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Abstract: This paper documents the trends in the life-cycle profiles of net worth and housing equity between 1983 and 2004. The net worth of older households significantly increased during the housing boom of recent years. However, net worth grew by more than housing equity, in part because other assets also appreciated at the same time. Moreover, the younger elderly offset rising house prices by increasing their housing debt, and used some of the proceeds to invest in other assets. We also consider how much of their housing equity older households can actually tap, using reverse mortgages. This fraction is lower at younger ages, such that young retirees can consume less than half of their housing equity. These results imply that ‘consumable’ net worth is smaller than standard calculations of net worth.

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Between 2000 and 2005, real house prices grew by about 40 percent on average and by as much as 100 percent in some metropolitan areas. This rapid growth has renewed interest in identifying the role that housing equity plays in the net worth of retirees, and how much of their housing equity retirees can tap to fund non-housing consumption.

In this paper, we document how the evolution of house prices since 1983 has affected the life-cycle profile of net worth, and estimate how much of the growth of housing equity is actually available for non-housing consumption. Our analysis focuses on the trends for households nearing retirement age and older. In the first part of the paper, using the Survey of Consumer Finances (SCF), a nationally-representative survey with detailed information on asset and debt holdings, we find that the net worth of retirement-age households rose significantly in the early part of this decade, tracking trends in house prices. However, while housing equity also rose, it did not grow as much as net worth. In part, this occurred because non-housing assets appreciated at the same time as housing. In addition, it appears that younger elderly increased their housing debt to offset some of the rise in house values and invested some of the proceeds from the debt in other assets.

In the second part of the paper, we consider how much of households' housing equity is available for non-housing consumption without moving. Many elderly are reluctant to move, and even if they do move they might not want to downsize.¹ However, the elderly can borrow

¹ The baseline of no-moving (constant housing consumption) is not only conceptually attractive, it also appears to be realistic. Households rarely tap housing equity by moving and, when they do, it appears to be largely in response to particular circumstances such as an adverse health event (Venti and Wise (1989, 1990, 2004); Megbolugbe *et al* (1997)). Nor do they appear to plan on selling their houses to finance retirement (Lusardi and Mitchell (forthcoming)). On the other hand, other researchers have found some evidence that households do reoptimize their housing equity (Coronado *et al* (2006)), or point out that households have a valuable option to do so (Skinner (2007)). Our analysis will not capture the value of the *option* to reduce housing consumption. Still, even households that move (whether they downsize or switch to renting) will have to devote a large portion of the proceeds from the sale to cover the transactions costs plus future housing services. Another way to tap housing equity is to simply cut back on maintenance. [See Davidoff (2006) and Gyourko and Tracy (forthcoming).] We consider that to be similar to accessing capital through credit markets in that such households cannot tap *all* their

against their house value, essentially transferring wealth from their heirs (after death) to current consumption. We use a convenient measure of the equity available to be extracted from a house: the amount that can be borrowed via a reverse mortgage. In theory a reverse mortgage is an ideal way to consume home equity without incurring the transactions costs from moving.² It provides homeowners a lump sum loan that accrues interest and is settled against the sale of the house when the homeowner dies or moves out. We consider two forms of reverse mortgages: first, a theoretical “upper-bound” reverse mortgage product that provides the maximum possible liquidity; and, second, the actual reverse mortgage products available in 2007, which appear to still suffer the drawbacks of having a small market.

We find that homeowners have considerable housing equity that they can borrow against, but nowhere near as much as standard measures of housing equity would imply. The available loan amount generally increases with a household’s age, since the lender has less long to wait on average before being repaid. Under the upper-bound reverse mortgage, the maximum fraction of housing equity that the median 90-year-old household could consume would be 89 percent of housing equity, or about \$103,000. But for those aged 62 to 69, the maximum that could be consumed would be only 49 percent of housing equity, or about \$50,500; and 11.5 percent of households in that age range would not have any housing equity available to consume at all. Under the actual (2007) reverse mortgage programs, even less of home equity is available, even before fees.

These results motivate calculating a modified measure of net worth, “consumable net worth,” that accounts for the fact that, absent moving, not all housing wealth is available for non-

housing equity and the amount they can access will depend on the number of years they expect to remain in their houses.

² Unlike other forms of housing debt, the borrower cannot default on a reverse mortgage and he offloads to the lender the risk associated with the uncertainty over how long he will stay in his home. In practice, reverse mortgages currently have high fees and interest rates and provide relatively little equity.

housing consumption. Even among households aged 62-69 who have consumable housing equity, the median consumable net worth in the upper-bound case is only three-quarters of the standard measure of net worth. At age 90, the median household could consume only 91 percent of standard net worth.

This paper makes two contributions relative to previous research. First, we provide updated cohort and over-time analyses of how net worth and housing equity has evolved, including during the recent housing boom. This builds on Poterba and Samwick (1997) and Coronado *et al.* (2006), among others. Poterba and Samwick (1997) use the SCF to provide a cohort analysis, through 1992, that includes housing wealth and housing debt. Coronado *et al.* (2006) analyze home equity and net worth using two waves of the Health and Retirement Survey (HRS). We examine related issues using the SCF, which enables us to examine many more cohorts and much older households (up through age 94, compared to age 61 in the original HRS cohort).

Second, we provide estimates of how consumable housing equity and consumable net worth evolve with age, cohort, and time. Most studies add all of housing equity to net worth (e.g., Poterba and Samwick (1997), Mitchell and Moore (1998), Coronado *et al.* (2006)). Others leave housing equity out altogether (Bernheim (2000)) or split the difference (Engen *et al.* (1999)). The closest to what we do is Venti and Wise (1991), who find that a reverse mortgage could increase non-housing consumption by as much as 10 percent on average, but they do not express that number as a fraction of housing equity or net worth. Other research on the value of reverse mortgage products focuses on the potential size of the market for products, rather than the equity available to be tapped (Merrill *et al.* (1994), Rasmussen *et al.* (1995)).

It is worth emphasizing that housing is different than most other assets on household balance sheets because of its dual nature as both an asset and a consumption good. Since households must live somewhere, they have an implicit liability for housing services that is not recorded in standard measures of net housing equity and net worth. (Sinai and Souleles (2005)) Buying a home provides those housing services, but only the housing asset (net of housing debt) appears on the balance sheet, not the bundled liability.³ Thus, unlike for instance a stock portfolio, the housing portfolio cannot be completely liquidated because there would be no provision for the housing service liability. Instead a household must find another way to extract equity.

Complicating the interpretation of the results, changes in house prices do not necessarily lead to increases in real wealth, even if housing equity can be reallocated to non-housing consumption. Because the price of housing reflects the present value of the entire stream of future housing services, for young households, who are most “short” housing services, increases in house prices can be largely offset by increases in their housing services liability, leaving their real wealth largely unchanged. But for older homeowners, who have a smaller remaining implicit housing liability, increases in house prices can translate into larger increases in real wealth, and thus potentially into higher non-housing consumption.⁴ However, this increase in consumption comes at the expense of the next generation, which no longer stands to inherit the increased housing equity, but still inherits the commensurately higher housing liability.

³ Of course one can extend this line of reasoning to many other liabilities that are not measured, for instance households’ expected food expenses. However, in such cases there is no matching asset (or durable good) on the other side of the balance sheet that directly offsets the liability. Buying a house provides a hedge against changes in housing costs, potentially a perfect hedge for a household that never sells its house or otherwise has an infinite effective horizon. The example of long-term care insurance, discussed elsewhere in this volume, is related, in that it hedges future long-term care expenses.

⁴ Consistent with this implication, Campbell and Cocco (2005) find that the response of consumption to house prices increases with age.

The rest of the paper proceeds as follows: We first describe the data we use for our calculations, then show how net worth, housing equity, and housing debt evolve over the lifecycle, over time, and by birth cohort. Then we turn to calculating the amount of housing equity available for non-housing consumption and the modified measure of consumable net worth. Finally, we briefly conclude.

Data

The data used in our analysis was obtained from the Federal Reserve Board's Survey of Consumer Finances. The SCF is conducted every three years, and we use the seven cross-sectional survey waves conducted between 1983 and 2004, excluding the 1986 Survey. The SCF oversamples high-wealth families, yielding a large number of observations on holders of various assets and liabilities. A more complete description of the survey can be found in Bucks *et al* (2006). To make the estimates more representative of the overall population of the U.S., we apply the SCF's replicate weights. We exclude households where the head was under the age of 25, age 95 or over, or born before 1900; and households whose primary residence was on a ranch or farm, or in a mobile home.⁵ This yields almost 113,000 observations across the seven surveys.⁶ With population weights, the data cover 71 million households in 1983 up through 97 million in 2004. All dollar values are inflated to 2004 dollars using the CPI research series for all urban consumers (CPI-U-RS).

In this paper, we categorize households variously by age, birth cohort, survey year, and remaining life expectancy. We define the age of a household by the age of the household head,

⁵ We also drop 22 households who report negative gross assets.

⁶ We have 3,506 household-level observations in 1983, 13,962 in 1989, 17,235 in 1992, 18,768 in 1995, 19,210 in 1998, 19,854 in 2001, and 20,283 in 2004, for a total of 112,818. The 1989 through 2004 SCFs have five replicate observations per household.

which, by the SCF convention, is defined as the male spouse of a married couple, the older spouse of a same-sex couple, or the adult in a single-headed household. The birth cohort is the decade in which that household head was born, such as 1910-1919 for a head aged 89 in 2004.⁷ Remaining life expectancy was obtained from actuarial tables created by the Social Security Administration.⁸ These tables report expected remaining lifetime and the distribution of the probability of dying in each future year separately for men and women by age and year. We merge this data to individuals in the SCF by gender, age, and year. At the household level, in the case of married couples we assume the expected remaining lifetime for the household is the maximum of the expected remaining lifetimes over both spouses.

