Demographic Trends, Housing Equity, and the Financial Security of Future Retirees

by

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Abstract

Housing equity accounts for a large portion of the non-pension assets of most retirees. We consider how home ownership, housing equity and housing value have changed in recent decades and, in particular, how housing equity has changed near retirement age. We also consider what these changes suggest about the feasibility of forecasting future housing market activity and home equity of elderly households.

We find that the age profile of home ownership rates has changed little over the past two decades. This stability suggests that predictions of how demographic trends will affect the *number* of homeowners can be made with some confidence. On the other hand, there have been very large increases in the *value* of owner-occupied homes and in home equity over the past two decades. These increases appear to be the result of many factors that affect housing markets, including but not exclusively demographic trends. The wide variation in house values suggests that it is likely to be very difficult to forecast the future value of homes based on the past age profile of home values and projections of future demographic structure.

We use cohort data to compare the home value, home equity, and mortgage debt of cohorts approaching retirement over the past 20 years. We also simulate the evolution of home values over the course of a typical retirement to explore the relationship between home equity at retirement and home equity at older ages. We compare the home equity of past retirees to that of those who will retire in the near future. Recent retirees have both more home equity and more mortgage debt than past retirees, which suggests that they are likely to hold more home equity at older ages than past retirees.

Cohort data also show that over a 20-year period marked by very large increases in home equity, the ratio of home equity to total non-pension wealth remained remarkably stable. This empirical regularity leads us to consider whether projections of the home equity of future retirees might be based on forecasts of the wealth of future households. The recent turmoil in the housing market adds interest to such projections but also draws attention to the large changes in home value and home equity that can occur over a short period of time.

About 80 percent of households with heads at retirement age own a home. Aside from Social Security and dedicated retirement saving, home equity is the primary asset of a large fraction of these homeowners. Thus the financial security of many older households depends importantly on the value of their homes. Venti and Wise (2004) and Banks, Blundell, Oldfield, and Smith (2007) show that housing equity tends to be withdrawn when households experience shocks to family status like entry to a nursing home or death of a spouse. If, as these analyses suggest, housing equity is conserved for a "rainy day," then the value of housing can have important implications for the reserve of wealth in the event of such shocks.

In a series of earlier papers—Poterba, Venti, and Wise (2007 a,b.c,d)--we considered the retirement asset accumulation of future retirees. In particular we considered the implications of the transition from a pension system dominated by employer-provided defined benefit plans to a system dominated by 401(k) plans and personal retirement accounts. We concluded that future retirees in the United States were likely to have substantially greater retirement assets than current retirees.

In this paper we consider how trends in housing equity could affect the well-being of future elderly. We address two related issues. One is how home ownership, housing equity and housing value have changed in recent decades, particularly for households near retirement age. The second concerns the likely path of housing equity of future retirees. This is a difficult issue to address with any degree of certainty, as past attempts to project home prices have demonstrated. We present data that illustrate how key relationships needed for projections have changed over time, thus contributing to substantial errors in some previous projections. Although we recognize that any projections are extremely uncertain, we do consider some "what if" scenarios regarding the path of housing equity and we ask how such scenarios might affect the financial well-being of future retires.

While our focus is on the possible effect of housing equity on the financial security of future elderly, our discussion of housing equity is necessarily related to prior work on demographic trends and housing prices. Substantial attention was first drawn to this issue by Mankiw and Weil (1989) and their paper elicited comments from many reviewers. McFadden (1994) and Hoynes and McFadden (1997) also consider the effect of demographic change on future house prices. Demographic change is, of course, not the only explanation for changes in house prices. Poterba (1991) considers the role of construction costs, the after-tax cost of home ownership, as well as demographic change. Glaeser, Gyourko, and Saks (2005) investigate the possibility that restrictive zoning has resulted in rapid price increases in some cities. More recently, Shiller (2007) discusses some of the causes of the recent spike in house prices observed in some regions of the United States since 1998.

To put the importance of housing equity in perspective, we begin in this introduction with data on home equity relative to other assets of households near

retirement. The tabulation below shows the dollar values of housing equity and other assets, calculated from responses to questions in the Health and Retirement Study (HRS) which included households with a member age 51 to 61 in 1992. Although housing equity represents about 15 percent of total wealth for all households in 2000, it represents about 33 percent of non-retirement assets. For about half of all households, housing equity represents over 50 percent of non-retirement assets. Because of the apparent special nature of home equity—as a reserve of last resort for many families—it may have a particularly important effect on the resources available to older families in the event of shocks to family status, such as entry into a nursing home, other health shocks, or death of a spouse.

In the first four sections of the paper, we explore the relationships between age, home ownership, and home values in recent decades. We show both cohort and cross-section representations of the data and consider which relationships changed over time and which ones have remained relatively unchanged for several decades. In section 1 we present cohort and cross-section descriptions of trends in home ownership by age. We find that the profiles of ownership by age changed little between 1984 and 2004—for couples, single men, and single women separately. In section 2 we combine trends in home ownership with demographic projections to obtain projections of the demand for homes in future years. These projections suggest that the total number of homes will continue to grow through 2040, but at a declining rate. In section 3 we discuss the value of housing by age given ownership. Unlike the stable pattern for home ownership, we find that the real value of housing roughly doubled between 1984 and 2004--for couples, for single men, and for single women. In section 4 we combine demographic data with ownership rates and home value given ownership to project the value of housing between 1984 and 2004. Over these years our projections correspond closely to Flow of Funds Accounts (FFA) estimates of aggregate housing value.

In section 5 we consider the relationship between non-pension wealth and home equity between 1984 and 2004. Using cross-sectional comparisons, we find that the ratio of home values to wealth increased somewhat between 1984 and 2004, while the ratio of mortgage debt to wealth increased substantially. On net, the ratio of home equity to wealth was essentially the same in 2004 as in 1984. This ratio did vary over the intervening years, largely as a function of stock market values.

In section 6 we consider cohort descriptions of home values, home equity, and mortgage debt, as well as the relationship between home equity and non-pension wealth. We find that the home values and home equity of successively younger cohorts increased very substantially over the 1984 to 2004 period. But the mortgage debt of younger cohorts also increased. Because the percent increase in equity was less than the percent increase in home values and the percent increase in mortgage debt was much greater than the percent increase in home values, the ratio of equity to value decreased for successively younger cohorts and the ratio of mortgage debt to value increased. Thus younger cohorts will approach retirement with more home equity than older cohorts, but also with more mortgage debt. In spite of the large changes in the ratios of home equity to home value, the cohort data also show that the age profile of

the ratio of home equity to non-pension wealth remained strikingly stable over the 1984 to 2004 period. We use simulation methods to illustrate the potential effect of changes in home prices on the home equity of households as they age and compare the distributions of home equity at successively older ages for households that approach retirement with different home value-equity-mortgage profiles.

Mean assets of HRS households in 2000

Asset category	Dollar amount		Percent ot total wealth	
	All households	Home-owners	All households	Home-owners
Retirement assets	370,748	415,357	53.93%	52.34%
Social Security wealth	174,865	188,185	25.44%	23.71%
DB pension wealth	94,118	108,038	13.69%	13.61%
401(k) assets	31,885	35,876	4.64%	4.52%
IRA & Keogh assets	69,879	83,258	10.16%	10.49%
Other non-retirement non-housing assets	212,928	249,420	30.97%	31.43%
Housing equity	103,820	128,843	15.10%	16.23%
Total wealth	687,497	793,620		

Percent of households with housing equity greater than a specified percentage of total wealth

	All households	Home owners
>25%	22.7	26.7
>50%	5.4	5.4
>75%	2.8	2.1

Percent of households with housing equity greater than a specified percentage of non-retirement wealth

>25%	70.1	83.0
>50%	50.2	58.5
>75%	30.6	34.4

In section 7 we explore the relationship between home equity and non-pension wealth in more detail, with the goal of understanding whether projections of future trajectories for household wealth might be helpful in projecting the home equity of future retirees. In section 8 we summarize our findings and discuss future research plans.

1. Trends in Home Ownership

We begin with a cohort description of home ownership. The data are from the Survey of Income and Program Participation (SIPP). The SIPP asks each household

respondent if the housing unit in which they are living is owned or rented. If the unit is owned then up to three owners can be designated. We use this information to classify each person as an owner, a renter, or living in a unit owned by another person. We also distinguish "families' within a living unit using the same rules as the tax code. Thus, for example, a house owned by a married couple also containing their adult son contains two "families" in our analysis: a married couple (owners) and a single male (a non-owner living in a unit owned by another person). Our analysis focuses on home owners.

The SIPP is a series of short panels that survey respondents for 32 to 48 months. New panels were introduced in most years between 1984 and 1995 and every four years after 1996. We disregard the short time-series component of the SIPP and treat survey data in each calendar year as independent cross-sections. We make use of data on home ownership for seventeen years: 1984, 1985, 1987, 1988, 1991-1995, and 1997-2004. From the random samples from each for these years we create cohort data. For example, to trace the average home ownership rate of the cohort that attained age 40 in 1984, we calculate the ownership rate for persons age 40 in the 1984 cross-section, age 41 in the 1985 cross-section, age 43 in the 1987 cross-section, and so forth. The last observation for this cohort will be at age 60 in 2004. We follow the same procedure for all cohorts that are between the ages of 21 and 80 at anytime between 1984 and 2004. For most cohorts this procedure yields 17 observations. However, fewer observations are available for some older cohorts (attaining age 80 before 2004) and for some younger cohorts (attaining age 21 after 1984).

The home ownership rates of couples from selected cohorts are shown in Figure 1-1. The data show essentially no cohort effects, except at older ages. The cohort data suggest that cross-section data for any year would look much like the pieced-together cohorts. For example, the 1984 data for different ages lie essentially on the age-ownership profile described by the cohort data. So do the data for 2004, the last year for which SIPP data are available. The cross-section data for 1984 and 2004 are shown for couples, single men, and single women in Figures 1-4 to 1-6 respectively. The ownership rates by age changed very little for couples between 1984 and 2004, except perhaps at older ages—80 and above. The ownership rate of single men age 60 and younger was about the same in 2004 as in 1984 but for those over 60 the ownership rate was higher in 2004 than in 1984. The ownership rate of single women changed little between 1984 and 2004. Because of the increasing proportion of single persons at younger ages, however, the number of all "households" (single persons and couples) who owned homes declined at younger ages between 1984 and 2004, as shown in Figure 1-7. On balance, ownership rates at older ages were somewhat higher in 2004 than in 1984.

Considering both the cohort and the cross-section data it appears that the ownership rate of older households will likely be higher in future years than it is today.

Figure 1-1. Percent owning for two-person households: eight selected cohorts identified by year members of cohort attain age 65

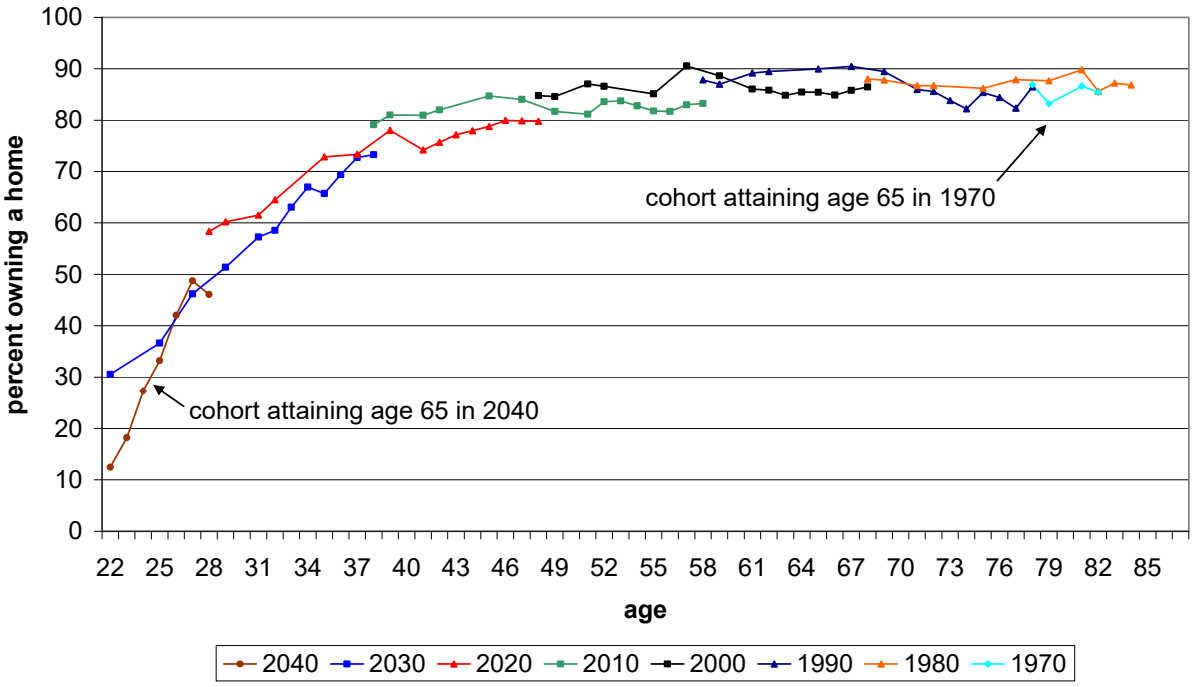


Figure 1-2. Percent owning for single males: eight selected cohorts identified by year members of cohort attain age 65

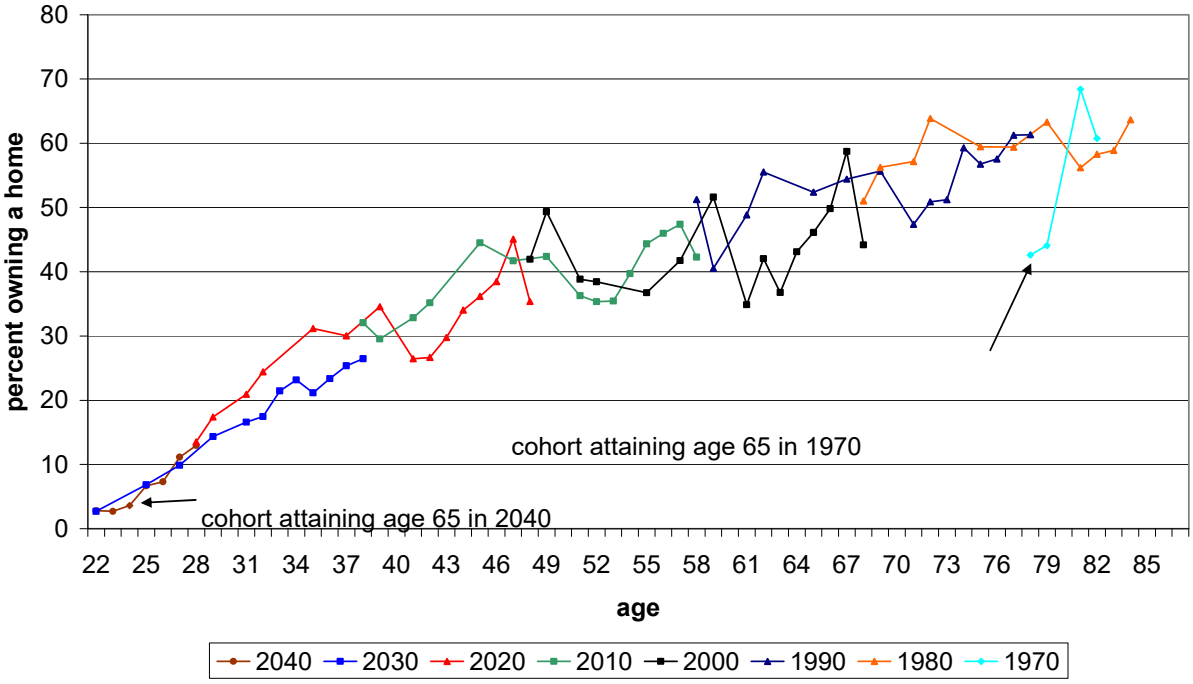


Figure 1-3. Percent owning for single females: eight selected cohorts identified by year members of cohort attain age 65

