THE WEALTH OF OLDER AMERICANS AND THE SUB-PRIME DEBACLE

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Abstract

This study explores the consequences of the housing price bubble and its collapse for the wealth of older households. We utilize micro survey data to follow the rise in home values to 2007, observing which households enjoyed home price appreciation and how they responded in terms of equity withdrawal. We then use the SCF survey data on wealth holdings from 2007 in combination with national price indexes to simulate the magnitude and distribution of wealth loss from the 2008-2009 financial crisis. The collapse of the housing market triggered a broad decline of asset prices that greatly reduced the wealth of all households. While older households mitigated their real estate and equity losses with relatively stable fixed-value assets and pension programs, no demographic group was left unscathed.

Prior to the financial crisis, our study and others had concluded that the current baby-boom cohort of near retirees were surprisingly well-prepared for retirement compared with similarly aged households over the past quarter century. Unless there is a strong recovery of asset values in the next few years, that favorable assessment is no longer true.

Introduction

In recent years a substantial number of studies have addressed the adequacy of the baby-boom generation's preparation for retirement. In particular, are they better off in terms of retirement wealth than prior cohorts of retirees? The general conclusion has been that the wealth accumulation of the boomers is equal to or greater than that of earlier cohorts.[2] That finding is surprising in light of the repeated observation that American households are saving far less than in the past. However, a quick glance at the national wealth statistics of the Flow of Funds Accounts (FoFs) provides an immediate reconciliation because it highlights the extraordinary capital gains that were generated over the period covered by the studies. As illustrated in Figure 1, the past two decades stand out for the magnitude of capital gains in real estate and equity holdings that have been more than enough to offset the decline in household saving rates and pushed the aggregate wealth-income ratio to record high levels in 2006. The baby-boom generation was the primary beneficiary of that surge in asset prices.

However, all of this changed in 2008 when the bursting of the housing price bubble and the catastrophic implosion of the sub-prime mortgage market triggered a widespread financial crisis that destroyed large portions of household wealth. The FoFs report a $13 trillion (15 percent) loss of household wealth between the peak of mid-2007

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[2] Studies undertaken prior to 2003 are summarized in CBO (2003). More recent reports that focus on a comparison with prior age cohorts are those of Sinai and Souleles (2007) and Wolff (2007). A different perspective is evident in Munnell and Soto (2005) and Love and others (2008), where the focus is on a comparison of pre- and post-retirement income, or the "replacement rate." Finally, a few other studies, such as Scholz and Seshadri (2008), have sought to determine if the accumulation of retirement wealth is consistent with optimal saving patterns obtained from a life-cycle model.

and March 2009; and, as shown in Figure 1, the wealth-income ratio has basically fallen back to the levels of the early 1990s.

The primary purpose of this study is to explore the consequences of the housing price bubble and its collapse for the wealth of older households. Which households experienced a large rise in home values and how did they respond? Using longitudinal data from the Panel Study of Income Dynamics (PSID), we can follow the rise in home values to 2006 as well as the mortgage financing decisions of aged and near-aged households.[3] The *Survey of Consumer Finances* (SCF) does not have a panel dimension, but it has included a set of questions about households' housing finance decisions in each wave of the survey since 1995, and its information is as recent as mid-2007. Thus, we have information on which households enjoyed large home price appreciation and how they responded to this appreciation. While we do not have direct observation of the extent of wealth loss in the 2008 crisis, we can use the distribution of wealth and its components in the above surveys together with national measures of average asset price changes to simulate the likely magnitude of loss and its distribution among major socioeconomic groups.

We focus first on the aggregate measures of the rise in home values and changes in housing finance and the extent to which those changes are captured in the micro survey data. In the second section, we explore the determinants of mortgage refinancings and the extraction of home equity. The analysis is largely based on the answers to a series of questions in the various waves of the SCF and PSID. In the third section, we focus more broadly on the overall wealth position of older households and the effects of the collapse of housing and asset prices more generally.

Macro to Micro

The residential housing market has undergone a remarkable transformation over the past two decades. The real price of homes – adjusted for general inflation – was

[3] We initially planned to make use of the *Health and Retirement Survey*, but until 2008, it only collected information on the value of mortgages with no questions about refinancing or equity withdrawal. The 2008 wave has an expanded set of questions revolving around the impacts of the mortgage crisis.

largely unchanged throughout the 1980s and the first half the 1990s, but then shot up by 60 percent between 1995 and the peak of 2006. With the bursting of the asset price bubble in 2007 and the resulting financial crisis, home prices have fallen back by an average of 10-15 percent at the national level. The mortgage market also changed in important ways. Adjustable rate mortgages, aimed at shifting the balance of interest-rate risk between lender and borrower, were introduced in 1982. The steady decline in inflation and nominal interest rates from their historical peaks in the early 1980s resulted in political pressures to eliminate mortgage prepayment penalties. The option to renegotiate the mortgage contract has become standard practice for the conforming mortgages held by federally sponsored agencies.[4] Declining interest rates, rising home values, innovations that reduced the costs of mortgage transactions, and the reduced frequency of prepayment penalties all contributed to the growth in mortgage refinancings. By 2000, about half of all mortgage borrowers had refinanced at least once after their initial purchase.[5] However, interest savings were not the sole motivation for refinancing; during the period of rapid increases in home values, many households could not resist the temptation to increase the size of the mortgage and use it as a vehicle to remove some of the accumulated home equity. Home equity lines of credit (HELOCs) also became popular beginning in the mid-1980s as a response to the termination of tax deductions for consumer interest and as an alternative means of extracting equity.

National trends in home prices are available from two major statistical sources. The home price index of the Federal Housing Finance Agency (FHFA) uses data on repeat sales and refinancings of single-family homes obtained from the records of the federally-sponsored enterprises for conforming mortgages transactions. The S&P Case-Shiller index is based on repeat sales of homes as recorded in local deed records of all residential properties. The two indexes differ in methodology, geographical coverage,

[4] The absence of prepayment penalties is standard for conforming mortgages securitized through the federally sponsored agencies, but prepayment penalties often applied to sub-prime and alt-A mortgages that had reduced rates in the early years of the contract.

[5] Canner and others (2002).

and type of properties that are included.[6] However, they both show similar long-run trends in home prices with the S&P Case-Shiller index showing a somewhat larger increase in prices during the boom and a larger decline in the post-2007 collapse. In Figure 2, we compare these measures of home price change with two indexes constructed from the longitudinal data of the HRS and the PSID. In both cases, we computed the change in the self-reported home price for households who did not move between two consecutive waves of the survey, and chained them together to form a price index. The data for the PSID begins in 1985 and is available on an annual basis through 1997 and biennial until 2005. The data for the HRS is biennial between 1992 and 2006 for the 1931-1941 birth cohort. The PSID index, in particular, closely follows the FHFA index, whereas the increases in the HRS survey are about 90 percent of those reported in the FHFA index and three-quarters of the S&P measure. For the SCF, we can only report the change in the mean home price between successive waves, but it also seems to capture the pattern of price change.

Two papers by Greenspan and Kennedy (2005, 2008) document the growth in mortgage refinancing and the extraction of home equity from an aggregate or macroeconomic perspective. Their estimate of the volume of mortgage refinancing is shown in the top panel of Figure 3. Refinancings ranged between $0.2 trillion and $1 trillion in the 1990s when interest rates fluctuated in the 7-8 percent range, down from the 10 percent levels of the late 1980s. But activity exploded in 2002-2004 when mortgage interest rates dropped below 6 percent, reaching a peak of $3 trillion in 2003. The lower panel reports on the extraction of home equity both through home equity loans and increases in the size of the mortgage at the time of refinancing.[7] Slightly more than half of the funds have been withdrawn in the form of home equity loans and the rest is associated with the refinancing of the mortgage. Equity withdrawal has grown in line with refinancings, but it shows a more consistent pattern of growth right up to the bursting of the housing bubble in 2007, rising from less than 1 percent of household

[6] The methodological issues are discussed in Rappaport (2007).

[7] We exclude equity extractions that take place at the time of a home sale. At the micro survey level, we have no means of matching the mortgages of the buyer and the seller.

disposable income in the early 1990s to more than 5 percent in 2004-2006. Both forms of withdrawal have nearly stopped during the financial crisis.

