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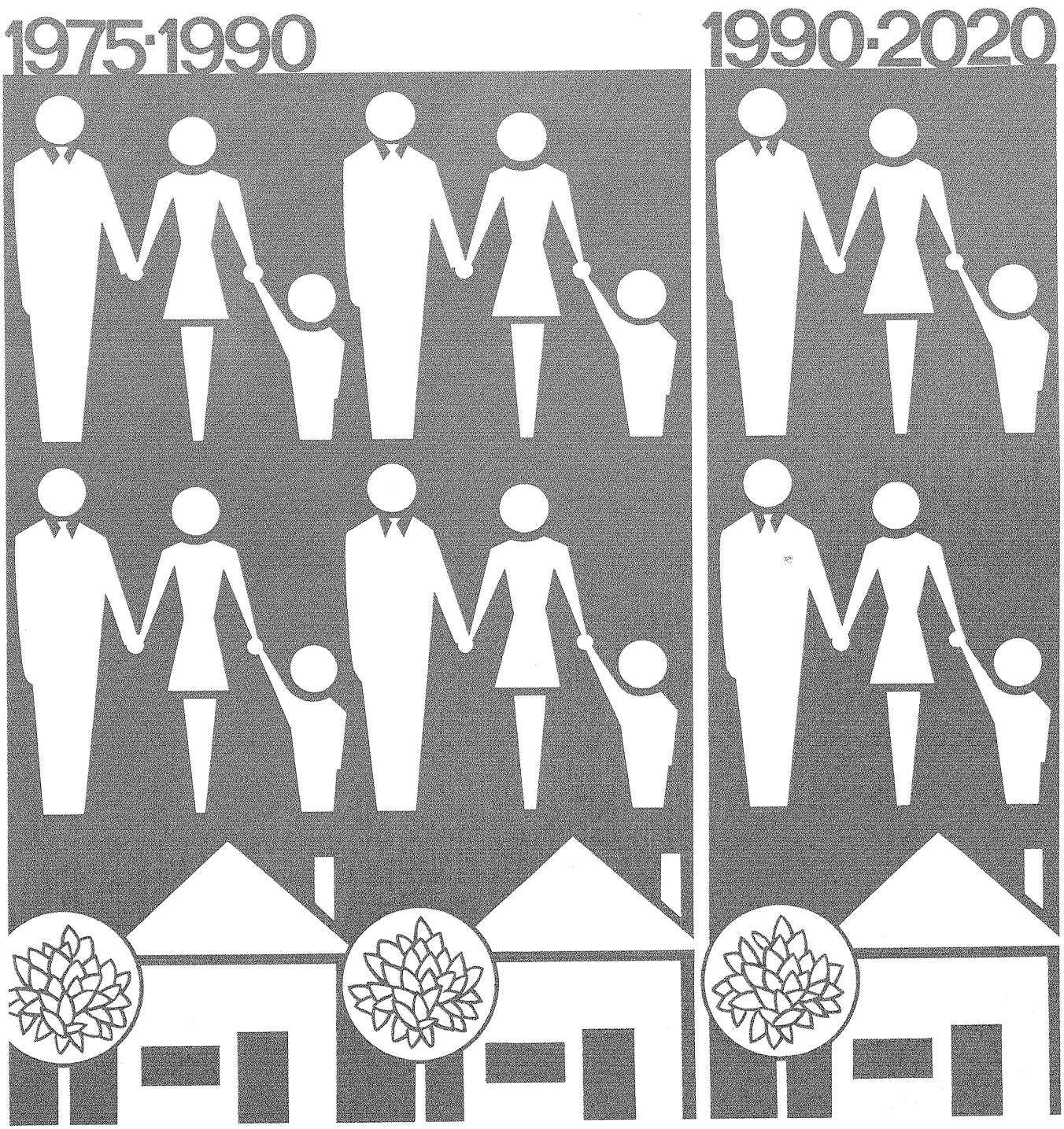
the effects of declining population growth on the demand for housing



thomas c. marcin

NORTH CENTRAL FOREST EXPERIMENT STATION
FOREST SERVICE
U.S. DEPARTMENT OF AGRICULTURE

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Dr. Thomas C. Marcin is an Economist for the Station and is assigned to the Headquarters Laboratory in St. Paul, Minnesota. The Station is maintained by the USDA Forest Service in cooperation with the University of Minnesota.

North Central Forest Experiment Station
John H. Ohman, Director
Forest Service - U.S. Department of Agriculture
Folwell Avenue
St. Paul, Minnesota 55101
(Maintained in cooperation with the University of Minnesota)

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THE EFFECTS OF DECLINING POPULATION GROWTH ON THE DEMAND FOR HOUSING

Thomas C. Marcin

The Nation is now on a path toward eventual zero-population growth which will profoundly affect the demand for housing in the coming decades. In 1973 the Nation's birth and fertility rates reached all-time lows. The fertility rate--i.e., the number of births per woman upon completion of childbearing years--is now below the long-run replacement rate of 2.1 births per woman needed to eventually stabilize the Nation's population, assuming no immigration. Furthermore, the trend to lower fertility rates shows no signs of tapering off. Nevertheless, the Nation's population will continue to grow well into the next century because of the present age structure (fig. 1); and, of course, the fertility rate could rise in the future. In addition, the age composition of the population will change dramatically in the next several decades, greatly affecting housing demand in the future.