Lifecycle analysis of housing equity and net worth

We begin by examining the accumulation and decumulation of assets and liabilities over the lifecycle, focusing on the contribution of housing equity to both phases. Since the SCF data are cross-sectional, we do not actually follow the same households over time and so we have to make an assumption to infer what their life-cycle profiles must look like. We can assume either that households of different ages observed in the same year are otherwise comparable despite being born in different years, or that households of different ages but from the same birth cohort are otherwise comparable despite being observed in different years. We analyze the results under both assumptions.

⁷ Naturally, we have relatively more data on households born between 1920 and 1969 as the members of those households are within the age range of 25-94 for more years of the survey. We have 1,751 observations on household heads born between 1900-1909; 6,735 for 1910-1919; 13,915 for 1920-1929; 16,988 for 1930-1939; 24,496 for 1940-1949; 26,199 for 1950-1959; 17,130 for 1960-1969; and 5,604 for 1970-1979.

⁸ We are grateful to Jeff Brown for sharing these tables with us.

In Figure 1, the first panel provides a cohort-based life-cycle analysis for household net worth.⁹ A household's age – categorized into five-year bins – is on the horizontal axis and net worth, in thousands of 2004 dollars, is on the vertical axis. Each line segment corresponds to the median net worth for households born in a particular decade. Most segments span multiple age bins because we have 21 years of surveys. For example, someone born in 1960 will be in the 25-29 bin as of the 1989 survey, the 30-34 bin in the 1992 survey, the 35-39 bin in the 1995 and 1998 surveys, and the 40-44 bin in the 2001 and 2004 surveys. The dots correspond to the median net worth across all households in that age bin, regardless of birth cohort. (Cohort \times age groups that have fewer than 11 observations are omitted from the segment drawings, but not from the calculations for the dots.)

The dots illustrate the usual age profile for net worth, with a steady accumulation between age 25 and 64, and generally a decumulation thereafter. Net worth peaks at retirement age at around a median of \$250,000 (in 2004 dollars). There are two other notable results in this figure. First, median net worth declines until age 80 (falling to just under \$200,000), but then, for the 1900-1909 and 1910-1919 cohorts, begins to rise again. Second, while the cohort line segments are tightly overlapping for households between the ages of 25 and 54, they diverge after that. That is, for the most recent periods (the most recent age bins), the segments lie above the prior cohorts' segment. This is especially true for the 1930-1939 and 1940-1949 birth cohorts.

⁹ The definition of net worth follows the one used in Bucks *et al* (2006). Assets include checking, savings, and money-market accounts; call accounts at brokerages; certificates of deposit; directly-held mutual funds; stocks; bonds; retirement accounts; savings bonds; the cash value of whole life insurance; trusts, annuities, and managed investment accounts; other financial assets such as royalties and loans made; vehicles; primary residence, other residential, and non-residential real estate; business interests; and other non-financial assets such as jewelry and antiques. Debt includes debt on the primary residence and other residential and non-residential real estate; credit-card debt; installment loans not for real estate or credit cards such as vehicle or student loans; and other debts such as margin loans or loans against life insurance policies.

Potential explanations for these patterns can be found in the second panel of Figure 1, which calculates the age profile of median net worth by the year of the SCF survey. For clarity, only a subset of the SCF years is displayed. The dots, being sample medians by age that are computed using all the SCF years, are the same across both panels. In the second panel, the different SCFs' age profiles generally peak between age 55 and 64 and, with the exception of the 2004 SCF, decline with age or are level through age 94. Analogous to the first panel, there is relatively little difference in median net worth across SCFs for households under age 55. But for older households, net worth grows from 1983 to 1998, and then from 1998 through 2004.¹⁰

These results are suggestive that the 2001 and 2004 increases in net worth for households approaching retirement age and older are responsible for the earlier patterns in the cohort analysis in the first panel. That is, the upwards slant of the cohort lines is due to net worth growing over time for everyone, rather than age-based accumulation. For example, the 1930-1939 and 1940-1949 cohort lines in the top panel have the steepest increase in their last two age bins because they have the most concentrated exposure to 2001 and 2004 in those bins. Likewise, the upturn in net worth in the top panel between age 85 and 94 could be due to the run-up in the 2000s overwhelming the usual life-cycle drawdown of net worth.

One key factor behind the rise in net worth between 1998 and 2004 is growth in housing values. As displayed in Figure 2, during the seven years between 1998 and 2004, real national average house prices rose by about 25 percent, more than the growth over the 16 years between 1983 and 1998.¹¹ The index graphed in Figure 2 measures house price appreciation from repeat

¹⁰ Gale and Pence (2006) also find that the largest gains in wealth between 1989 and 2001 accrued to older households.

¹¹ Gyourko, Mayer, and Sinai (2006) show that the pattern of house price growth varies considerably across cities, so the national average is an imperfect proxy for the house price growth experienced by a given household in the SCF. Unfortunately, city of residence is not publicly available in the SCF and even region is made available only in some surveys, so we cannot match external measures of house price appreciation to households in the SCF.

sales of the same houses, thus controlling for changes in the quality or size of houses. This raises the question: How much of the recent growth in net worth among households of retirement age was due to growth in housing values?

It appears that at least some of the growth in net worth was due to growth in housing values, but not all. Both the cohort and SCF-year graphs of median home equity by age in Figures 3A and 3B mimic the patterns for net worth in Figures 1A and 1B, indicating that growth in home equity played a role. However, while housing clearly accounts for a large portion of the recent increase in net worth for seniors, the dollar amounts in Figures 3A and 3B are smaller than for net worth (both on average and for the changes over time). For example, while median home equity for 65 to 69 year olds rose from about \$100,000 to \$140,000 between 1998 and 2004, median net worth rose from about \$220,000 to \$320,000. In addition, the rise in the value of home equity between 1983 and 2001 occurred almost exclusively for households aged 65 and over while the increase in net worth was spread across all ages.¹² Indeed, Figure 4 shows that while net worth *excluding* housing equity still shows a substantial increase between 1983 and 2004, non-housing net worth grew over this time period for all ages, not just those over age 65. These differences suggest that housing equity growth alone cannot fully explain net worth.

Another way to see that net worth rose by more than housing equity is in Figure 5. Conditional on home-owning, the ratio of housing equity to net worth is relatively constant at about 40 to 60 percent over the life-cycle and over time. (The ratio starts to increase at retirement, rising from 40 percent to about 70 percent for the oldest seniors, consistent with households drawing down their liquid assets first.) This persistence over time can happen only when net worth experiences the same percentage growth as home equity which, given the higher initial level of net worth, implies that net worth increases more in absolute terms than housing

¹² For brevity, subsequent graphs will focus on the over-time life-cycle profiles.

equity. In addition, the time pattern of the equity-to-net worth ratio does not match the growth of house prices. In 1983, equity to net worth was unusually high and for the 1998 through 2004 SCFs the ratio is generally *lower* (for any given age).

While growth in housing equity may not fully explain the rise in net worth, growth in house values may do better. That is, if home owners increased their housing debt to offset rising house values and used the proceeds to invest in other assets, that could explain a pattern of net worth rising faster than housing equity.¹³ One fact consistent with this hypothesis is that the growth in net worth was concentrated in the population of homeowners. If one re-graphs Figure 1B restricting the sample to homeowners, the results for their net worth look very similar to the original results for the overall population's net worth. By contrast, the corresponding graph for renters looks much different: Renters' net worth does not rise with age and does not increase with house values. (However, this data is somewhat noisy at older ages, since few elderly rent).

Of course, one cannot automatically conclude from these last results that the rise in house values was solely responsible for the growth in net worth for home-owning seniors. First, the population of renters is potentially very different from the population of owners. For example, renters are generally poorer and less likely to own assets that can significantly appreciate. Their median net worth is quite low, under \$10,000 for most of the life-cycle. Second, the fraction of seniors that rents is small. As shown in Figure 6, by age 35 the majority of households own their homes. By retirement age, 80 percent of households own. The homeownership rate does not begin to decline much until age 80, reaching 60 percent only by age 90-94. Thus, the vast majority of elderly do not consume against their home equity by selling their homes and becoming renters. In general, there is no clear time pattern across SCFs in the homeownership

¹³ Coronado *et al* (2006) compared two cohorts in the Health and Retirement Survey, interviewed in 1992 and 2004, and concluded that households might have increased their housing debt in response to house appreciation in order to rebalance their portfolios.

rate. But, while the data are somewhat noisy, there is some indication that the homeownership rate among the elderly rose between 1983 and 2004, from 60-70 percent to 70-80 percent, depending on the household's age.

While house values rose more than housing equity, suggesting that homeowners may have reallocated their housing equity into other assets, this appears to be less so the case for the elderly than for households aged 60-64 or younger. Figure 7 reports the *gross* value (not subtracting debt) of a household's primary residence. The figure clearly shows the rise in house values in recent years, as the age profiles from more recent SCFs lie above those from earlier SCFs, sometimes by as much as 30 percent. Comparing Figure 7 to Figure 3B (home equity), one can see that the dollar increase in house values often exceeds the increase in home equity. In Figure 7, there is a steady rise over time in house values that appears at all ages and is especially pronounced for households aged 65 and over. By contrast, in Figure 3B, home equity does not grow much between 1983 and 2001 for those under age 65. For example, the median home equity rose by about \$60,000 between 1983 and 2004 for households aged 60-64. House values for the same age group increased by about \$100,000 over that same time period. After age 65, however, housing equity tracks house values more closely. The increase in home equity between 1983 and 2004 is much closer to the growth in house values for the 65-69 age group and, by age 70-74, is almost exactly the same.

One possible explanation is that for younger households housing debt, including first and second mortgages as well as home equity loans and lines of credit, rose along with house values. For seniors this explanation is limited by the fact that few seniors have any housing debt. In the top panel of Figure 8, only about 60 percent of home owning households aged 60-64 have any housing debt whatsoever, and this ratio steadily declines with age until it levels out at about 10

percent of households aged 80 and above. While this age profile is relatively stable over time, a smaller fraction of households of almost any age had housing debt in 1983 and a larger fraction held housing debt in 2004. Especially for households aged 65 through 80, borrowing against the house appears to have become steadily more prevalent over the 1983 through 2004 time period, rising by as much as 20 percentage points.