If the survey data show a similar pattern in home equity withdrawal, we can obtain additional information on the factors driving this behavior. The SCF has asked a series of questions about mortgage refinancing and equity withdrawal beginning in 1995. Information is obtained on the date of the last loan origination or refinancing and the outstanding balance. Respondents are also asked about equity withdrawals, but until 2004, the survey did not specifically inquire about the magnitude of increase in the loan balances. A direct question about the amount was added in 2004, but only for the first mortgage. The frequency of refinancing and equity withdrawal is shown in Table 1 for the three-year period before each survey, distinguishing between households with a head under and over age 50. The survey conforms to the national data in indicating a sharp rise of refinancing activity after 2001. At the peak of the refinancing in 2001-2004, 20 percent of homeowners refinanced their mortgage. Similarly, equity withdrawal became an increasingly common phenomenon and did not recede after 2004. Refinancing and equity withdrawal are more common among younger households, but conditional on having debt, older households are more likely to make use of the opportunity to withdraw equity. This seems to be particularly true if the purpose was to finance consumption.

Estimates of the dollar magnitude of equity withdrawal and its uses are reported in Table 2. The public use version of the SCF aggregates some of the detailed uses; but the division of funds among consumption and consumer debt repayment, home improvements, and other investments is comparable with a Federal Reserve sponsored survey for 2001-2002 (Canner and others, 2002). Equity withdrawal (three-year total) has averaged about 4 percent of home value in the recent surveys. The largest single use is the financing of home improvements, and we cannot fully distinguish between consumption and debt consolidation. Interestingly, households with a head over age 50 are slightly less likely to withdraw equity when it is measured as a percent of their housing wealth, but there is no consistent difference in the purposes for which the funds

are withdrawn.[8] The withdrawal of home equity for purposes of consumption and debt consolidation averages between 1.0 and 1.5 percent of housing wealth over the three-year sub-periods – or less that 0.5 percent on an annual basis – with no consistent difference across age groups.

The PSID provides an alternative source of some information on home refinancing. Since 1996, it has asked respondents about the outstanding value of the first two mortgages, the current interest rate, and whether they refinanced. In addition, the panel dimension of the survey makes it possible to determine the change in the interest rate of refinanced loans from 1996 forward and the amount of the change in the mortgage balance. Thus, we can use the change in the loan value to infer whether the household withdrew equity. We define a change in the reported mortgage value of more than $10,000 (in a two-year period) as indicating equity withdrawal. As shown in Table 3, the PSID yields estimates of the number of households that refinanced their mortgage or extracted equity that are very similar to those of the SCF. However, a substantial number of households report a major change in their mortgage value despite saying that they did not refinance since the prior wave of the survey.[9] Thus, the change in the mortgage between successive waves may be an unreliable measure of the extracted equity. The PSID, however, does show a substantial rise in the probability of refinancing and equity withdrawal after 2001, and conditional on having a mortgage, older and younger households seem equally likely to withdraw equity.

Modeling Equity Withdrawal

Hurst and Stafford (2004) is one of the first studies that used micro survey data to model the decision to refinance the mortgage and/or extract equity. Their analysis was

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[8] The estimates of equity withdrawal probably have an upward bias because the original focus was on the amount of the mortgage and the date that it was originated or refinanced. In 2004, a question was added to the SCF to inquire about the magnitude of additional debt associated with refinanced first mortgages. The estimated increase was 20 percent of the new balance. We scaled down the estimates of the equity withdrawal for first mortgages in earlier waves of the survey. Yet, we still use the balance on new second mortgages and equity loans as the estimate of additional equity for those transactions.

[9] Our inspection of the individual responses does indicate a high degree of time inconsistency in that the reported mortgage amount is highly variable across serial waves of the survey.

based on the 1989-1996 waves of the PSID, and thus preceded much of the more recent refinancing boom. The conceptual model incorporated both the financial motivation for refinancing at a lower interest rate to save on future mortgage payments and a consumption-smoothing motivation in which liquidity-constrained households use equity extraction as part of the adjustment to unexpected shocks.[10] They used the present value of the future interest saving to measure the financial motivation for refinancing and unemployment as the income shock and interacted the shock with the household's holdings of liquid assets. Households with high levels of liquidity would not need to withdraw housing equity to smooth consumption. They found statistical support in their data set for both the financial motivation and the hypothesis that liquidity-constrained households would be more likely to utilize equity withdraw in responding to spells of unemployment.

Canner and others (2002) used data from a special version of the *Surveys of Consumers* in early 2002 that obtained detailed information on mortgage refinancing and the extent of equity withdrawal.[11] They found that over 90 percent of households that refinanced did so to lower the interest rate, and that the reduction averaged about two percentage points. About half of the refinancers withdrew equity, and used the funds in roughly equal proportions for debt consolidation, home improvements, consumption, and other investments. Munnell and Soto (2008) use the 2004 SCF to explore characteristics of households that withdrew equity from their home and the factors that influenced their decisions to consume the funds.[12] They conclude that households extracted about 19 percent and consumed 6 percent of the rise in home values between 2001 and 2004. However, those values represent a much smaller percentage of housing wealth, and given that the increase in consumption was only one-third of the withdrawn equity, the effect on consumption operating through equity withdrawal is quite small. Their estimate is

[10] Many authors have explored the financial motivation for and optimal timing of refinancing. A recent paper with an extensive bibliography is Agarwal and others (2008).

[11] The Surveys of Consumers are based on monthly telephone interviews conducted by the Survey Research Center of the University of Michigan.

[12] The SCF has no information on the prior mortgage, and therefore cannot provide direct information on the financial benefits of refinancing.

consistent with the findings of Canner and others, but far below the effect of an increase in housing wealth on consumption as reported in some macroeconomic studies.[13]

We have extended the above empirical studies in two respects. First, the questions about mortgage refinancing have been continued in the PSID after the 1996 wave, which was the source of the data for Hurst and Stafford. Thus, we have four additional waves extending through 2005. Second, the questions on mortgage refinancing have been a regular part of the SCF since 1995 and we can expand the analysis of Munnell and Soto to five waves covering the years of 1995 to 2007.

The regression estimates of our version of the Hurst and Stafford model are shown in Table 4. The number of observations is expanded from the original 1,400 to 8,900.[14] The present value of the wealth gain from a refinancing is computed using the outstanding mortgage balance and the interest rate reported in the prior wave of the survey together with the lowest market rate in the intervening period. We also included the same set of demographic and income controls, but do not report them to conserve space. The first column shows the results of estimating a dprobit regression on the probability of refinancing the mortgage. The decision is dominated by the potential wealth gain (interest saving), which is highly significant. In addition, the probability of refinancing is positively related to the loan-to-value ratio unless it is very high. Finally, we included shift terms for each sub-period, and they indicate that the probability of refinancing was high in the early 1990s, when there was a major decline in interest rates, and in the years since 2001.

The wealth gain from refinancing and the loan-to-value ratio are also strongly correlated with the probability that the homeowners will extract some of their home equity. The PSID does not directly ask about equity extraction, but we computed it as a change in excess of $10,000 and more than 10% of the mortgage balance between two

[13] A recent example of the macroeconomic literature with additional references is Carroll and others (2006). However, as discussed below, those findings have been challenged by several more recent studies.

[14] The number of observations was reduced by our efforts to filter the data and exclude implausible extreme values. For further details, see Bosworth and Smart (2009).

survey waves. The marginal effect of the interest rate gain on the probability of equity withdraw is about half as large as that for refinancing and the effect of high loan-to-value ratios is uniformly negative. Also, consistent with Hurst and Stafford, households with high levels of liquid assets are less likely to withdraw equity. However, we do not find a significant role for unemployment as a measure of the negative income shocks that the household might seek to offset with equity withdraw. The lack of a significant role for the unemployment rate remains true even if we interact it with liquid assets, as in the Hurst and Stafford study. The final column shows the effect of making the decision to withdraw equity conditional on the decision to refinance. Knowledge of refinancing greatly increases the predictability of the withdrawal decision, but it has only small effects on the other variables. Lower interest rates, in particular, appear to encourage households to withdraw equity, in addition to the benefits to refinancing. Finally, we include age and a special categorical indicator of households with a head over age 50, but neither is statistically significant.