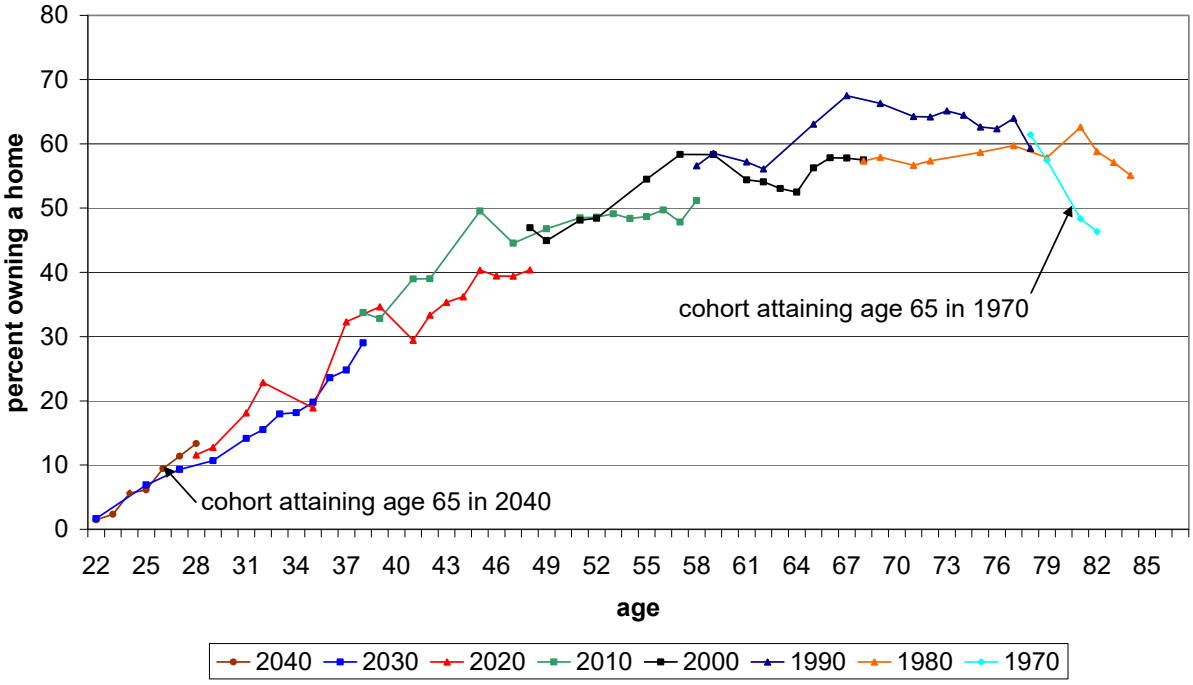


Figure 1-4. Percent of couples that owned homes, 1984 and 2004, SIPP data

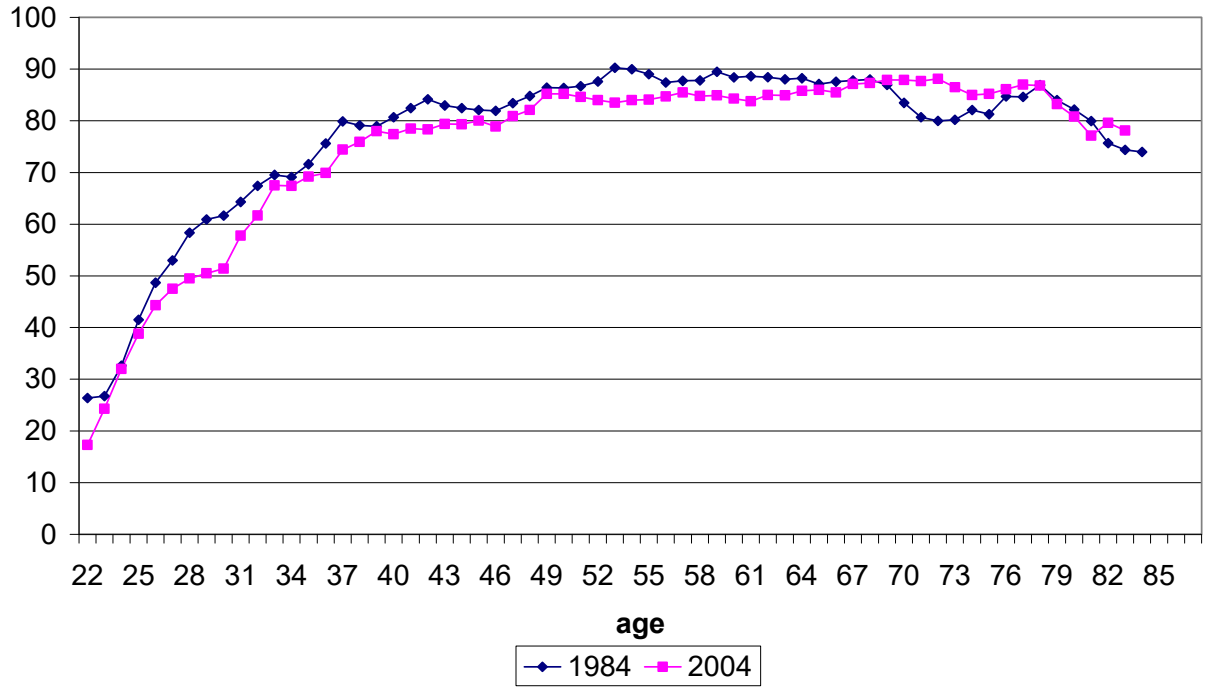


Figure 1-5. Percent of single men that owned homes, 1984 and 2004, SIPP data

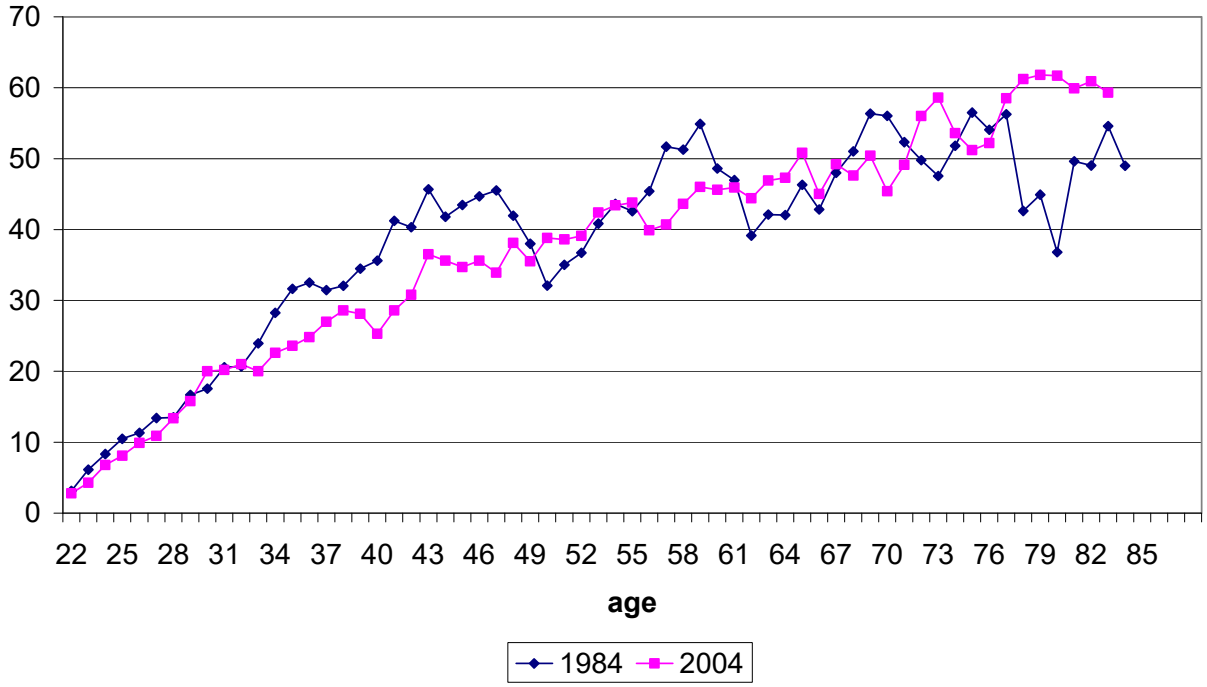


Figure 1-6. Percent of single women that owned homes in 1984 and 2004, SIPP data

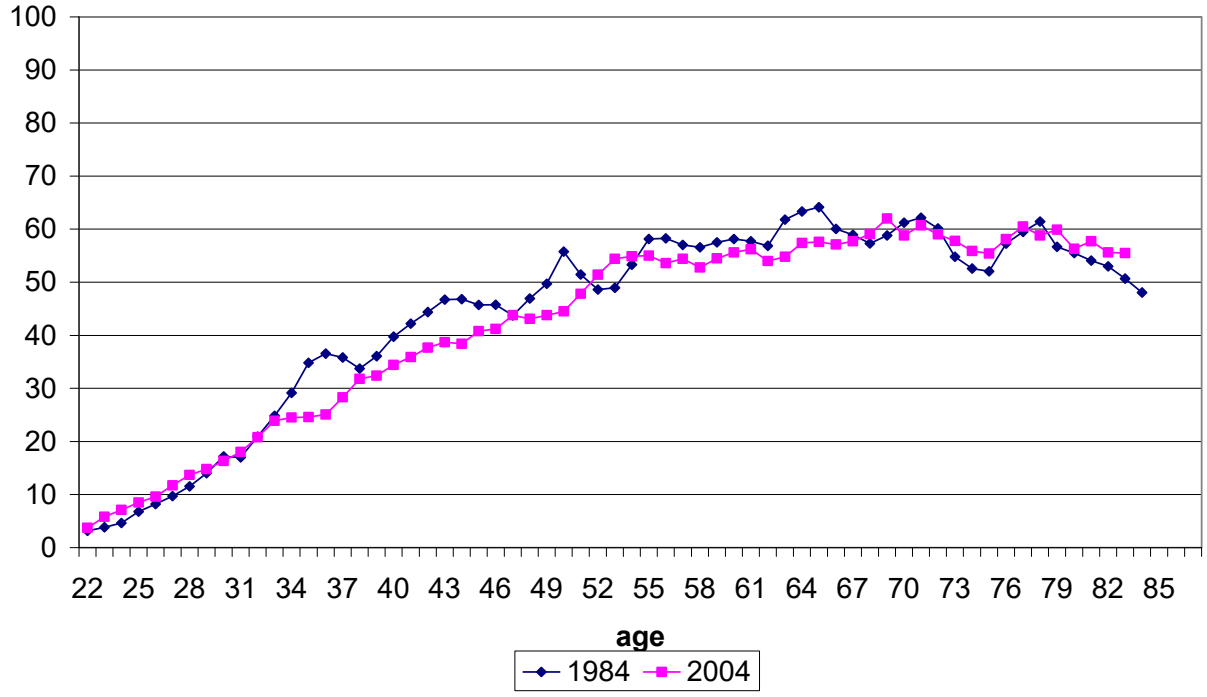
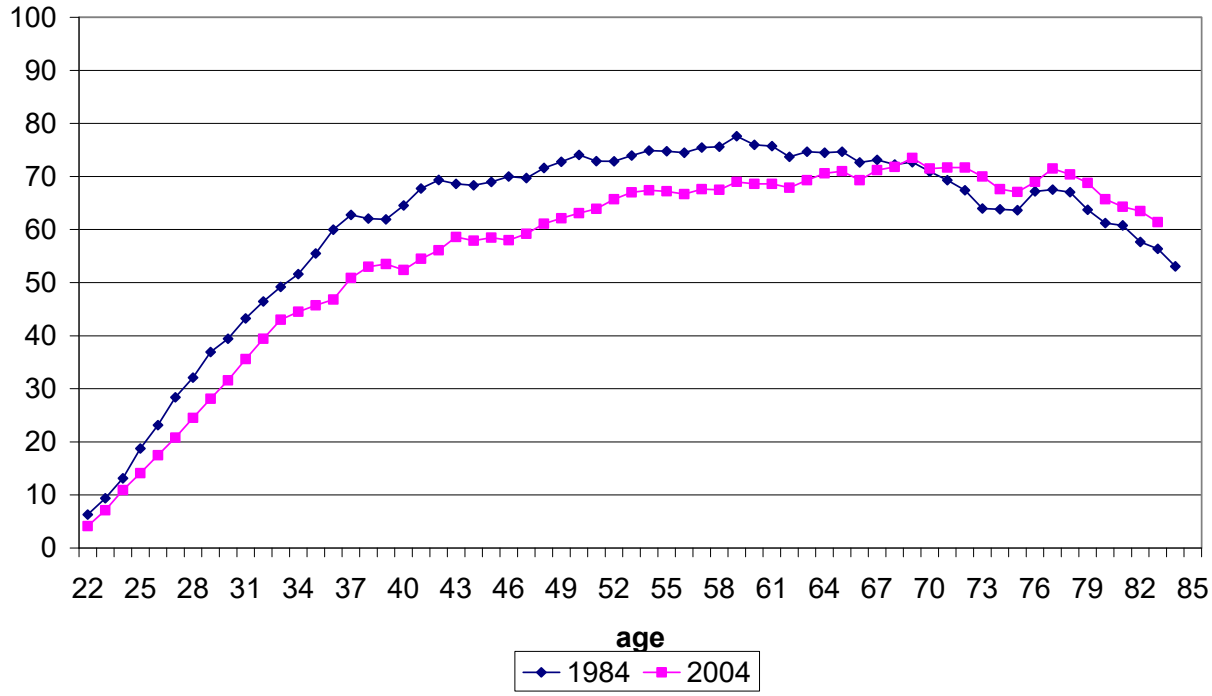


Figure 1-7. Percent of all households that owned homes in 1984 and 2004, SIPP data



2. The Aggregate Number of Homes

The previous section showed that the age profile of homeownership for couples, single males, and single females changed little between 1984 and 2004. We combine these age profiles with demographic data on the number of couples and single persons at each age in each year to obtain projections of the aggregate number of home owners (or the number of owner-occupied homes) in each year.

Projections are shown for the years 1982 to 2040 in Figure 2-1. These projections use the 2004 age profiles of homeownership shown in figures 1-4, 1-5, and 1-6 above. Thus the projections show what homeownership would be if the age profile of home ownership was the same as the 2004 profile over the entire period. The projection uses population forecasts by age, year, gender, and marital status that were provided by the Office of the Actuary of the Social Security Administration.1 In each year and for each age, the SIPP ownership rate for couples is weighted by the number of couples in the population to obtain an estimate of the number of couple homeowners. A similar calculation is made at each age for each year for single males and for single females. The projected aggregate number of homeowners shown in Figure 2-1 is the sum over all ages and over all demographic groups in each year.

The projected number of homeowners mirrors the pace of underlying demographic change. For the years 1982 to 2006 the figure also shows the actual number of owner-occupied housing units obtained from the Census estimate of the housing inventory in each year. The two series are quite close, although there is more fluctuation in the Census series. The projected number of homes increases essentially linearly from about 51 million in 1982 to about 102 million in 2040.

The projections suggest a substantial slowdown in the rate of increase in the number of homeowners. Figure 2-2 shows the implied rate of growth which declines from about 2 percent in the early 1980s to about ½ percent by 2040. The figure also shows the "actual" growth rates implied by the Census estimates of the number of home owners. On average the decline in the growth rate implied by the Census data essentially matches the decline implied by the projections. And the decline in the projected growth rates after 2006 essentially continues the path of decline between 1982 and 2006.

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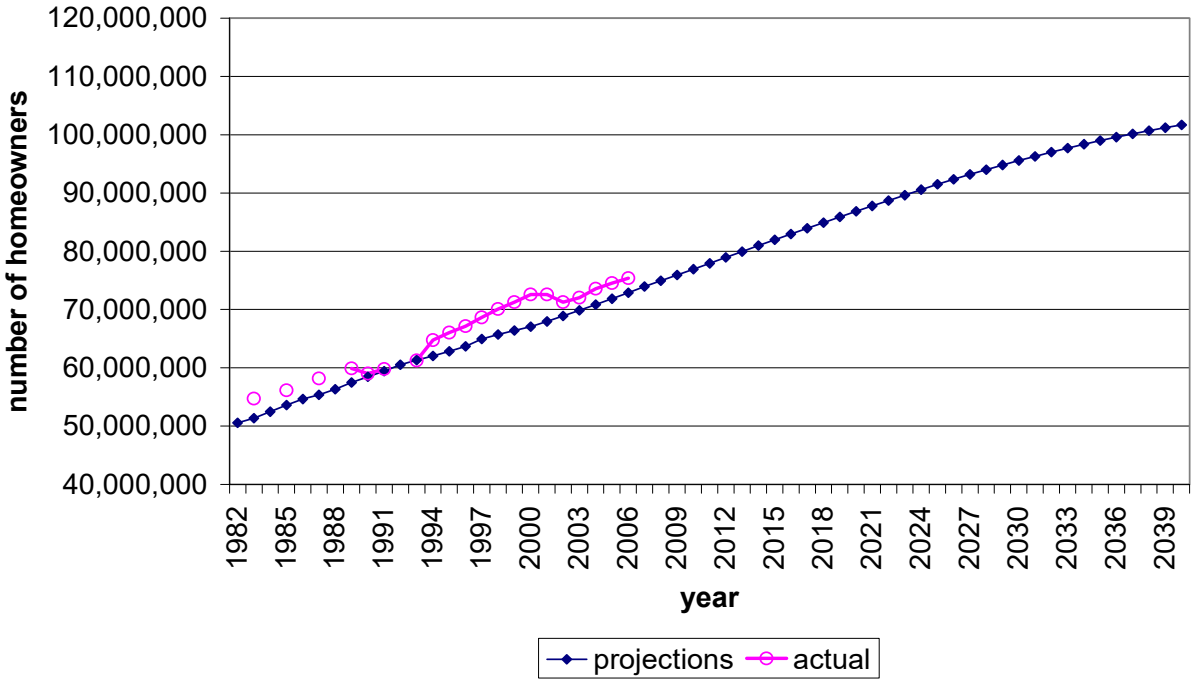
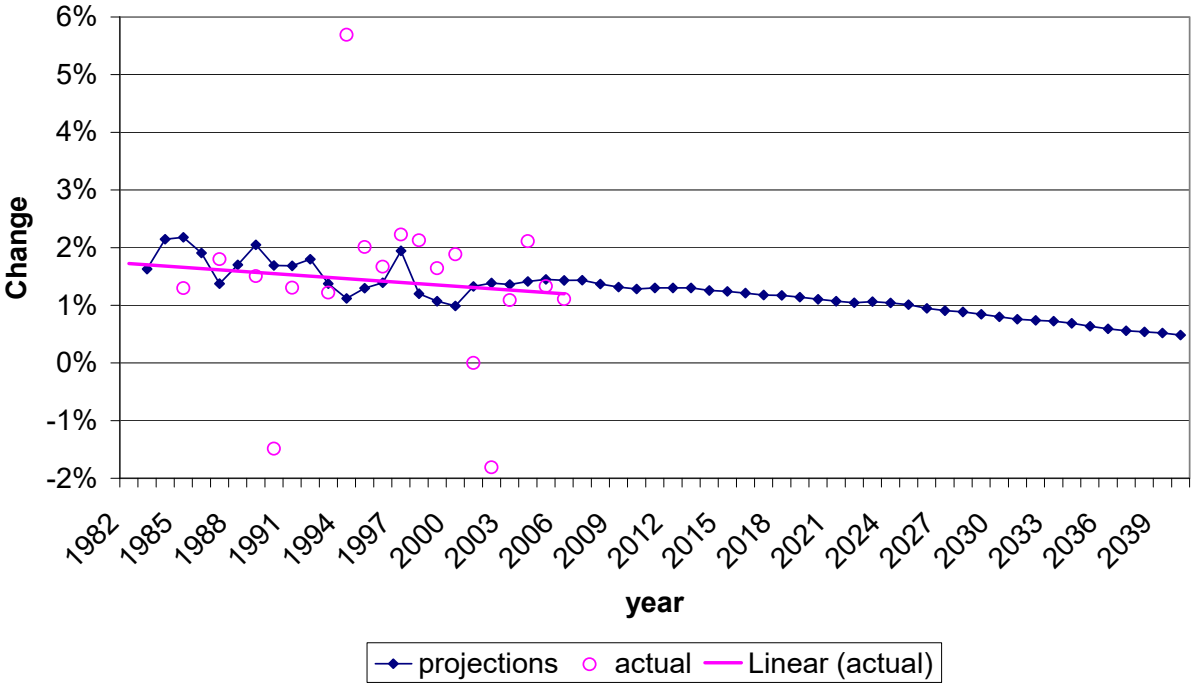
1 Population estimates for 1980 to 1999 are from the U.S. Census. Population projections from the Social Security Administration (SSA) are used for the years 2000 through 2040. The two sources differ slightly in coverage. The Census data exclude persons in the military and persons living abroad. These two groups are included in the SSA data. We have adjusted the SSA data by the ratio of Census estimates to SSA projections in the year 2000 for each of the gender and marital status groups.

F2-1. Projected and actual number of owner-occupied units



F2-2. Projected and actual percent change in the number of owner-occupied units



3. The Value of Owned Homes and Housing Equity

The data above show that the profiles of home ownership by age for couples, single men, and single women changed little between 1984 and 2004. But the value of homes and home equity increased substantially over this time period. Figures 3-1, 3-2, and 3-3 show the age profiles of the value of homes by age for couples, single men, and single women respectively. For each of the groups the home values (in 2000 dollars using the GDP price deflator) increased approximately two-fold between 1984 and 2004. For households between ages 60 and 70, real home values of couples increased by 110 percent, home values of single men increased 136 percent and home values of single women increased 93 percent.

In addition, home equity increased substantially for each of the groups. The age profiles of home equity for couples, single men, and single women are shown in Figure 3-4, 3-5, and 3-6 respectively. For households between 60 and 70, real home equity increased by 95 percent for couples, 119 percent for single men, and 77 percent for single women.

There are several possible reasons for the increase in home values and home equity between 1984 and 2004. One explanation is that household investment patterns changed over this time period, and that households chose to invest more in housing assets. Another is that home prices increased so that both home values and home equity increased while owners remained in the same home. This explanation invokes a more passive account of household behavior. In sections 5 and 7 below, we find that the increase in housing equity and housing values is strongly correlated with the increase in household wealth over this time period. We also find that for many households equity increased passively while the owners remained in the same home.

The data presented in figures 3-1 through 3-6 highlight the difficulty of projecting home prices and home values based on past empirical relationships. Projections based on the profiles of home values by age in 1984 would be far from the mark in 2004. These results also have implications for the oft-made suggestion that personal retirement accounts such as 401(k) plans and IRAs were funded in part by increasing home equity loans and reducing home equity. In this case, however, these data are not by themselves definitive. As discussed more fully below, as home equity increased, so did mortgage debt. In principle, home equity loans could have been used to fund 401(k) and other personal accounts. Greenspan and Kennedy (2007), however, show that increasing home equity loans and home refinancing in recent years were used largely to pay off short-term debt. Thus home equity loans were apparently not used in large part to fund personal retirement accounts.