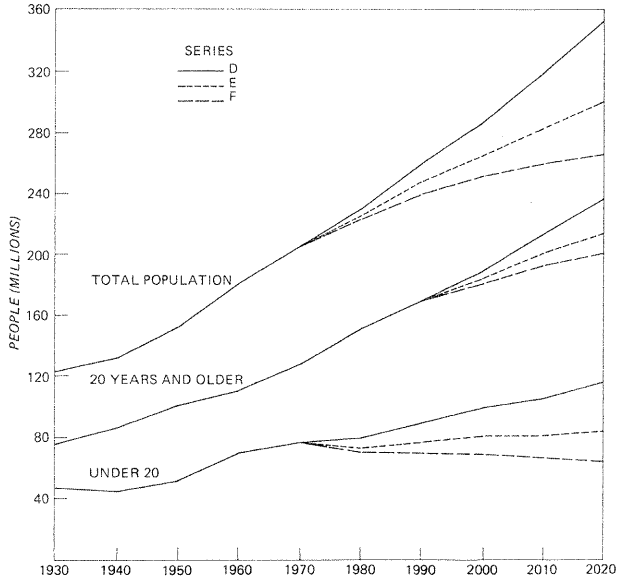

Figure 1.--Total U.S. population, population 20 years and older and population under 20 for 1930, 1940, 1950, 1960, and 1970 with projections to 2020.

METHOD OF PROJECTION

The projections presented are based upon a computer model of housing demand by type of unit and region under specific assumptions relating to population growth and social and economic change (Marcin 1972).

The model is based partly on the life-cycle model of housing demand relating household formation to population change by age group (Campbell 1966, Smith 1966). One purpose of the household life-cycle model is to isolate changes in demographic factors from changes caused by other factors. Age will be the only demographic factor considered. Other factors, such as sex, race, and marital status, could also be considered. Age is, however, most important because it serves as a good indicator for many related variables. For example, sex ratio, marital status, income, and assets all have age-related cycles. Age also affects other aspects of housing demand, especially the demand for certain types of units and second homes. Shifts in the age composition of the population can lead to changes in housing demand even if economic conditions and consumer preferences remain unchanged.

Annual projection of population by age class forms the starting point for a model. Next, household formations and type of unit occupied are related to the population age groups. Household formations are then distributed to the regions on the basis of adult population.

In addition to household formations, there are two other important sources of housing demand: the demand for units to (1) maintain the inventory of vacant units and provide second homes, and (2) replace those removed from the existing housing stock by natural disaster, demolition, abandonment, merger, or other similar causes (Maisel 1963).

This paper examines the effects of declining population growth and the changing age-mix of the population on the long-run demand for housing by type of unit. A summary of several alternative projections of possible housing demand is presented for the period 1975 to 2020 based upon alternative assumptions of population growth.

These are not intended as projections of actual housing production but rather as a measure of possible housing demand under certain conventional assumptions: continued economic growth, moderate inflation, and the occurrence of no catastrophic event such as a major war, etc. Lack of credit, runaway costs, shortages of materials, or a major recession could reduce housing production. In the long run, however, the Government would probably institute housing programs to alleviate any major housing shortage.

The second part of the model provides a method for projecting vacancy and replacement demand by region. Regional vacancy and replacement rates are input into the model, and total housing demand by type of unit is projected for each region. An index based on household formation and type of housing occupied by age class is used to estimate the housing-type mix. National totals are obtained by summing the regions.

THE CHANGING STRUCTURE OF THE POPULATION

In the last several years net household formation has been at an all-time high while population growth has declined to its lowest rate since the 1930's. This paradox is possible because of the extremely unbalanced age distribution in the U.S. population. Today, population increase is largely concentrated in the age group born in the "baby boom" of the 1940's and 1950's.

Three major trends in births have shaped the age structure of our population (fig. 2). First, birth declined from about 3 million to 2.3 million in the decade 1925-35. A large increase followed as births rose from 2.5 million in 1939 to 4.3 million in 1957. The last decade has seen the sharpest drop in births in history, to 3.14 million in 1973.

The most recent projections of population for the period 1972 to 2020 are based on four fertility rate assumptions:

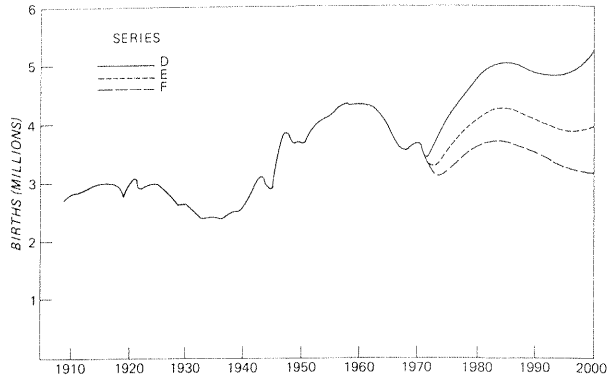

Figure 2.--Number of births in the U.S., 1909-1972, with projections to 2000.

2.8, 2.45, 2.1, and 1.8 births per woman (U.S. Bureau of the Census 1972a). These are lower than previous assumptions because of the sharp decline in the fertility rate since 1970 and the continued decline in births expected by young wives during the last 5 years (U.S. Bureau of the Census 1972b). The current fertility rate is about 1.9, the lowest in American demographic history.

One set of age-sex specific mortality rates and net immigration rates is used for all four series. Annual immigration is assumed to be 400,000.