The SCF does not collect information on the prior interest rate and therefore we cannot use that survey to examine the financial motive for refinancing; however, the survey does ask about current house value and the original purchase price. It also provides extensive information on other assets and liabilities. Furthermore, the SCF includes some interesting questions about attitudes toward risk and credit constraints that were also used by Munnell and Soto (2008). People who said they were unwilling to take any risk are characterized as risk-averse. If they had been turned down for credit in the prior five years, they are classified as credit-constrained. Long-term planners are those who indicate a planning horizon over five years.

The basic dprobit results for refinancing and equity withdrawal using the SCF data are reported in Table 5. Our results for a pooled data set based on the five waves of the survey beginning with 1995 are similar to those of Munnell and Soto, with some differences in specification. Rapid home price appreciation increases the probability of equity withdrawal, but it has a small effect on the refinancing decision. The probabilities of refinance and equity withdrawal are both positively correlated with the loan-to-value ratio until it reaches levels of 0.9 or above, but the dominant effect is on the refinance decision. We find a strong negative correlation between large holdings of liquid assets

and equity withdrawal – a result that is consistent with the hypothesis of Hurst and Stafford. Furthermore, liquid asset holdings have no apparent effect on the decision to refinance. Risk-averse households are less likely to refinance and less likely to withdraw equity. Those who are credit-constrained are less likely to refinance but more likely to withdraw equity, and interestingly, those heads of household with a long planning horizon or a college education are more likely to refinance but less likely to withdraw equity. However, unlike the results with the PSID, older households (age 50-plus) are less likely to refinance and less likely to withdraw equity. We find no statistically significant role for unemployment as a measure of negative income shocks, but there is a positive correlation between equity withdrawal and large anticipated future medical or education expenses.[15] In addition, the coefficients on the period fixed effects indicate a steadily growing propensity to withdraw home equity throughout the period of 1992 to 2007.

In summary, the regression analysis indicates that home price appreciation and interest rate decisions have played key roles in the decisions to refinance existing mortgages and to withdraw home equity. Thus, much of the refinancing activity has been a rational response to opportunities to reduce mortgage interest costs. While we do not have a direct estimate of consumption expenditures in the SCF or the PSID, the responses from the SCF suggest that it accounts for less than a third of home equity extraction. On that basis, home equity extraction has had a relatively minor influence on consumption.

Retirement Wealth

While housing accounts for a large portion of the increase in the net wealth of households in recent decades, it is only part of total household wealth, and the collapse of the secondary market for sub-prime mortgages triggered a financial crisis that extended far beyond housing. Thus, an analysis of the full effects to the run-up of asset prices and their collapse needs to incorporate a broader measure of wealth than just housing.

[15] The SCF does ask about large current education and medical expenses, but only for those who had a loan increase.

Using data from eight waves of the SCF extending over a 25-year span preceding the financial crisis, we find that American families had experienced large gains in their real wealth positions, and the gains of older Americans exceeded those of younger families by a significant amount. A summary of wealth holdings by major components for families with a head over and under age 50 is shown in Figure 4.[16] While older households have always been considerably wealthier than younger households, the differences have steadily widened since the early 1980s. Older households own more valuable homes and they have greater progress in paying off their mortgages. However, the higher wealth holdings and relative gains over the past quarter century are largely attributable to their greater holding of financial assets – particularly those subject to capital gains – not housing.[17] The home values of older households and younger households have grown at very similar rates. Older households also have less mortgage and other debt, but the differences across age groups have narrowed considerably.

The percentage gains in wealth also have consistently exceeded the gains in income for all age groups, leading to a substantial rise in wealth-income ratios. The wealth-income ratio for various age groups is shown in Figure 5 for the 1989-2007 period. While the ratios for recent surveys are consistently higher than those of 1989, the differences are much larger for older households. Households with a head aged 50-61 experienced an increase to 6.7 times income in 2007 compared with 4.9 in 1989. In contrast, households with a head aged 30-39 had a rise in the ratio from 2.0 to 2.4. based on more detailed calculations that are not reported herein; the greater gains among older households can be traced to the larger role of assets subject to capital gains in their wealth portfolios.

The wealth estimates of the SCF are very consistent with the aggregate measures of wealth reported in the FoFs – see Appendix Table A1 – and the survey suggests that

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[16] The data were initially computed by 10-year brackets for those under age 50 and for ages 50-61 and 62 and over. The conclusions are not materially different from those reported above.

[17] The category of financial assets subject to capital gains includes equities, mutual funds, real estate, equity in own business, defined-contribution retirement accounts, and IRAs. Fixed value assets include savings, checking and money market accounts, and bonds, all net of credit card and other consumer debt.

the wealth gains were widespread across household of various socioeconomic characteristics. However, if we control for levels of educational attainment, much of the *relative* wealth gains of older households disappears. Between 1983 and 2007, the proportion of household heads over age 50 who had a college degree more than doubled, while the increase for household heads below the age of 50 was a more modest 30 percent. The levels of wealth by age and educational attainment are shown in the first four columns of the top panel of Table 6 for the 1983-2007 period. Because college graduates have much higher levels of income and wealth, the increase in their representation among older households can account for nearly all of the relative wealth gains. Younger workers with less than a high school education and high school graduates over age 50 stand out with low rates of net wealth gain, largely because of major increases in consumer debt balances.[18]

We obtain similar effects if we divide each wave of the survey into income terciles, as shown in the bottom panel of Table 6. Again, the evidence of large relative wealth gains for older households is greatly reduced. Because of the strong association between education and income, the two controls yield similar results, but low-income households below age 50 stand out for a particularly low rate of wealth accumulation. Although we do not report the calculations in detail, we also computed average incomes by age, controlling for education and relative position in the income distribution. Those results closely mirror those for wealth, suggesting that the effects of education on wealth accumulation have largely operated through increases in household incomes.

Our findings for the wealth position of older households are very similar to earlier studies, such as CBO (2003), Wolff (2007), and Sinai and Souleles (2007), differing only in our use of more recent waves of the SCF. They too report substantial gains in the wealth position of older age cohorts. However, much has changed since the last SCF in 2007. The collapse of housing prices and equity prices have destroyed a large portion of household wealth holdings. Unfortunately, a comprehensive survey of post-crisis wealth

[18] The SCF is a small and very heterogeneous survey and there is some concern about the sample size for subgroups of the population, but these patterns are evident in the last three waves of the survey.

holdings will not be available until 2011. However, we know from previous work (Bosworth and Smart, 2008) that the wealth components of the SCF line up very closely at the aggregate level with the wealth estimates of the FoFs. Therefore, we use the estimates of price changes for detailed categories of wealth from the reconciliation tables of the FoFs for the period between the middle of 2007 (the last SCF) and the second quarter of 2009 to adjust the individual SCF estimates of net worth. We have no means of adjusting for compositional changes in portfolio holdings after mid-2007, and we can only use national averages for changes in the prices of housing and other assets categories.[19] However, this should not be a serious problem as long as we restrict the comparisons to national averages of socioeconomic groups.

The projections to early 2009 are shown in the fifth and sixth columns of Table 6. On average, U.S. households have lost a fourth of their wealth between 2007 and 2009. It is also notable that the percentage losses are larger for younger than for older households. The larger loss among younger families is concentrated in housing wealth, which reflects their lower ratio of home equity to value. Thus, a 20 percent loss in home value became a 45 percent loss in home equity. Older households have a larger equity position and that translates into a smaller 30 percent loss of housing wealth. There are no significant differences in the percentage loss in capital-gain and fixed-value assets, but older household benefited from having a higher share of their net worth in fixed-value assets.

The separations by education and income in the lower portion of the table reinforce the finding that the losses have been larger for younger households and that less-educated and lower-income households below age 50 have suffered particularly large declines in wealth. Younger middle-income households show the largest losses, 40 percent, because their wealth holdings are dominated by housing with a low equity share, and reliance on defined-contribution retirement accounts, which also were hard hit by the fall in equity prices.

[19] A recent paper by Rosnick and Baker (2009) uses a similar methodology, but they rely on the 2004 SCF and develop scenarios based on alternative projections of asset price changes. Their projections are much more pessimistic than the results reported here.

