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Introduction

During the past several decades in the United States, significant changes have occurred in household saving and borrowing behavior. As shown in the top panel of Figure 1, the personal saving rate has fallen from an average of 9.1 percent in the 1980s to an average of 1.7 percent so far this decade. Between the same periods, the ratio of total household debt to aggregate personal income, shown in the bottom panel, rose from 0.6 to 1.0. In this paper, we consider the causes and consequences of the dramatic increase in household indebtedness. Clearly the issues surrounding household borrowing are closely related to those surrounding household saving. However, the borrowing perspective is relatively underexplored, and we think it is particularly interesting at the present time given the rapid pace of mortgage debt accumulation in recent years.

We focus first on the factors explaining the rise in household debt. Using simple models of household behavior as our guide, we empirically explore the likely contributions of a wide range of factors. Changes in tastes, interest rates, and households' expected incomes do not appear to have materially increased household borrowing, but demographic shifts can explain part of the run-up in debt. The increase in house prices—particularly, but not exclusively, over the past half-dozen years—appears to have played the central role. House prices can be linked to household borrowing through several different channels; distinguishing among them is difficult, although we present some suggestive evidence. Financial innovation also seems to have boosted debt, not primarily by increasing the share of households that are able to borrow but by increasing the amount of debt held by households that already had some access to borrowing.

We then turn to the consequences of higher household debt. For monetary policymaking, the key issue is whether greater indebtedness has affected the sensitivity of household spending

to various economic shocks. U.S. households have become more exposed to shocks to asset prices through the greater leverage in their balance sheets; a given change in stock prices or home prices will have a larger effect on net wealth and so on spending. With regard to income and interest rate shocks, forces push in opposite directions. On the one hand, households' discretionary cash flow has become more sensitive to such shocks because of the increased share of their incomes devoted to debt service. On the other hand, the greater availability of credit makes it easier for households to smooth through temporary downturns in income, and the rapid rise in household assets means that net worth has risen considerably relative to income despite the run-up in debt. Empirical work suggests that, on average, U.S. households have become less sensitive to shocks to their income, but this result should not be taken as generalizing to every situation or every type of household. Of particular note, households in the upper tail of the distribution of the ratio of debt to assets are more likely to be insolvent than in the past and more likely to face financial strain. As illustrated by the recent developments among subprime mortgage borrowers, excessive accumulation of debt can, in some circumstances, lead to financial distress. Moreover, the reaction of financial markets to these developments raises the possibility that credit availability could be hampered for a larger group of households, which could, in turn, have effects on the broader economy.

Factors Influencing Household Debt

In a world with no borrowing constraints, households choose a path for consumption based on their expected lifetime resources, interest rates, and tastes. Given some level of income at any point in time, the consumption choice immediately implies a level of saving. Households also choose their portfolio allocation, determining the amounts they hold of different types of assets

and liabilities consistent with their net worth. These decisions are determined by households' risk preferences, market rates of return, tax provisions, and other factors. If incomes rise over time until retirement, as they typically do, households in this constraint-free world tend to borrow, on net, when young, move into positive net worth as they age, and then run down their net worth in retirement.

In this world, households' desire to take on debt can increase for a number of reasons.[1] Households may become less patient, less willing to substitute over time, or less risk averse—all of which flatten the optimal consumption path. A flatter consumption path, in turn, implies less saving and more borrowing when households are young. Alternatively, a reduction in uncertainty lessens the need for precautionary reserves, which tends to boost borrowing. In addition, an increase in expected future income shifts desired consumption upward, also tending to increase borrowing. As is well known, changes in interest rates affect consumption through different channels with opposing signs; as a result, the sign of the net effect cannot be ascertained by theory alone. Debt holding can also rise if households use credit cards instead of cash and checks for a larger share of transactions, perhaps because effective interest rates or some other cost of debt use has declined.

An increase in house prices could also boost debt. First, a wealth effect may boost consumption. It might seem that a household whose home appreciates in value has experienced a matching increase in its nominal housing wealth and its cost of living and therefore would make no change in its consumption, saving, or borrowing. However, if that household expects to downsize in the future and does not have a perfect altruistic link to its children, then it is indeed richer. If this household's children cannot reduce consumption in the face of the positive shock

[1] Debelle (2004) also discusses factors that can lead to a rise in household indebtedness; he emphasizes many of the same themes presented here.