All projections used an average age of childbearing of 25.8 years. However, this average age could increase as women delay childbearing and work before starting a family. Part of the present decline in fertility may be attributed to a postponement of childbearing. At the present time, an average of two children per women would appear to be the most likely assumption. However, the current pessimistic outlook of the public, caused in part by the present social and economic upheaval, combined with the general availability of sophisticated birth control methods, legalized abortion, and the public campaign against population growth could keep the fertility rate below the long-run replacement rate. People may choose to maintain a high standard of living by not having children.

The importance of the changing age composition of the population for age-related activities such as housing cannot be overemphasized. The impact of past fluctuations in births is reflected in population changes by age class. In the

past 20 years the decline in births of the 1930's, followed by the large increase in births from 1940 to 1960, followed in turn by a sharp decline in births over the past 10 years, created an age-class bulge in our population. The future passage of this population bulge through the various age classes will clearly influence housing demand.

From 1950 to 1970 most of the increase in population was in the age group under 30 years (fig. 3). From 1970 to 1990 the increase will be concentrated in the group aged 25 to 45. In the 1980's and 1990's the needs of middle-aged people are likely to dominate our society, replacing the youth-orientated markets of the 1960's. During this period the number of people under 25 is expected to decline substantially.

RELATION OF HOUSING DEMAND TO THE POPULATION AGE STRUCTURE

Household formation and the demand for certain types of housing units and second homes vary with the age of individuals. These differences in housing demand have remained fairly stable over long periods in the U.S. due in part to regular patterns of income, income expectation, assets, family status, and preferences over the life cycle (Campbell 1966).

Individuals generally form a separate household sometime in their 20's and by age 30 about 50 percent head a separate household, most of which are married couples. Headship—i.e., the ratio of household heads to total population—then

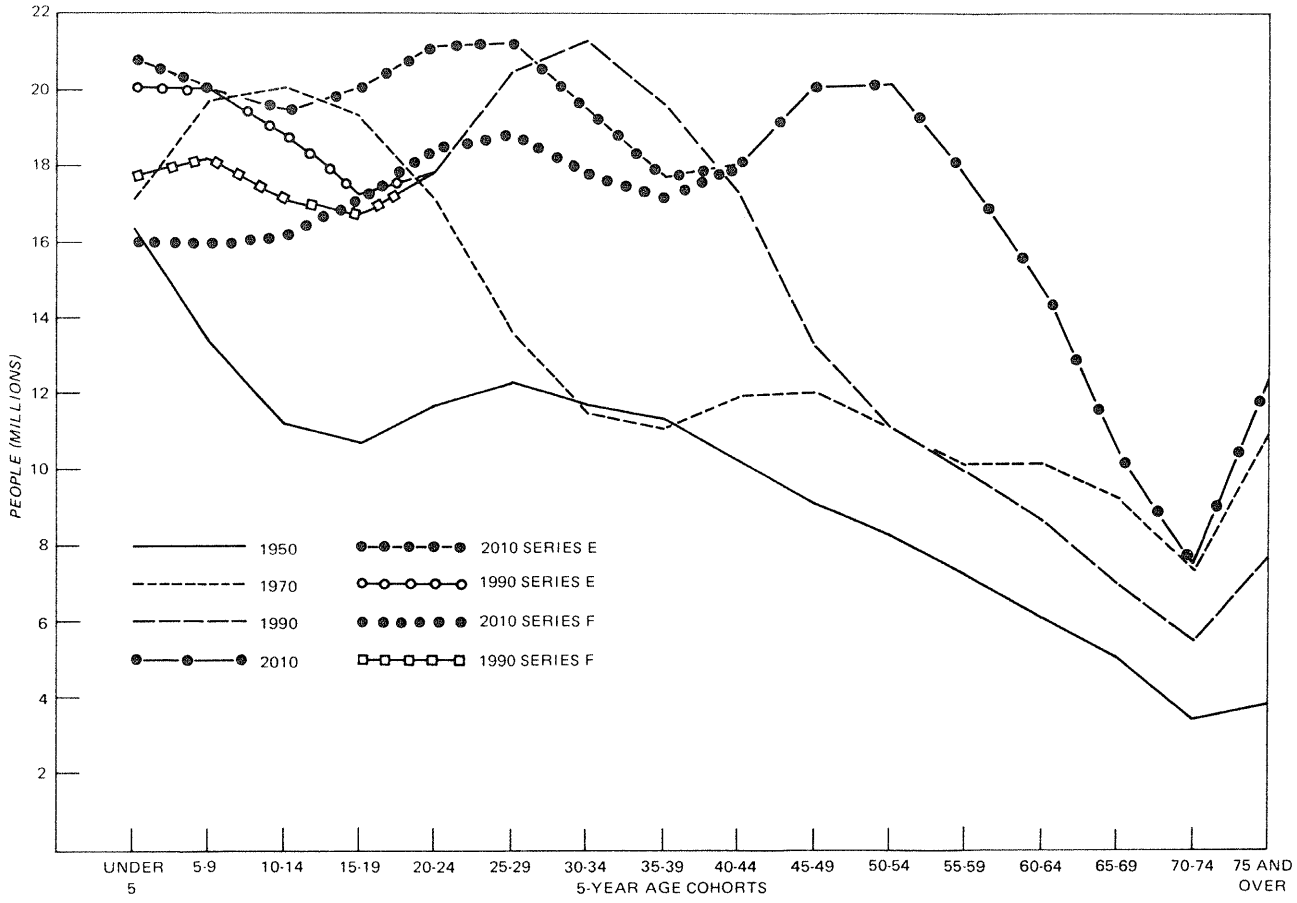

Figure 3.--U.S. population by 5-year age cohorts for 1950 and 1970 with projections for 1990 and 2010.