These calculations overstate the degree of wealth loss because they exclude the wealth equivalent of employer-provided defined benefit plans and Social Security pensions. Both defined-benefit pensions and expected Social Security wealth were not directly affected by the asset-price meltdown. Social Security is a particularly essential component of retirement wealth for low- and moderate-income households. We have constructed wealth-equivalent estimates for both pension programs. In the case of defined-benefit plans, the SCF does ask respondents about when they expect the pension to start and the expected amount. We used an algorithm of Karen Pence (Gale and Pence, 2006) to estimate the present discounted value of those pensions over the individual's lifetime. However, the SCF provides very little information that we could use to construct lifetime wages, which is the basic input to the computation of Social Security benefits. Fortunately, a recent paper by Mermin, Zedlewski, and Toohey (2008) provides estimates of the present value of Social Security pensions for the 2004 SCF. They first matched lifetime earnings from the Urban Institute's DYNAMSIM3 model to adults in the SCF using a set of demographic and economic characteristics, and those earnings were used to estimate future benefits and their present value.[20] We used the same characteristics to statistically match their estimates for 2004 to the 2007 SCF on the basis that there were no significant changes in Social Security provisions in the interim. We have extended the wealth valuation of defined-benefit pensions back to 1989, but currently have estimates of Social Security wealth only for 2004 and 2007.

The last column of Table 6 restates the estimated percentage wealth losses with defined benefit pensions and Social Security included in the denominator. It greatly reduces the percentage losses for all groups, but it also narrows the differences by age and changes the conclusions about the magnitude of loss by education and income. Both retirement programs represent a major share of total wealth – 15 percent for defined-benefit pensions and 18 percent for Social Security. Furthermore, the importance of Social Security varies inversely with income, representing 40 percent of total wealth for

[20] The DYNASIM3 model is based on a survey sample that includes historical earnings records. The matching characteristics include age, gender, race, education, annual earnings, years worked since age 18, financial assets, homeownership, and pension coverage.

households in the bottom third of the distribution and only 12 percent for those at the top. Defined-benefit pensions are most significant for households in the middle of the distribution because low-income households are unlikely to be enrolled in a pension plan, and higher income households have shifted to defined-contribution plans. Both forms of pension yield slightly higher values for younger households, but that conclusion is sensitive to the discount rate that is used in the calculations. The wealth losses are reduced from an average of 26 percent of net worth to 19 percent of total wealth. Also, the percentage losses are largest for households in the top third of the income distribution and those with a college-educated head because Social Security represents a relatively small share of their total wealth. However, the most striking aspect is the uniformity of the losses across household types. The breadth of the asset price meltdown implies that few households have been immune from its effects.

Finally, the inclusion of housing price changes may overstate the actual loss to households. Several economists have argued that home ownership should be viewed as a hedge against future rent increases, rather than a simple element of household wealth.[21] If homeownership is equivalent to an annuity that adjusts to the cost of future rent payments, fluctuations in its price may not imply equivalent wealth changes. Instead, households that are invested more in housing than they plan to consume over their lifetime will lose from a price decline whereas those that are short – have not yet purchased a home – will gain. Some older households may have a larger investment in their home because they view the home as a protected vehicle for future bequests, as collateral for future loans, or they plan to use the proceeds of a future sale to enroll in assisted living or a nursing home. For such households, the decline in value represents a partial loss of wealth, but in the aggregate, changes in home prices have offsetting effects on the expected future cost of housing services, leaving nothing to spend on non-housing consumption.

We can illustrate the importance of the hedging aspect by re-computing the wealth change in Table 6 after excluding home values. Those results are reported in

[21] Examples are provided by Ortalo-Magne and Rady (2002), Sinai and Souleles (2005), and Buiter (2008).

Table 8. Housing represents about 25 percent of net worth, and while it is larger in absolute amount for those over age 50, the shares are roughly similar. However, because younger households hold a smaller portion of their net worth in equities, their percentage loss between 2007 and 2009 is smaller than shown in Table 6 – 24 versus 30 percent – whereas the percentage loss for older households is very similar in both cases. The bigger difference is in the evaluation of the total wealth loss. As noted previously, lower-income households' wealth largely consists of their house and expected Social Security payments. Thus, the decline in other asset prices is of little consequence, and their total wealth loss is limited to about 10 percent compared with the 14 percent loss reported in Table 6. The loss on non-housing assets is still substantial for upper income groups. Thus, the exclusion of housing reduces the magnitude of apparent loss to low-income families.

However, the exclusion ignores the fact that some households will lose their homes as a result of foreclosure. Clearly, for those households the loss is real. In our projection of the SCF home values, 15 percent of homeowners are estimated to be in a negative equity position in March of 2009 compared with 1 percent in the 2007 survey. This result also seems consistent with contemporaneous survey estimates; a Pew survey in February found that 20 percent of households believed that they were in a negative equity position. The likelihood of a negative equity position is much higher for households under age 50 and those in the middle income category – an incidence of 30 percent. A realistic picture of the losses would seem to be best represented by an average of the results in Tables 6 and 7.

Conclusion

We have used information from a series of household surveys to construct a broader picture of the impact on U.S. households of the rise and fall in home prices and the financial crisis. Encouraged by home price appreciation and advantageous interest rates, households increased their refinancing activity and home equity withdrawal until 2004. While, as a percentage of homeowners, more young households refinanced their mortgage, older households were equally likely to utilize their housing wealth to finance consumption, repay debt, and make home improvements.

However, with the collapse of the housing market, the primary factors driving this equity withdrawal disappeared, and households across the age distribution experienced major wealth losses. Since younger families have a larger share of their net wealth in housing and hold larger mortgages as share of home value, they typically suffered a larger percentage loss in net worth. In contrast, older households were hit harder by the decline in equity prices. Overall, while older households buffered their real estate and equity losses with relatively stable fixed-value assets, no age, education, or income group was left unscathed by the economic meltdown. Older households lost much of their presumed gains relative to earlier cohorts, and they will have less time to recover.

