses in metropolitan areas and was up from a rate of 1.9 percent during the previous decade. Such houses are more affordable by first-time buyers and therefore more competitive with rental units than are larger ones. Sources: Tabulations of the 1960 and 1970 Census Public Use Sample and 1975 Annual Housing Survey (National) tapes.

54. For example, in 1960, 16 percent of married couples in which the woman was between 35 and 39 had four or more children under age 15, by 1970 the comparable figure had risen to 19 percent and by 1975 it had fallen to 11 percent. Sources: Tabulations of 1960 and 1970 Census Public Use Sample and 1975 Annual Housing Survey (National) tapes.

55. These patterns are seen in tabulations of the 1960 and 1970 Census Public Use Sample and 1975 Annual Housing Survey (National) tapes, as well as in the findings of Struyk, 1976, and others, with regard to home ownership. The increased consumption of large units is approximately centered on this age interval.

56. Our fertility assumptions differ from those used by the Bureau of the Census in their latest population projections (U.S. Bureau of the Census, 1977). Census levels of completed fertility are 1.7, 2.1 and 2.7 births per woman for the low, medium and high rates respectively. These rates of fertility seem inappropriate because the present rate is almost at the bottom of the range and the upper end appears to be totally unrealistic as an average that could be reached in the near future.

Our methodology departs from the Census Bureau's in a number of other respects. First the fertility levels trend almost immediately (by 1980) and in a linear fashion to the equilibrium levels. Second, the initial baseline population numbers by age and sex are assumed to be "true counts" instead of assuming undercount as does the Census Bureau. Their population projections are made consistent with the pattern of undercount in the census by the "inflation/deflation" method. Because of the uncertainty about the size of the undercount and about marital status, fertility and housing patterns of this population, our projections assume that the baseline data are accurate.

57. The excess of men around 40 years old in 2000 reflects the failure to "deflate" the projections early in the projection period when the men were 20 years younger.

58. For a detailed discussion of the association between total fertility and parity distributions see George Masnick, "Historical Trends in Cohort Parity Distributions: Implications for Fertility in the 1980s" paper presented at 1980 meeting of Population Association of America, Denver, Colo., April 11, 1980.

59. The importance of a historical cohort perspective is seen from the consistency of the transitions out of the "never married" category made by different categories at each age. A quick start at marriage meant a low fraction still single at every age. A slow start at marriage left the cohort with a high fraction single later on in life. The conclusion that emerged from this analysis of cohort trends in first marriage was to underscore how strikingly incongruent with the bulk of historical experience was the trend in marriage patterns of cohorts entering the marriage market in the two decades following the outbreak of World War II.

60. Since 1960 there has been sharp upward swing in the proportion of men and women still single at each age. This trend has shown no sign of abating in recent years, and by 1978 the proportion single in each age group had returned to a level that would have to be considered "normal" in view of the trend over the 50 year period from 1890 to 1940. One argument in favor of the possible reversal of the present trend is the approaching end, after 1980, of the "marriage squeeze" experienced by women between 1960 and 1980 where, because of the shape of the age distribution, women entering the nubile ages faced a relative shortage of slightly older men. After 1980 the age pattern will be reversed with younger women finding a surplus of older men. Counteracting the sheer influence of numbers, though, is the greater independence that women have attained through increased education, labor force activity and the growth of the ideology of female emancipation. Because of these countervailing forces, it is quite uncertain at this time which path will be taken. Our assumptions have been chosen in order to reflect a wide range of possible experiences.

61. While the end of the marriage squeeze for women poses a great deal of uncertainty about the future direction of trends in proportions never married, the beginning of the marriage squeeze on men would appear to make it certain that the present trend toward delayed marriage for men will continue well into the future.

62. Cohort trajectories of the fraction of ever married who are divorced at each age show a steady increase for each cohort from age 15-24 through age 55-64. Furthermore, succeedingly younger cohorts have experienced a steepening of this rate of increase, especially after 1960. Because the post-1960 period was one of such a sharp increase in the fraction divorced, for both men and women, it is difficult to use these trends to fix a likely trend for the future. It was concluded that the recent trend in the fraction of women who are presently divorced would probably be too high if extrapolated into the future, while the trend for men would be too low. The reasoning with regard to women is that some of increase in divorce for women was due to non-recurring increases in the economic independence of women and liberalization of divorce laws in the 1970s. Also the marriage squeeze on women has put them at a disadvantage for remarriage, thus further inflating the proportion divorced. Men, on the other hand, have been at an advantage for remarriage, allowing the fraction of men currently divorced to be significantly lower than the fraction for women. The declining availability of women because of changes in the age structure should tend to lower the remarriage rate for men in the future, and men should do some "catching up" in the fraction presently divorced.

63. Since never married women were not asked about children ever born in the 1960 Census, it would have been necessary to estimate the fertility distribution for this marital status category.