rises gradually until about two-thirds of all surviving individuals in their 70's head a separate household. A major determinant of headship is the level and distribution of personal income. Since 1950 there has been a steady increase in headship, particularly among the young and old age groups (fig. 4). This reflects the trend toward nuclei family units with younger and older generation members splitting off to form separate households. Present social and economic trends seem to indicate that the increase in single-person households will continue, aided by liberalized divorce laws, equal opportunity for women, the emerging role of the single life as an alternative life style, and continued Government programs to subsidize housing for the poor and elderly. However, at some point in the future, headship rates will level off. A major disruption of economic growth or a change in life styles to larger household units could even cause headship rates to decline.

Two series of headship rates are used to account for the current high rate of household formation. An upper series projects headship increasing at the present trends until 1980, and more moderate increases thereafter (fig. 4). The lower projection series assumes a more moderate increase in headship. As income continues to grow, headship will depend more on life styles and preferences and could be above or below the projections used in this study.

The available data indicate that the demand for different types of housing varies with age and income of the household head (Atkinson 1966; Smith 1966; U.S. Bureau of the Census 1973a, 1973b, 1973c; U.S. Department of Housing and Urban Development 1968).

Typically the young householder first occupies an apartment or mobile home, then at about age 30 buys a moderately priced single-family home or townhouse. Later, as his financial position improves in middle age, he will upgrade his home. Finally, he will move to a smaller retirement home, apartment, or mobile home. In the last several years condominium apartments have added a new dimension to this progression and some people may decide to buy an apartment rather than a single-family home. It is difficult to tell how significant the condominium boom will be in the long run. However, the overwhelming preference of most middle-aged householders still appears to be for single-family homes (Lansing 1966, Lansing *et al.* 1964). Second-home ownership rates are also strongly related to age, most owners being 40 to 64 years (U.S. Bureau of the Census 1969).

There was little change in the type of housing unit occupied by the middle-aged group between 1960 and 1970: nearly 80 percent of household heads age 35 to 54 occu-

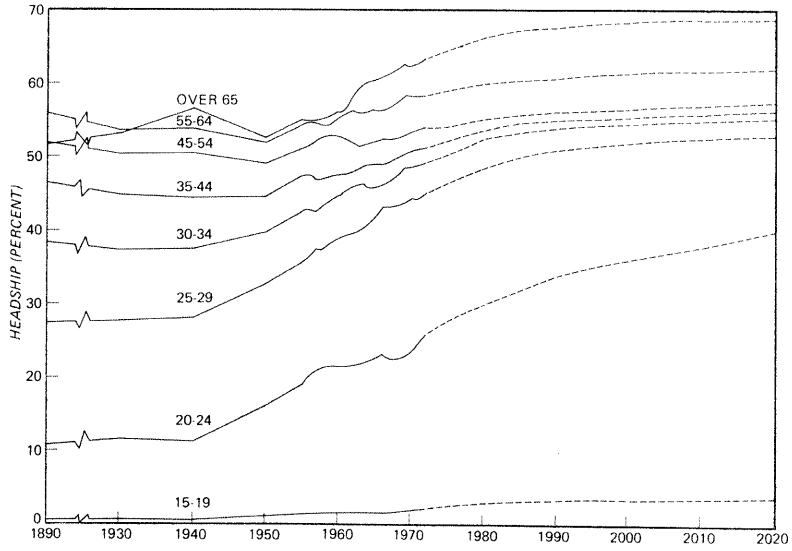

Figure 4.--Headship rates by age class for 1890, 1930, 1940, 1950, and 1955-1972, with projections to 2020 (high series).

pied one-unit structures (fig. 5). There was an increase in multi-unit occupancy by younger household heads and for householders 65 and older, primarily a shift in the rental market to new apartments from the surplus of single-family homes built up in the 1950's. Mobile home occupancy increased for all age groups, especially young household heads. This trend is expected to continue (table 1). A moderate shift to multi-unit occupancy is also projected, coupled with a corresponding lower rate for one-unit demand.

FUTURE HOUSEHOLD FORMATION

Net household formation, i.e., the net increase in the total number of households, has risen sharply in recent years, from about 1 million a year in the 1950's and 1960's to over 1.6 million a year in the early 1970's. Although special factors, such as the end of the Viet Nam war and

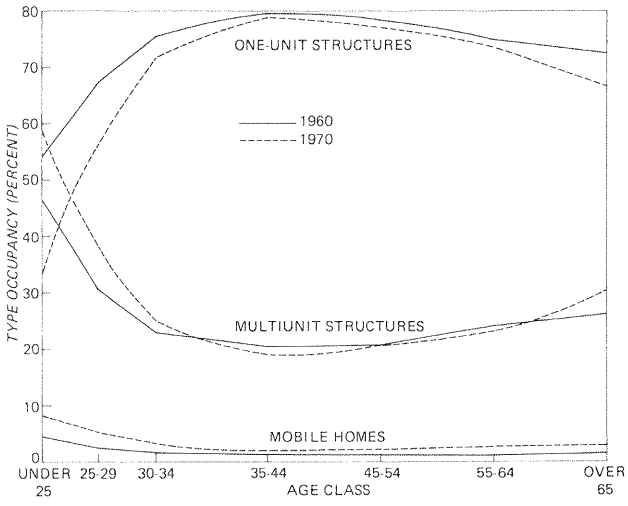

Figure 5.--Housing type occupancy rates in the U.S. by age class for 1960 and 1970.