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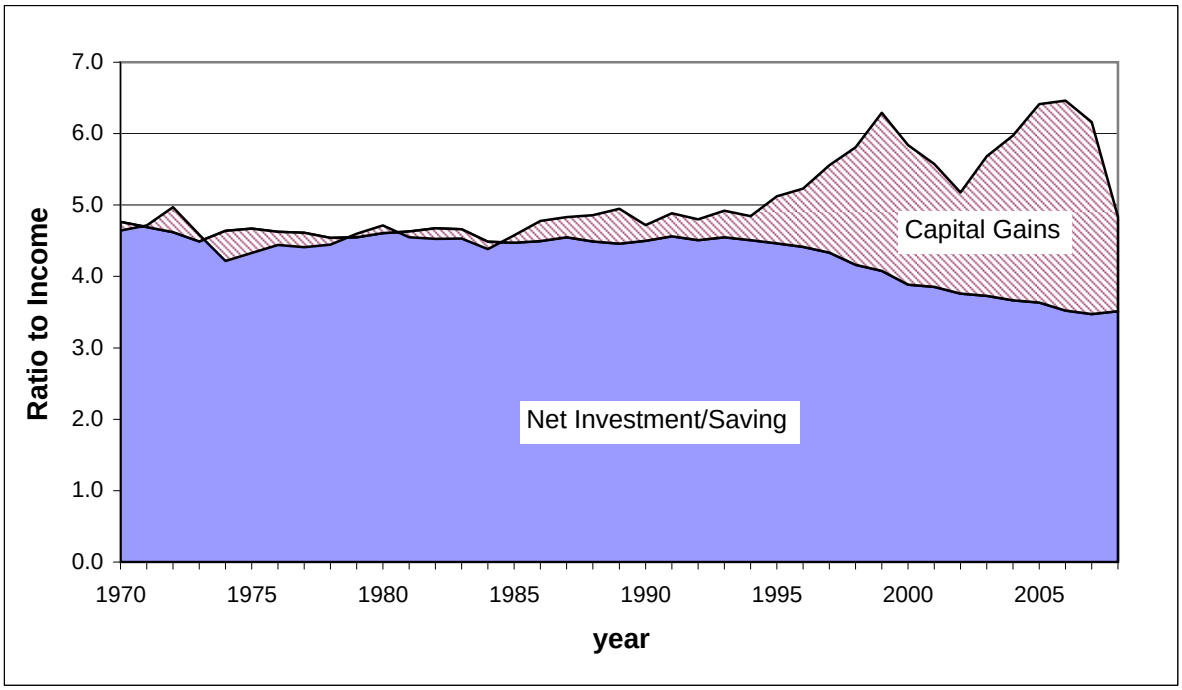
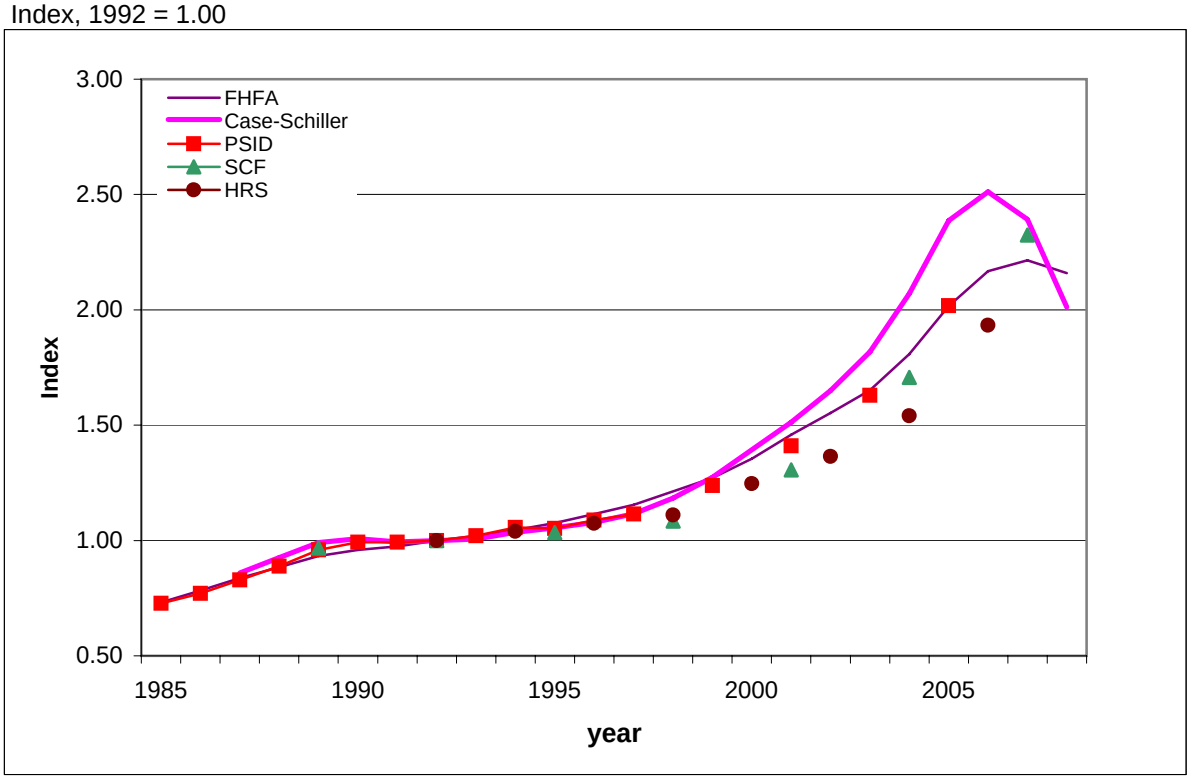
Figure 1. Household Wealth as a Ratio to Income, 1970-2008



Source: Computed from tables B100 and R100 of the Flow of Funds Accounts.Net investment flows are converted to real values, cumulated, and converted back to nominal values.

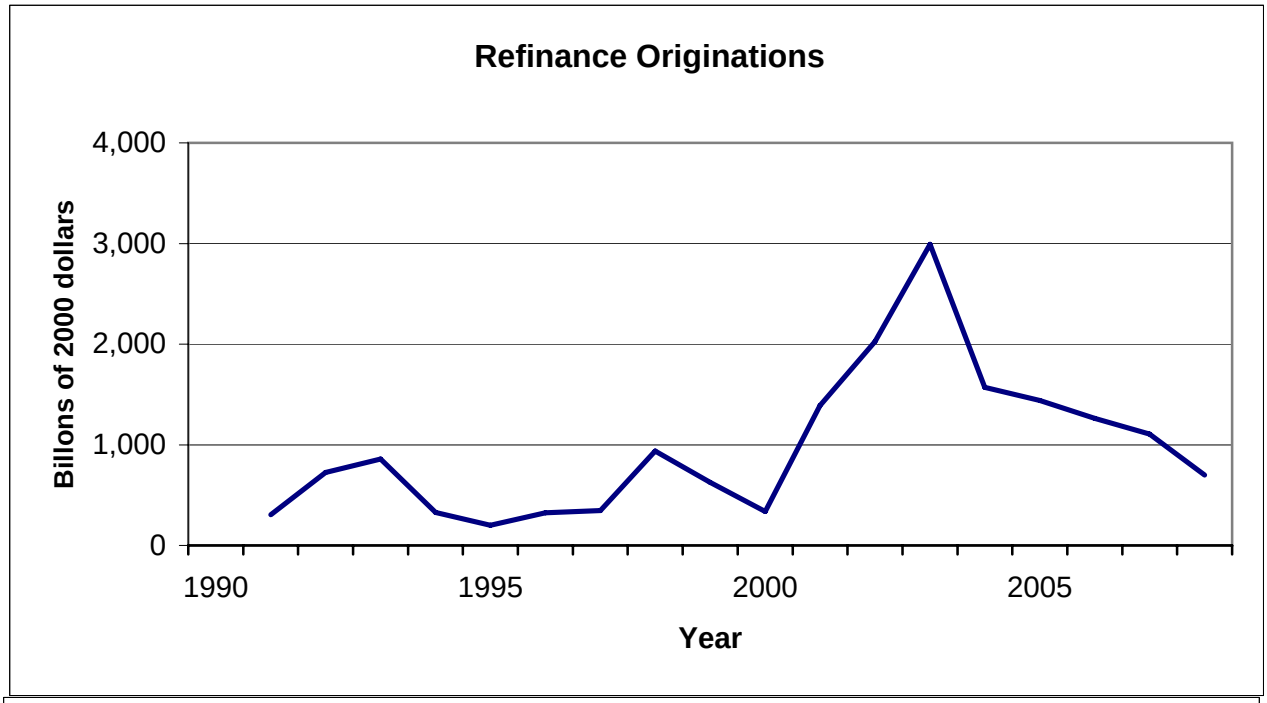
Figure 2. Indexes of Home Price Change, 1985-2007