64. Through adoption or the taking of foster children it is of course possible for a family to have more children than the woman has ever borne. This possibility is also allowed for.

65. In this model, 20 two-level dimensions of housing consumption are needed to define the distribution of each population group among the 21 consumption possibilities. These two-way choices are hierarchically related in the form of a decision-tree in the order headship, tenure, structure type and room count. Net transition rates link each of these bimodal choice ratios for each age, marital status, sex and family size group.

66. Data on actual consumption in 1980 is not scheduled to be available before 1982.

67. The average annual rates of change are for five-year intervals. For shorter periods the rates may be less stable and fluctuate outside the range of the projections.

68. The fully disaggregated projected distributions of households exist on computer tape. The authors are hopeful that the projections of the housing consumption of broad population groups, such as single parent families, the elderly, etc., can be summarized and published in the near future.

69. Since the Series B projections assume the same, fixed consumption rates as Series C under age 30, the divergences between the two series are entirely attributable to the much more rapid trading down by older cohorts under the fixed 1975 cross-sectional consumption rates than under the observed cohort transitions. In order for the total consumption of large, one-family houses to grow as slowly as implied by Series C, either the cohorts over age 55 in 1975 would have to move out of such houses more rapidly in the future than the cohorts at the same ages did during the 1960s, or younger cohorts would have to move into them less rapidly. Barring a prolonged economic reversal, a sustained decline by cohorts with established housing patterns is unlikely and therefore the age distribution of housing consumption projected by Series C is implausible. It would require a general shift away from consumption of large units by all age groups to lower aggregate consumption growth to the Series C rate.

70. For purposes of comparison in these figures and in the discussion, housing consumption Series B is used. This choice of housing series does not affect these comparisons, since the relationships across the population assumptions are very similar under both housing series.

71. Between 1960 and 1975 the constant-dollar median gross monthly rent of one to four-room apartments increased by 19 percent in metropolitan areas and by less for other types of rental units and units located outside metropolitan areas. Given that these fifteen years were a period of rapid apartment construction and growth in incomes, small apartments suitable for an individual

who might also have lived with a friend or relative were in plentiful supply and became significantly more affordable. Sources: Tabulations of 1960 Census Public Use Sample and 1975 Annual Housing Survey tapes and U.S. Bureau of Labor (Consumer Price Index).

72. Between 1960 and 1975 the mean out-of-pocket monthly ownership costs for 5 and 6 room houses in metropolitan areas rose by 48 percent in constant dollars, far more rapidly than the cost of renting. However, during the same period, the mean current dollar value of the same units rose by 122 percent. If such rapid appreciation is considered on an accrual basis as an off-set against out-of-pocket costs, then the net cost of ownership can be said to have declined. This sort of calculation on the part of households was apparently instrumental in driving up the rate of home ownership. Since 1975 this trend appears to have accelerated. Source of cost data: Tabulations of 1960 Census Public Use Sample and 1975 Annual Housing Survey tapes. For purposes of deflating values to constant dollars the Consumer Price Index was used.

73. In 1970, the mean value of 7 or more room houses in metropolitan areas was 59 percent above the 1960 level, compared with a 35 percent increase for 5 and 6 room houses. Since then the rates of increase for different size units have been much more similar. Sources: Tabulations of 1960 and 1970 Census Public Use Sample and 1975 Annual Housing Survey tapes.

APPENDIX. Comparison with Census Bureau Projections of Total, Husband/Wife and Non-Husband/Wife Households

The range of Census projections of the total number of households is superimposed on a graph showing the range of projections by the cohort method, Figure A-1. The high Census household Series A, is based on an extrapolated acceleration of changes in marital status and household headship rates observed over the period from 1964 to 1978, while the low series, Census D, extrapolates the same trends at a decelerated rate.[1] Of the projections of total households made by the cohort method, Series 1-A (low marriage, high divorce and 1970-1975 cohort transitions in housing consumption) is the highest and 3-B (high marriage, low divorce and 1960-1970 cohort consumption transitions) is the lowest. The range of growth rates projected in this paper is entirely within the Census projection range after 1980.[2] Series 3-B is very similar to, though slightly above Census Series D. However, Series 1-A averages between 150 and 300 thousand units below Census Series A per year and as a result implies that there will be no major, sustained increase in the rate of growth of total households above the rate that prevailed between 1975 and 1980.

Detailed analysis of the sources of the differences between the Census household projections requires further computations since some of the difference is due to extrapolation of housing consumption (headship) rates for cohorts and some is due to the different marital status assumptions.[3]

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1. See U.S. Bureau of the Census, 1979b, for a full description of their methodology. There are minor differences in the Census's projections of the adult population and those used here.

2. That our projections show a broader range than the Census's through 1980 results from our earlier "jumping-off" point, 1975 versus 1978.