to their future housing costs that they have experienced—perhaps because they are too young to be active economic agents—then the aggregate effect is an increase in consumption. The resulting reduction in saving will generally lead to more borrowing. Second, when house prices rise, expenditures are more front-loaded relative to income. Like other durable goods, a home is generally purchased before the consumption of its services, and the vast majority of households borrow large amounts to make this purchase. When house prices are higher, larger amounts must be borrowed to obtain the same housing services (although the desired quantity of housing services may also adjust). Third, an increase in house prices changes the composition of household portfolios and may induce portfolio rebalancing that involves increases in debt holding. In particular, households may borrow against their house to invest more in tax-deferred retirement assets.[2]

Lastly, changes in demographics can boost aggregate debt in this world, even if the debt of similarly situated households does not change over time. For example, households with more education generally have steeper life-cycle income paths and therefore do more borrowing at young ages. The increase in average educational attainment of the population would then be expected to push up debt accumulation. Likewise, younger households tend to borrow more than older households, so an increase in the share of the population represented by the former would be expected to raise aggregate debt.

The preceding paragraphs discuss forces that might raise debt in a world without borrowing constraints. In the real world, such constraints exist, so households do not necessarily attain their optimal consumption given their lifetime resources. In this world, debt can increase for all of the reasons already offered, but it can also increase if some change in the economy

[2] Amromin, Huang, and Sialm (2007) show that, given the tax-deductibility of mortgage interest and tax-exemption of qualified retirement savings, it can become a tax arbitrage to reduce mortgage prepayments and increase contributions to tax-deferred accounts.

relaxes the constraints. To start, an increase in collateral against which households can borrow—arising from either higher house prices or a shift from defined benefit to defined contribution pension plans—should make credit less expensive and could lead to an increase in borrowing (see, for example, Iacoviello, 2004). In addition, a decline in inflation can relax constraints that are based on nominal interest payments relative to nominal income, as with traditional underwriting standards for home mortgages. In particular, when inflation is lower the same real interest rate will be associated with a lower nominal interest rate, which means that the ratio of nominal interest payments to nominal income on a prospective loan is less likely to be above some upper bound imposed by the lender.

Further, financial innovation may relax borrowing constraints. This relaxation can take several forms: It can give more households access to credit (sometimes termed the "democratization of credit"), it can increase the amount of credit available to households that already have some credit, and it can reduce the cost of borrowing. Moreover, financial innovation can interact with the other channels described above. In particular, such innovation has made it much easier for households to borrow against their housing wealth and thus may accentuate the effect of house prices on debt.

So far, this discussion has focused on reasons why rational households might increase their indebtedness. However, substantial evidence suggests that households are not always fully rational when making financial decisions (Campbell, 2006). One can imagine a variety of reasons why households might take on more debt than is rationally appropriate. For example, a rise in house prices might make households feel wealthier than they are, perhaps because they do not recognize the increase in the cost of housing services; as a result, they might borrow too much and be left underprepared for retirement. Alternatively, households may suffer self-control

problems so that a relaxation of borrowing constraints spurs borrowing that, in the long run, lowers rather than raises utility. Or households might mistakenly extrapolate recent run-ups in house or equity prices and take on too much debt to finance investment in these assets.

Evidence on Causes of the Rise in Household Debt

This section presents evidence on the importance of various factors contributing to the rise in household debt in the United States. We do not attempt to develop and test a formal model of the relationship between debt and its determinants; that approach seems too ambitious given the breadth of the topic and the limitations of the available data. Instead, we use summary statistics, graphs, and simple regressions to document the basic relationships.

Much of this analysis is based on data from the *Survey of Consumer Finances* (SCF). This survey has been conducted by the Federal Reserve Board on a triennial basis for nearly a quarter-century. The SCF contains comprehensive and high-quality information about the balance sheets of U.S. households, as well as data on their income, demographics, and attitudes. We use data from the waves conducted in 1983, 1989, 1992, 1995, 1998, 2001, and 2004. The 1986 wave did not generate data comparable in scope with data from the other waves, and the 2007 wave is still being conducted. In light of the significant developments in household borrowing and credit markets since 2004, the lack of more-timely data represents an important limitation; we discuss some of these developments at the end of this paper. Each wave included between 3,000 and 4,500 households, and weights are provided to make the results representative of the full population.[3]

[3] For more information about the survey, see Bucks, Kennickell, and Moore (2006).

Impatience

Some evidence against the hypothesis that households have become less patient over time comes from answers to SCF questions about household attitudes. Some of these questions have appeared in the survey only since 1992, but as shown in the bottom panel of Figure 1, most of the rise in debt has occurred since that time.