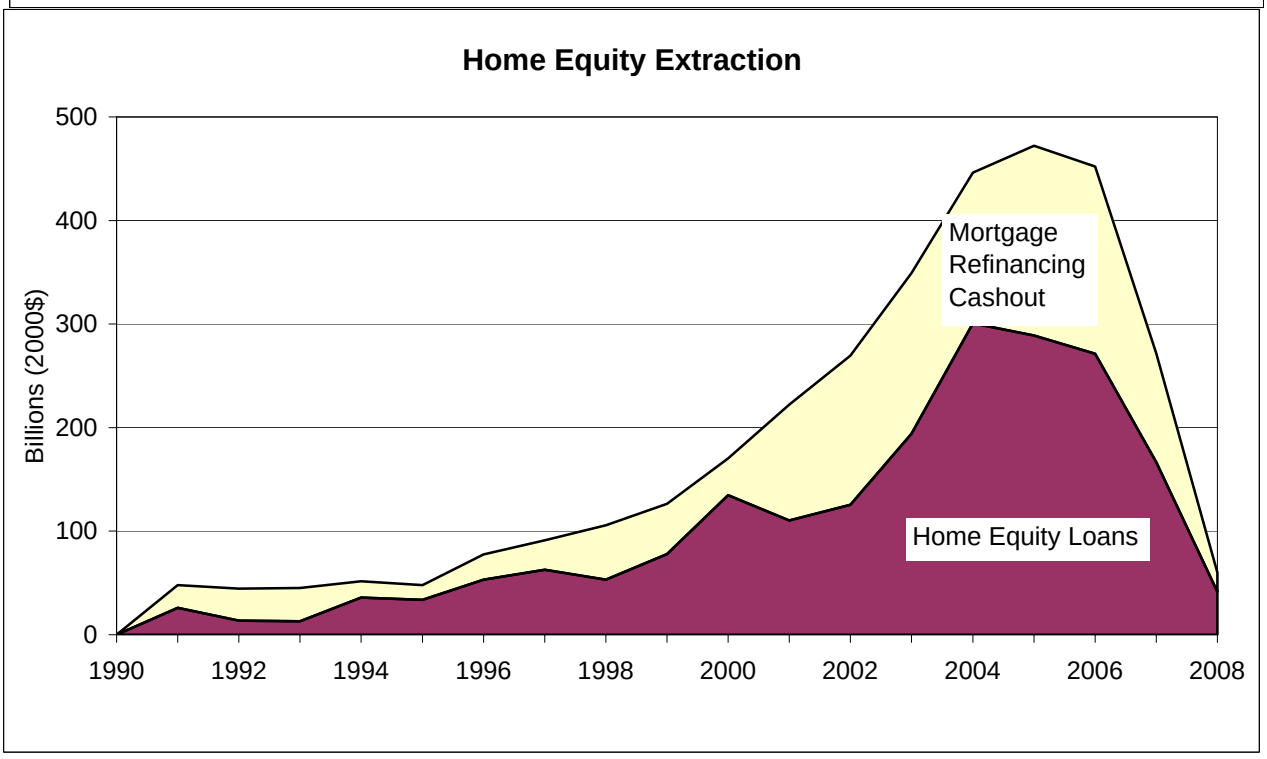
Index, 1992 = 1.00



Sources: Federal Housing Finance Agency, Standard and Poors, Housing and Retirement Survey, and the Panel Study of Income Dynamics. Both the HRS and PSID estimates are estimated as the percent change in the mean home price of households who owned their home and did not move between two adjacent survey waves. The HRS is limited to the 1931-41 birth cohort. Households in the PSID and HRS are weighted by the initial period weight. The SCF estimate is the change between survey waves in the mean home value for all homeowners.

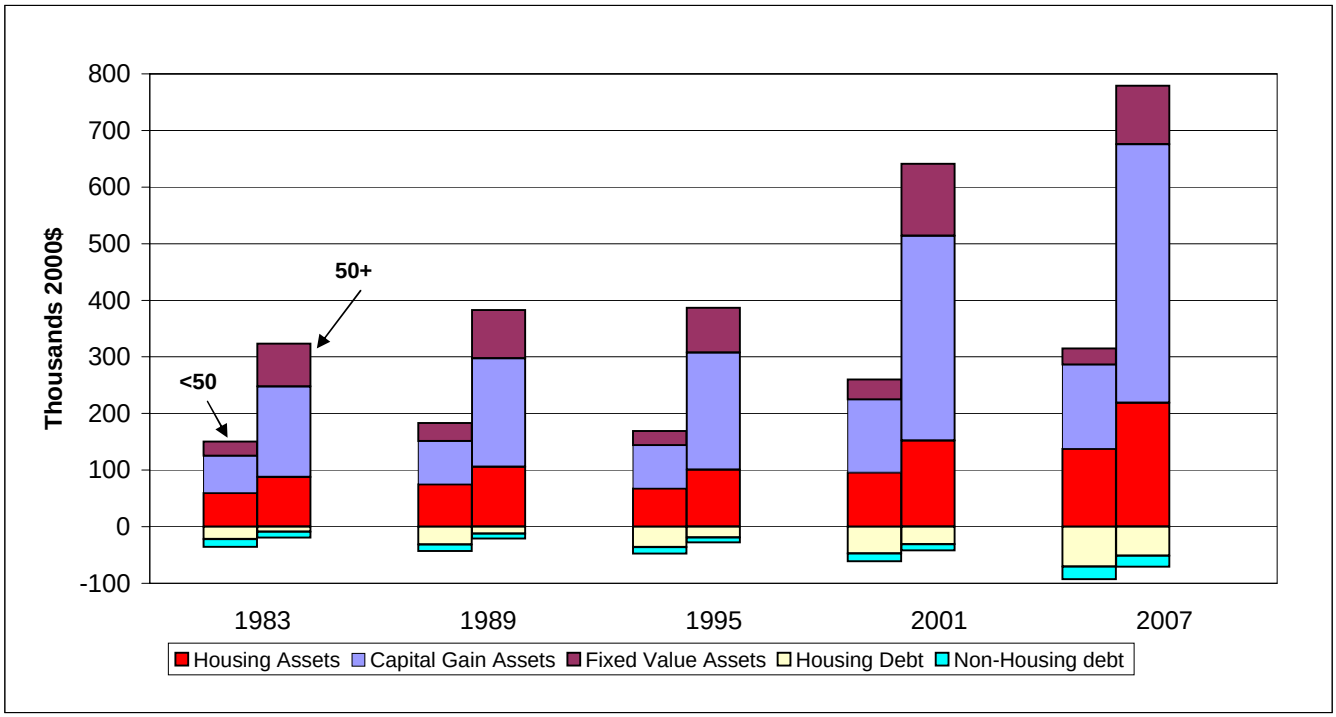
Figure 3. Mortgage Market Activity, 1991-2008





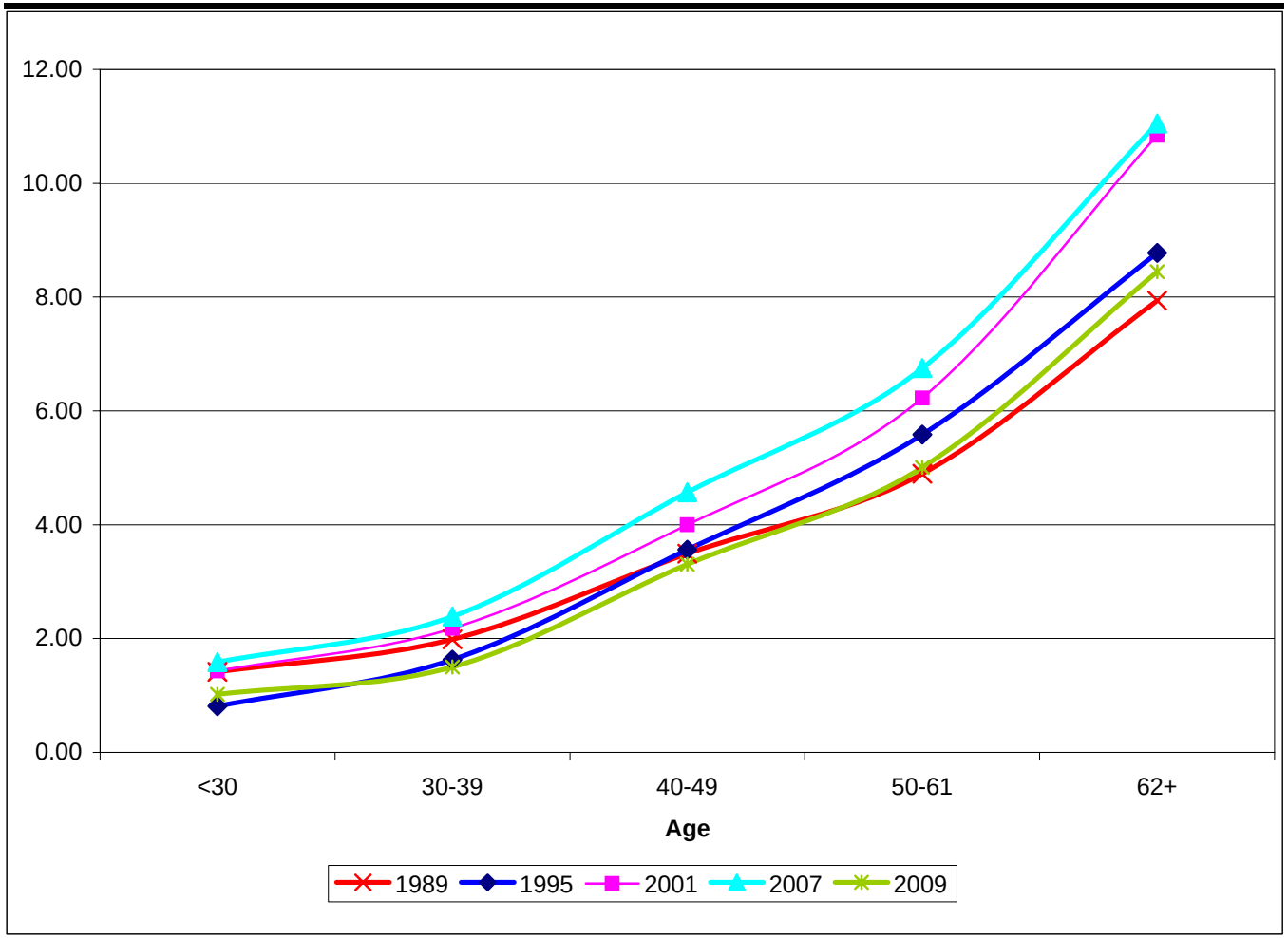
Sources: Data from Kennedy and Greenspan (2008). Data exclude equity extracted through home sales.