Conditional on having any housing debt, the *amount* of debt rose substantially. In Figure 9, the pattern of the dots indicates that median debt amounts decline with age. However, the households surveyed in more recent SCF years have higher debt levels at almost every age through 70-74. Unlike with the frequency of having housing debt, the rise in the amount of debt is largely a younger-household phenomenon. (One important caveat: since so few of the very elderly have debt, it is difficult to draw inferences for that age group.)¹⁴

One possible reason that the amount of housing debt rose with house values is that households tend to keep their leverage ratio constant. Figure 10 reports median loan-to-house value (LTV) ratios by age for homeowners who have housing debt. Indeed, except from 1983 to 1992, the age profiles of LTV have not changed much over time. Thus the (*percent*) growth in debt has generally kept up with the (*percent*) growth in house values, keeping the ratio of debt to value roughly constant. This implies that, while the *dollar* amount of home equity rose with the increase in house prices, it did not rise as much in absolute terms as house values. And given how few elderly have housing debt, even the apparent increases in leverage between 1992/1998 and 2001/2004 for homeowners 75 and older have only a small effect on aggregate leverage.

¹⁴ The corresponding cohort analysis (not shown) suggests the possibility of a significant cohort effect, in addition to the time effects just discussed. At any age, later birth cohorts have more debt than earlier cohorts. If this reflects some decline in aversion to housing debt for more recent birth cohorts, then one needs to be careful about extrapolating from today's seniors to future seniors. Future cohorts of seniors could arrive in retirement with less housing equity than do the current elderly.

In the absence of panel data, it is difficult to directly show whether households actually used the proceeds from higher housing debt to invest in other assets. Nonetheless, in the two panels of Figure 11 we attempt to shed some light on the matter. Figure 11A reports the median value of non-housing assets, measured as total assets minus the value of the primary residence. Figure 11B reports the median value of non-housing assets minus housing debt, measured as total assets minus both the value of the primary residence *and* the debt on that house. If housing debt is reallocated at least in part to investments in non-housing assets rather than being wholly spent on current consumption, we would expect the life cycle profiles in the top panel to increase over time more than the ones in the bottom panel. To elaborate on the comparison: *ceteris paribus*, changes in house values without a change in housing debt should affect neither the top nor the bottom panels since only non-housing assets are measured. Changes in the value of non-housing assets should have the same effect on both the top and bottom panels. However, an increase in housing debt that is used to invest in non-housing assets should raise the life-cycle profile in the top panel (since assets go up but housing debt is not netted out) but *not* in the bottom panel (where housing debt is netted out). Conversely, an increase in housing debt that is spent would have no effect on the top panel but would lower the life-cycle profile in the bottom panel.

For younger households, below age 65, the top panel shows a rising life-cycle profile between 1983 and 2004. By contrast, the bottom panel exhibits no such pattern and, in fact, the 2004 profile lies below most of the other profiles through age 54. This pattern suggests that while non-housing assets rose faster than house values for the median household in this age range, the difference could be explained by growth in housing debt. For households age 65 and over, non-housing assets were also growing steadily between 1983 and 2004. But unlike for

younger households, there is less difference between the top and bottom panels for the 65-and-up households and almost no difference by age 75. Again, that is because so few of the very elderly hold housing debt, so at the median there can be little reallocation from housing equity to net worth.

Lastly, we consider the fact that trends in house values might reflect not just changes in house prices, but also moves to different houses and other changes in the quantity or quality of housing. The SCF does not report a household's entire housing history. But, in addition to (self-reported) current house-value, the survey asks for the price that homeowners paid for their current house when they purchased it and how much they spent on remodeling and additions in the interim. This allows us to roughly estimate how much of households' housing equity is due to the capital gain on their current house. Figure 12 reports median real housing capital gains expressed as a percentage of house equity. We construct this variable by taking the difference between the self-reported house value (in 2004 dollars) and the self-reported purchase price (in 2004 dollars), subtracting out spending on remodeling and additions, and then dividing by current housing equity.¹⁵ Given the limitations of the data, the resulting measure will likely provide a lower-bound on the actual fraction of housing equity due to capital gains.¹⁶

Even so, in 2001 and 2004 the fraction of housing equity due to capital gains rose substantially, to more than 30 percent of housing equity for the most senior elderly. In earlier

¹⁵ For example, consider a homeowner who purchased a house for \$200,000, financed 100 percent with debt. The house is now worth \$210,000. This homeowner's housing equity (\$210,000 current value - \$200,000 debt = \$10,000) is entirely capital gain, and thus the household would have a ratio of 1. If the homeowner had financed 80 percent with debt, he would have \$50,000 in housing equity (\$210,000 current value - \$160,000 debt) and \$10,000 in capital gain (\$210,000 current value - \$200,000 purchase price) and the ratio would be \$10,000/\$50,000 = 0.2.

¹⁶ Unfortunately, we have a consistent CPI series only back to 1967, so households who purchased their homes prior to that date are omitted. Also, we cannot adjust for the length of ownership. E.g., consider a household who purchased a house in 1970 and in 2002 sold it (with a large capital gain) and purchased a new house using the gain as a down payment. This household would appear to have relatively small housing capital gains in 2004 because it would have been in the new house for only two years and we cannot track the capital appreciation from its prior house.

years, by contrast, housing capital gains appear to have contributed relatively little to housing equity. In any case, in recent years housing capital gains were clearly a large source of wealth for households in retirement.

Consumable housing equity and net worth

Methodology. Given the recent increase in housing equity documented above, the rest of this paper considers how much of that equity the elderly can tap, both in theory and practice. We compute the amount of housing equity that is consumable by a household without moving, using two variants of a reverse mortgage. First, we calculate the theoretical upper-bound amount that a homeowner could borrow against his house from a risk-neutral lender. Second, as a lower bound, we identify how much a homeowner could borrow using the actual reverse mortgage programs in place in the first quarter of 2007. After computing the resulting amounts of consumable housing equity, we calculate the corresponding modified measures of consumable net worth, which includes only consumable housing equity rather than all housing equity.

We begin by following Venti and Wise (1991) in computing the maximum fraction of a house's value that could be borrowed using a reverse mortgage from a risk-neutral lender. Suppose a household borrows a lump-sum amount L today, lets it cumulatively compound, and pays off the resulting total liability at death using the proceeds from the sale of the house. This is basically how current reverse mortgages work. Since the bank is risk neutral, it will set the initial loan amount such that in expectation the sale value of the house will exactly equal the mortgage balance at the time of the homeowner's death. In this case, the initial loan amount L is determined by:

$$L = \sum_{t=a}^A [(1+g)^{t-a} H] d(t|a) (1+m)^{-(t-a)} \quad (1)$$

where a is the current age of the homeowner, H is the current house value, and $d(t|a)$ is the probability of dying in year t conditional on being age a currently. (In the case of married couples, we use the age of the youngest spouse, which determines the conditional survival probability as used by reverse mortgage lenders.) The nominal mortgage interest rate is m and g is the nominal growth rate of house prices, for simplicity both assumed to be constant and $m > g$. In our calculations, for m we use the average nominal 30-year mortgage interest rate in the year the household reports having taken out the loan. For g we will use the long-run average national real growth rate in house prices, 1% per year, plus the expected 10-year average annual inflation rate from the Livingston Survey in the year of the SCF survey.

From L , we net out existing housing debt D to obtain our measure of consumable housing equity, $CHE \equiv L - D$. While L must be non-negative, CHE can be negative if existing debt exceeds the amount of potential reverse mortgage. (In this case the household can be thought of as having a net housing liability, in that it will need to pay for a portion of its housing consumption out of income or non-housing wealth.)

The potential loan amount L is primarily a function of the expected remaining lifetime of the household. If a household is expected to live a long time, any amount it borrows has a long time to compound before it is settled against the proceeds of the house sale. Thus the lender, who in expectation needs to have the sale value of the house equal the accumulated debt in order to break even, will lend a smaller initial amount to a young household, *ceteris paribus*. An older household could borrow a greater fraction of the house value since it will repay the loan sooner.¹⁷

¹⁷ An alternative approach is to suppose a household draws down its housing equity by selling its house and renting (through a long-term lease). Since the household's housing services are no longer being provided by an owned house, the household will have to reserve some of the proceeds from the house sale to pay for its future rents. A younger household that is expected to live a relatively long time would have to reserve more of the proceeds but an

Results. The results of applying equation (1) are tabulated by age in Table 1. The first column reports the fraction of households who have positive consumable housing equity. Very few young households have positive consumable equity (first row of the first column), and for those that do, the median amount of equity is small (first row of the second column). This is because young households have high debt loads relative to house value and long life expectancies. By comparison, older households are more likely to have positive consumable home equity, and greater amounts of equity. Given the topic of this paper, we will focus on the households aged 62 and older.

It is clear from Table 1 that older households have the potential for significant consumable housing equity. For those aged 62-69, for example, among the 88.5 percent with positive consumable equity, the median amount is almost \$50,500. By age 90, all home owning households have consumable housing equity, in part because housing debt is almost nonexistent and also because remaining life expectancy is short. The median amount of consumable equity for that age group is about \$103,000.

While consumable home equity can be substantial in dollar terms, it can nonetheless be a relatively small fraction of housing equity as measured in the standard way. For example, households aged 62-69 can consume only 49 percent of their standard housing equity.¹⁸ By age 70-79, only about two-thirds of housing equity is consumable, and even by age 90 less than 90 percent is consumable.

older household could reserve less, *ceteris paribus*. We use reverse mortgages to estimate the consumable portion of housing equity because, unlike rents for owner-occupied houses, mortgage interest rates are easily observable. In addition, reverse mortgage lenders absorb the uncertainty over length-of-life.

¹⁸ It turns out that in every age group in the SCF, the median household with positive consumable housing equity has no housing debt. Thus it makes no difference whether we report consumable housing equity as a fraction of housing equity or house value.