The top panels of Figure 2 report households' views of the most important horizon for spending and saving decisions. The share of households focused on the next few months or the next year has been fairly stable between 30 percent and 40 percent, and the share looking beyond ten years has hovered around 15 percent. The middle-left panel of Figure 2 shows that retirement has become a more important motivation for saving over time, which is not consistent with greater impatience. This pattern holds true even after controlling for the changing age distribution of the population, as shown in the middle-right panel.[4] Moreover, households' attitudes toward the use of credit have changed little over time. Most households continue to think that borrowing is appropriate to purchase a car, as shown in the bottom-left panel, while few households continue to think that borrowing is appropriate to finance a vacation, as shown in the bottom-right panel.[5] Of course, households' stated views may not be good predictors of their actual behavior, so this evidence must be viewed as suggestive.

[4] The increase over time in respondents reporting retirement as a motivation for saving, even after controlling for age, could reflect the shift away from defined benefit retirement plans and toward defined contribution plans in that the latter may seem more like "saving" to households than the former. See Pence (2002).

[5] Most households also think that borrowing is appropriate to finance education, and about one-half of households think that borrowing is okay when income falls. In contrast, less than 10 percent think that borrowing to buy furs or jewelry makes sense.

Precautionary Saving

Households may have become a bit less risk averse over time. The share of households asserting that they are willing to take no financial risk to earn a higher return has slipped from roughly 50 percent in 1992 to close to 40 percent in the past several waves, as shown in the top-left panel of Figure 3. Meanwhile, the share of households willing to take "above average" or "substantial" risk has drifted up, on balance, as shown in the top-right panel. Another factor tending to reduce precautionary saving is financial innovation, which has made it easier for households to borrow during downturns in income.[6] On the other hand, some recent papers have found that household income has become more volatile over time.[7] These findings are consistent with the views of many commentators that globalization, deregulation, and the rapid pace of technological change have increased the pace of creative destruction and made the economy more dynamic and risky for individual households. Given these conflicting trends, then, households' desire for precautionary reserves may have increased or decreased over time.

A rough measure of households' interest in precautionary saving may be the share of households that report that liquidity is an important motivation for saving. As shown in the middle panels of Figure 3, this share has declined a little over time. If households are doing less precautionary saving, that decline would be consistent with greater borrowing—both because greater borrowing is one way to reduce net saving and because lower reserves of liquid assets make households facing a temporary disruption to income more likely to borrow. That said,

[6] Greater ability to borrow means that household expenditures may be less sensitive to changes in income. See Dynan, Elmendorf, and Sichel (2006a, 2006b) for evidence supporting this proposition.

[7] See Dynan, Elmendorf, and Sichel (2007) and Hertz (2007). Note, though, that an increase in income volatility does not necessarily imply that risk has increased, as these studies do not distinguish between voluntary and involuntary income changes or keep track of changes in desired consumption such as shocks to health-care spending. An increase in income volatility at the household level is not inconsistent with the well-documented finding that the aggregate economy has become more stable over time, as the covariance of income movements across households may have changed over time (see Dynan, Elmendorf, and Sichel, 2006b).

given the small size of the change, particularly over the last fifteen years, and the limitations of these attitudinal questions, more analysis is needed to draw a firm conclusion.

Interest Rates and Expected Income

According to some of the empirical models of aggregate consumption used at the Federal Reserve Board, the net decline in real interest rates during the past half dozen years can explain about 2 percentage points of the decline in the aggregate saving rate over that period.[8] The lower saving rate implies less asset accumulation and more debt accumulation. However, the rise in the debt-income ratio during the past six years is much larger than can be explained by the decline in the saving rate. If the saving rate averaged 1 percentage point lower because of lower interest rates, then lower rates explain a reduction in net worth of 6 percent of income. Yet aggregate debt has risen by 40 percent of income during this period, as shown in the bottom panel of Figure 1. Moreover, these models imply that movements in real interest rates had almost no net effect on the saving rate between 1990 and 2000, a decade in which debt increased a good deal relative to income. Therefore, changes in interest rates do not seem to explain much of the secular accumulation of household debt.

The relatively rapid pace of productivity growth of the past decade may have led households to mark up their expectations for future income growth even though median household income has not increased to nearly the same extent, at least as yet. Saving less and borrowing more would be a natural response to this situation. Some limited evidence against the view that households are expecting their real incomes to rise particularly rapidly comes from the

[8] We should emphasize that these models are reduced-form in nature, so the magnitude of this effect should not be interpreted as the interest elasticity. Instead, the estimated coefficient appears to be capturing both the true interest elasticity and some signaling power of interest rates for future income and other economic conditions. The coefficient does not include the effect of interest rates on stock prices and house prices because wealth appears separately in the models.