Table 1.--*Housing occupancy rates in the United States by type of structure and age of occupants for 1960 and 1970 with projected incremental occupancy rates to 2020.*

(In percent)

OVERALL OCCUPANCY RATE

Year	Housing type	Age of occupants (years)							
		15-19	20-24	25-29	30-34	35-44	45-54	55-64	65+
1960	One-unit structures[1/]	47	55	68	75	79	78	75	73
	Multi-unit structures	47	41	30	23	20	21	24	26
	Mobile units	6	4	2	2	1	1	1	1
	Total	100	100	100	100	100	100	100	100
1970	One-unit structures		[2/] 33	57	72	79	77	74	67
	Multi-unit structures		59	38	25	19	21	23	30
	Mobile units		8	5	3	2	2	3	3
	Total		100	100	100	100	100	100	100
	INCREMENTAL OCCUPANCY RATE								
1970-2020	One-unit structures	5	5	30	50	65	63	55	49
	Multi-unit structures	65	65	45	32	22	24	28	33
	Mobile units	30	30	25	18	13	13	17	18
	Total	100	100	100	100	100	100	100	100

1/ These rates are for all one-unit structures and differ from those previously published by the author that classified attached one-unit structures with multi-unit structures.

2/ This estimate is for all households under 25 years. Source:

1960--Author's estimates based on unpublished data from the one-in-a-thousand sample of population characteristics from the 1960 census which is available on magnetic tapes. U.S. Bureau of the Census, U.S. Census of Housing: 1960. Public Use Sample.

1970--Author's estimates based on data from the 1970 Census of Housing. U.S. Bureau of the Census, Census of Housing: 1970. Final Report HC(7)-6, Mobile Homes, Table A-1, and Final Report HC(7)-1, Housing Characteristics by Household Composition, Table A-5.

the draft, may have increased the rate of household formation in this period, continued sharp increases in the number of persons in their 20's and early 30's will keep net household formation high until the mid-1980's. In this study, the total number of households is projected to increase by 14.9 to 16.4 million in the 1970's and by 13.0 to 13.8 million in the 1980's.

In the 1990's alternative assumptions about future population growth become important. Household formation will likely decline in this decade to less than a million a year due to the recent decline in births (table 2). After the turn of the century, about 1 million households will be formed annually unless there is an upswing in fertility rate.

Table 2.--*Projections of housing demand in the United States by components, annual averages, 1975-1980, and 10-year periods to 2020*

(Thousand units)

Period	Household formations	Conventional vacancies	Replacement units: Conventional	Replacement units: Mobile	Other mobile units[1/]
HIGH PROJECTIONS					
Series E					
1975-1980	1,682	197	671	220	138
1981-1990	1,374	230	781	310	130
1991-2000	980	264	896	362	123
2001-2010	1,139	246	997	426	164
2011-2020	1,059	192	1,101	490	169
Series F					
1975-1980	1,682	197	671	220	139
1981-1990	1,372	230	781	310	130
1991-2000	883	252	894	357	116
2001-2010	870	209	981	401	144
2011-2020	723	144	1,059	445	148
Series D					
1975-1980	1,682	197	671	220	139
1981-1990	1,379	231	781	310	130
1991-2000	1,172	288	899	371	139
2001-2010	1,538	301	1,025	467	194
2011-2020	1,500	255	1,165	559	205
LOW PROJECTIONS					
Series E					
1975-1980	1,468	176	607	213	126
1981-1990	1,302	221	701	296	122
1991-2000	917	253	799	340	114
2001-2010	1,075	235	887	400	154
2011-2020	985	180	977	458	156
Series F					
1975-1980	1,468	176	607	213	126
1981-1990	1,300	220	701	295	122
1991-2000	826	241	797	336	107
2001-2010	820	200	874	376	135
2011-2020	655	134	940	416	138
Series D					
1975-1980	1,468	176	607	213	126
1981-1990	1,306	221	701	296	122
1991-2000	1,096	275	802	349	130
2001-2010	1,458	288	912	438	182
2011-2020	1,402	240	1,033	524	191

1/ Includes mobile units used for purposes other than a primary residence such as second homes, because vacant units are not counted in the housing inventory by the Bureau of the Census.

Changes in the age-mix of household heads are occurring that greatly influence the type of unit demanded. The effects of the changing age structure of the population are reflected in long-run fluctuations of the number of household heads by age class. To illustrate the potential effects on housing demand of the changing age-mix, consider two key age groups for housing demand: (1) those households headed by persons under 30 who are most likely to demand apartments and mobile homes, and (2) the 35- to 44-year-old age group who typically occupy single-family homes. From 1966 to 1975 household heads under 30 are expected to increase by *5.7 million* while only a *slight decrease* is projected for the 35- to 44-year-old age group (fig. 6). This