3. The authors plan to make the necessary calculations to permit a detailed comparison with the Census projections.

The size of the differences in marital status assumptions is seen in Figures A-2 and A-3, which compare the two ranges of projections of growth in husband/wife households and non-husband/wife households, respectively. It can be seen, for example, that Series 1-A implies no growth in the number of husband-wife households until after 1990. This is far below the growth projected in Census Series A. Non-husband/wife households show much more rapid growth in Series 1-A than in Census Series A. While these sharp contrasts clarify the differences in marital status assumptions used, they tend to obscure the effects of the purely methodological differences in the two sets of projections.

Figure A-1. Average Annual Increase in Number of Households
1960-1975 (Actual) and 1980-1995
(Comparison of Projections by Cohort and Census Methods)

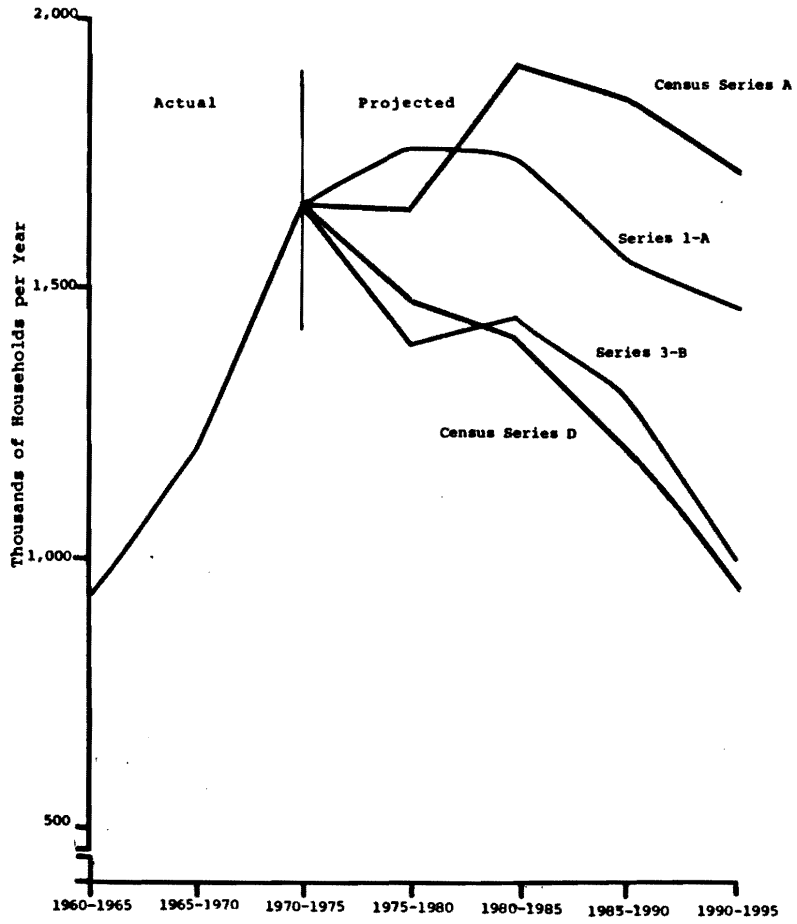


Figure A-2. Average Annual Increase in Number of Husband-Wife Household
1960-1975 (Actual) and 1980-1995
(Comparison of Projections by Cohort and Census Methods)