Figure 3-1. Home value given ownership, couples, 1984 and 2004 (in year 2000 dollars)

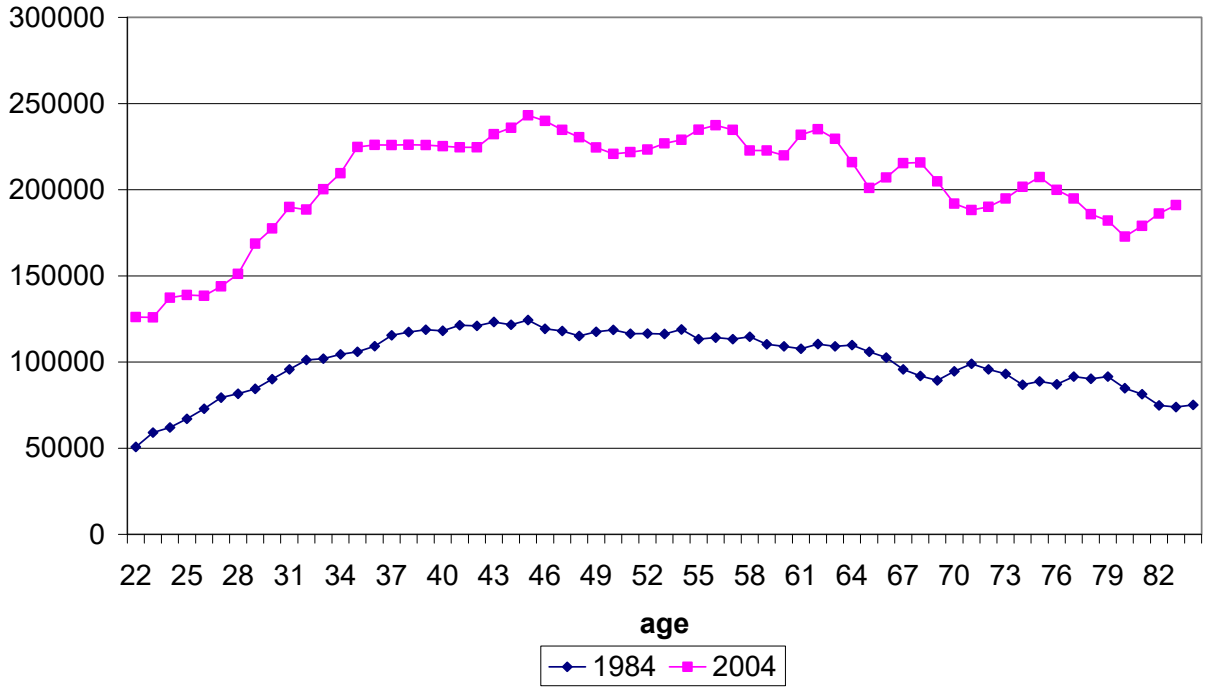


Figure 3-2. Home value given ownership, single males, 1984 and 2004 (in year 2000 dollars)

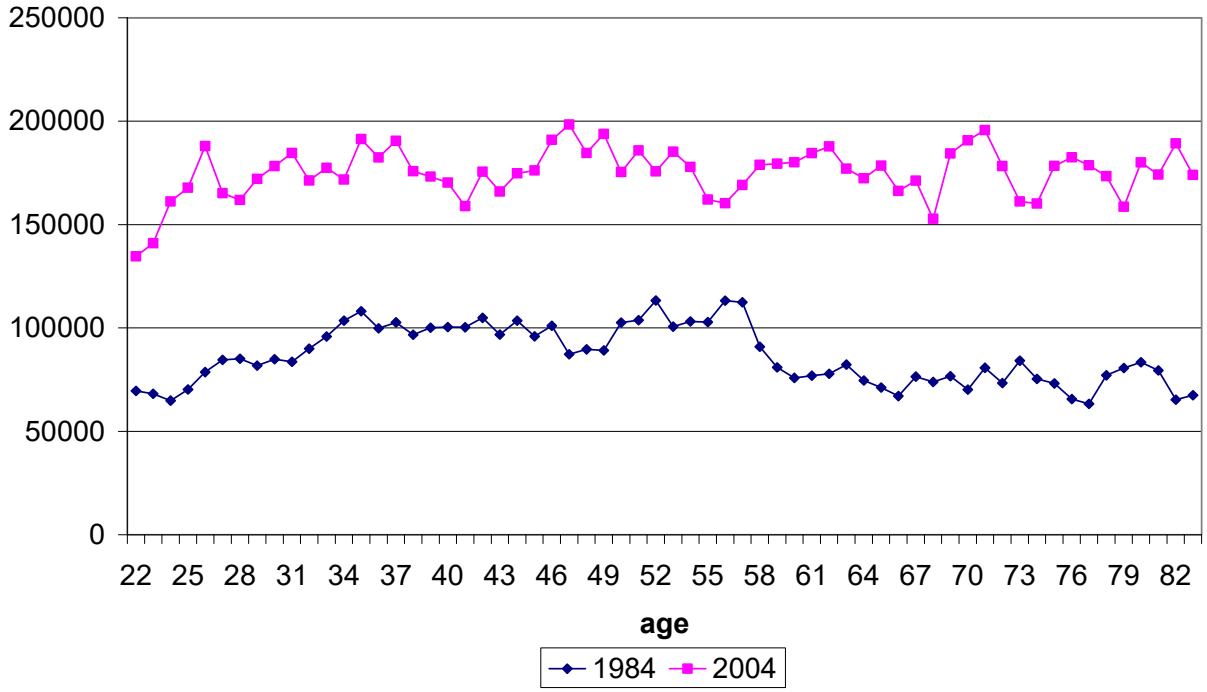


Figure 3-3. Home value given ownership, single females, 1984 and 2004 (in year 2000 dollars)

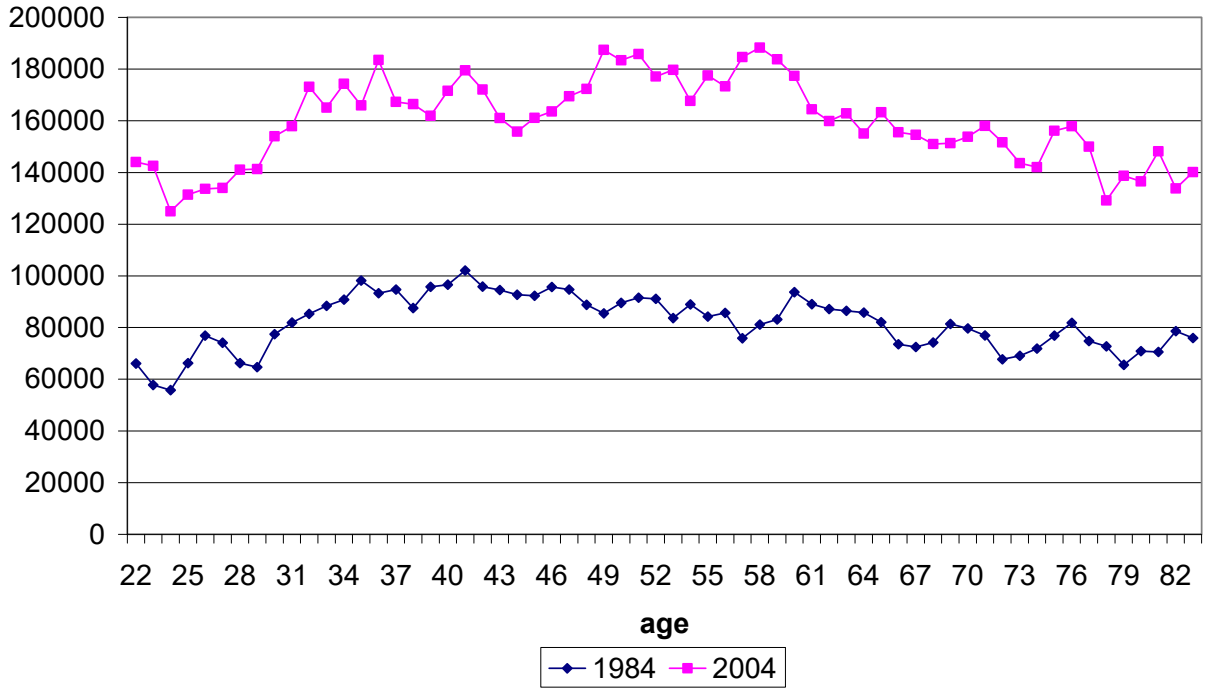


Figure 3-4. Home equity given ownership, couples, 1984 and 2004 (in year 2000 dollars)

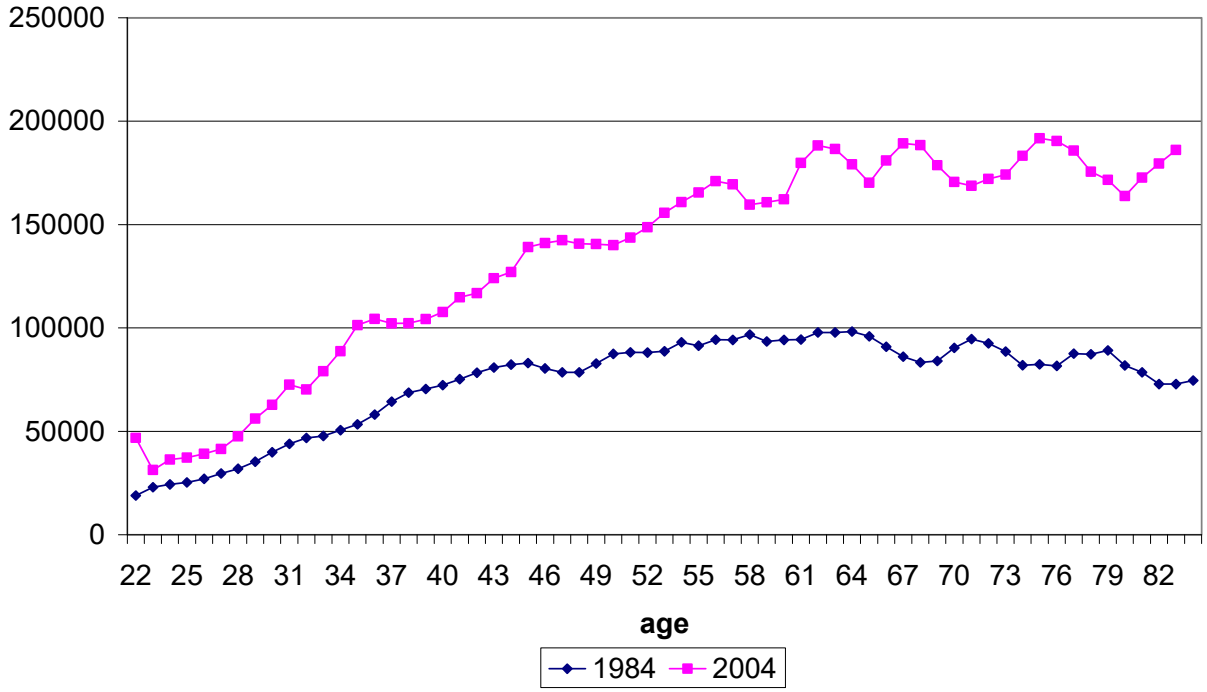


Figure 3-5. Home equity given ownership, single males, 1984 and 2004 (in year 2000 dollars)

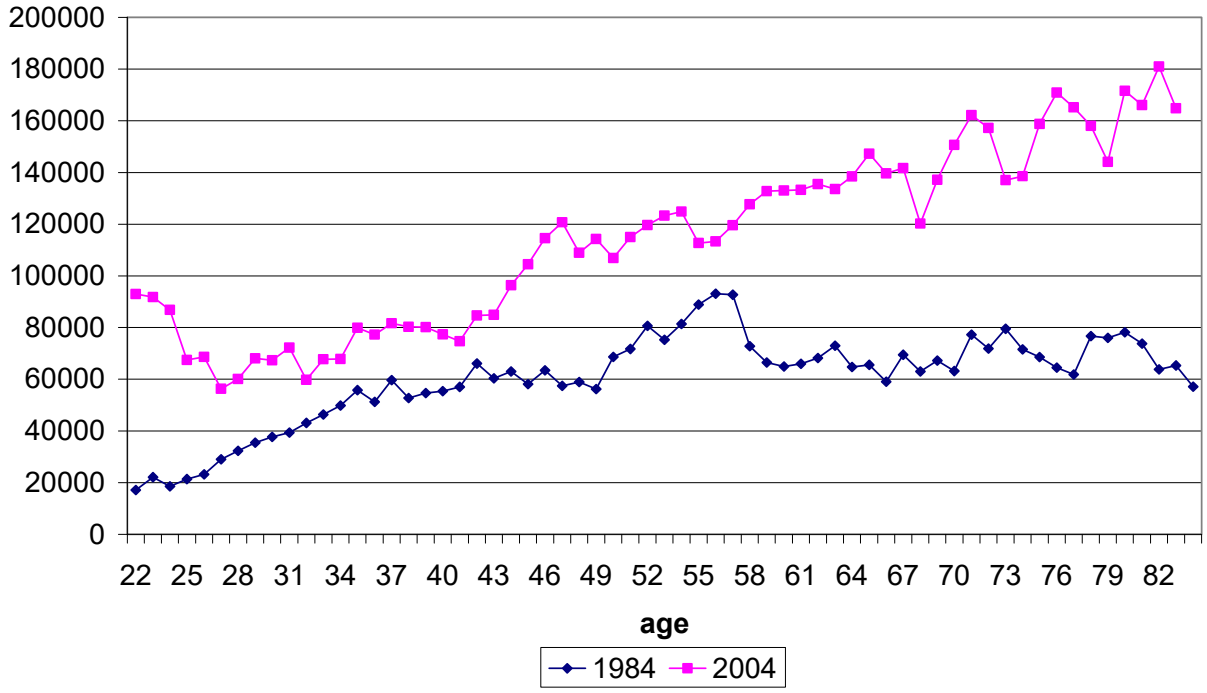


Figure 3-6. Home equity given ownership, single females, 1984 and 2004 (in year 2000 dollars)

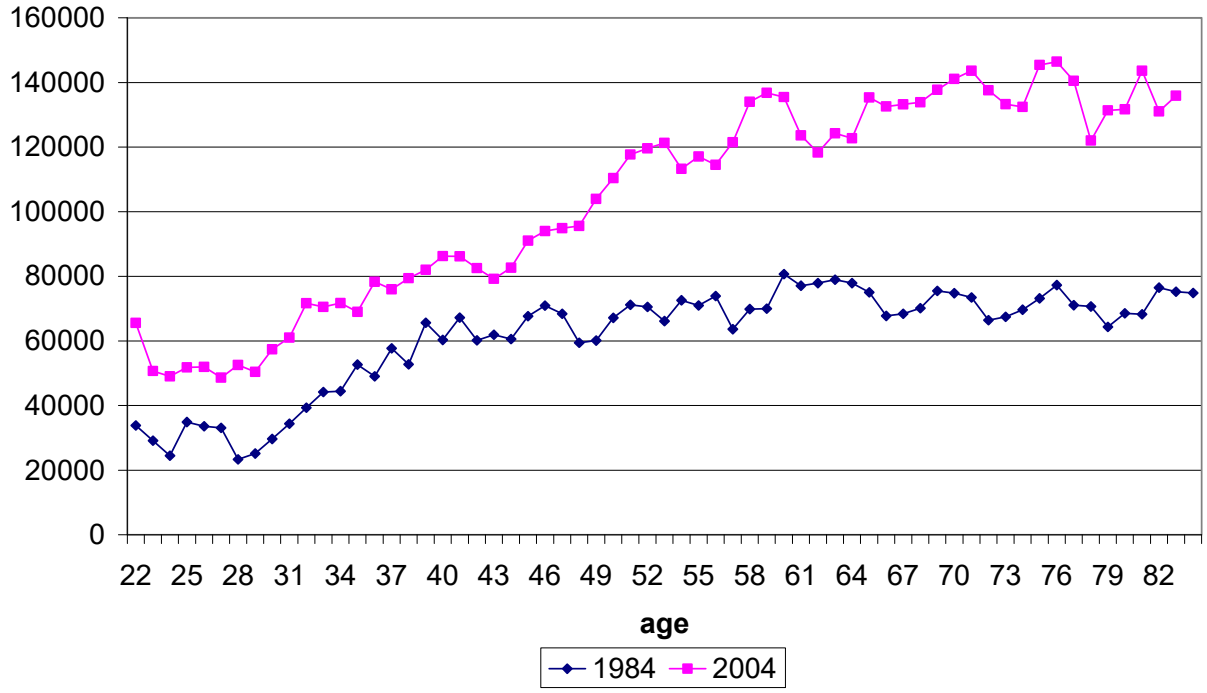
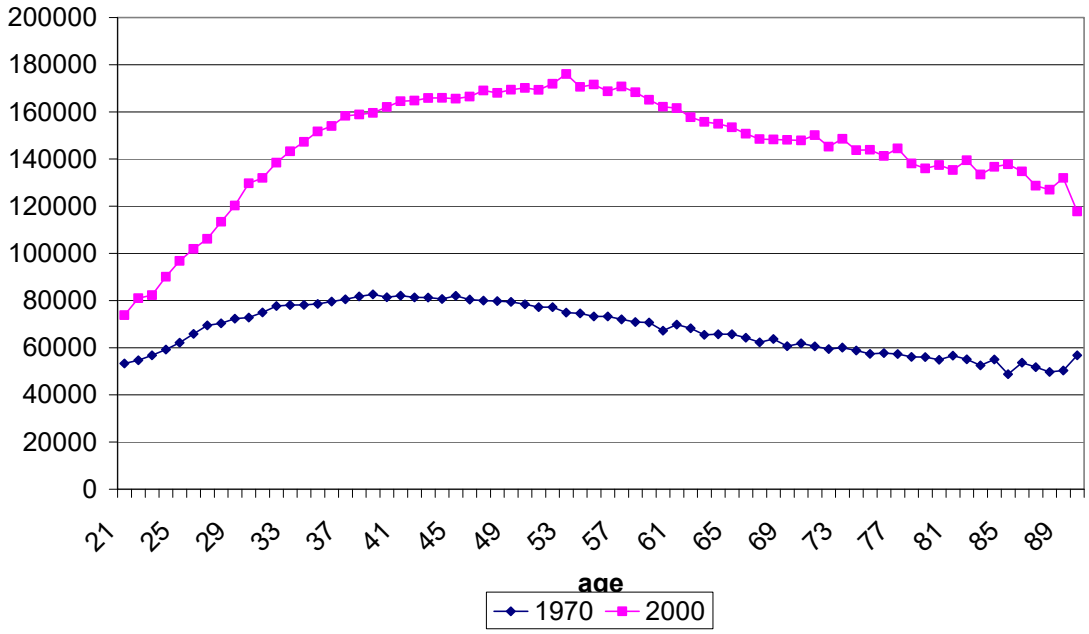


Figure 3-7. Home value of couples given own, 1970 & 2000, Census data (2000 dollars)



4. The Aggregate Value of Housing and Home Equity between 1984 and 2004

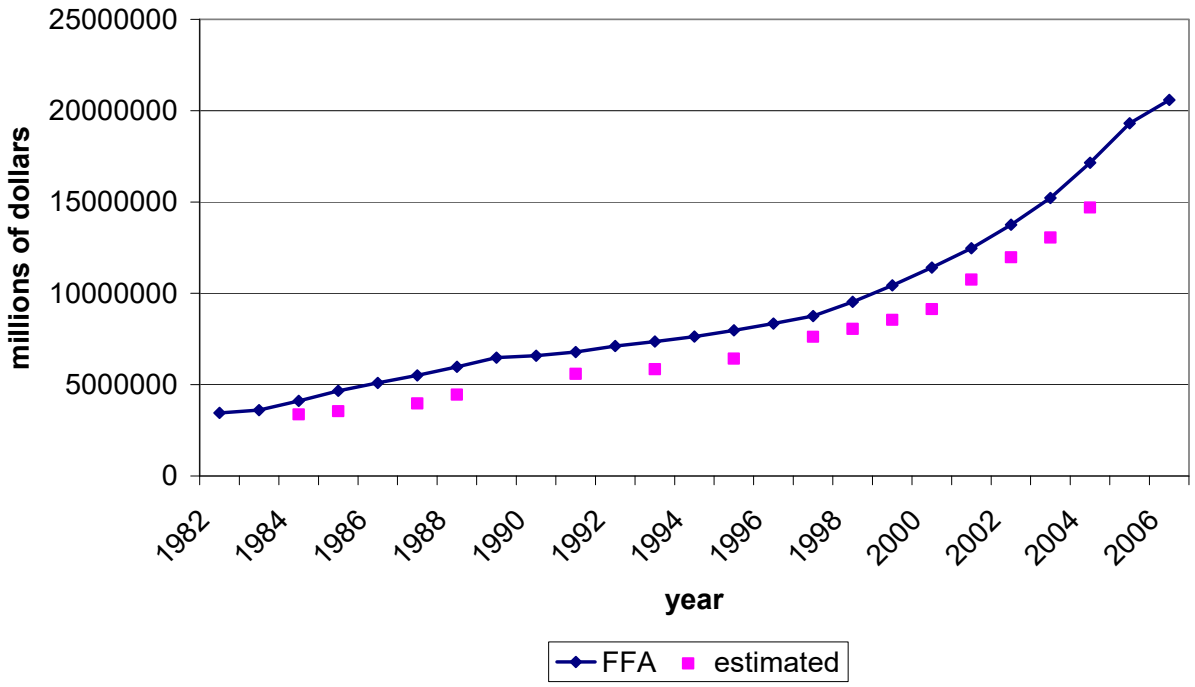
To check our results on home ownership and home values, we predict the aggregate value of housing based on our data and compare our estimates with Flow of Funds Accounts (FFA) aggregate data. We find a close correspondence between our estimates and the FFA aggregates. Our calculations for the 1984 to 2004 period are based on the observed pattern of home values and home ownership by age. We cannot assume, however, that the profile of home values by age will remain stable in the future. Thus we are not confident that the method we have used here could be used to make reliable projections for future years.

The data above show that the home value of owners increased substantially between 1984 and 2004 based on SIPP data. The increase between 1970 and 2000, based on Census data, was even greater. Now we want to consider the change in the aggregate value of housing between 1984 and 2006. To do this, we build upon the estimates produced in section 3. There we combined SIPP estimates of ownership by age in 2004 with population estimates for each year to obtain an estimate of the number of homes (or homeowners) for each year 1984 through 2006. Separate calculations were made for each gender and marital status group because these groups had different ownership profiles and because these groups experienced different rates of population growth over the period.