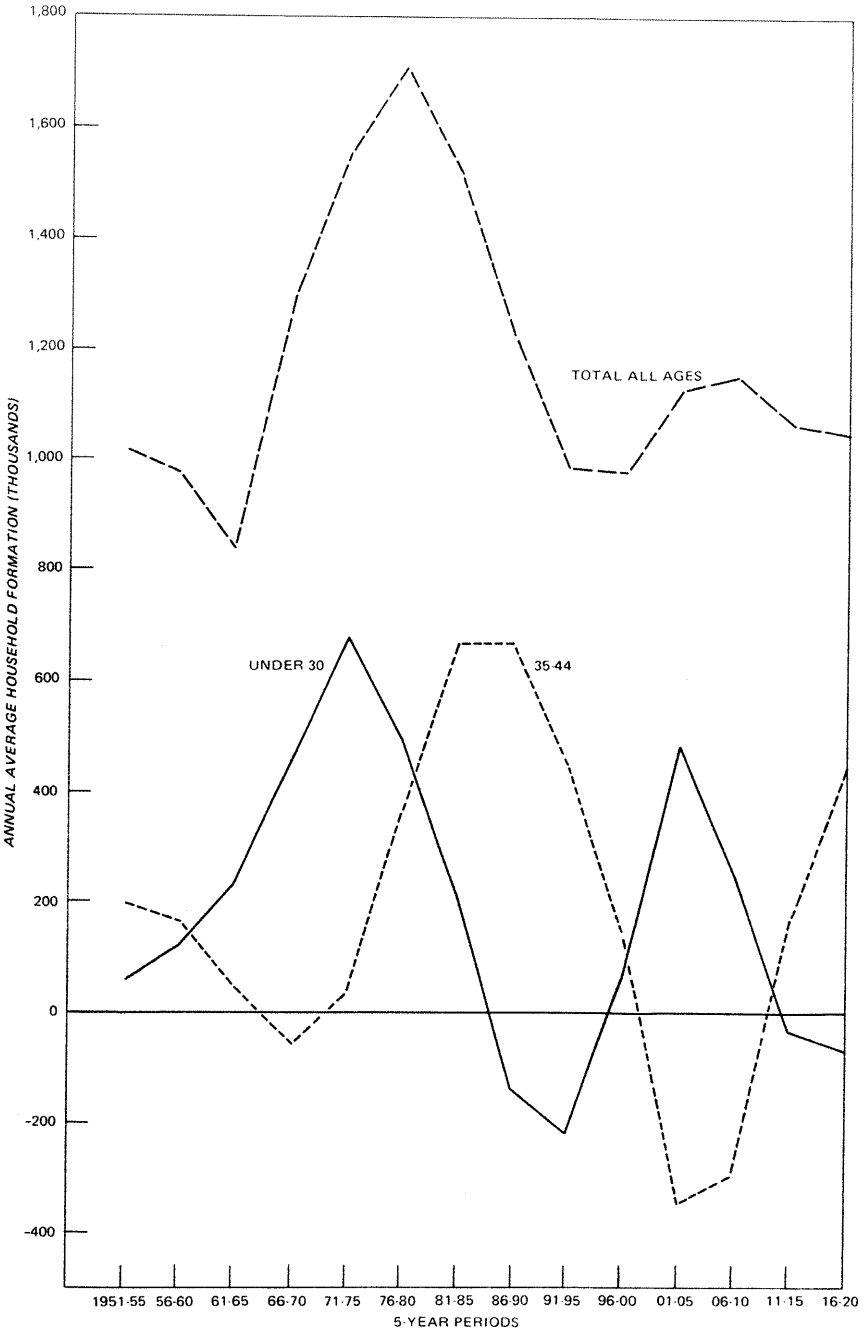

Figure 6.--Average household formation by selected age groups for 5-year periods 1951-1970 with projections to 2020 (Series E high projections).

in part explains why apartment and mobile home demand has boomed in this period and single-family home demand has languished. Similar fluctuation will occur in the number of household heads in other age groups through time. In the 1970's the number of middle-aged household heads will increase rapidly while the number of households headed by persons under 30 will begin to decrease in the latter half of the decade. In the 1980's an upsurge of single-family housing demand is likely to occur due to changing the population age structure.

PROJECTION OF VACANCY AND REPLACEMENT DEMAND

The second phase of the projection model requires estimates of the other components of housing demand: vacancy and replacement demand. In this section we will add estimates of future vacancy and replacement rates to the projections of household formations to obtain projections of total housing demand by type of unit.

Vacancies may occur for many reasons and may be categorized into: (1) those units available for sale and rent, and (2) those units held vacant for other reasons such as second homes and hence not available in the housing market. Little increase in the vacancy rate is projected for the next 10 years because of the expected housing demand. In the late 1980's and 1990's, vacancies are projected to increase more rapidly as housing demand shifts to meet the needs of the middle-aged householder. Total vacancies are projected to increase from 9.1 percent in 1980 to 12.1 percent in 2020. Mobile homes that are vacant or used as second homes are not included in the vacancy-rate statistics.

Replacement demand is the other major component of housing demand. Net replacement demand in this study is divided between conventional housing units and mobile homes. Two assumptions are made about net replacement rates: (1) replacement rate for conventional housing units was assumed to be about the same as the 1960's, ranging from 0.78 to 0.85 percent, and (2) replacement rate for mobile homes was assumed to be 4 to 5 percent. Overall the replacement rate varied from about 1 to 1.1 percent of the total housing stock. Mobile homes that become vacant or are used as second homes are no longer counted in the housing inventory. These projections of replacement rates may be somewhat optimistic in view of the present shortages of energy, materials, and capital.