Reuters/University of Michigan Surveys of Consumers. When asked whether they expect their incomes to rise more than prices over the coming year, or vice versa, the share of respondents expecting the former has actually declined in the past half-dozen years and shows little trend over the past few decades; see the bottom panel of Figure 3.

Demographics

Debt use varies substantially across age groups and across households with different levels of education. Therefore, shifts in the age and education composition of the U.S. population might explain the long-term rise in indebtedness. The top-left panel of Figure 4 shows the evolution since 1983 of the share of households in the SCF with positive debt by age group. The top-right panel shows, over the same time period, the median debt-income ratio for households that are holding debt. In each cross-sectional slice, debt use increases between the youngest age group and middle age but then falls off in the older group. Over the period explored, the baby-boom generation has moved essentially from the youngest group to the middle age group, which would tend to boost the aggregate debt-income ratio, all else being equal. At the same time, households in all age groups have shown a marked upward trend in their debt holdings, which suggests that other factors have contributed as well.

The middle panels of Figure 4 present comparable information for education groups. Debt use increases with education, so the rising educational attainment for the population during the past several decades would tend to boost the aggregate debt-income ratio. Once again,

however, debt use has increased within each educational group, which suggests that other factors are also at work.[9]

To further investigate the effects of demographics, we first estimate a regression with the debt-income ratio as the dependent variable and indicator variables for each wave of the SCF as independent variables (with 1983 as the omitted indicator). The debt-income variable has large outliers due to both extremely low values of income and high values of debt, so we use a median regression estimator to downweight the outliers.[10] We restrict the sample to households with heads under 60 years old because current income for older households is likely to be an especially poor measure of their long-term economic situation. The estimated coefficients are shown by the hollow bars in the bottom panel; reflecting the uptrend in debt holding, these coefficients increase over time, and the most dramatic rise is observed at the end of the sample. Each coefficient is significantly different from zero at the 5 percent level, and the increase over time is statistically significant as well.

We then estimate a regression that adds age, age-squared, age-cubed, and indicator variables for high school and college degree as independent variables (all pertaining to the household head's characteristics). The estimated coefficients for SCF waves, shown by the shaded bars in the bottom panel, are still significantly different from zero and still increase significantly over time. However, they are noticeably smaller than in the regression excluding demographic variables. One caution is that the aging of the baby boom and gain in educational attainment essentially push debt in one direction over the period examined, so the reduction in

[9] For both age and education groups, the rise in the amount of debt held also shows up prominently at higher points in the debt-income distribution.

[10] Beginning with the 1989 wave, the SCF uses a multiple imputation approach to deal with survey non-responses. As a result, the public data sets include five replicates of every observation. For the regressions in this paper, we use a repeated-imputation inference technique to correct the point estimates and standard errors for the presence of these replicates. See Kennickell (1998) for more information.

the estimated time effects may reflect not just demographic changes but also other forces that have trended over time. All told, however, the results suggest that demographic influences likely explain part, but not all, of the uptrend in debt holding over time.

House Prices

According to data from the SCF, fully 100 percent of the increase in aggregate debt relative to income since 1983 has taken the form of debt on households' primary residences. The ratio of aggregate debt on primary residences to aggregate household income—depicted by the shaded area in the top-left panel of Figure 5—climbed from 0.36 in 1983 to 0.84 percent in 2004, pushing up the ratio of total household debt to income from 0.64 to 1.12. Meanwhile, aggregate debt associated with credit cards, consumer installment loans, and other borrowing stayed just below 0.30 of aggregate household income throughout the last quarter-century.

These figures from the SCF data are broadly consistent with corresponding figures based on the U.S. Flow of Funds (FOF) accounts, shown in the top-right panel. According to the FOF, 84 percent of the increase in aggregate household-sector debt relative to NIPA personal income (that is, personal income as measured in the national income and product accounts) since 1983 has taken the form of home mortgage debt. A similar parsing applies to the increase in debt relative to income since 1970. The difference between the SCF and FOF figures may be attributable to a number of factors.[11] One important difference is the treatment of credit card debt. In the SCF, households are asked to report their credit card balances after making their last payments and thus ignore temporary balances related to transactions use of their cards, whereas the FOF measure represents the stock of outstanding debt at a given point in time and therefore

[11] Antoniewicz (2000) explores differences between household debt as measured in the FOF accounts and household debt as measured in the SCF.

includes transactions balances. Indeed, credit card debt has increased relative to income in the FOF but not in the SCF, which is consistent with rising transactions use although it may also stem from other factors.[12]

Of course, these patterns do not prove that the rise in household indebtedness is related to housing; they might reflect an increase in desired debt for other reasons, with mortgages being the preferred type of debt. Some evidence for a more direct link between debt and housing is the strong high-frequency correlation between mortgage borrowing and house prices. The middle-left panel of Figure 5 shows changes in FOF mortgage borrowing and home prices, while the middle-right panel presents levels of these variables. Mortgage debt rises especially sharply when house prices rise rapidly, as over the past decade.