Using consumable housing equity also makes a big difference to net worth. The fifth column of Table 1 calculates consumable net worth using our measure of consumable housing equity rather than the standard measure of housing equity, and the sixth column compares the result to the standard definition of net worth. For younger households, consumable net worth is only a small fraction of reported net worth, again because they have relatively larger debt and longer life expectancies. (One can think of their housing asset as being largely dedicated to paying for their large future housing liability, and so effectively unavailable for non-housing consumption.) By age 62-69, less than three-quarters of the standard measure of net worth is consumable. Even by age 90, only 91 percent of net worth is consumable.

While Table 1 provides a useful theoretical benchmark, in practice reverse mortgage markets do not generally allow one to borrow as much as assumed using equation (1). First, legal and marketing considerations require that lenders collect the lesser of their debt position or the house value. Thus, they reduce the initial loan amounts to be relatively confident that the house value will exceed the debt position at the time of death. Second, problems of adverse selection (long-lived borrowers) and moral hazard (borrowers do not maintain their houses) also reduce the amount lenders are willing to lend. Finally, current reverse mortgage markets might also suffer from other early-stage problems of a new financial product, such as thinness or lack of familiarity.

To bound the differences between the theoretical and current reverse mortgages, we recalculate consumable housing equity using the actual amount a household could borrow through a current reverse mortgage, using the program parameters in place in the first quarter of 2007. We used the on-line reverse mortgage calculator available at <http://www.financialfreedom.com/calculator> to calculate how much a borrower in zip code

60614 (Cook County, Chicago) could obtain from the three primary reverse mortgage programs: FHA/HUD's 'HECM Advantage', Fannie Mae's 'Homekeeper', and Financial Freedom's 'Cash Account Advantage'. These programs currently lend only to those aged 62 or older, so we computed the potential loan amount for each age between 62 and 94, and for house values in \$25,000 increments between \$0 and \$1 million. For each age × house value cell, we used the maximum loan amount from the three programs. That loan amount was imputed to households in the SCF using the age of the youngest spouse and their self-reported house value. When the SCF house value lay between the \$25,000 bins, we linearly interpolated the loan amount. From this potential reverse mortgage amount we netted out existing housing debt, since that is what a reverse mortgage lender would do.

The amount one can borrow through the reverse mortgage market has been increasing steadily over time and is expected to continue to do so. Thus we view this exercise as providing a lower bound on future access to home equity. However, we did not net out fees, which are sizeable in the current reverse mortgage market – they can be upwards of 15 percent of the loan amount. Thus, our calculations still overstate currently available consumable equity.

The results are reported in Table 2, which mimics Table 1 using the new computation of consumable housing equity. Since households younger than 62 are not eligible for reverse mortgages, their consumable housing equity is no greater than zero. Overall, the actual reverse mortgage programs generally provide positive consumable housing equity to fewer households than does the upper-bound theoretical program, especially at younger ages. For example, only 60 percent of 62-69 year olds have positive consumable housing equity under the actual reverse mortgage programs versus 88.5 percent under the theoretical upper-bound. And for the households with positive equity, the actual programs generally provide a smaller amount of

housing equity. In this dimension the gap increases with age: For households age 62 and over, median consumable housing equity (conditional on being positive) ranges from \$51,000 to \$94,000, or about 49 percent to 76 percent of total housing equity. The ratio of consumable net worth to the standard measure of net worth reflects these patterns. It ranges from 71 percent for young seniors to 82 percent for the oldest seniors and is always lower than under the theoretical program.

Comparisons between Tables 1 and 2 are complicated by the fact that in Table 1 we used the mortgage interest and expected inflation rates at the time of the SCF survey year, but in Table 2, by applying the 2007 reverse mortgage program, we implicitly used 2007 rates. Table 3 attempts to provide a better comparison by using just the 2004 SCF households for both computations.¹⁹ The current reverse mortgage program is less generous than the theoretical one. The current program gives markedly fewer younger retirees access to consumable housing equity – e.g., only 51 percent of 62-69 year olds versus 90 percent in the theoretical program – and the amounts of equity are also smaller.

A natural question to ask is how the recent trends in house values affected these results. Consumable housing equity will generally increase with greater house values. But, as already noted, the recent increase in house values was partly offset by increased debt. Table 4 explores how this process played out, focusing on the ratio of consumable net worth to standard net worth, by SCF year, using the theoretical reverse mortgage program from Table 1 (which generally overstates consumable housing equity). The fraction of net worth available for non-housing consumption is at or near all-time highs for homeowners aged 62 or older. For those aged 62-69 in 1989, 69 percent of net worth was consumable; by 2004, that fraction rose to 80 percent. For

¹⁹ Even so, we still are comparing the 2004 SCF (with 2004 interest rates and expected inflation) to the actual 2007 program, so the match is imperfect.

80-89 year olds, the fraction of net worth that could be consumed rose from 83 percent in 1989 to 90 percent in 2004.

Underlying these results, the fraction of older households with *any* consumable housing equity generally declined from the relative house price peak of 1989 to the trough of 1995-1998, and rose with house prices again through 2004. However, even in 2004, the fraction had not caught up to its level in 1989. This partly reflects the increased debt we observed in recent years. The turnaround in the *amount* of consumable home equity (conditional on being positive) began a little later, in 2001 or 2004, for households aged 62 and older. But by 2004, the median amounts of consumable housing equity were larger than in 1998, about double for households aged 62 and older. These recent trends reflect both the recent growth in house prices and the recent decline in interest rates.

Conclusion

Using the SCF, we documented the evolution of the life-cycle profiles of net worth and of housing values, equity, and debt, from 1983 through 2004. We found that the recent increase in house prices increased the net worth of retirement-aged households, but less than one-for-one. In part, this appears to be because other assets appreciated along with housing. In addition, households increased their housing debt, offsetting some of the increase in house value, and used some of the proceeds to invest in other assets. However, this latter explanation seems to be most prevalent among younger households and to a degree among the youngest elderly, but not among the oldest seniors who do not hold much housing debt.

We also found that a large fraction of seniors' housing equity is not actually available for non-housing consumption, especially for younger retirees. For example, for the median 62- to

69-year-old household, only 49% of housing equity could actually be consumed, even using the theoretical upper-bound reverse mortgage, and that excludes the 12 percent of such households with no consumable housing equity at all. Even for the median 90-year-old household, only 89 percent of housing equity is available.

These results imply that consumable net worth is smaller than standard calculations of net worth. Even among households aged 62-69 who have consumable housing equity, median consumable net worth in the upper-bound case is only three-quarters of a standard measure of net worth. Even at age 90, the median household could spend only 91 percent of its net worth on non-housing consumption.

On the other hand, these fractions have increased in recent years, partly due to increased house values and lower interest rates. Overall, these results show that accounting for the trends in older households' ability to extract housing equity is important for obtaining an accurate picture of their consumable net worth and potential standard of living.

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Table 1: ‘Upper-Bound’ Housing Equity Available for Consumption, by Age

Age category	‘Consumable’ housing equity		Median ratio ‘consumable’ housing equity to house equity	Median net worth using ‘consumable’ housing equity	Median ratio ‘consumable’ net worth to standard net worth
	% > 0	Median value if >0			
25-61	34.7	25,690	0.26	117,991	0.59
62-69	88.5	50,499	0.49	173,534	0.74
70-79	95.8	66,728	0.64	160,743	0.80
80-89	99.1	76,752	0.78	164,036	0.86
90-94	100.0	103,093	0.89	217,212	0.91
Median if age ≥ 62	93.6	62,673	0.60	166,116	0.80

Notes: ‘Consumable’ housing equity is defined as the amount of capital that could be extracted from a house by a risk-neutral mortgage lender (given the owners’ ages and genders and prevailing 30-year fixed mortgage rates) less the existing debt secured by the primary residence. Net worth using ‘consumable’ housing equity replaces housing equity in the net worth calculation with ‘consumable’ housing equity. Sample includes homeowners with houses with values less than \$1 million, 1989-2004 SCFs.

Table 2: Actual Housing Equity Available for Consumption, by Age

Age Category	'Consumable' housing equity		Median ratio 'consumable' housing equity to house equity	Median net worth using 'consumable' housing equity	Median ratio 'consumable' net worth to standard net worth
	% > 0	Median Value if >0			
25-61	0.00	0	0.00	0	0.00
62-69	60.0	50,981	0.49	150,423	0.71
70-79	90.9	62,131	0.58	156,242	0.75
80-89	97.0	68,648	0.65	154,510	0.79
90-94	99.3	93,776	0.76	202,874	0.82
Median if age>=62	80.1	60,429	0.56	154,205	0.75

Notes: 'Consumable' housing equity is defined as the maximum amount of capital that could be extracted from a house by a reverse mortgage using the programs available in 2007, netting out the existing debt secured by the primary residence. These programs lend only to those aged 62 and older. Net worth using 'consumable' housing equity replaces housing equity in the net worth calculation with 'consumable' housing equity. Sample includes homeowners with houses with values less than \$1 million, 1989-2004 SCFs.

Table 3: Comparing ‘Upper-Bound’ and Actual ‘Consumable’ Housing Equity: 2004 only

Age Category	Best-case ‘Consumable’ Housing Equity		Reverse Mortgage ‘Consumable’ Housing Equity	
	% > 0	Median Value if >0	% > 0	Median Value if >0
25-61	36.1	44,006	0.00	0
62-69	89.5	80,110	51.2	67,768
70-79	93.7	90,497	85.7	79,875
80-89	100.0	119,776	94.7	102,961
90-94	100.0	113,128	100.0	97,810
Median if age>=62	93.7	93,217	75.84	81,194

Notes: In columns 2 and 3, best-case ‘consumable’ housing equity is defined as the amount of capital that could be extracted from a house by a risk-neutral mortgage lender in 2004 (given the owners’ ages and genders and prevailing 30-year fixed mortgage rates) less the existing debt secured by the primary residence. In the last two columns, reverse mortgage ‘consumable’ housing equity is defined as the maximum amount of capital that could be extracted from a house by a reverse mortgage using the programs available in 2007, netting out the existing debt secured by the primary residence. These programs lend only to those aged 62 and older. Sample includes homeowners with houses with values less than \$1 million, 2004 SCF.