SUMMARY OF HOUSING DEMAND

Total housing demand is projected to remain high until the late 1980's (fig. 7). By 1990, however, a decline in housing demand is projected to occur because of the "baby bust" of the last 10 years. An upper and lower series of projection of possible housing demand were made for each population Series D, E, and F.

Total housing demand, including mobile homes, is projected to be between 2.6 and 2.9 million units annually for 1975 to 1980 (table 3).[1/] This is about the level of production for the housing boom of 1971 to 1973, and substantially above the 1.7 million units produced in the 1960's. Net household formations are projected to remain high, averaging between 1.5 and 1.7 million annually. Vacancies are projected to increase by nearly 200,000 units a year, while replacement demand is projected to vary from 820,000 to 890,000 units annually (table 2).

In the 1970's the demand for multi-unit structures and mobile homes is expected to remain strong because of large increases in net household formation for people under 30 years of age. By the mid-1970's the demand for single-family housing units is expected to begin to rise rapidly as the many people born in 1940 to 1960 approach middle age. For the period 1975 to 1980 one-unit structures are projected to constitute 57 percent of total conventional housing demand of about 2 to 2.2 million units annually. Mobile home demand is projected to average between 630,000 and 690,000 units or about 24 percent of total housing demand.

In the 1980's total housing demand is projected to be between 2.6 to 2.8 million units. Demand will remain high in the first half of the decade and then decline in the second half because of declining household formations. The demand by components for

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1/ These projections are of basic long-run trends in housing demand under the assumption made in the study and do not account for short-run fluctuations in housing productions that could vary as much as 20 percent.

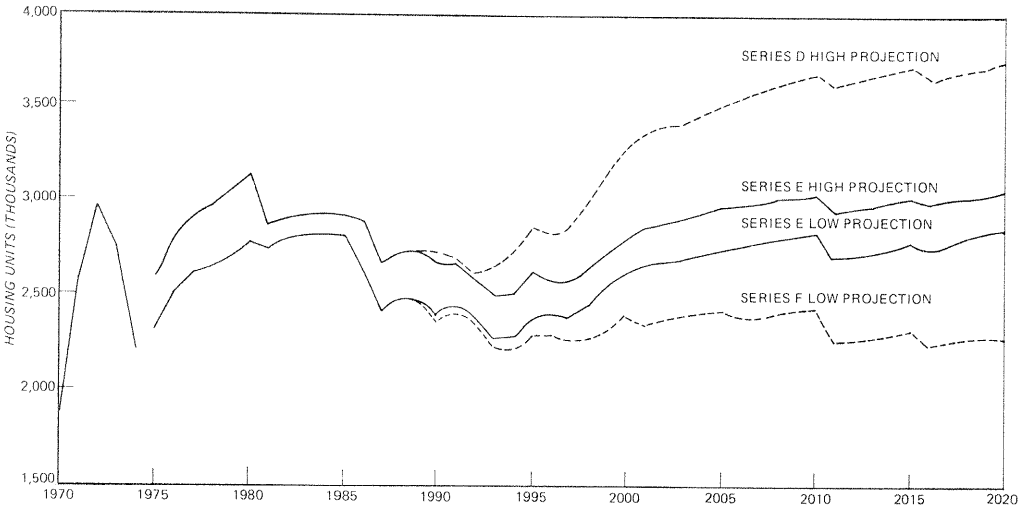

Figure 7.--Estimates of housing production, 1970-1974, with projections of total housing demand to 2020.

the decade includes 1.3 to 1.4 million new households annually, 220,000 to 230,000 additional vacant units a year, and 1.0 to 1.1 million units for replacements, of which 300,000 are mobile home replacements. In addition, it is estimated that about 130,000 additional mobile homes will be required that are not used as primary residences or counted in the housing stock, as defined by the Census Bureau. These units may be vacant, used as second homes, or for other purposes. Twenty percent of total mobile home shipments are assumed to be in this category.

The demand for one-unit structures is expected to continue to rise in the 1980's because most of the growth in households for the decade will be concentrated in the early middle-aged group. On the other hand, the demand for multi-unit structures is expected to decline substantially by the mid-1980's because of the decline in numbers of young households. Mobile home demand is also projected to decline for the same demographic reasons. By the late 1980's one-unit structures could account for 70 percent of new construction.

Throughout the 1980's, new construction is projected to remain at about 2 to 2.2 million units a year; about two-thirds of the demand will be for one-unit structures. Mobile home demand is projected to be between 610,000 to 650,000 units a year.

In the 1990's, alternative population growth rate assumptions become important for the first time. A large decline in household formation will occur in the decade. If the birth rate of the last year continues, household formation could drop to an annual rate of 830,000 to 980,000 or nearly half the peak rate of the 1970's. For the decade, projected total housing demand varies from 2.3 to 2.9 million depending on population assumptions. Replacement demand is projected to vary from 11 to 13 million units. Vacant units are projected to increase by 2.4 to 2.9 million units, reflecting a probable upswing in second home demand.

For the first time replacement will become the most important component of housing demand. If replacement demand, which can be postponed, falls short of the projections, a further decline in housing demand would occur.

In the early 1990's, one-unit housing demand is projected to reach a peak as the number of householders aged 35 to 54 increases rapidly, while there is a decrease in the number of household heads under 30. But by the late 1990's, an upswing in multi-unit demand is expected. For the entire decade, one-unit structures could account for nearly 70 percent of conventional housing demand.