Figure 4. Average Net Worth of Households by Major Component and Age of Head, 1983-2007



Source: computed by the authors from selected waves of the Survey of Consumer Finances

Figure 5. Wealth Income Ratios by Age, Surveys of Consumer Finances 1983-2007



Source: Computed by the authors from various waves of the Survey of Consumer Finances.
Note: Wealth is net worth excluding the present value of future Social Security and defined-benefit pensions. Income is total household income. The ratios are the computed as the sum of all wealth in the age group divided by the sum of income.

Table 1. Number of Households with Mortgage Activity, by Age Group, Survey of Consumer Finances, 1995-2007

	1995-1998		1998-2001		2001-2004		2004-2007	
	<50	50+	<50	50+	<50	50+	<50	50+
Homeowners (thousands)	32,952	34,993	34,928	37,126	35,049	42,365	34,818	44,888
Percent homeowners with mortgages	85	46	87	47	91	52	89	57
Percent homeowners with recent refinancing of 1st mortgage	17	7	17	9	37	20	20	12
Percent homeowners with recent refinancing or borrowing	30	18	32	19	47	34	37	30
Percent homeowners who extracted money from their home equity	15	10	15	11	27	22	27	24
Percent homeowners who financed consumption with their home equity	7	5	6	5	13	11	13	10

Sources: Authors' estimations from the Surveys of Consumer Finances, 1995-2007. Homeowners with recent refinancing or borrowing either refinanced or rolled over a first, second, or third mortgage since the prior wave. Homeowners who extracted money borrowed additional money on their mortgages or a line of credit secured by home equity. Homeowners who financed consumption used the money for purposes other than home improvements or repairs, home purchases, or business/asset/real estate investment. See table 2 for details.

Table 2. Home Equity Extractions and Their Use, by Age Group, Surveys of Consumer Finances, 1992-2007

billions 2000$

	1992-1995		1995-1998		1998-2001		2001-2004		2004-2007	
	<50	50+	<50	50+	<50	50+	<50	50+	<50	50+
Final Period Value of Homes	4,074	4,027	4,566	5,511	5,763	7,097	7,380	10,260	8,262	12,019
Amount Extracted from Home Equity	127	67	173	122	254	141	341	382	363	479
Percent Used for Consumption or Debt Consolidation	26	37	41	46	36	45	33	40	38	36
Percent Used for Home Improvements	45	32	43	40	41	38	39	32	39	45
Percent Used for Other Investments	38	39	24	23	32	25	37	37	32	27

Sources: authors' estimations using the 1992-2007 Surveys of Consumer Finances

Notes: Age is defined as age in the final year of the period. Investment includes home purchases in addition to investment in real estate, financial assets, business, or "other" investments. In general, the data for equity extractions refers to new borrowing or refinancing when respondents indicated the funds were used to withdraw equity or both equity withdraw and refinancing in the prior three years. In 2004, the Survey of Consumer Finances added a question specifically focusing on the "additional amount borrowed" from the first mortgage. The ratio of additional fund borrowed to funds raised in 2001-04 was used to adjust the estimates of equity withdrawal from first mortgages for the prior surveys. Also there is no origination date for home equity loan transactions and they are assumed to be recent.

Table 3. Number of Households with Mortgage Activity, by Age Group, PSID 1994-2005

	1994-1996		1997-1999		1999-2001		2001-2003		2003-2005	
	<50	50+	<50	50+	<50	50+	<50	50+	<50	50+
Homeowners (thousands)	28,541	29,260	28,555	33,163	29,533	34,787	29,807	36,654	30,658	39,235
Percent of homeowners with mortgages	86	43	86	47	88	49	89	52	89	54
Percent of homeowners with recent refinancing	12	5	19	9	13	5	34	17	34	17
Percent of homeowners who recently withdrew equity	12	9	14	11	12	9	18	13	17	12
Percent of homeowners who recently withdrew equity and refinanced	3	2	7	4	4	2	11	7	11	6

Sources: Authors' estimates from the Panel Study of Income Dynamics, 1994-2005. The percent who recently refinanced is based on the response to a direct PSID question. Those who withdrew equity reported an increase in their mortgage debt between two waves of the survey by more than $10,000 and more than 10 percent of the original amount.

Table 4. Probability of Refinancing or Extracting Home Equity, Marginal Effects, PSID

	Refinancing	Equity Extraction			
	(1)	(2)	(3)	(4)	(5)
Present Value of Wealth Gain	0.015 **	0.006 **	0.005 **	0.009 **	0.006 **
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Loan-to-Value Ratio	0.196 **			-0.175 **	-0.243 **
	(0.02)			(0.02)	(0.02)
.8 < LTV < .9	-0.066 **			-0.083 **	-0.066 **
	(0.02)			(0.01)	(0.01)
LTV > .9	-0.152 **			-0.101 **	-0.065 **
	(0.02)			(0.01)	(0.01)
Liquid Assets	-0.0003			-0.023 **	-0.023 **
	(0.00)			(0.00)	(0.00)
Unemployed	-0.029 *			0.000	0.009
	(0.01)			(0.01)	(0.01)
Period Dummy: 1991-1996	0.198		-0.042 **	-0.078 **	-0.100 **
	(0.02)		(0.01)	(0.01)	(0.01)
Period Dummy: 1997-1999	0.117 **		0.067 **	0.053 **	0.024
	(0.02)		(0.01)	(0.01)	(0.01)
Period Dummy: 2001-2003	0.284 **		0.111 **	0.106 **	0.035 **
	(0.02)		(0.01)	(0.01)	(0.01)
Period Dummy: 2003-2005	0.339 **		0.057 **	0.056 **	-0.016
	(0.02)		(0.01)	(0.01)	(0.01)
Dummy: Refinanced					0.266 **
					(0.01)
Observations	8,899	9,270	9,270	8,899	8,899
Log Likelihood	-4,849	-4,122	-4,024	-3,715	-3,328
Pseudo R-squared	0.108	0.0073	0.0309	0.0795	0.176

Sources: Authors' estimates and Panel Study of Income Dynamics 1991-2005.
Notes: these are dprobit regressions reporting household equity withdrawal or refinancing over the given period. Standard errors are in parentheses; and "*" indicates p>0.05, "**" indicates p>0.01. Demographic categorical variables are included in all regressions excepting (2). Equity extraction is defined as an increase in the household's real mortgage value by more than 10 percent over the 2-year period (or more than 27 percent over the 5-year period)

Table 5. Probability of Refinancing and Extracting Home Equity, Homeowners Under Age 62

	Refinancing of First Mortgage			Equity Extraction		
	Marginal Effect	Standard Error	Signifi-cance	Marginal Effect	Standard Error	Signifi-cance
(House Price Appreciation/Income)	0.000	0.0002		0.002	0.0003	**
Loan-to-Value Ratio	0.468	0.0072	**	0.073	0.0051	**
LTV > 0.9	-0.169	0.0031	**	-0.051	0.0051	**
Liquid Assets/income Greater than 0.5	-0.003	0.0039		-0.070	0.0035	**
Have Children under 18	0.064	0.0040	**	0.030	0.0038	**
Risk Averse	-0.058	0.0042	**	-0.061	0.0039	**
Credit Constrained	-0.034	0.0043	**	0.025	0.0046	**
Long Planning Horizon	0.022	0.0036	**	-0.013	0.0035	**
Age	0.006	0.0003	**	0.004	0.0003	**
Age 50 or Older	-0.046	0.0059	**	-0.036	0.0056	**
College Educated	0.040	0.0037	**	-0.004	0.0035	
Non-white	-0.026	0.0048	**	-0.050	0.0043	**
Anticipated Education or Medical Expenses	0.009	0.0036	**	0.019	0.0035	**
Believe Interest Rates will Increase	-0.012	0.0074		-0.003	0.0072	
Adjustable First Mortgage	0.023	0.0051	**	0.024	0.0051	**
Period Dummy: 1992-1995	0.088	0.0064	**	-0.036	0.0052	**
Period Dummy: 1995-1998	0.006	0.0059		-0.001	0.0054	
Period Dummy: 2001-2004	0.218	0.0067	**	0.121	0.0060	**
Period Dummy: 2004-2007	0.044	0.0060	**	0.125	0.0061	**
Psuedo R-squared	0.1236			0.0546		
Log likelihood	26,640			-26,193		
Observations	56,709			56,709		

Sources: Authors' estimates and Surveys of Consumer Finances, 1992-2007. Dprobit regression reporting household equity withdrawal or refinancing over the past 3 years. *p>0.05, **p>0.01.