Table 4: Ratio of Net Worth Available for Consumption to Standard Net Worth
for Households with ‘Consumable’ Equity,
Using ‘Upper Bound’ Definition, by Age and Year

Age category	Year						Median
	1989	1992	1995	1998	2001	2004	
25-61	0.50	0.57	0.58	0.61	0.62	0.65	0.59
62-69	0.69	0.73	0.73	0.74	0.76	0.80	0.74
70-79	0.77	0.82	0.79	0.79	0.80	0.83	0.80
80-89	0.83	0.85	0.85	0.86	0.88	0.90	0.86
90-94		0.90	0.88	0.91	0.89	0.96	0.91
Median if age>=62	0.75	0.80	0.79	0.81	0.80	0.84	0.80

Notes: ‘Consumable’ housing equity is defined as the amount of capital that could be extracted from a house by a risk-neutral mortgage lender (given the owners’ ages and genders and prevailing 30-year fixed mortgage rates) less the existing debt secured by the primary residence. Net worth using ‘consumable’ housing equity replaces housing equity in the net worth calculation with ‘consumable’ housing equity. Sample includes homeowners with houses with values less than \$1 million, 1989-2004 SCFs.

Figure 1A: Median Net Worth by Age and Birth Cohort

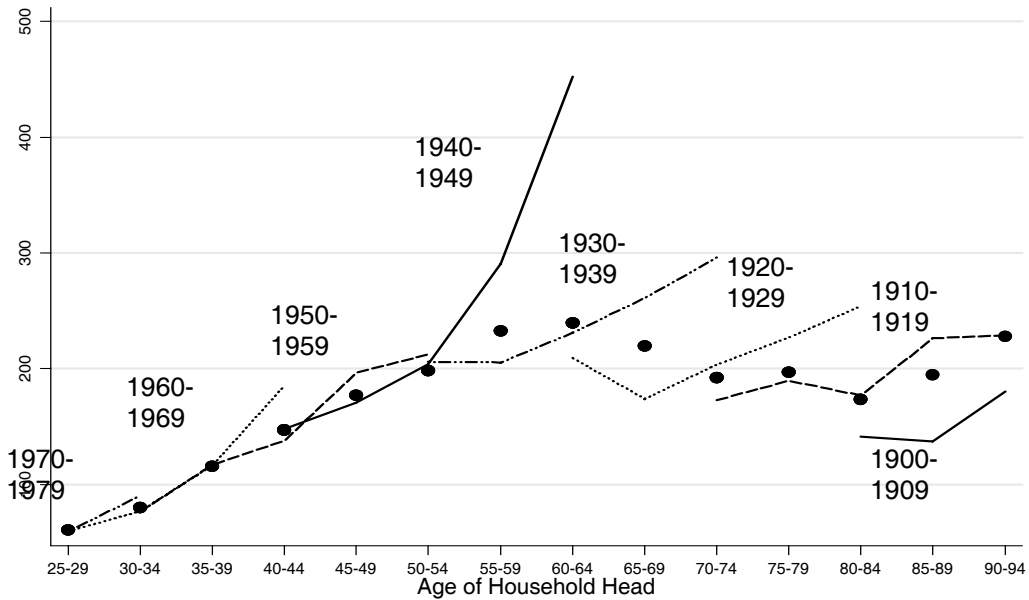
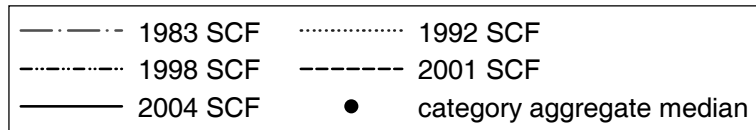
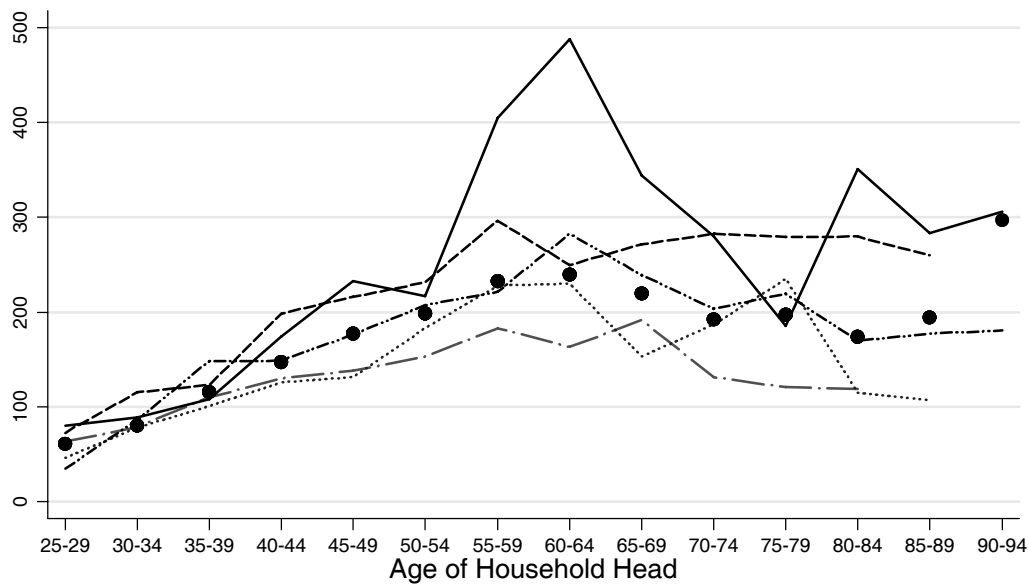
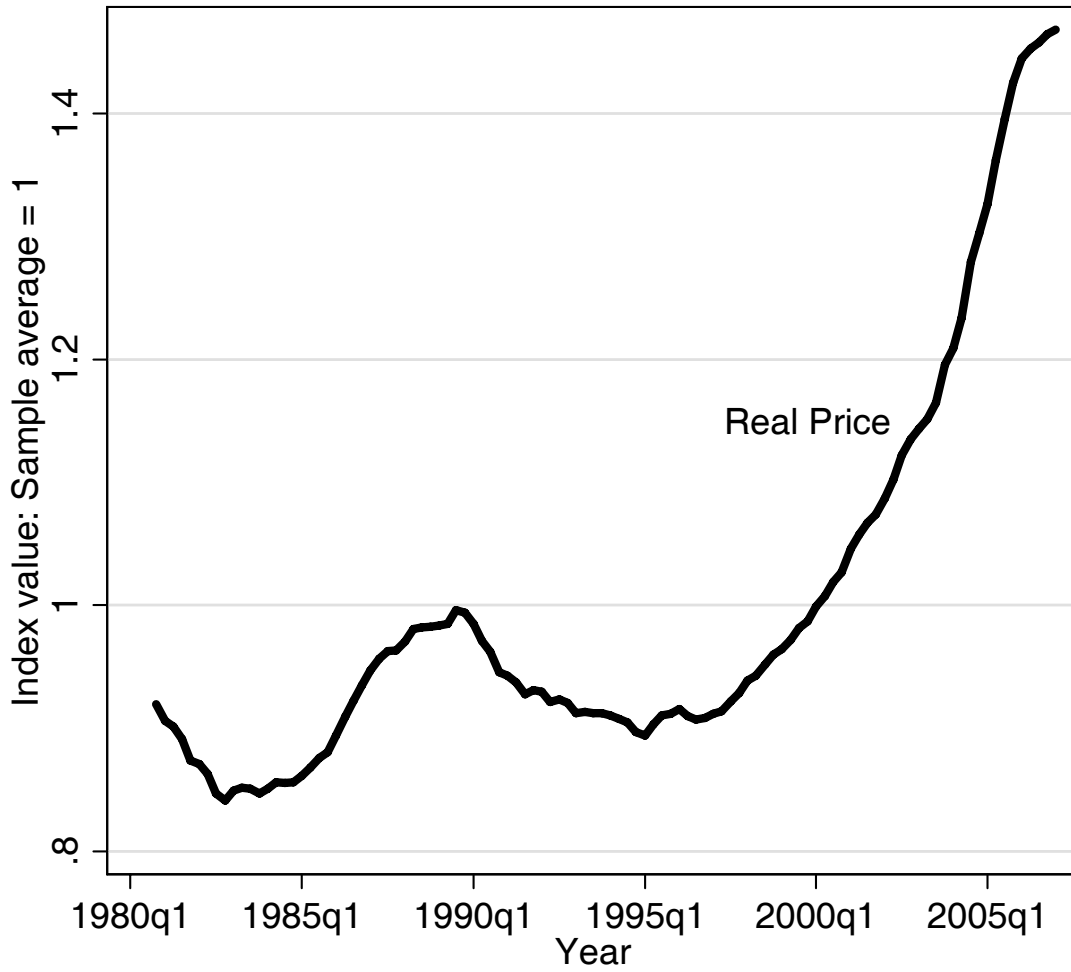


Figure 1B: Median Net Worth by Age and SCF Year



Source: Survey of Consumer Finances 1983-2004. Sample is limited to home owners with positive net worth. We exclude age x cohort or age x SCF year cells with fewer than 11 observations. Values are in thousands of 2004 dollars.

Figure 2: Real House Price Index: 1980:1 – 2007:1



Notes: Source: OFHEO Conventional Mortgage House Price Index; BLS CPI-All Urban Consumers. The index is normalized so that the average over the sample period equals one.