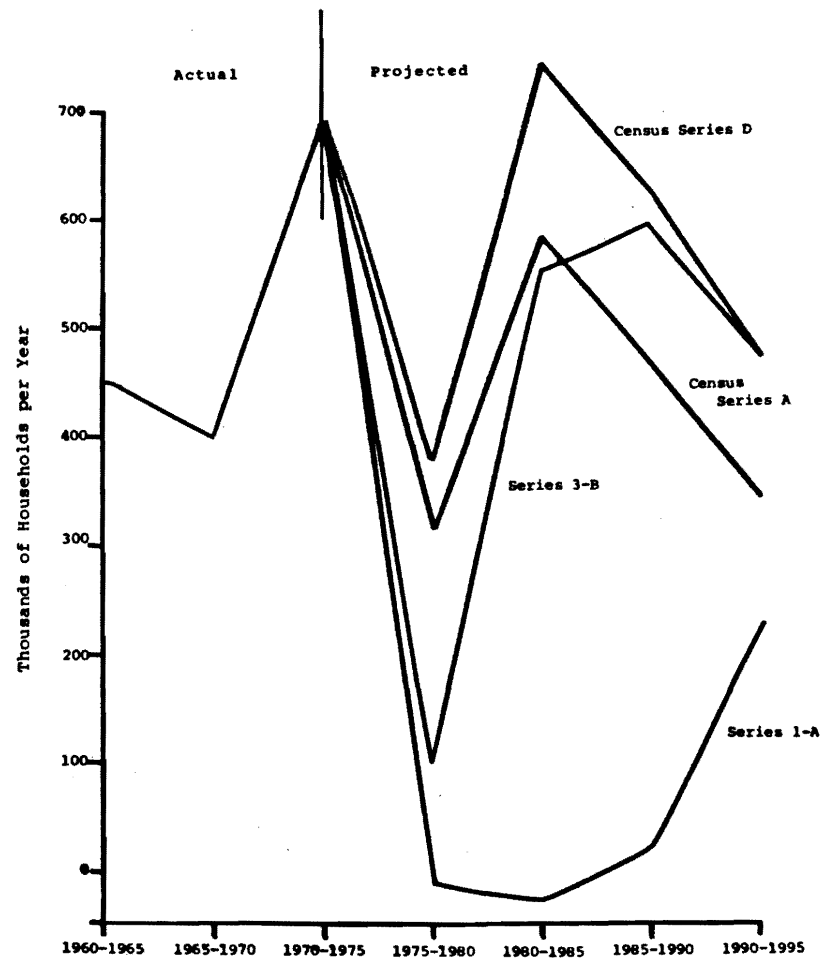
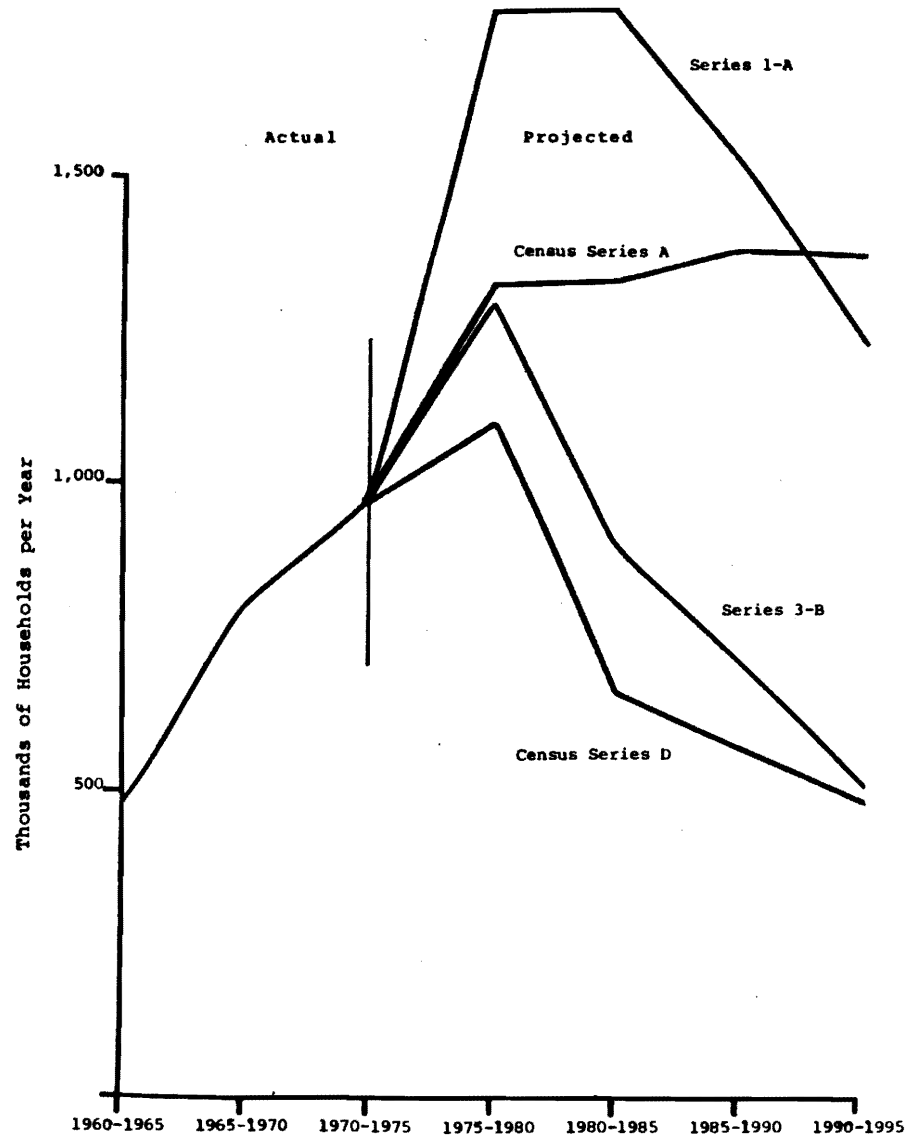


Figure A-3. Average Annual Increase in Number of Non-Husband-Wife Households 1960-1975 (Actual) and 1980-1995)

(Comparison of Projections by Cohort and Census Methods)



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