The next step is to assign housing values to the estimated population of owners in each year. Because housing values changed so much between 1984 and 2004 we use separate age-home value profiles for each year that they are available in the SIPP. These profiles are shown in Figure 3-1 through Figure 3-3 for two of the years, 1984 and 2004, but we have estimates for 15 of the 21 years between 1984 and 2004.

The results are displayed as square markers in Figure 4-1. For comparison we have also graphed the market value of household real estate from the Flow of Funds Accounts (FFA). The trends are strikingly similar for the two series, although our projections lie below the FFA estimates. This is likely the result of differences in coverage between the two series. The FFA data include several components (farm houses, second homes that are not rented, vacant homes for sale, and vacant land) that are not contained in our projections.

F4-1 Projected and actual aggregate value of owner-occupied homes



5. Home Value, Home Equity, and Household Wealth Between 1984 and 2004

Various commentators have suggested a range of different explanations for the nationwide increase in home values between 1984 and 2004. Glaeser, Gyourko, and Saks (2004) suggest that land use restrictions constraining the supply of housing in key markets has played a role in rising house prices. Green and Wachter (2007) point to major changes in the home finance system and falling mortgage rates that reduced the user cost of housing, which stimulated the demand for housing. Real incomes rose

over this period as well. These factors, and others, offset the downward effect of demographic pressures on house prices that Mankiw and Weil (1989) identified in their projections.

One potential explanation of rising house values is that they were the result of rising demand for housing assets, driven in turn by rising non-housing wealth. It is difficult to test this potential explanation for the observed pattern, since housing values and other asset values are simultaneously determined in general equilibrium. As a first step in considering this explanation for rising house values, one must explore the relationship between housing wealth and non-housing wealth. To do that, we begin by comparing wealth in 2004 with wealth in 1984, and the ratio of home values to wealth and the ratio of home equity to wealth in these two years. We show that wealth in 2004 was much higher then wealth in 1984. In addition, we show that both the ratio of housing value to wealth and the ratio of home equity to wealth were about the same in 2004 as in 1984. Differences between the two years were largely concentrated among young households. The ratio of mortgage debt to wealth was greater in 2004 than in 1984, essentially at all ages. We then consider the ratio of home value to wealth, the ratio of home equity to wealth, and the ratio of mortgage debt to wealth in each of the intervening years for which SIPP data are available between 1984 and 2004. We find in particular that the ratios vary with the stock market fluctuations over this period, although the ratio of home equity to wealth was essentially the same in 2004 as in 1984

Figure 5-1 shows that at each age mean total non-pension wealth, including housing equity, increased 1984 and 2004. Over all ages mean wealth increased 69.1 percent between 1984 and 2004 (in year 2000 dollars). Figure 5-2 shows that at each age non-pension wealth excluding home equity also increased between 1984 and 2004. Over all ages this measure of wealth increased 58.8 percent between 1984 and 2004.

We are particularly interested in the relationship between home values and home equity on the one hand and household wealth on the other. Figure 5-3 shows that the ratio of home value to wealth somewhat higher in 2004 than in 1984 at ages 40 and over, but was substantially higher in 2004 than in 1984 for younger ages. Figure 5-4 shows that the ratio of mean home mortgage to household wealth increased between 1984 and 2004 for all ages. Figure 5-5 shows that on balance the ratio of home equity to wealth was very similar in 1984 and 2004, except at ages 30 and younger. Thus due to an increase in mortgage levels, the ratio of home equity to wealth remained the same when the ratio of home values to wealth increased.

Figure 5-1. Mean total non-pension wealth (including housing equity) in 1984 and 2004 (in 2000 dollars)

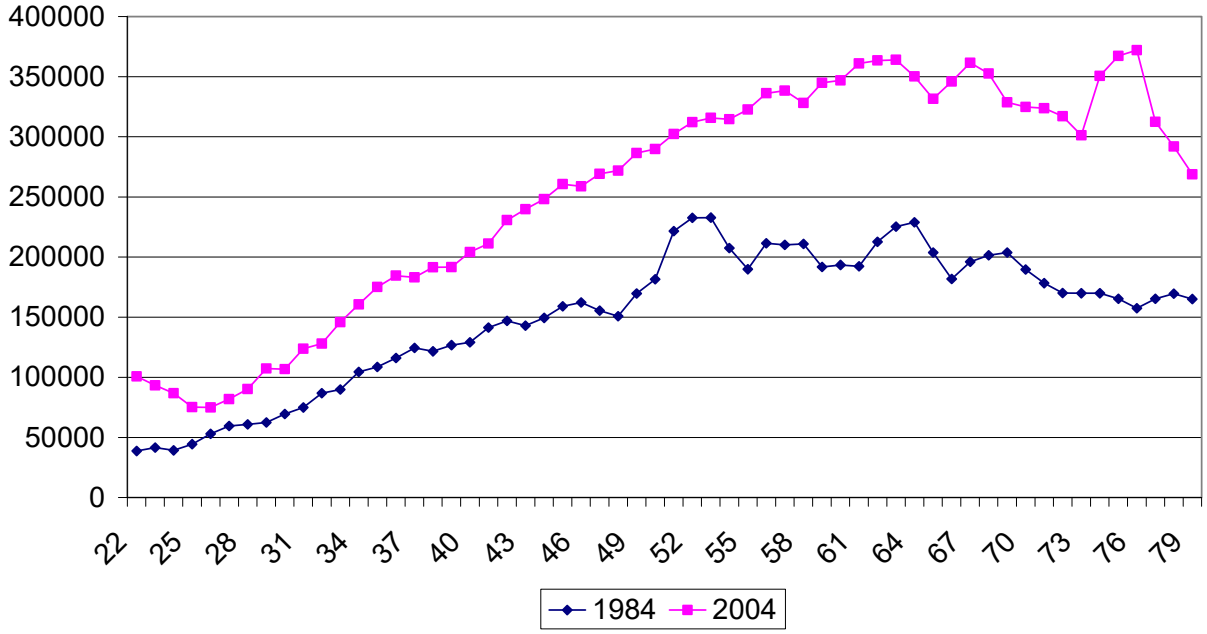


Figure 5-2. Mean total non-pension wealth (excluding housing equity) in 1984 and 2004 (in 2000 dollars)

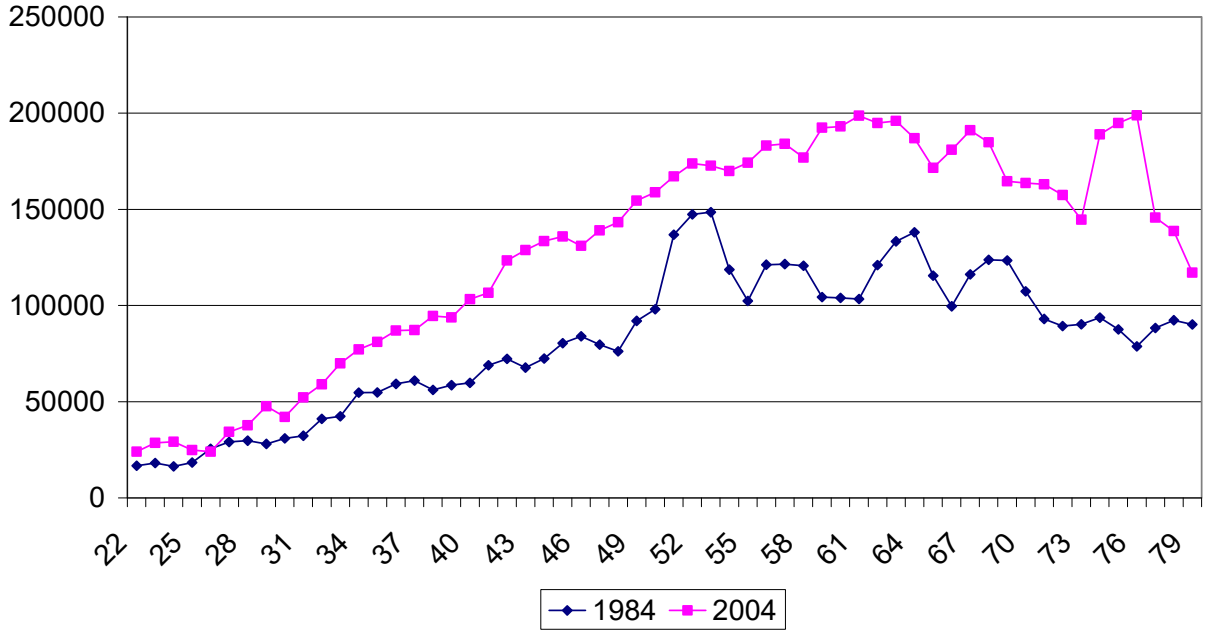


Figure 5-3. Ratio of house value to non-pension-wealth (excluding housing equity)

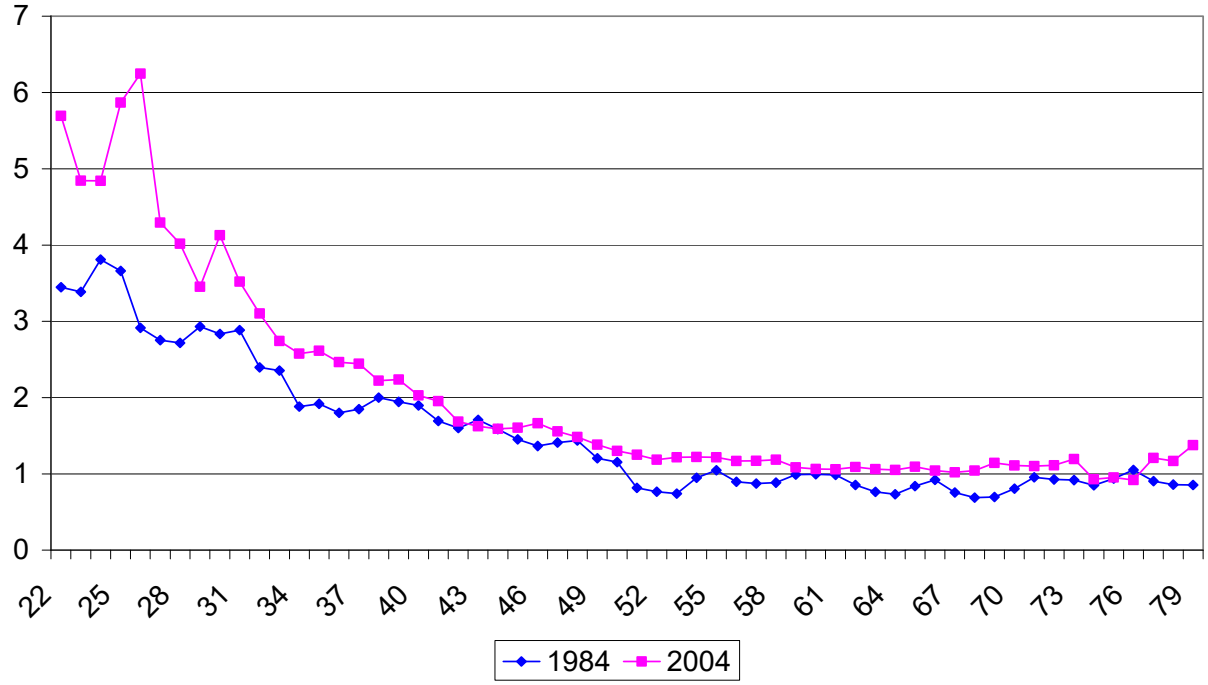


Figure 5-4. Ratio of mortgage debt to non-pension wealth (excluding housing equity)

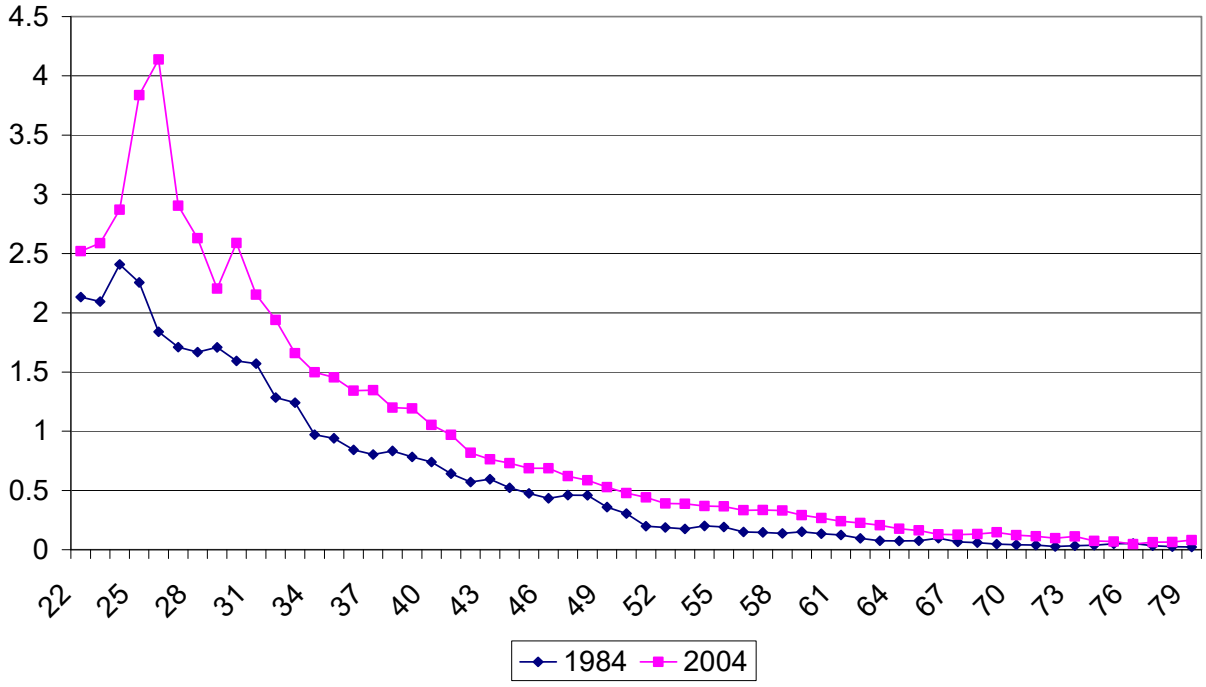
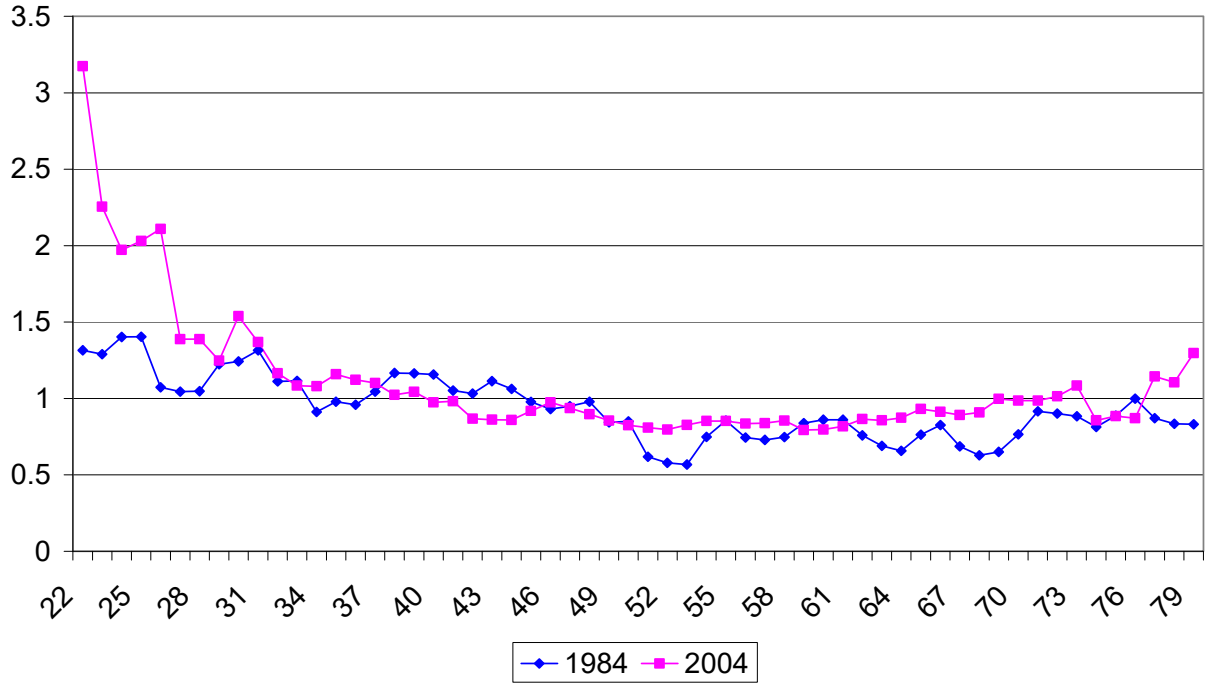


Figure 5-5. Ratio of home equity to non-pension wealth (excluding housing equity)



Although the ratio of home equity to wealth was about the same in 2004 as in 1984, except at younger ages, there were substantial changes in household wealth over the intervening years, as well as changes in the ratio of home equity to household wealth. To understand these changes, we consider household wealth and the ratios of home value, mortgage debt, and home equity to wealth for each of the years between 1984 and 2003. We consider the changes in each of these ratios for four geographic regions—mid-west, northeast, south and west. Figure 5-6 shows nominal non-housing wealth in each of the four regions. There was a substantial increase in all of the regions, especially beginning in 1995. On average there was about a three-fold increase in wealth over this period. The pattern of increase was essentially the same in each of the regions.

Figure 5-7 shows that the ratio of housing value to wealth varied over the period, with a dip about at the peak of the stock market bubble. Home values, however, were higher at the end than at the beginning of the period. Figure 5-8 shows that the ratio of mortgage debt to wealth increased over the period in all geographic regions. Figure 5-9 shows that the net effect was a ratio of home equity to wealth that was, on average, about the same in 2004 as in 1984. Like the ratio of home value to wealth, home equity also changed over intervening years, with a dip at about the peak of the stock market bubble.