Figure 3A: Median Home Equity by Age and Birth Cohort

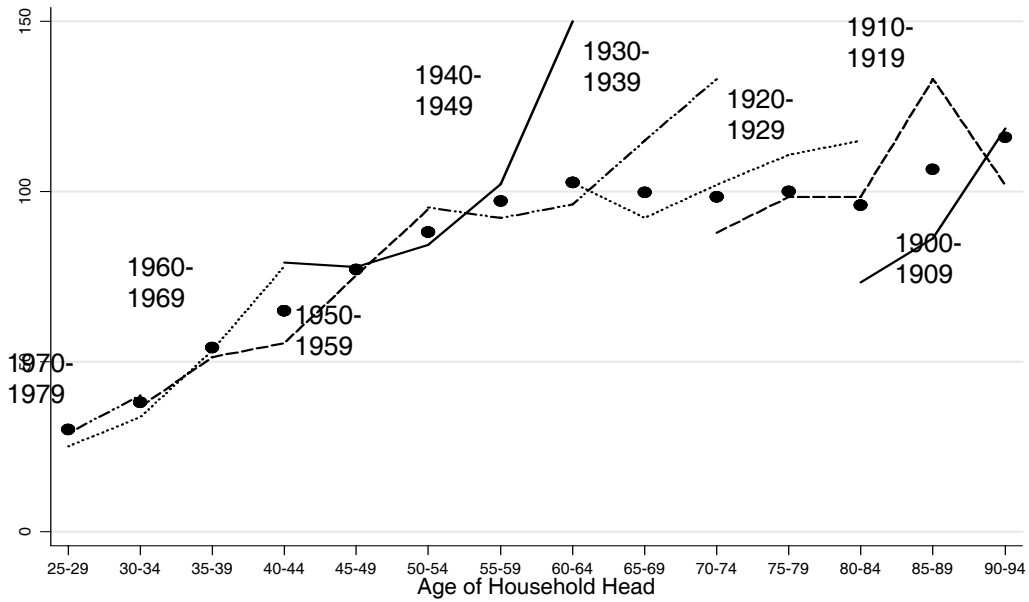
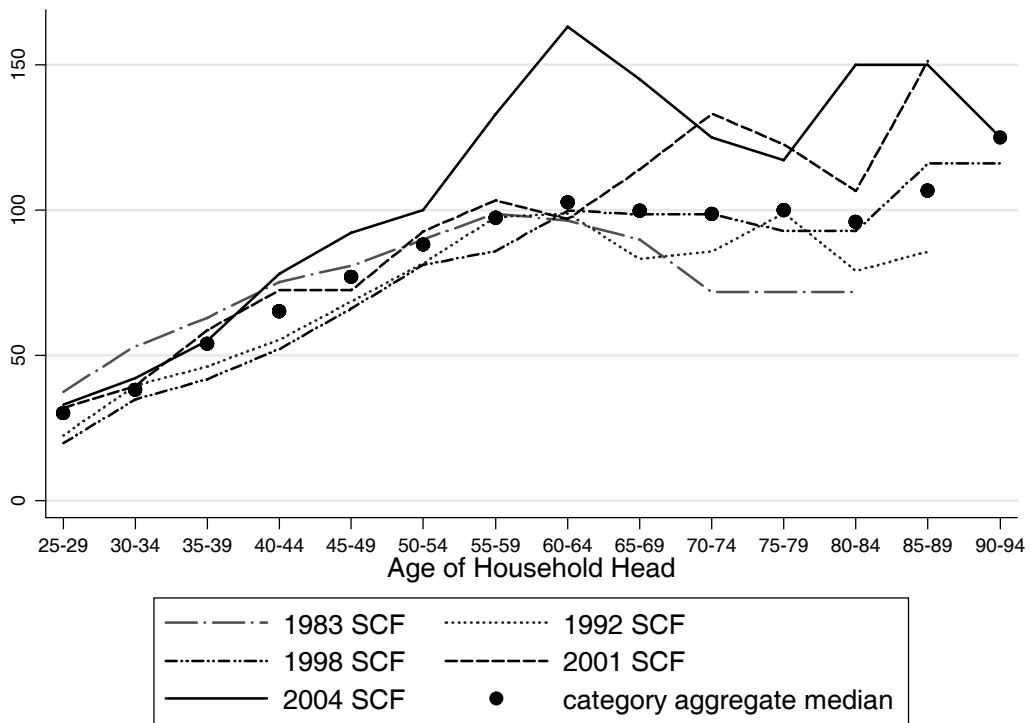
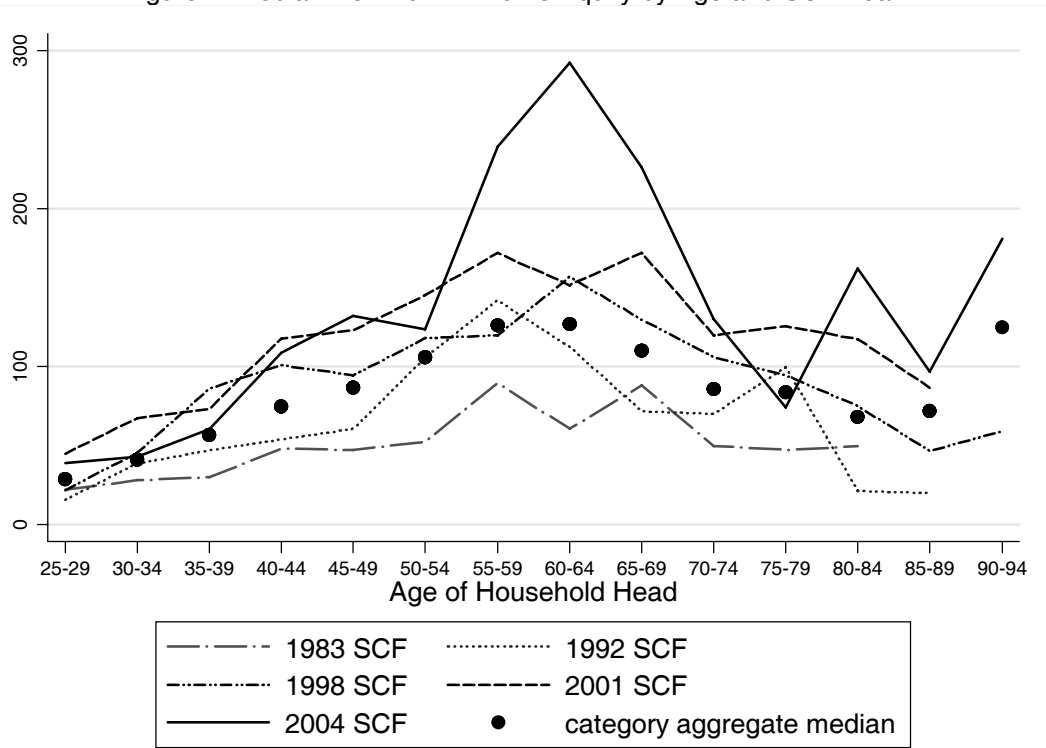


Figure 3B: Median Home Equity by Age and SCF Year



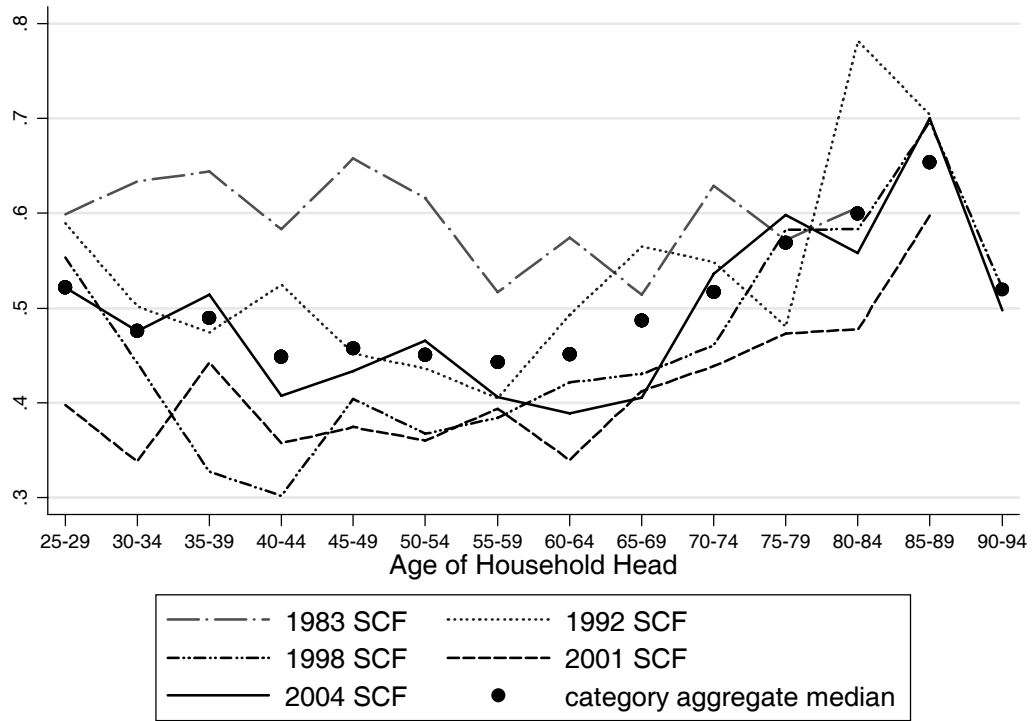
Source: See Figure 1. Sample is limited to home owners with positive home equity and positive net worth.