Table 6. Net Household Wealth by Age: 1983, 1995, 2007, and 2009
thousands of 2000 dollars

	Net wealth - SCF						Total Wealth Loss
Category	1983	1995	2007	Ratio 2007/1983	Projected 2009	Percent Loss 2009/2007	2009/2007
All households	194	220	454	2.35	335	26	19
Under age 50	114	121	222	1.94	154	30	20
Age 50 and over	303	358	708	2.33	533	25	18
			By Educational Attainment				
Less than High School	79	82	106	1.34	79	26	15
Under age 50	32	23	36	1.15	21	41	18
Age 50 and over	104	112	168	1.62	129	23	14
High School	157	159	233	1.49	170	27	16
Under age 50	81	75	119	1.46	78	35	19
Age 50 and over	320	302	364	1.14	276	24	15
College and above	440	453	1,024	2.33	760	26	20
Under age 50	253	248	493	1.95	353	28	20
Age 50 and over	812	861	1,609	1.98	1,209	25	20
			By Income Tercile				
Lower Tercile	47	58	88	1.88	67	24	14
Under age 50	24	26	27	1.09	17	36	16
Age 50 and over	67	88	144	2.15	111	22	13
Middle Tercile	94	107	178	1.89	127	29	15
Under age 50	50	57	76	1.53	45	41	17
Age 50 and over	174	190	308	1.77	231	25	14
Upper Tercile	443	503	1,119	2.53	830	26	20
Under age 50	249	256	557	2.24	398	29	20
Age 50 and over	770	957	1,769	2.30	1,330	25	19

Source: computed by the authors from various waves of the Survey of Consumer Finances.
Note: Total wealth is net worth plus the present value of future Social Security and defined-benefit pensions.

Table 7. Net Household Wealth Excluding Housing Wealth by Age: 1983, 1995, 2007, and 2009
thousands of 2000 dollars

	Net wealth excluding housing wealth - SCF						Total Wealth Loss
Category	1983	1995	2007	Ratio 2007/1983	Projected 2009	Percent Loss 2009/2007	2009/2007
All households	139	168	339	2.44	259	24	16
Under age 50	77	90	155	2.02	118	24	13
Age 50 and over	225	277	541	2.40	414	23	16
			By Educational Attainment				
Less than High School	41	46	50	1.21	38	23	9
Under age 50	12	13	9	0.75	5	47	8
Age 50 and over	56	64	86	1.53	69	20	9
High School	106	114	153	1.44	118	23	11
Under age 50	48	50	74	1.55	55	25	11
Age 50 and over	234	224	244	1.04	190	22	12
College and above	352	372	817	2.32	623	24	17
Under age 50	194	198	369	1.90	283	23	15
Age 50 and over	666	719	1,311	1.97	997	24	18
			By Income Tercile				
Lower Tercile	22	30	41	1.86	33	21	8
Under age 50	13	17	14	1.10	9	32	10
Age 50 and over	31	43	66	2.14	54	19	8
Middle Tercile	52	65	105	2.01	80	24	9
Under age 50	26	35	37	1.43	26	30	8
Age 50 and over	101	114	192	1.91	149	23	10
Upper Tercile	344	415	890	2.58	679	24	17
Under age 50	178	199	411	2.31	315	23	15
Age 50 and over	625	813	1,444	2.31	1,101	24	18

Source: computed by the authors from various waves of the Survey of Consumer Finances.
Note: Total wealth is net worth plus the present value of future Social Security and defined-benefit pensions minus housing wealth.

Table A1. Comparison of SCF Asset and Liability Categories With Flow of Funds Estimates, 1989-2007

Billions of dollars

	1989			1995			2001			2007		
Components	SCF	FFA	Difference	SCF	FFA	Difference	SCF	FFA	Difference	SCF	FFA	Difference
Assets -matching components	**15,538**	**15,922**	**-384**	**19,603**	**21,749**	**-2,146**	**38,357**	**34,810**	**3,547**	**63,876**	**55,011**	**8,865**
	0.976			0.901			1.102			1.161		
Deposits	2,031	3,145	-1,114	2,065	3,168	-1,104	3,740	4,443	-702	4,935	6,852	-1,917
Credit market instruments	850	1,071	-221	797	1,863	-1,066	1,158	1,961	-803	1,293	3,199	-1,906
Mutual funds	491	511	-20	1,679	1,280	399	4,334	2,762	1,572	6,650	4,881	1,769
Corporate equity	2,386	1,726	660	3,456	3,373	83	8,314	6,659	1,655	10,458	8,046	2,412
Publicly Traded	944	1,235	-291	1,420	2,286	-867	4,360	4,950	-591	4,590	5,951	-1,361
Closely Held	1,442	491	951	2,036	1,086	950	3,954	1,709	2,246	5,868	2,094	3,773
Noncorporate business equity	2,951	2,880	70	3,097	3,347	-250	5,433	4,639	794	12,233	8,154	4,078
Pension assets (Defined contribution only)	686	652	34	1,348	1,296	52	2,612	2,363	248	4,762	3,606	1,156
Owner occupied real estate	6,144	5,936	207	7,160	7,421	-260	12,766	11,982	783	23,547	20,274	3,273
Liabilities - matching components	**3,573**	**2,958**	**615**	**4,040**	**4,384**	**-344**	**6,111**	**6,929**	**-818**	**11,670**	**12,654**	**-984**
Home mortgages	2,436	2,166	271	3,068	3,257	-190	4,750	5,074	-324	9,544	10,169	-625
Consumer credit	1,081	792	289	869	1,127	-258	1,225	1,855	-630	2,005	2,485	-480
Other	56	0	56	103	0	103	136	0	136	122	0	122
Net worth - matching components	**11,965**	**12,965**	**-999**	**15,562**	**17,365**	**-1,802**	**32,246**	**27,881**	**4,365**	**52,206**	**42,357**	**9,849**
	0.923			**0.896**			**1.157**			**1.233**		
Overall totals												
Total assets	19,272	19,116	156	23,567	26,907	-3,340	46,053	43,204	2,849	72,710	67,000	5,710
Matching component shares	0.806	0.833		0.832	0.808		0.833	0.806		0.878	0.821	
Total liabilities	2,429	3,089	-660	3,598	4,578	-979	5,806	7,272	-1,466	11,272	13,110	-1,838
Matching component shares	1.471	0.957		1.123	0.958		1.053	0.953		1.035	0.965	
Total net worth	16,842	16,027	815	19,969	22,329	-2,360	40,247	35,932	4,315	61,438	53,890	7,548
Matching component shares	0.710	0.809		0.779	0.778		0.801	0.776		0.850	0.786	

Source: 1983-2004 Surveys of Consumer Finances, Flow of Funds Accounts, Antoniewicz (2000), and author's estimates.

Notes: All FFA estimates are two-year averages of end-of-year data and exclude consumer durables and the assets and liabilities of nonprofit institutions. Total assets and liabilities of the SCF are consistent with the definitions used on the the SCF web site with the exception of the exclusion of motor vehicles. Note that SCF liabilities in the matching components exceed total liabilities because the SCF definition nets nonresidential real estate debt against non-residential assets.

Table A2. Wealth Income Ratios by Age, Surveys of Consumer Finances 1983-2007

	1983	1989	1992	1995	1998	2001	2004	2007	2009
Total	4.31	4.23	4.33	4.42	5.05	5.39	5.91	6.19	4.57
Under 30	0.90	1.41	0.87	0.81	0.84	1.43	1.02	1.58	1.02
30-39	2.26	1.98	1.84	1.63	2.37	2.18	2.45	2.39	1.50
40-49	3.90	3.49	3.43	3.56	3.83	4.00	4.31	4.57	3.30
50-61	5.27	4.89	5.69	5.59	6.26	6.22	6.77	6.75	5.00
62+	8.25	7.94	8.49	8.78	9.63	10.84	11.34	11.05	8.44

Source: Computed by the authors from various waves of the Survey of Consumer Finances.
Note: Wealth is net worth excluding the present value of future Social Security and defined-benefit pensions. Income is total household income.

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