Figure 5-6. Mean nominal non-housing wealth for owners, by region,1994 to 2004, SIPP

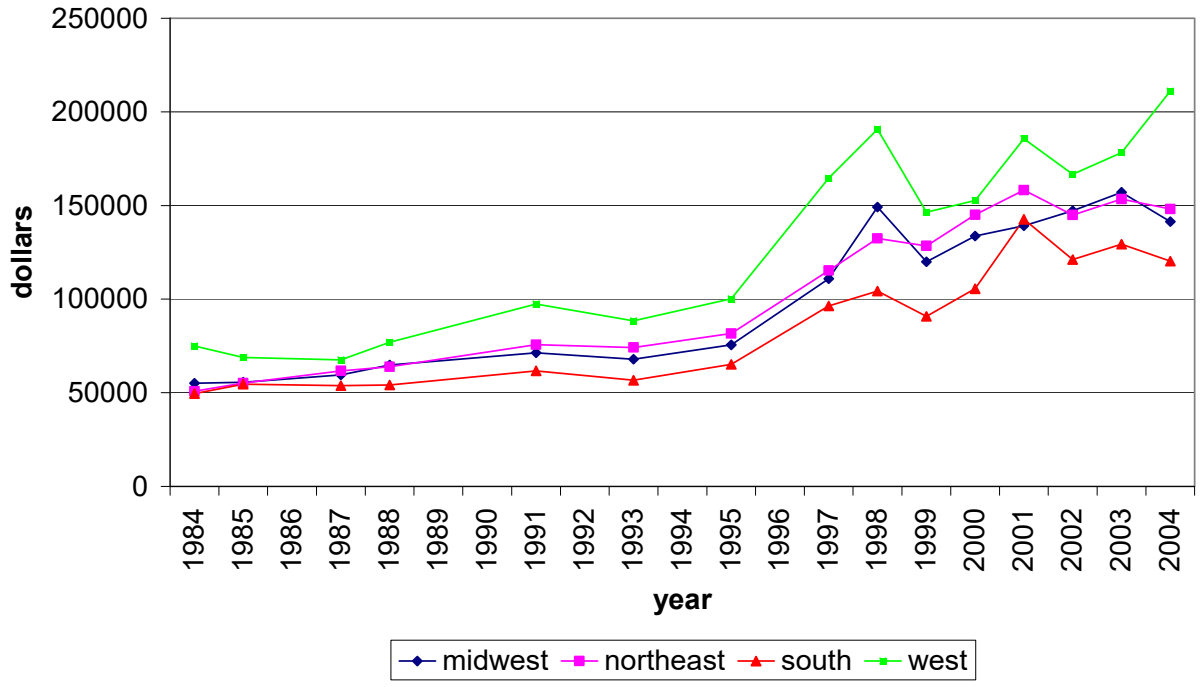


Figure 5-7. Ratio of home value to non-pension wealth for owners, by region, 1984 to 2004, SIPP

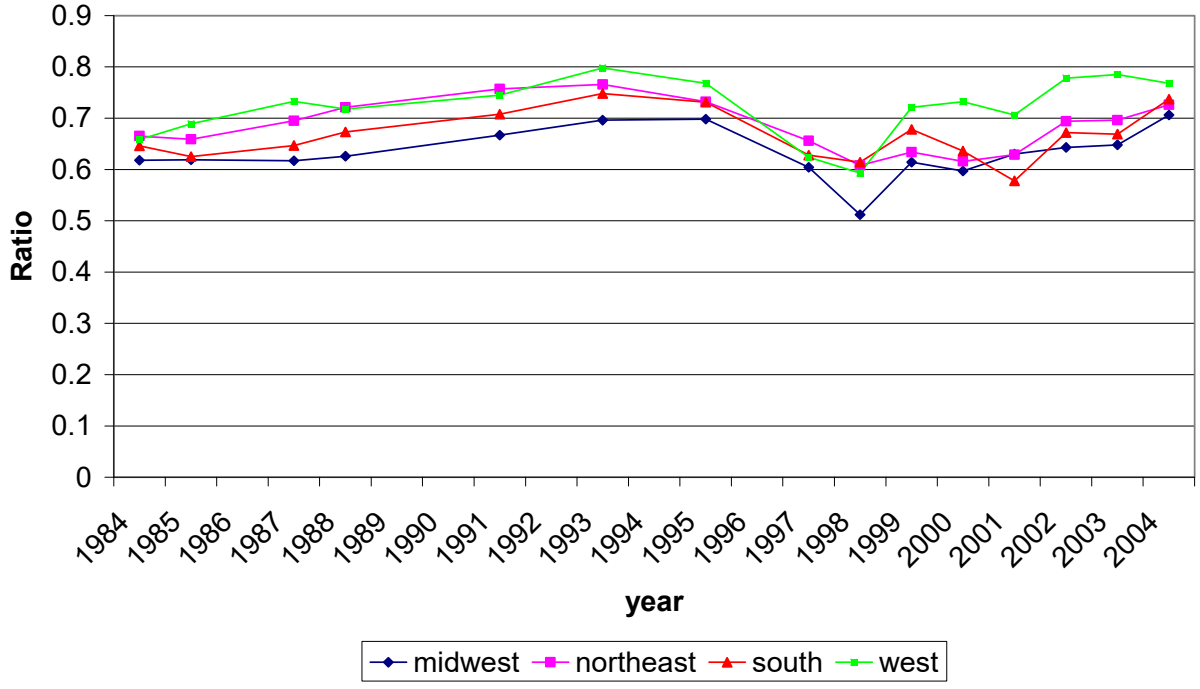


Figure 5-8. Ratio of mortgage debt to non-pension wealth for owners, by region, 1984 to 2004, SIPP

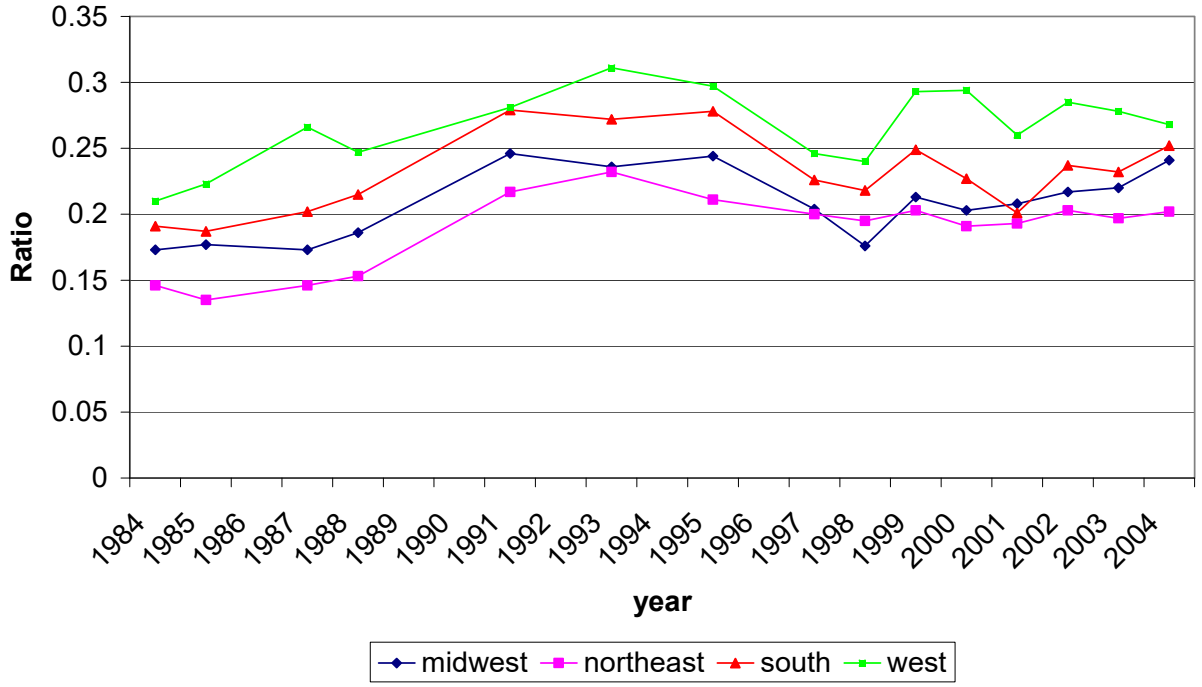


Figure 5-9. Ratio of housing equity to non-pension wealth for owners, by region, 1984 to 2004, SIPP

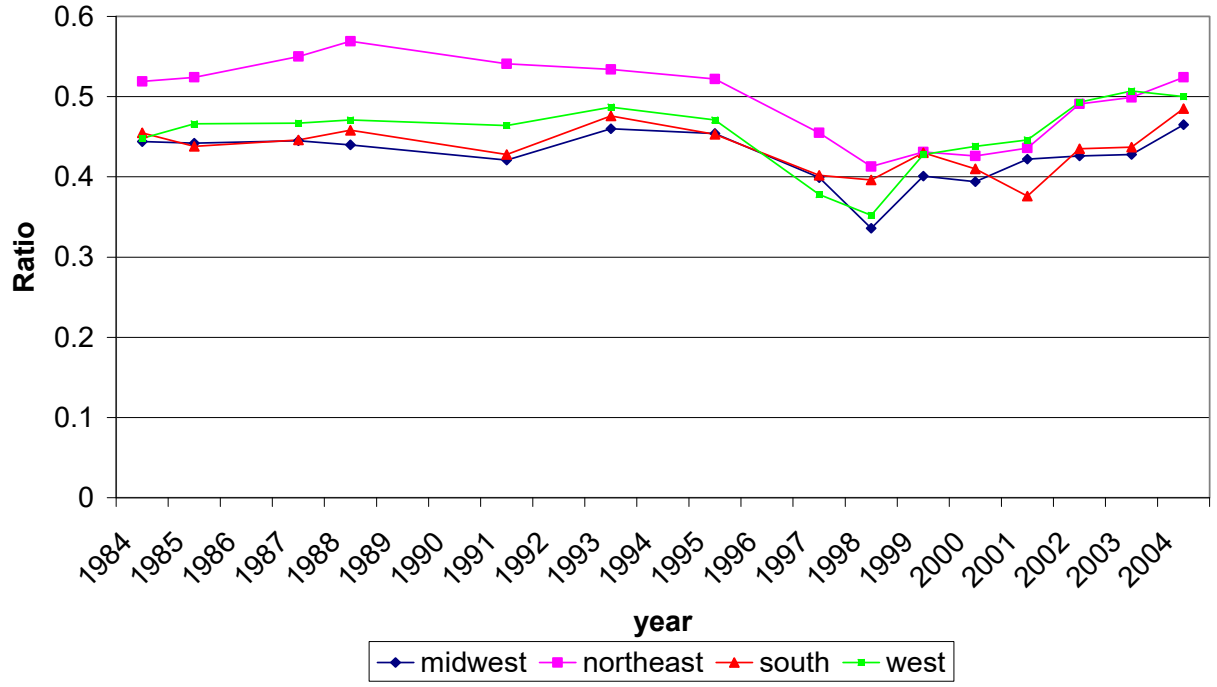


Figure 5-10. Ratio of home value, home equity, and mortgage debt to non-pension wealth for owners, all regions, 1984 to 2004, SIPP

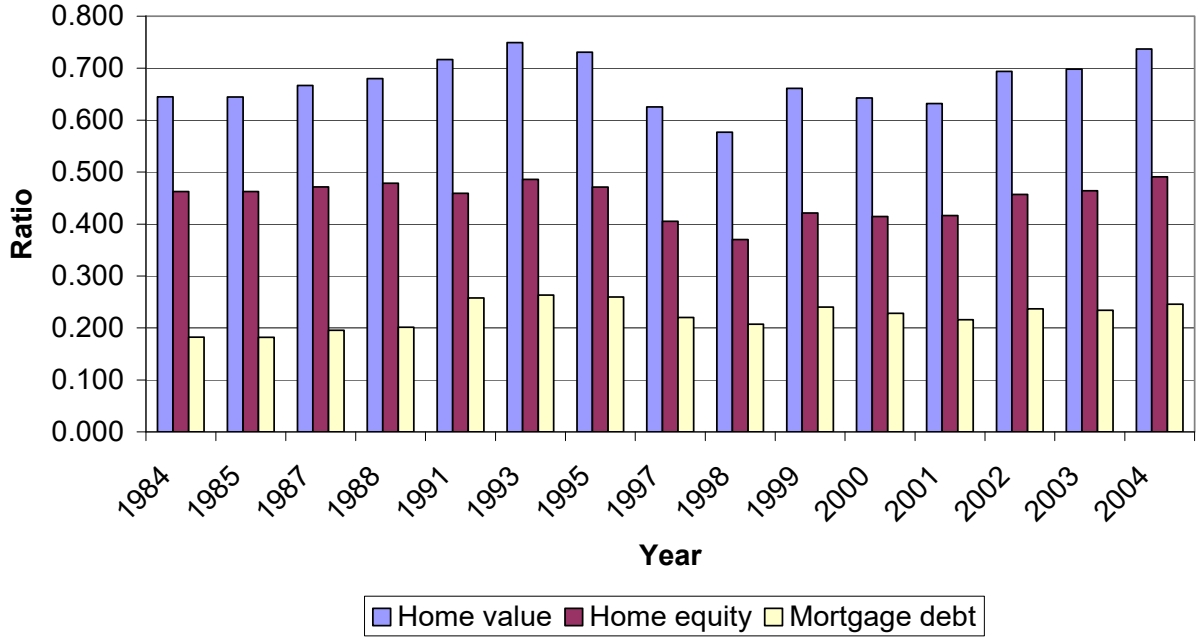


Figure 5-10 shows the ratios of home value, mortgage debt, and home equity to wealth for all regions combined. The combined data show the ratio of home value to wealth followed the wealth profile over the period, with a dip when stock market values reached their peak. The ratio of home value to wealth was somewhat higher in 2004 than in 1984. The ratio of mortgage debt to wealth, however, also increased substantially over the period, from 0.182 to 0.246, an increase of 35 percent. On net, the ratio of housing equity to wealth followed a pattern similar to the ratio of home value to wealth. But the ratio of home equity to wealth was essentially the same in 2004 as in 1984—0.462 versus 0.491.

Table 5-1 shows summary data, including these same ratios, for home owners aged 60 to 70. Total wealth, home value, and home equity all increased substantially between 1984 and 2004 (in 2000 dollars)—72.5 percent, 107 percent, and 91 percent respectively. Of the $147,355 increase in wealth, $102,222, about 69 percent, was accounted for by the increase in home values. Of the increase in home value $78,137, or 76 percent, was reflected in home equity and $24,085, or 26 percent was offset by an increase in mortgage debt.

These data bring to the fore the question of the balance between housing equity and the mortgage debt of future retirees. To explore this question further, we consider in the next section cohort data on home values, home equity, and mortgage debt. Then in section 7 we begin micro analysis of the relationship between wealth and other

household characteristic on the one hand and home value, home equity, and mortgage debt on the other hand.

Table 5-1. Means and percentage changes for all owners age 60 to 70, 1984 and 2004, in year 2000 dollars

Measure	1984	2004	% increase	Change
Total wealth	$203,343	$350,698	72.5	$147,355
House value	$95,661	$197,883	106.9	$102,222
Home equity	$86,032	$164,169	90.8	$78,137
Mortgage debt	$9,629	$33,714	250.1	$24,085
Ratio to wealth				
House value	0.470	0.564	19.9	0.094
Home equity	0.423	0.468	10.6	0.045
Mortgage debt	0.047	0.096	103.0	0.049
Ratio to home value				
Home equity	0.899	0.830	-7.8	-0.070
Mortgage debt	0.101	0.170	69.3	0.070

6. Cohort description of home values, home equity, and mortgage debt

The data description in the last section is based on changes in the cross section profiles of wealth, home values, mortgage debt, and home equity. Here we consider the cohort profiles of these same measures. These descriptions help to inform the possible financial implications of housing equity and housing debt for future retiree cohorts.

Figure 6-1 shows the increase in the mean home value of homeowners for selected cohorts. As described in Section 1, each cohort is observed in 15 of the years between 1984 and 2004. The figure presents profiles for cohorts attaining age 65 in 1970, 1980, 1990, 2000, 2010, 2020, 2030, and 2040. All values in this figure and subsequent figures have been converted to year 2000 dollars using the GDP implicit price deflator. The sharp acceleration in the rate of growth of real home values over the last eight years of data (beginning in about 1995) are common to all but the oldest cohorts and are largely year (time) effects. The vertical differences between the cohort profiles for prior years, however, represent "cohort effects." The combination of year effects and cohort effects leads to large difference in the home values of different cohorts at the same age. For example, the cohort retiring in 2010 had mean home value of $209,753 when observed at age 58 in 2004 and the cohort retiring in 1990 had only $106,745 when observed at the same age 20 years earlier. Without exception,

more recent cohorts (those retiring later) have substantially higher home value than earlier cohorts.

Mortgage debt also increased for successively younger cohorts, as shown in Figure 6-2. In this case, there are also substantial cohort effects—each successively younger cohort has more mortgage debt than the cohort ten years earlier. For older cohorts, mortgage debt fell as the cohort aged. Figure 6-3 shows home equity profiles for the same cohorts and reflects the net effect of the increase in home values and the increase in mortgage debt. As is the case with home value, younger cohorts have substantially more home equity at each age than older cohorts. In each of these figures, the vertical line at age 58 is intended to emphasize the large differences between home values, mortgage debt, and hoe equity at age 58, depending on the year in which the cohort attained age 58. The 2010 cohort (green markers) attained age 58 in 2004, the 2000 cohort (black markers) in 1994 and the 1990 cohort (blue markers) in 1984.

Over the 1984 to 2004 period the rate of growth of mortgage debt exceeded that of home value. As a consequence, successively younger cohorts have lower ratios of home equity to value, but higher ratios of mortgage debt to value, as shown in Figures 6-4 and 6-5 respectively. Within each cohort, the ratio of home equity to value increased with age. But there are also cohort effects. On balance, the ratio of home equity to home value is lower for each successively younger cohort. For all cohorts, the mortgage debt burden declines steadily with age. Again, though, there are some noticeable cohort effects.

Below we will consider in more detail the implications of the data in Figures 6-1 to 6-5. But for future reference, we also show here the relationship between household wealth and home equity. Figure 6-6 shows total wealth (home equity plus non-pension wealth) profiles for the same set of cohorts. The increase in wealth corresponding to the stock market run-up is evident. For example, households that attained age 58 in 2004 had much more wealth than households who attained age 58 in 1984 (in year 2000 dollars).

Home equity increased over the same period. It is striking that with very large increases in wealth, home values, and mortgage debt, the ratio of home equity to wealth was stable over the period. Indeed, there are essentially no cohort effects in the profile of home equity to wealth, as shown in Figure 6-7, to which we return below.

Figure 6-1. Mean house value for homeowners: eight selected cohorts identified by year cohort attains age 65

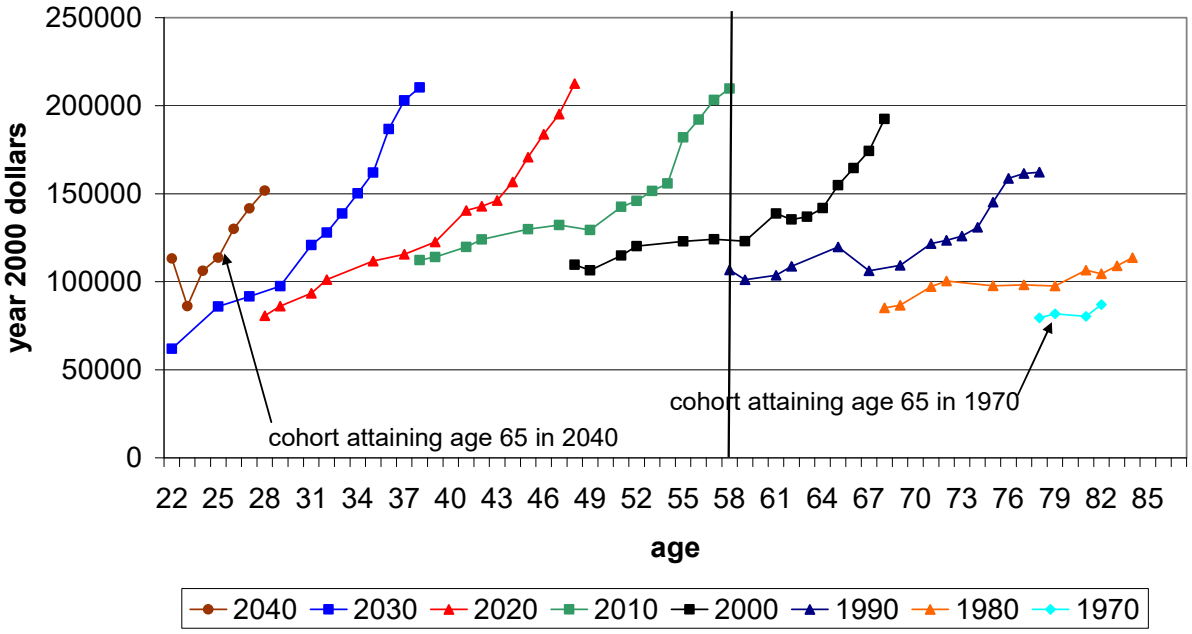


Figure 6-2. Mean home equity of homeowners: eight selected cohorts identified by year cohort attains age 65

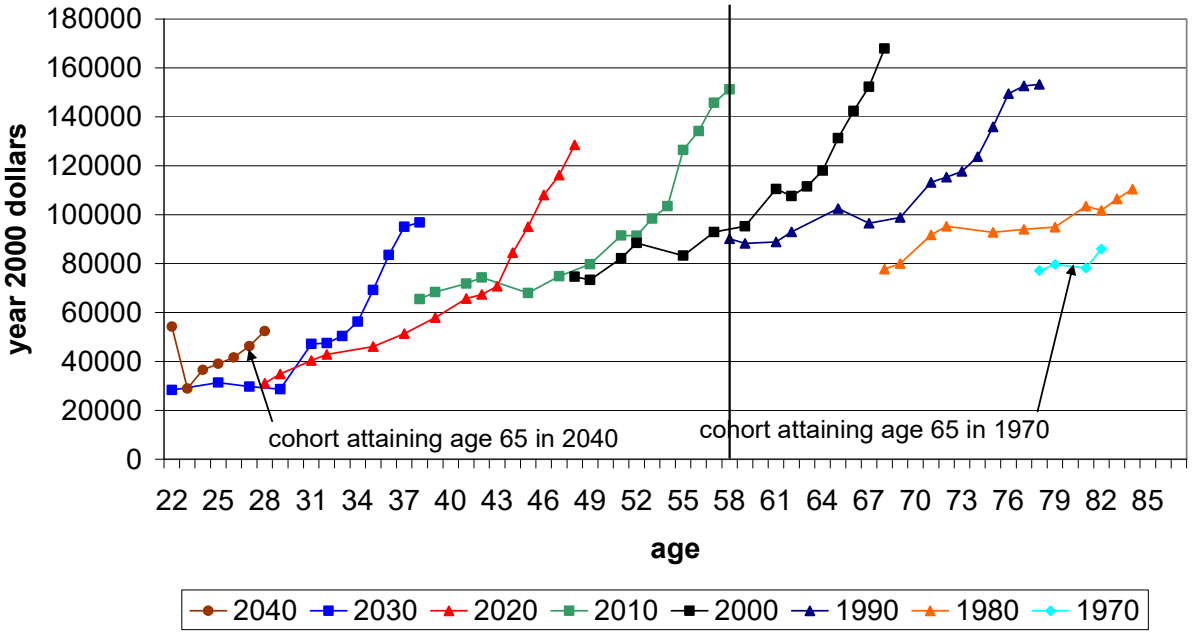


Figure 6-3. Mean mortgage debt for homeowners: eight selected cohorts identified by year members of cohort attain age 65