Figure 4: Median Net Worth – Home Equity by Age and SCF Year



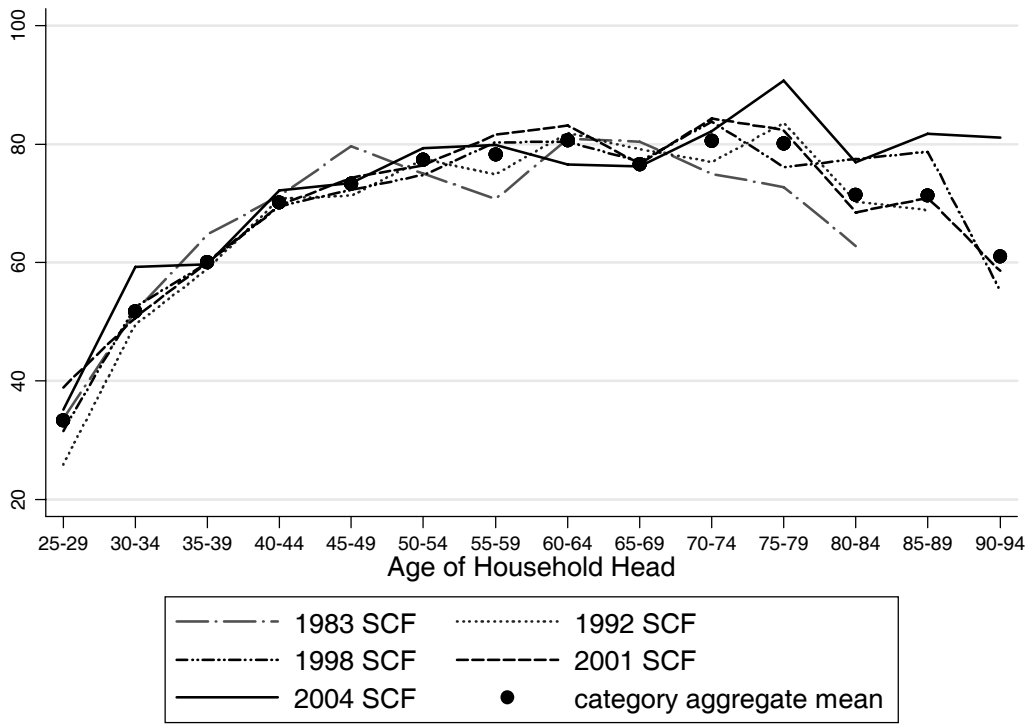
Source: See Figure 1. Sample is limited to home owners with positive net worth and home equity, and with $0 < \text{home equity}/\text{net worth} < 1$.

Figure 5: Median Ratio of Home Equity to Total Net Worth by Age and SCF Year



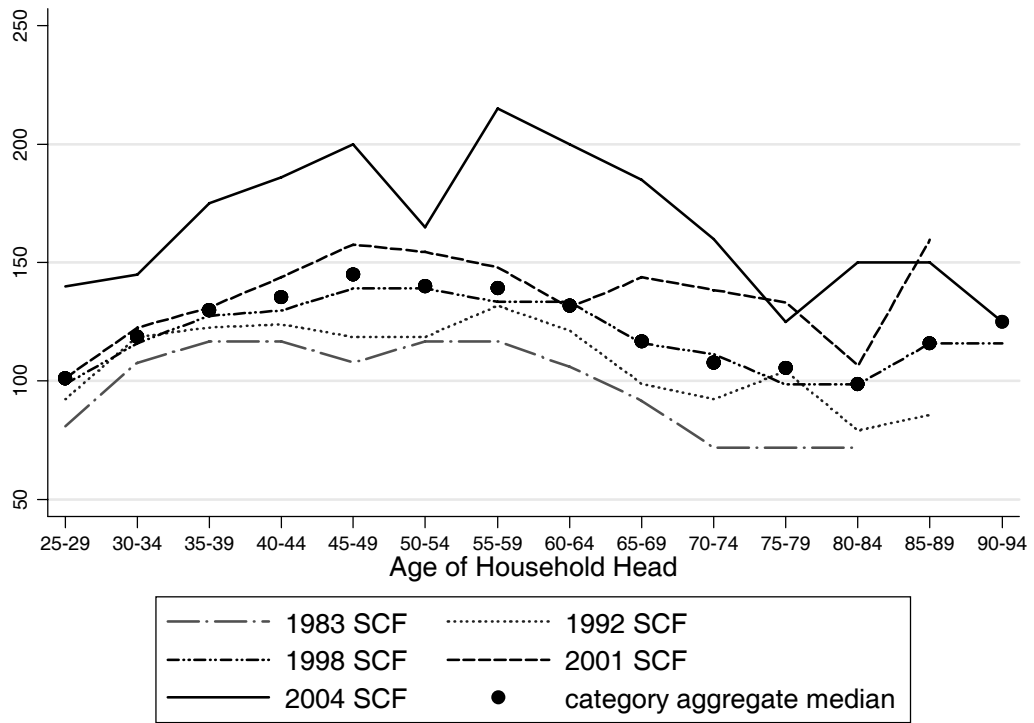
Source: See Figure 1. Sample is limited to home owners with positive net worth and home equity, and with $0 < \text{home equity}/\text{net worth} < 1$.

Figure 6: Percent Homeowners by Age and SCF Year



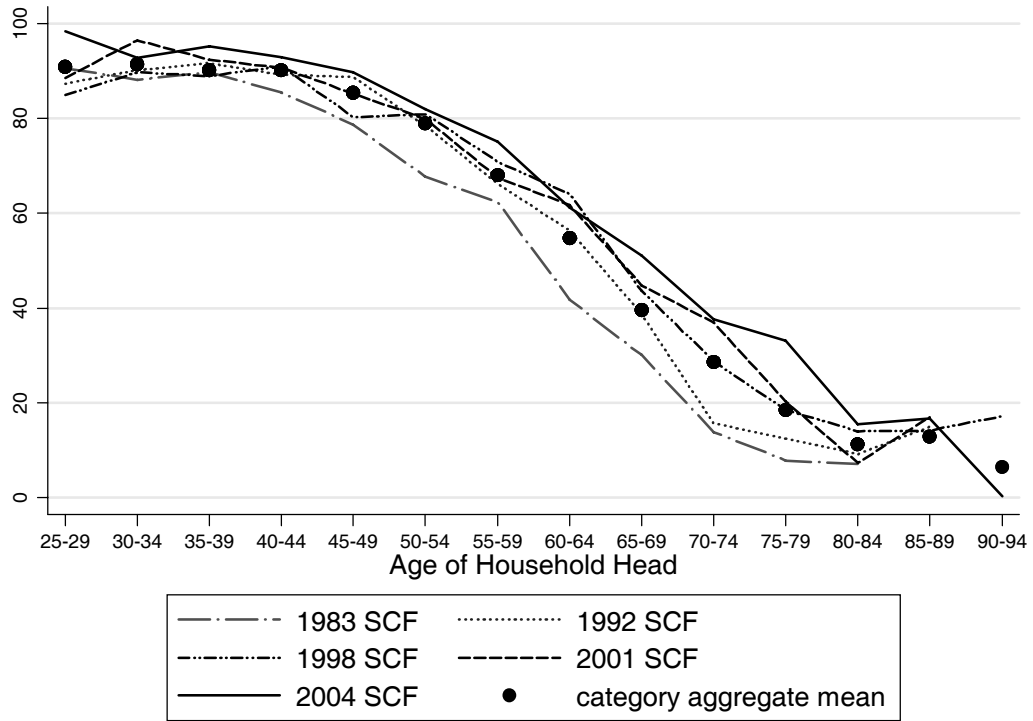
Source: See Figure 1.

Figure 7: Median Value of the Primary Residence by Age and SCF Year



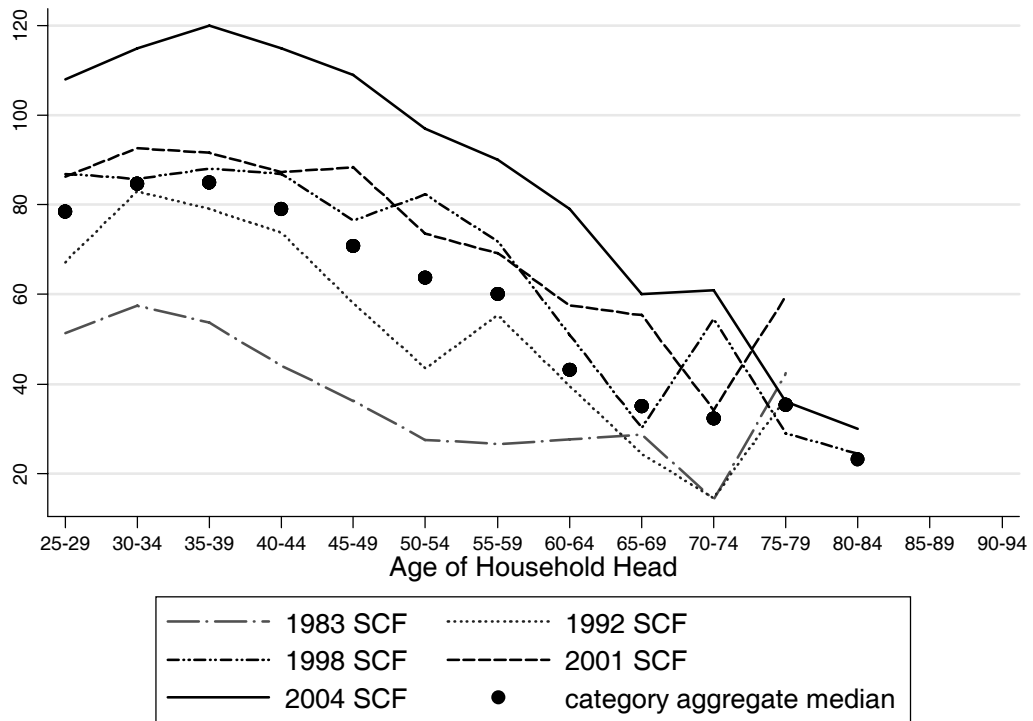
Source: See Figure 1. Sample is limited to home owners.