After the turn of the century the population growth rate assumption becomes increasingly important. For the two decades after 2000, total housing demand could vary from only 2.3 to 2.5 million units annually for the low fertility rate assumptions (1.8 births per woman) or demand could jump to 3.4 to 3.7 million units a year if fertility

Table 3.--*Projections of housing demand in the United States by type of unit, annual averages, 1975-1980, and 10-year periods to 2020*

(Thousand units)

Period	Total all types	New construction			
		All starts	One-unit	Multi-unit	Mobile
HIGH PROJECTIONS					
Series E					
1975-1980	2,908	2,219	1,272	947	689
1981-1990	2,825	2,176	1,448	728	649
1991-2000	2,624	2,007	1,362	645	617
2001-2010	2,972	2,150	1,248	902	822
2011-2020	3,010	2,165	1,359	806	845
Series F					
1975-1980	2,908	2,219	1,272	947	689
1981-1990	2,822	2,174	1,448	726	648
1991-2000	2,501	1,923	1,354	569	578
2001-2010	2,606	1,886	1,132	754	720
2011-2020	2,520	1,778	1,070	708	742
Series D					
1975-1980	2,908	2,219	1,272	947	689
1981-1990	2,831	2,180	1,448	732	651
1991-2000	2,870	2,174	1,384	791	696
2001-2010	3,526	2,554	1,454	1,100	972
2011-2020	3,684	2,659	1,646	1,013	1,025
LOW PROJECTIONS					
Series E					
1975-1980	2,590	1,958	1,120	838	632
1981-1990	2,642	2,030	1,370	660	612
1991-2000	2,423	1,849	1,275	574	574
2001-2010	2,751	1,980	1,162	818	771
2011-2020	2,758	1,970	1,251	719	778
Series F					
1975-1980	2,590	1,958	1,120	838	632
1981-1990	2,638	2,028	1,370	658	610
1991-2000	2,309	1,771	1,268	503	538
2001-2010	2,405	1,731	1,051	680	674
2011-2020	2,283	1,594	970	624	689
Series D					
1975-1980	2,590	1,958	1,120	838	632
1981-1990	2,646	2,033	1,370	663	613
1991-2000	2,652	2,004	1,295	709	648
2001-2010	3,278	2,366	1,363	1,003	912
2011-2020	3,390	2,434	1,527	907	956

rate should suddenly increase to 2.45 births per woman.

Regardless of the population series assumed, replacement demand will increase because of the growth in the size of the housing stock and the greater proportion of mobile homes. For example, for the 2.1 fertility rate, replacement demand is projected to range from 13 and 14 million units for the decade 2001-2010 and from 14 to 16 million units for 2011-2020. In the long run, housing demand will become more dependent on replacement of the existing housing and increases in second home demand. The future level of these components of housing demand is much less certain than the level of future household formation.

Ultimately, the mix of new construction will average about 60 percent one-unit structures and 40 percent multi-unit structures, according to the assumptions made about housing type occupancy. By the year 2020 mobile homes are expected to average about 30 percent of housing demand. Much of this demand is for replacement of the growing stock of older mobile homes.

CONCLUSIONS

The large numbers of people born in the 1950's who are now entering the housing market, and current expectations about future economic growth, indicate that the recent high-level housing demand will continue until the late 1980's, despite periodic disruptions of housing production because of short-term credit cycles. But, by 1990 a large decrease in housing demand could occur because of the decline in births of the last 10 years. The level of net household formations in the early 1990's may fall about half from the present rate of 1.6 million. Increases in replacement and vacancy demand are projected to moderate the effect on total housing demand. In fact, replacement will become the most important component of housing demand. Attainment of the projected replacement rate in the 1990's is by no means certain. By the 1990's, much of the housing stock will be relatively new and the replacement rates could fall below the projected levels. If this should happen, a major recession in housing could occur in the 1990's.

After the year 2000, projections of total housing depend increasingly on alternative assumptions about the future population growth rate. Long-run housing demand could average as low as 2.5 million housing units a year if the present level of fertility continues.

If the fertility rates stabilize at the replacement level, total housing demand is projected to average 2.75 to 3 million units annually for 2001 to 2020. A drop in fertility rates to 1.8 would result in a projected demand of 2.3 to 2.6 million units, while an increase in fertility to 2.45 children per woman increases housing demand projections to 3.3 to 3.6 million units a year.

Types of housing units demanded are likely to change dramatically over the next 30 years if historic relations of type of housing unit occupied to age of household head continue. These changes will be caused by unprecedented changes in the age distribution of the population.

A large demand for multifamily units and mobile homes will continue into the early 1980's because of continued large increases in households under age 30. However, overcapacity in apartments may occur by the late 1980's as the number of households under 25 greatly declines.

By the late 1970's and 1980's a great increase in demand for one-unit structures should occur as the number of households in the 30- to 44-year-old age group increases rapidly. This demand will at first be greatest for some type of moderately priced housing unit. Later, the demand for more expensive homes should build up as the households begin to upgrade their housing units. In the 1990's a new era of individually styled and custom-built homes may develop as an affluent, middle-aged society seeks to improve the quality of its housing.

Second home demand in the 1970's may not be as great as is often expected due to lack of increase in population in the key 40- to 60-year-old age group. By 1990, however, a large potential demand for second homes should develop as the number of householders in their 40's grows rapidly.

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