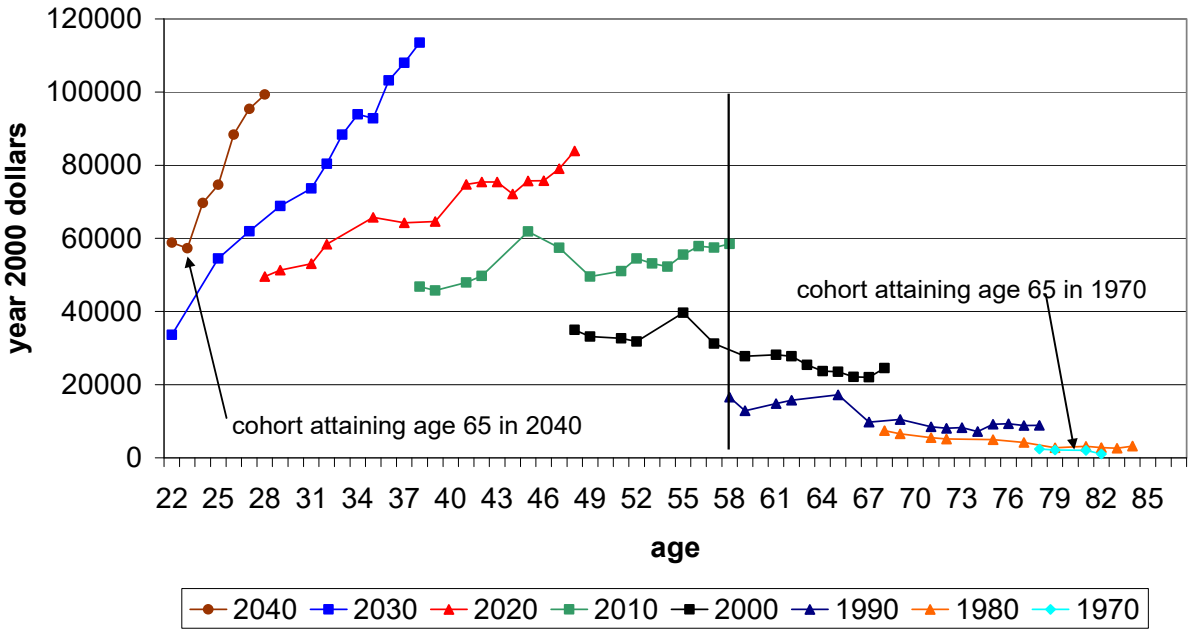


Figure 6-4. Home equity to house value ratio for homeowners: eight selected cohorts identified by year cohort attains age 65

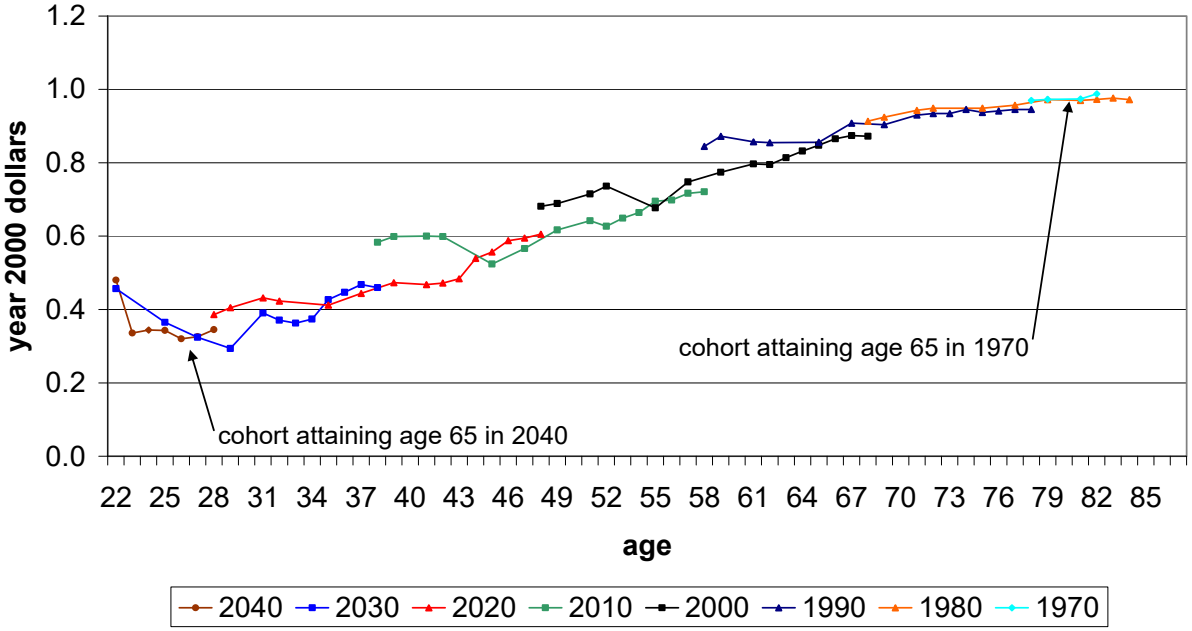


Figure 6-5. Mortgage debt to house value ratio for homeowners: eight selected cohorts identified by year cohort attains age 65

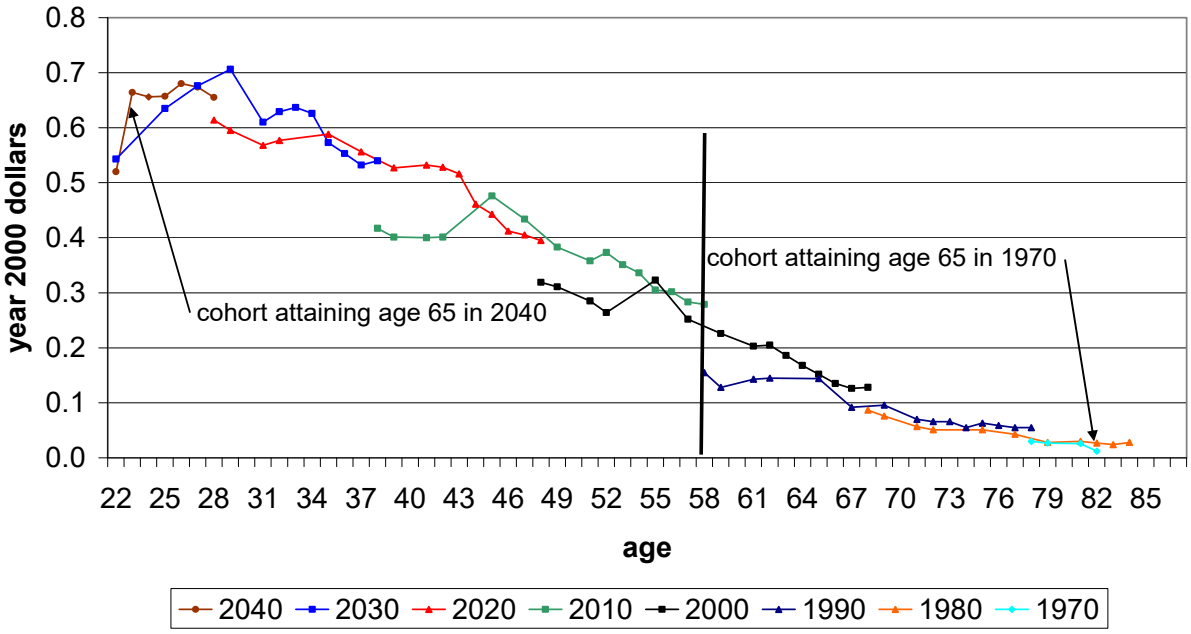


Figure 6-6. Mean total wealth of homeowners: eight selected cohorts identified by year cohort attains age 65

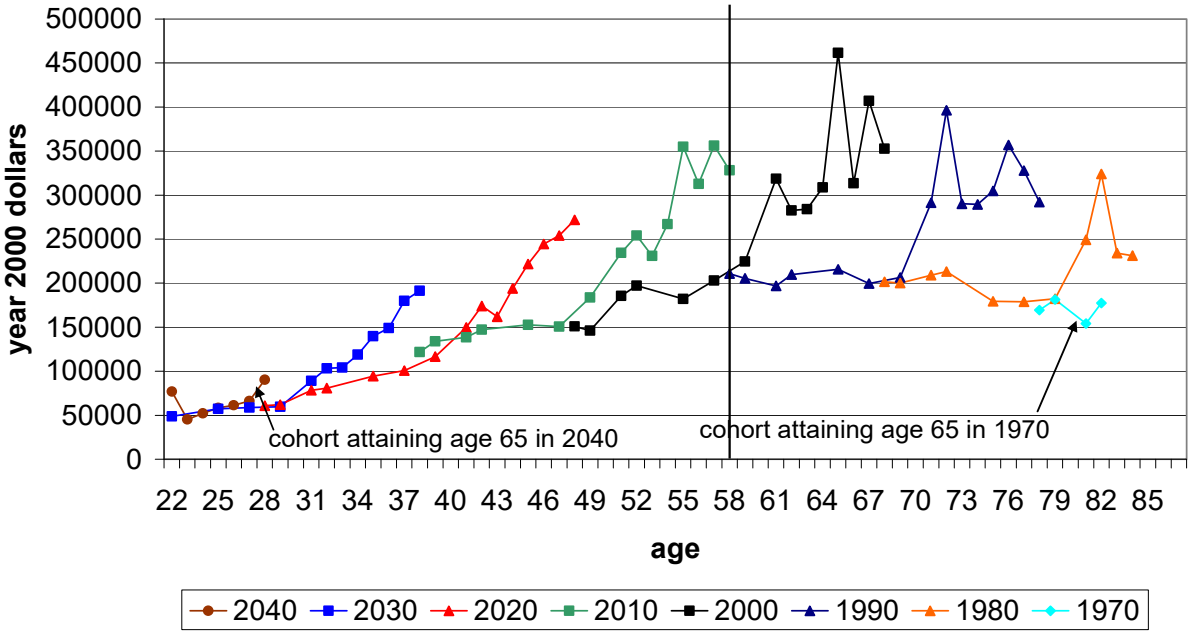
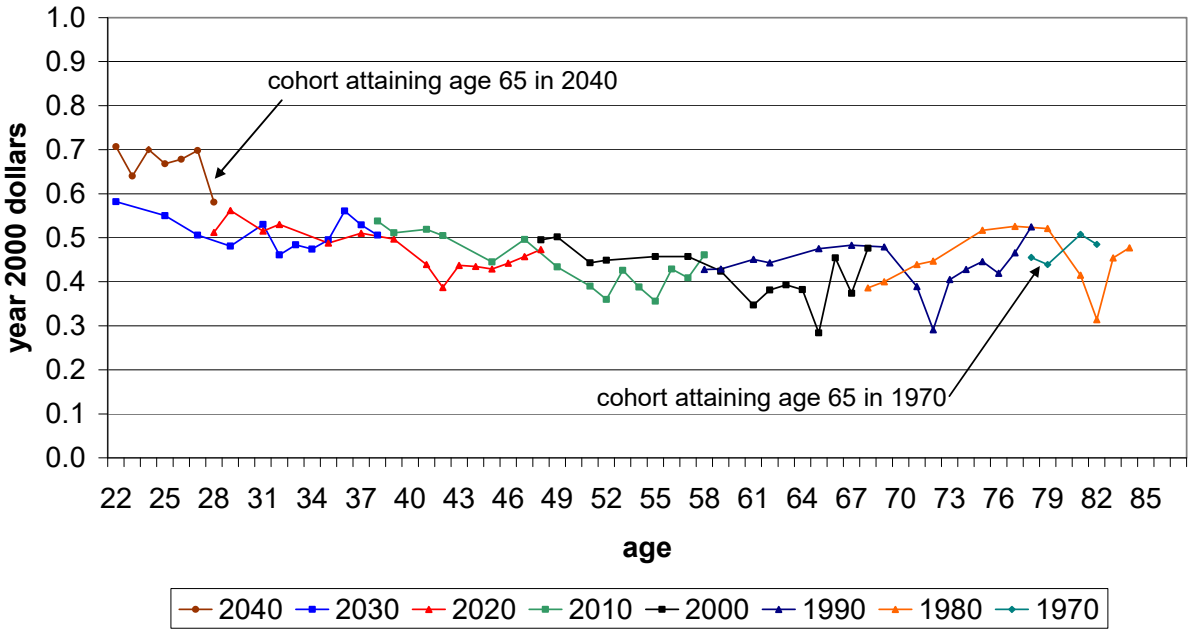


Figure 6-7. Home equity to wealth ratio for homeowners: eight selected cohorts identified by year cohort attains age 65



A critical question is what, if anything, the data in the foregoing figures imply for the home equity of persons who will retire in future years. To understand the implications of these trends we begin by examining data for persons who attained age 58 in different years. Figure 6-8 shows the average home value, the average equity, and the average mortgage debt at age 58 for the cohorts that attain age 58 between 1990 and 2010. Figure 6-9 shows the ratio of equity to home value and the ratio of mortgage debt to home value for these some cohorts. Average real home value nearly doubled over this period. But real home equity increased by only by a factor of 1.7. Real mortgage debt increased by a factor of 3.5. Thus as Figure 6-9 shows, the ratio of home equity to home value declined and the ratio of mortgage debt to value increased.

Fig 6-8. Housing value, home equity, and mortgage debt at age 58, by cohort (year attains age 65)

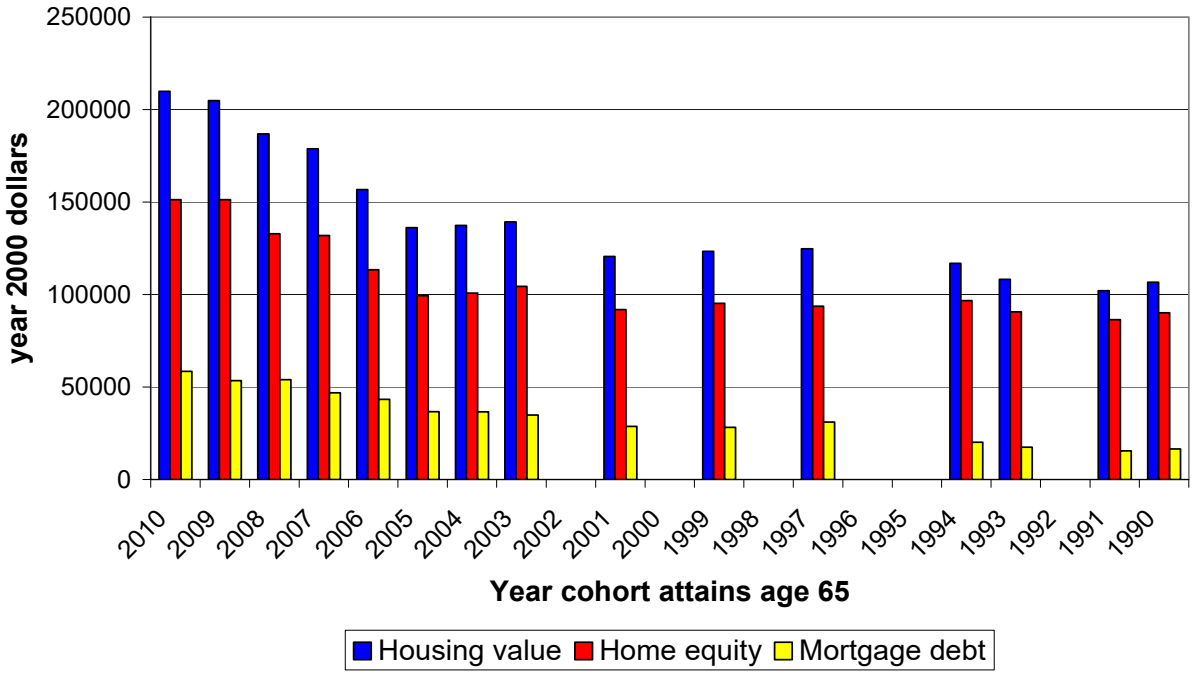
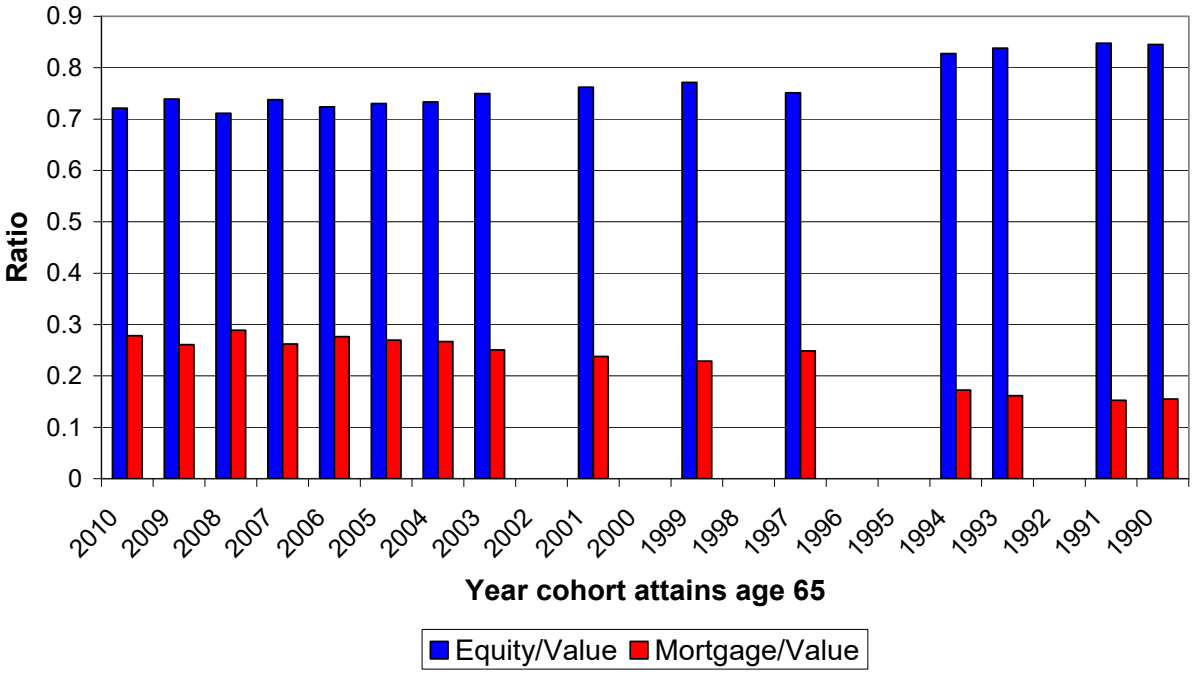


Fig 6-9. Ratio of home equity to value and ratio of mortgage debt to value at age 58, by cohort (year attains age 65)



To illustrate the potential implications of this change we consider in more detail the data at age 58 for the 1990, 2000, and 2010 cohorts. The top panel of Table 6-1 shows the average values for all members of the cohort. The subsequent panels show data for persons in the bottom quintile of the wealth distribution, those in the 3rd quintile and those in the 5th quintile of the wealth distribution. Moving from older to younger cohorts (left to right in the table), the decrease in the ratio of home equity to home value and the increase in the ratio of mortgage debt to home value are much more pronounced for poorer households than for the wealthier households.