Figure 8: Percent of Households with Any Housing Debt by Age and SCF Year



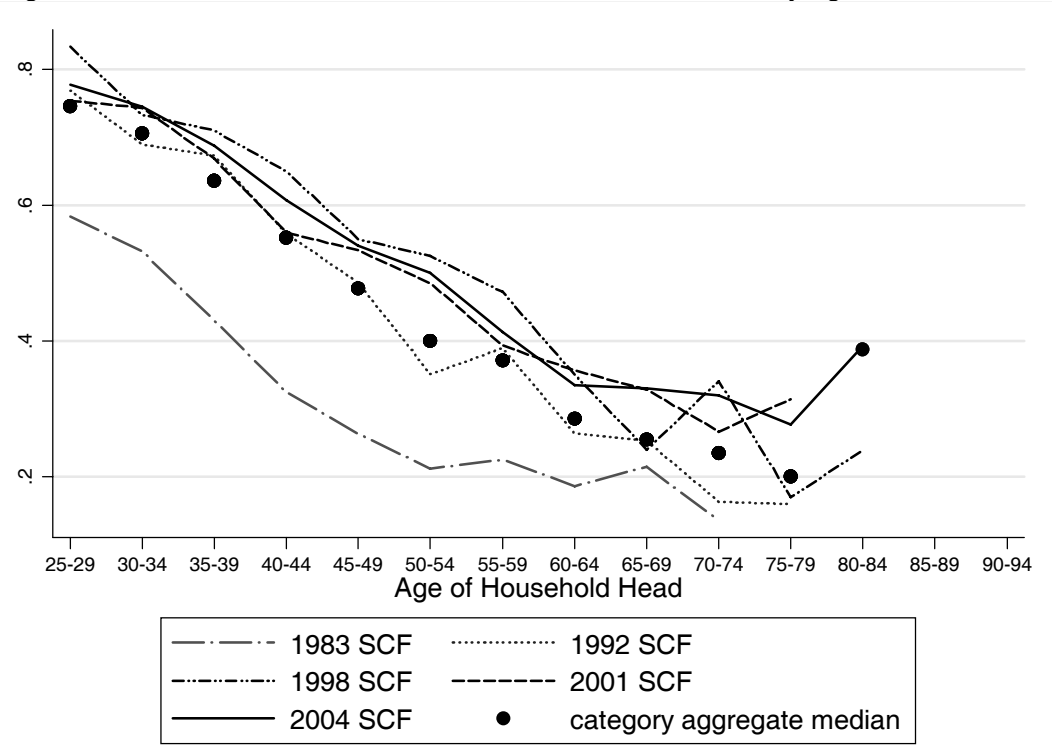
Source: See Figure 1. Sample is limited to home owners.

Figure 9: Total Housing Debt for Households with Any Housing Debt by Age and SCF Year



Source: See Figure 1. Sample is limited to home owners with any housing debt.

Figure 10: Median Ratio of Home Secured Loans to Home Value by Age and SCF Year



Source: See Figure 1. Sample is limited to home owners with positive primary residence debt.

Figure 11A: Median Value of (Assets – Primary Residence Value) by Age and SCF Year

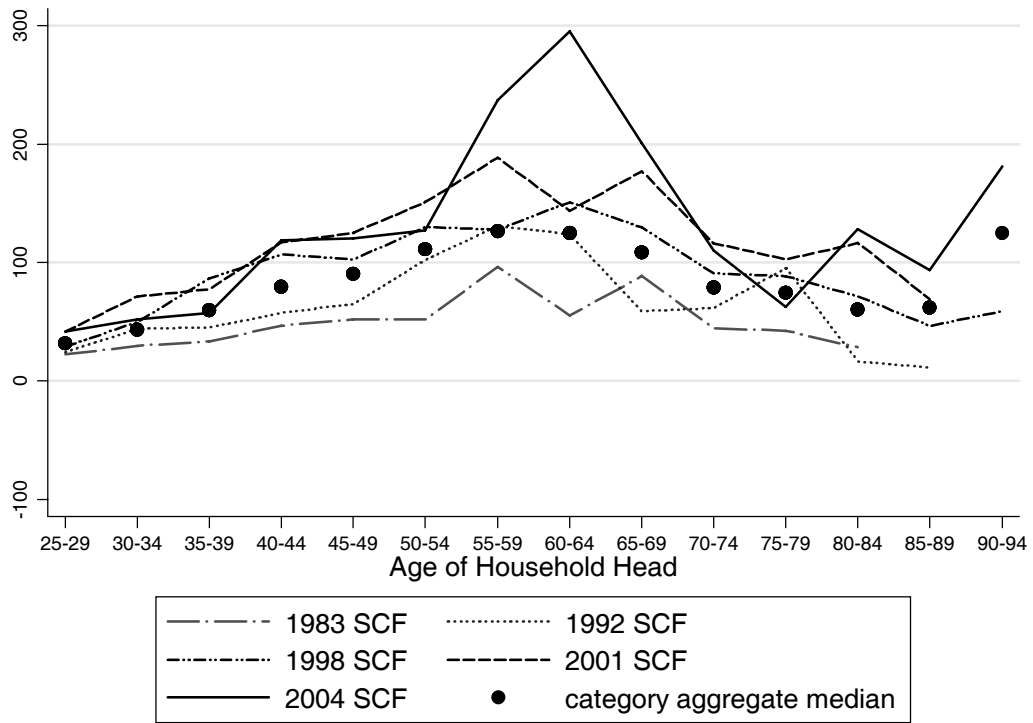
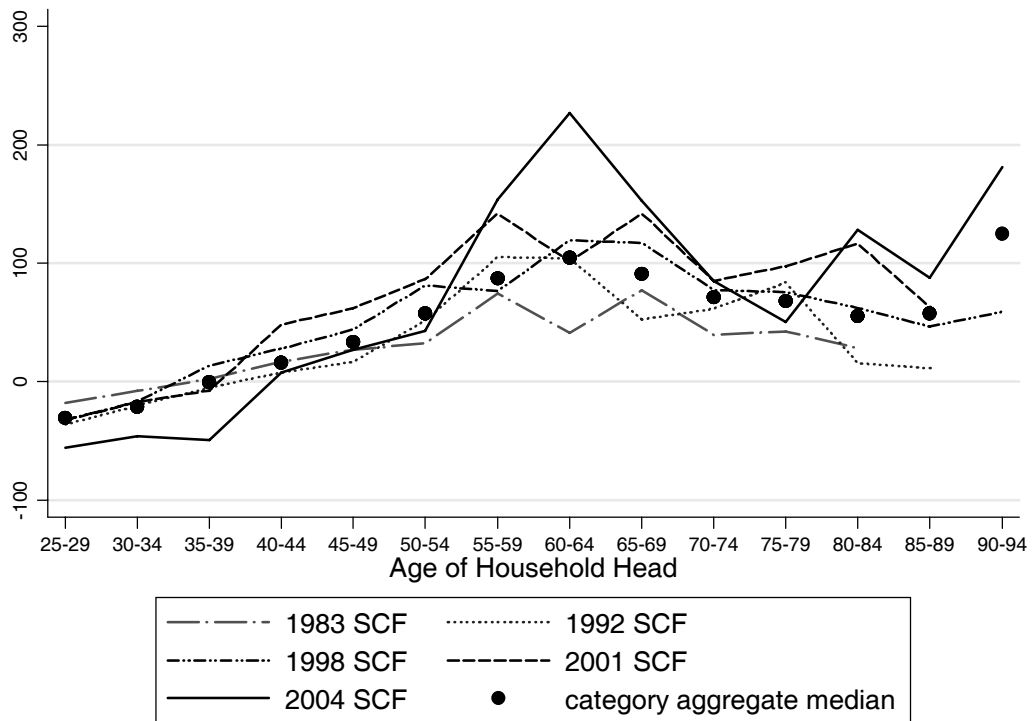
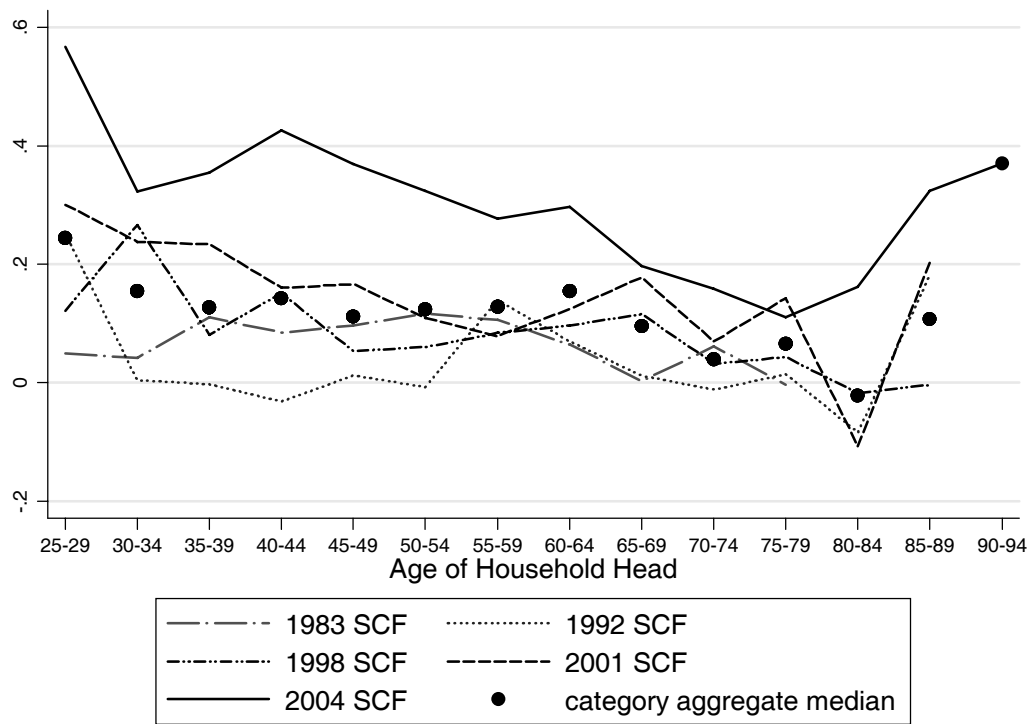


Figure 11B: Median Value of (Assets – Primary Residence Value – Primary Residence Debt) by Age and SCF Year



Source: See Figure 1. Sample is limited to home owners.

Figure 12: Median Ratio of Capital Gains and Losses on Homes to Total Home Equity by Age and SCF Year



Source: See Figure 1. Sample is limited to home owners who acquired homes after 1966 and have positive home equity.