Table 6-1. Home value, home equity, mortgage debt, and ratios of equity and mortgage debt to equity, at age 58 for three cohorts, attaining age 65 in 1990, 2000, and 2010. (year 2000 dollars)

Wealth quintile and measure	Cohort attaining age 65 in:		
	1990	2000	2010
All:			
Home value	106,745	122,029	209,753
Equity	90,173	93,546	151,277
Mortgage	16,571	28,483	58,476
Equity to value	0.845	0.767	0.721
Mortgage to value	0.155	0.233	0.279
1st Wealth quintile			
Home value	26,609	39,653	84,505
Equity	7,958	9,369	29,926
Mortgage	18,605	30,285	54,579
Equity to value	0.299	0.236	0.354
Mortgage to value	0.699	0.764	0.646
3rd Wealth quintile			
Home value	63,583	82,227	157,324
Equity	48,700	61,108	105,501
Mortgage	14,882	21,119	51,822
Equity to value	0.766	0.743	0.671
Mortgage to value	0.234	0.257	0.329
5th Wealth quintile			
Home value	151,425	192,977	360,396
Equity	131,075	155,111	289,253
Mortgage	20,349	37,811	71,142
Equity to value	0.866	0.804	0.803
Mortgage to value	0.134	0.196	0.197

To understand the implications of these changes, suppose that the home equity that households in each cohort have at age 58 is the home equity wealth that these households in these cohorts will have as they enter retirement. Then we consider the expected average level of home equity and, in particular, the distribution of likely levels of average home equity as these homeowners age and house prices change. Previous work, including Venti and Wise (1990, 2001, 2004), Megbolugbe, Sa-Aadu, and Shilling (1997), and Banks et. al. (2007) suggests that home equity tends to be saved for a "rainy day," and used when there is a shock to family status, such as the death of a spouse, entry into a nursing home, or the household faces large medical costs. Since home equity is the largest non-pension asset of a large fraction of households, we are interested in the level of home equity when the "rainy day" arrives.

We simulate the effect of house price changes on the distribution of home equity for households aged 58 to 83 that are members of the cohort retiring in 1990 and for households of the same age range in the cohort retiring in 2010. We begin with the historical distribution of changes in home values for each year from 1975 to 2006, based on the Office of Federal Housing Enterprise Oversight (OFHEO) house price index. For each cohort we assume the change in the mean house value observed at age 58 is uncertain. The possible price changes are determined by random draws (with replacement) from the historical distribution of price changes. Thus, for example, to simulate the distribution of home prices at age 63, we draw five values at random from the historical distribution of changes in home prices. From these five changes we calculate the average home price at age 63. We repeat this process 100,000 times to produce a distribution of home prices. We do this for 25 future ages—from 59 to 83. For each age, we calculate the expected home value. Home equity is obtained by subtracting mortgage debt from home value at each age. We assume that the mortgage debt observed at age 58 remains constant in nominal dollars as the household ages. This is a conservative assumption that will give us a lower bound on the growth in home equity as households age. More realistically, nominal mortgage debt will decline with age as households pay off their mortgages, although it is possible that some households will refinance their mortgage or take out home equity loans. Because we simulate price changes 100,000 times for each cohort we are able to obtain rather precise estimates of the low values in the tails of the distributions. We obtain the mean, median, and the percentiles of the simulated distribution of home equity.

Our illustrative simulated results begin with the average real home equity at age 58 for the 1990 cohort ($90,173) and the 2010 cohort ($151,277). Figure 6-10 shows expected home equity and the 5^{th} and the 95^{th} percentiles of the distribution of home equity for each age from 59 to 83 and for each retirement scenario (home equity at age 58 for the 2010 and 1990 cohorts). The figure also shows the actual values of home equity for the 2010 cohort for ages 55 to 58 (the values for years between age 38 and 58 are shown in Figure 6-2 above). The simulated future mean values for the 2010 cohort together with the 5^{th} and 95^{th} percentiles of the distribution are show by the fan-shaped array in blue. For example, at age 78, the mean is $265,431, the 5^{th} percentile is $200,711, and the 95^{th} percentile is $341,644.

For the 1990 cohort, we know realized home equity between age 58 and age 78. Nonetheless, as with the 2010 cohort, we begin with the value of home equity at 58 and then simulate the distribution of future home values, based on the method described above. The 5th and 95th percentiles are shown in the fan shaped array in red. For example, at age 78, the mean is $142,553, the 5th percentile is $109,616, and the 95th percentile is $181,338. Then at age 78 there is no overlap between the fifth percentile for the 2010 cohort ($200,711) and the 95th percentile for the 1990 cohort ($181,338). For this cohort we can compare the simulated distribution with the actual realized average value of home equity, shown by the green markers. The realized average lies within the 5th and the 95th percentiles of the simulated distribution, suggesting that the realized values were not unusual compared to values that would be predicted based on all price changes between 1975 and 2006.

Even at age 83, a household that enters retirement with the level of home equity observed for the 2010 cohort is unlikely to have less home equity at age 83 than a household that enters retirement with the level of home equity observed for the 1990 cohort. That is, the distribution of home equity under the 2010 average profile is far to the right of the distribution under the 1990 profile.

The data for the average of all households, however, do not reveal the large differences among households. To address this issue, we will in future work obtain distributions based on the profiles at age 78 of all households in the sample. Such a simulation will show equity at the tails of the distribution, especially the bottom tail. For now, we have divided households into total wealth quintiles where total wealth includes housing equity and all other non-pension wealth (including business equity and financial assets less debts). Then we obtain simulated results for the <u>average</u> of each quintile. Figures 6-11 to 6-13 show the simulations for the 1st, 3rd, and 5th quintiles respectively.

For households in the lowest wealth quintile, there is some overlap in the distributions of equity for households with the 1990 profile and households with the 2010 profile, especially at older ages. For households in the highest wealth quintile, however, there is essentially no overlap in the two distributions.

Figure 6-10. Predicted (5th percentile, mean, and 95th percentile) home equity using historical rates of return and assuming nominal mortgage debt constant

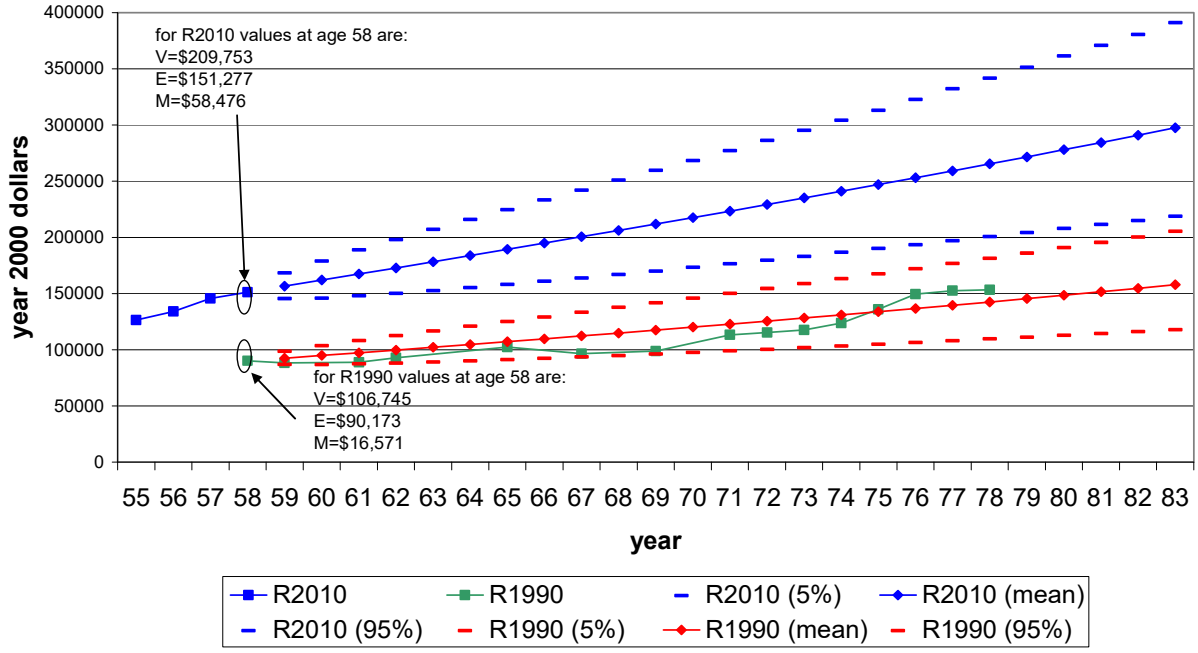


Figure 6-11. Predicted (5th percentile, mean, and 95th percentile) home equity using historical rates of return and assuming nominal mortgage debt constant, 1st quintile of the wealth distribution

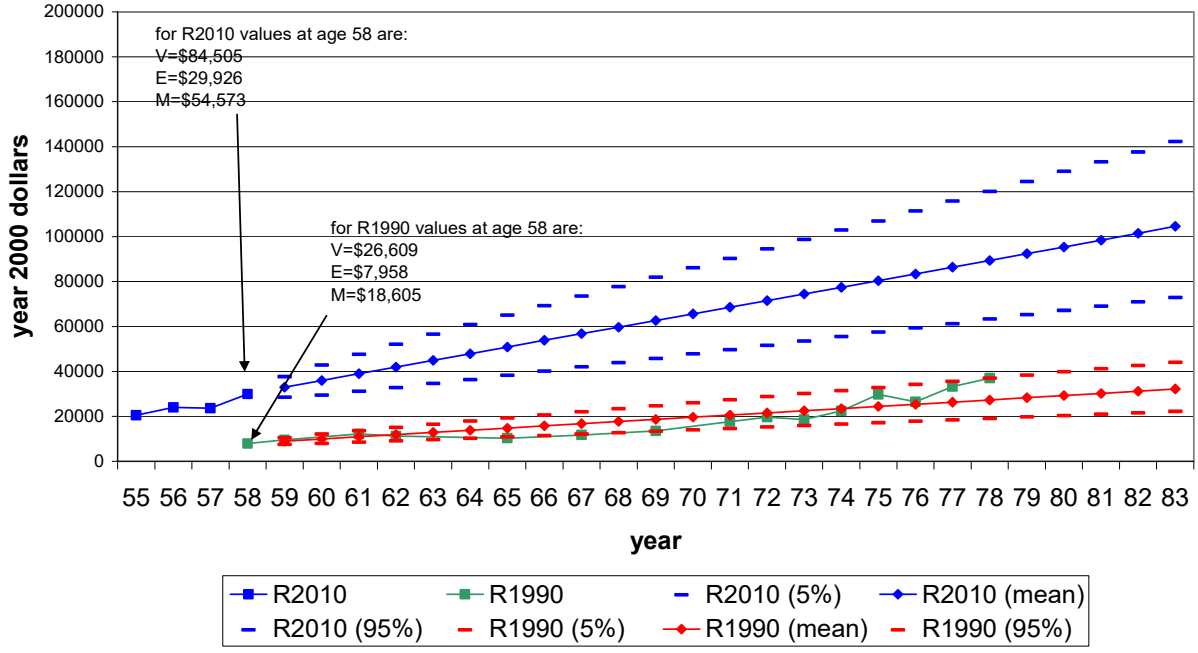


Figure 6-12. Predicted (5th percentile, mean, and 95th percentile) home equity using historical rates of return and assuming nominal mortgage debt constant, 3rd quintile of the wealth distribution

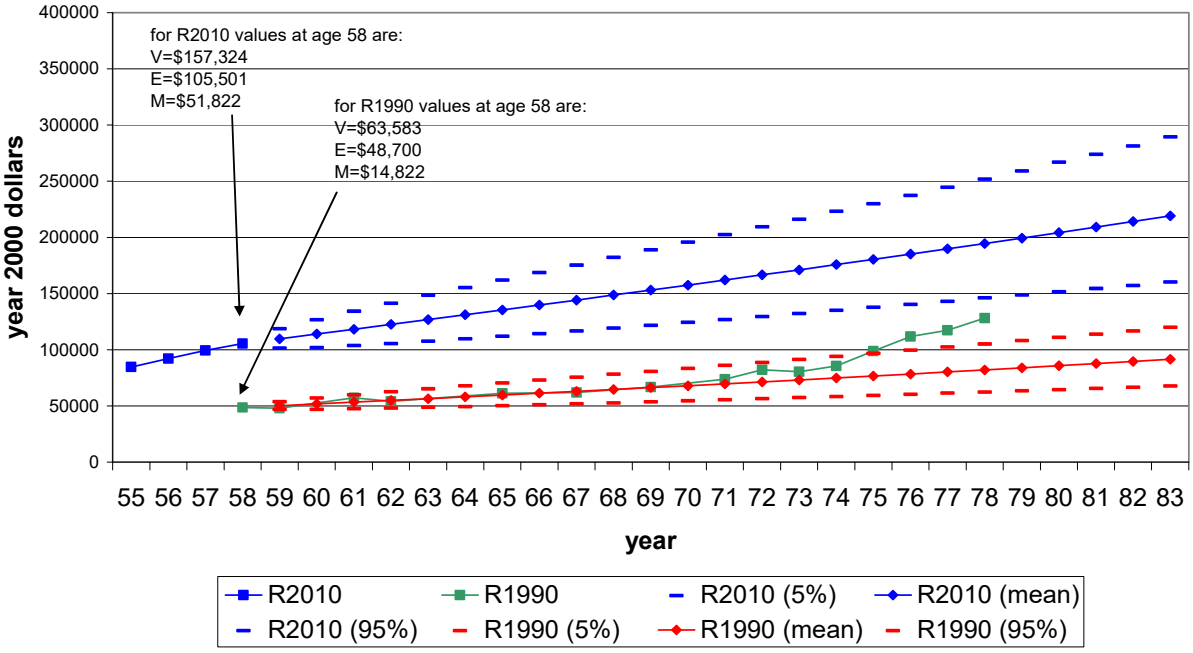
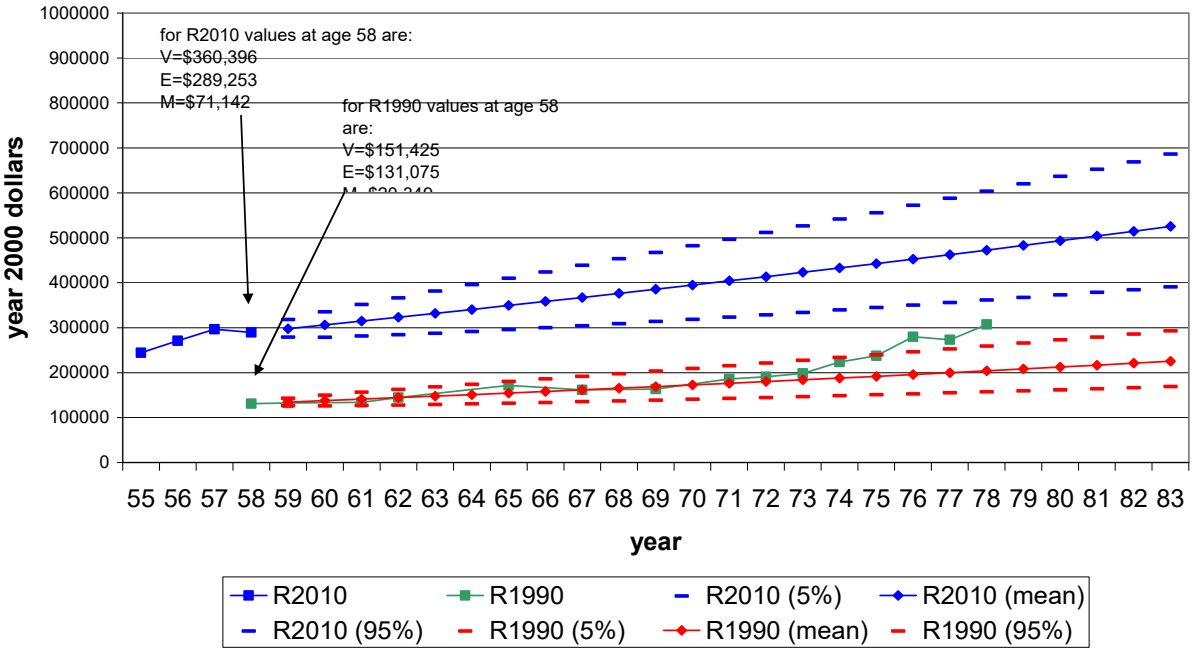


Figure 6-13. Predicted (5th percentile, mean, and 95th percentile) home equity using historical rates of return and assuming nominal mortgage debt constant, 5th quintile of the wealth distribution



The illustrations discussed in this section suggest that on average households that retire in the next several years will have more home equity than households that approached retirement age in 1990. Of course, as recent turmoil in the housing market has made clear there can be substantial changes in home values even in the short run. For example, suppose that between now (2006) and 2010, home prices and housing equity fell nationwide by 20 percent, with no other changes. Then we would predict that this "what if" 2010 cohort would have expected home equity of $212,345 at age 78 instead of $265,431 and the 5th percentile would be $160,569. In this case the 5th percentile of the 2010 cohort simulation would be substantially below the 95th percentile of the 1990 cohort simulation of $181,338. Under this scenario, there would be very large overlap between the distributions of the "what if" 2010 cohort and the 1990 cohort.

In addition, the illustrations in this section highlight the differences between the wealthiest and the least wealthy households. While the wealthiest households in the 2010 cohort are unlikely to have realized housing equity lower than the equity of the 1990 cohort, this is less true for the least wealthy households. But even these comparisons do not reveal the tails of the distributions that would be obtained if the simulations began the profile of each household and then simulated the distribution of home equity over all households in future years.

7. Further Evidence on the Consistency of the Ratio of Home Equity to Wealth

The cross-section data in section 5 suggest that non-housing wealth and home equity are strongly positively correlated. The cohort data in Figure 6-7 above shows that there are essentially no cohort effects in the ratio of home equity to wealth over a broad span of cohorts, attaining age 65 between 1970 and 2040. In this section we consider additional data on the relationship between housing equity and wealth. We then show some preliminary regression analyses to help to understand this regularity more fully.

Figure 7-1 shows the relationship of equity to wealth by wealth quintile. The figure also shows the average of the ratio over all quintiles. Two features of the figure stand out. One is that the fluctuation over time in the average is determined almost entirely by the fluctuation in the ratio for the fifth quintile. The households in the fifth wealth quintile hold the bulk of financial wealth. As stock wealth peaked in the late 1990s, the ratio of home equity to wealth declined. The second feature of the data is the quite modest fluctuation over time for households in the 2nd through 4th quintiles. Ratios for the first quintile show substantial fluctuation. The ratio is sensitive to non-housing wealth and many households in this quintile have little or no wealth other than housing equity.

Figure 7-2 shows several percentiles of the distribution of home equity. The 5th percentile was close to zero for all years between 1984 and 2004. The 50th percentile and the mean increased substantially over the period. The increase at the 95th percentile was especially large, over three-fold. The increase in home equity kept pace with the increase in wealth so that the ratio of equity to wealth showed little variation

over the 1984 to 2004 period. This is true for the 5th the 50th and the 95th percentiles, as well as the mean, as shown in Figure 7-3. Recall that the percentiles in this figure, as well as the mean, are based on the average of ratios and are thus not dollar weighted. The average in Figure 7-1 on the other hand is based on the ratio of means and thus the trend is affected by aggregate dollar values.

Finally, Figure 7-4 shows the age profile of the ratio of home equity to wealth for each year for which the SIPP data are available. The profiles for the individual years cannot be distinguished in the large amount of data. The point, however, is that although there is random variation across ages in a given year, the overall pattern of equity to wealth is very similar across the years between 1984 and 2003. Overall, the ratio is high at young ages, bottoms in the 50s, and then increases at older ages.

Figure 7-1. Ratio of home equity to wealth, by wealth quintile--ratio of means

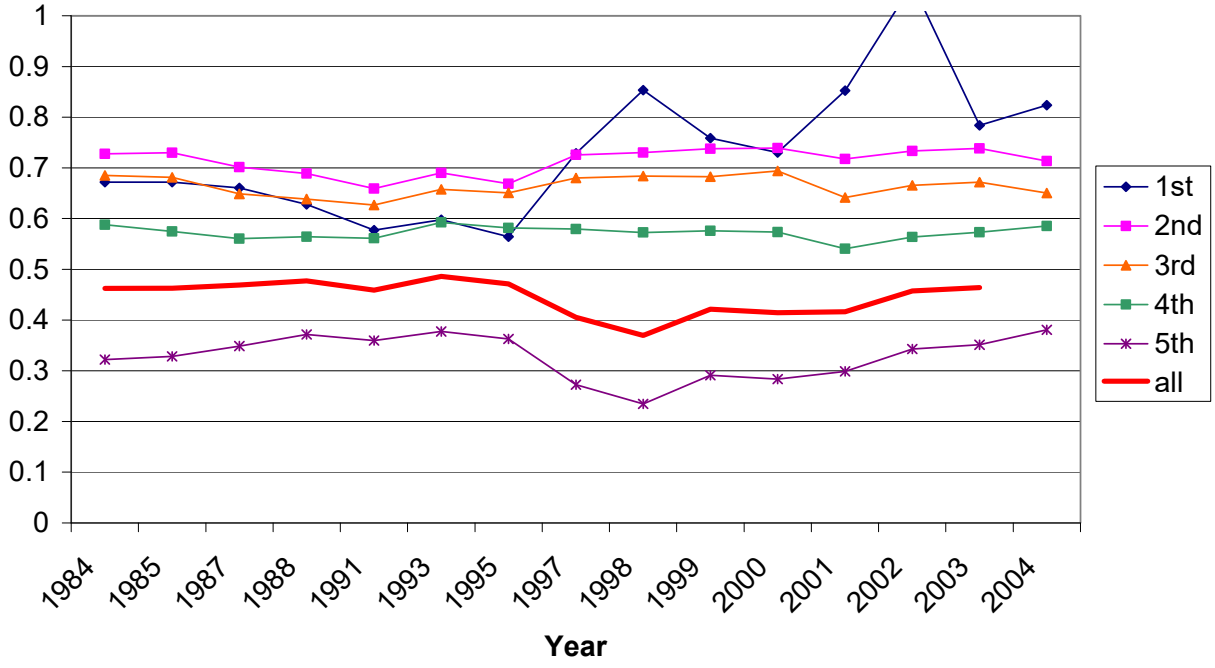


Figure 7-2. Percentiles of home equity by year--in 2000 dollars

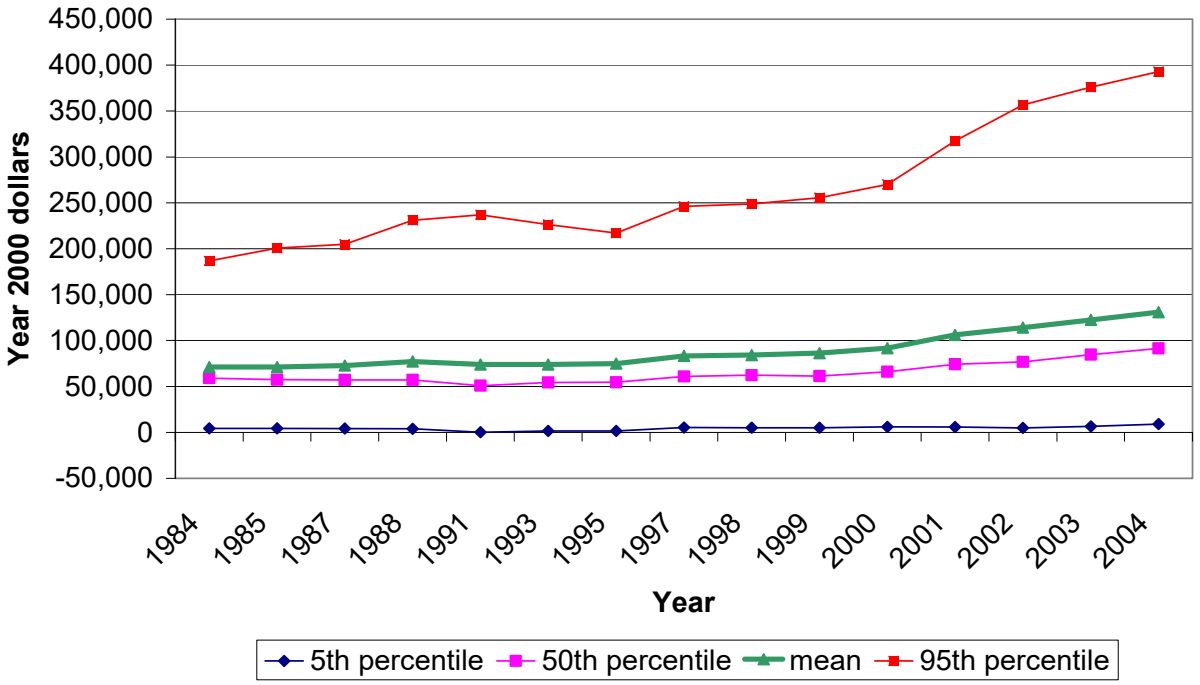


Figure 7-3. Percentiles of the ratio of home equity to wealth, by year (mean is mean of retios)

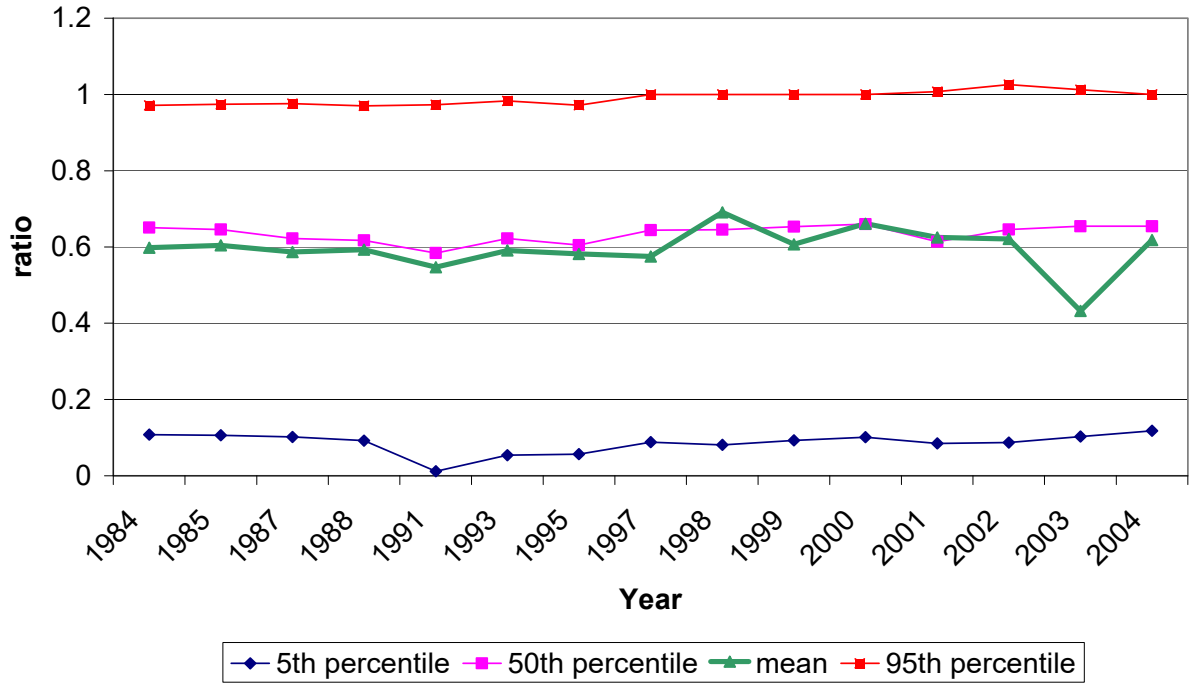
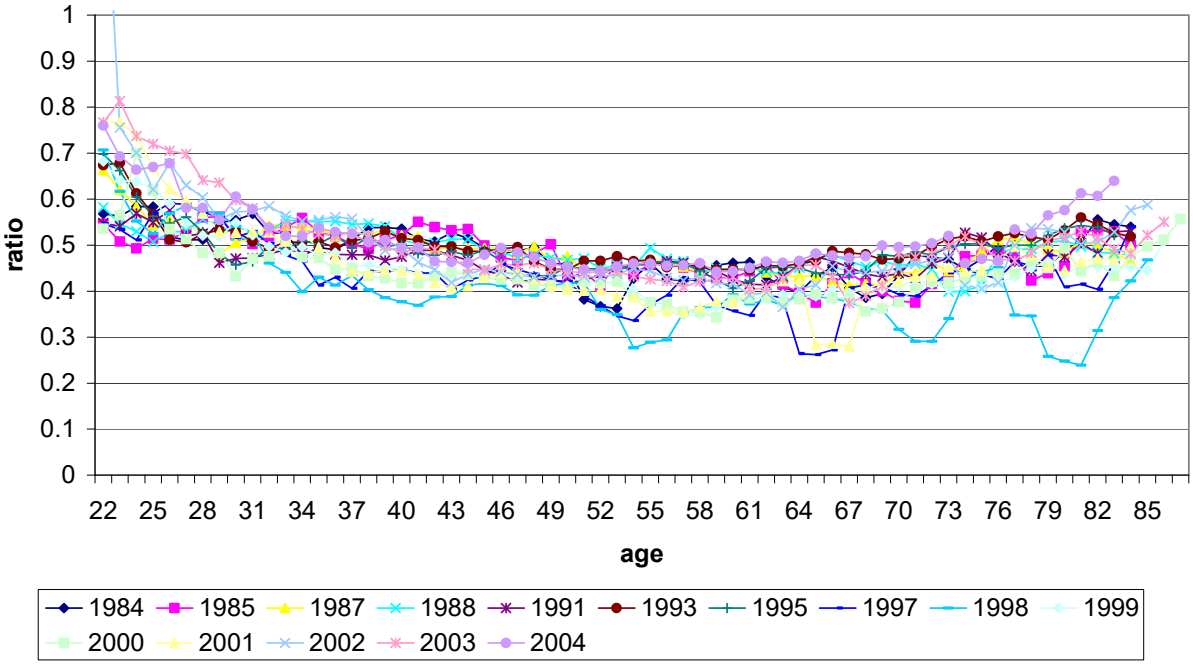


Figure 7-4. Ratio of home equity to wealth by age and by year (ratios of means)



To explore whether forecasts of future non-housing wealth might be used to speculate about future trends in home equity, we present some simple regression summaries of the relationship. Suppose that there is on average some "desired" proportion of wealth allocated to housing, and it remains the same over time. If this were true, there would likely be deviations from the "desired" proportion when there are abrupt changes in non-housing wealth or when there are house price shocks affecting a particular household. Housing wealth for a household could only be adjusted with a lag to changes in total wealth. For the aggregate economy, house prices can change to quickly restore equilibrium in the face of economy-wide shocks.

Suppose that we assume that a desired proportion of wealth is allocated to housing, but assume also that there will be deviations from the desired proportion of wealth in housing if there are changes in non-housing wealth. (There are of course several ways to adjust housing wealth. A household can move to a new home with a different value and a different mortgage. In addition, the household can refinance the mortgage on the existing home or take out a home equity loan on the existing house, both of which have become common in recent years.) For the time being, however, we are interested in the extent to which an empirical regularity exists, rather than trying to understand the portfolio behavior that would result in a desired proportion of wealth allocated to housing.

More formally, suppose we consider the proportion of wealth that is in housing. Again, we have in mind—for the moment at least—just an empirical regularity and not efficient asset allocation. Let's say we have a relationship of form:

$$E_{it} = \left[f(X_i) \right] \cdot W_{it} + \varepsilon_{it}$$

where E_{it} is the housing equity of person i in year t, W is "total wealth"—housing equity plus other non-pension wealth—and X is a vector of personal attributes. We begin with a simple ANOVA specification of the form:

$$E_i = \left[c + \alpha_{ai} + \gamma_{wi} + \delta_{yi} \right] \cdot W_i + \varepsilon_i$$

where c is a constant term, the α_a are age effects, the γ_w are wealth effects (indicated by wealth quintiles), and the δ_y are income effects (indicated by income quintiles). The estimated specification also includes family type effects (couple, single male, and single female) and the number of children. We have not yet incorporated state-level data on mortgage rates and house price changes, which may also affect the desired share of wealth allocated to housing. The α, γ, and δ effects in the equation above are normalized by setting the sum of each of the effects equal to zero. Thus the estimated effects should be interpreted as deviations from the estimated value of c, the mean of the ratio of E to W over the whole sample.

We estimate this specification for each of the years between 1984 and 2004 for which the SIPP collected housing data. The key result is in Figures 7-5, which shows the estimated overall average equity to wealth ratio in each year. The average is close to 0.60 in each year, which corresponds very closely to the mean and 50th percentile shown in Figure 7-3. The values in Figure 7-3 and the estimates in Figure 7-5 are means of proportions (or ratios). Although the overall average equity to wealth ratio is essentially the same over the entire period, there is some variation over time for households in given wealth and income categories, especially high wealth households. For example, Figure 7-6 shows the estimated ratios of equity to wealth for households in the 5th wealth and 5th income quintiles and households in the 3rd wealth and the 3rd income quintiles. Perhaps most noticeable is the pattern of equity to wealth ratios for households in the 5th quintiles. The bulk of stock market equity is held by households in these quintiles. With the run-up in the stock market in the late 1990s, the ratio of equity to wealth declined in this quintile and then increased as the stock market declined. There is some variation over time for households in the 3rd quintiles as well, but the relative fluctuations from year to year are much less than for the wealthiest households. In addition, there seems to be little correspondence between the ratio for these households and trends in the stock market.

Figure 7-5. Estimated overall average equity to wealth ratio, by year

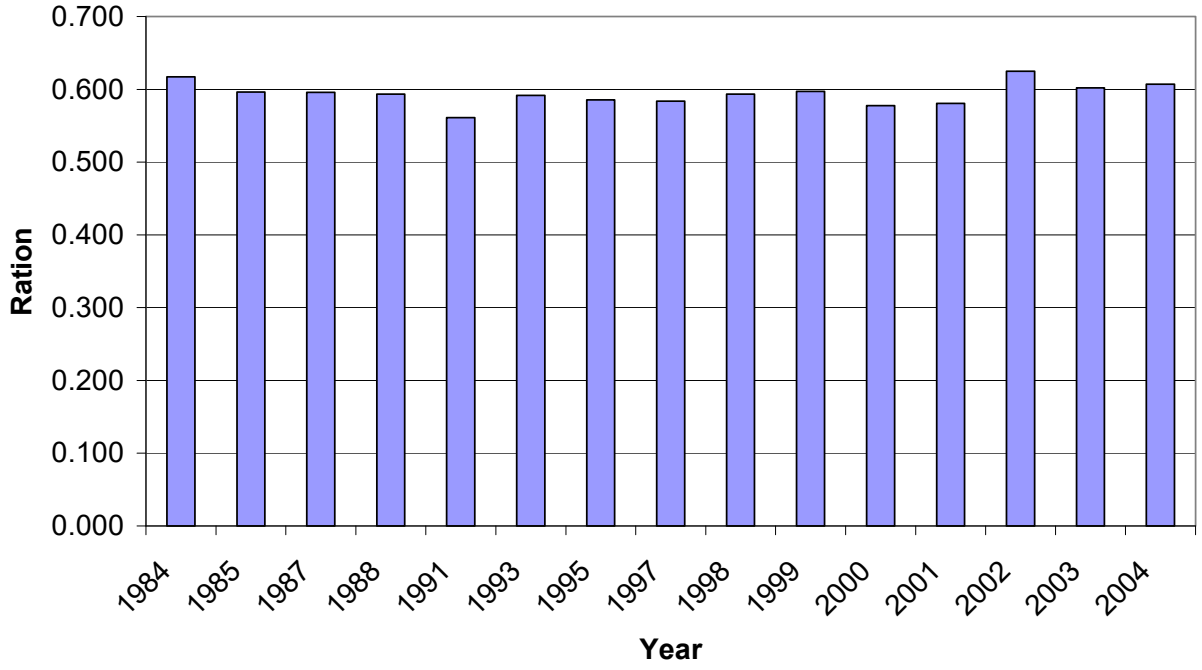
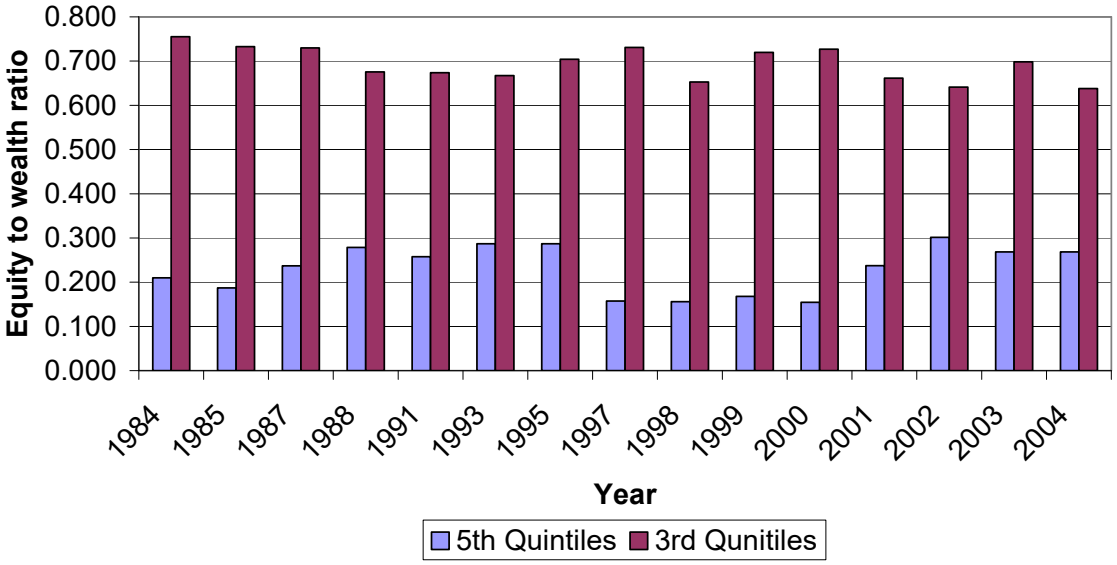


Table 7-6. Estimated equity to wealth ratio for households in the 5th wealth and the 5th income quintiles, and in the 3rd wealth and the 3rd income quintiles, by year



These initial results do not account for differences in mortgage rates and difference in home price changes across states, which we will account for in future work. We will also undertake additional analyses based on cohort data instead of variation among cross-sections.

8. Summary and Future Work

Housing equity accounts for a large share of the non-pension assets for a large fraction of retirees. We considered first how home ownership, housing equity and housing value have changed in recent decades and, in particular, now housing equity changed near retirement age. We find that the age profile of home ownership rates has been stable over the past two decades. This suggests that the prediction of the effect of demographic trends on the *number* of owned homes can be made with some confidence. On the other hand, there have been very large increases in *value* of owned homes and home equity over the past two or three decades. Thus attempts to forecast the future value of homes based on the past age profile of home values can easily miss the mark.

We examined cohort data on home value, mortgage debt, and equity for cohorts attaining age 65 between the late 1970s and 2040. For illustration, we considered the home equity of cohorts approaching retirement over the past 20 years. Based on simulated projections of the distribution of home values for 25 years after retirement age, we compared the likely home equity of past retirees with the home equity of those who will retire in the near future. Even though recent retirees have more mortgage debt than past retirees, they are also likely to have more home equity at older ages than past retirees had. We emphasize that a significant fall in home prices could reduce substantially the home equity of near-term retirees.

Finally, we considered the correlation between home equity and non-housing wealth in both cross-sectional and cohort data. We find a strong empirical regularity over time in the ratio of home equity to non-pension wealth. The average of the ratio of equity to wealth over all households was essentially the same over the 1984 to 2004 period. There was, however, some variation within household wealth and income categories, especially the wealthiest household. This was also a period during which the rate of increase in the number of homes was increasing but at a declining rate. In addition, we find that data for cohorts attaining age 65 between the late 1960s and 2040 show very limited cohort effects with respect to the ratio of equity to wealth. One interpretation of these two facts is that the increase in household wealth over the period led to an increase in the dollar value of resources allocated to housing and this wealth-induced demand offset the declining rate of increase of the demand for new homes that was associated with demographic change and that might otherwise have led to a decline in home values and thus in housing equity. This empirical regularity leads us to consider whether projections of the home equity of future retirees might be based on forecasts of the wealth of future households. Our interest is whether the risk of a fall in home equity presents a substantial threat to the financial well-being of future retirees.

The analysis in this paper raises several questions for future work. The illustrative simulations we presented to show the distribution of home equity in the years following retirement show only the distribution of average home equity for all households or for households grouped by wealth quintile. In future work we will want to undertake simulations that are based on the equity near retirement of all households. This is a way of understanding the effects over very heterogeneous households.

In related work, we dealt with the accumulation of 401(k)-like assets through 2040. We concluded that that the accumulated pension wealth of persons age 65 in 2040 would likely be much larger than the pension wealth of persons retiring now. We also concluded that that aggregate pension assets in the economy would increase several fold between now and 2040. Given the accumulation of these retirement assets, how might the build-up of home equity and mortgage debt affect overall financial well-being of future retirees? We will want also to address this question, recognizing the correlation between price movement in housing and returns and stock and bond returns.

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