Furthermore, the SCF shows that the rise in household indebtedness has been concentrated among homeowners, as depicted in the bottom panels of Figure 5. More homeowners have debt today than in the 1980s, which is not true for non-homeowners, and the median debt-income ratio for homeowners has increased substantially since the 1980s, which is also not true for non-homeowners. These differences may be attributable, at least in part, to the rising share of homeowners in the population, which may be related to changes in the financial system. We return to the role of financial innovation shortly.

Stronger evidence for the connection between house-price appreciation and borrowing comes from isolating the effect of house prices from the effect of other influences on indebtedness—such as financial innovation—that have trended over time. We regress households' debt-income ratios from the SCF on the level of house prices in each households'

[12] Johnson (2007) shows that transactions use has accounted for a material share of the rise in aggregate credit card debt.

region relative to the level in that region in 1983.[13] As controls, we include indicator variables for waves of the SCF (again omitting the 1983 indicator), indicator variables for the nine Census divisions (omitting the first division), the same demographic variables as in the earlier regressions, the log of household income, and an indicator variable for home ownership. We again use a median regression estimator and restrict the sample to households with heads under 60 years old. Table 1 shows the results, with the different columns corresponding to different sets of control variables. The estimated coefficient on house prices varies across rows, but it is highly statistically significant in all specifications. For the nation as a whole, house prices rose nearly threefold between 1983 and 2004. Applying the average of the estimated coefficients in the table of 0.05, we find that the rise in house prices can explain an increase in the aggregate debt-income ratio of roughly 0.1 (~ = .05 * [3 - 1]) out of a total increase of roughly 0.5.

This estimate probably understates the link between housing assets and debt for two reasons. First, the estimated coefficient on homeownership is positive because homeowners tend to have more debt than non-homeowners. Accordingly, the rise in the homeownership rate over the past decade has provided a further boost to the debt-income ratio. Second, financial innovation may have accentuated the effect of home values on debt beyond what is captured by our simple estimates. We return to this point shortly.

We can say much less about *why* house values have such an important relationship with debt. As we discussed in the introduction, one channel through which rising house prices can boost debt is a wealth effect on consumption. Empirical estimates of aggregate consumption

[13] Information about respondents' regions is not available in the 1989, 2001, or 2004 public-use SCF data sets. Therefore, we estimated these regressions using the Federal Reserve Board's internal SCF data sets; we thank Gerhard Fries and Kevin Moore for their assistance with these regressions.

To measure house prices, we used the "purchase-only" index from the Office of Federal Housing Enterprise Oversight. This index is available only beginning in 1990; we extended back to 1983 using the "all-transactions" version of the index.

equations generally imply that the effect of housing wealth is statistically and economically significant. Studies using aggregate data include Davis and Palumbo (2001), which suggests that the effect of non-stock-market wealth (of which housing wealth is an important component) on consumption exceeds six cents on the dollar, and Carroll, Otsuka, and Slacalek (2006), which finds a housing wealth effect of nearly ten cents on the dollar. The Case, Shiller, and Quigley (2005) analysis of regional data implies a marginal propensity to consume out of housing wealth of three to four cents on the dollar.

Translating these estimates into the effect of house-price appreciation on debt would require a further analysis of how changes in consumption and thus saving translate into changes in holdings of particular assets and liabilities. To provide a crude sense of the possible importance of this channel, suppose that the marginal propensity to consume out of housing wealth is 0.06. With the FOF data showing that the value of residential real estate rose by about 50 percent of personal income between 1998 and 2004, the implied decrease in the saving rate by the end of this period is 3 percentage points. Assuming that the effect rose linearly over time—in other words, the average damping of the saving rate over the six-year period was 1.5 percentage points—the implied reduction in net worth over these six years is 9 percent of income (~ = 1.5 * 6). If the change in net worth was completely concentrated in a change in debt holding —an extreme upper bound—wealth effects would explain close to a 0.1 rise in the debt-income ratio.

Another channel we noted earlier was that higher house prices should induce more front-loading of household outlays relative to income and thus more borrowing. Moreover, Merry (2006) shows that the average loan-to-value ratio among homeowners who recently purchased a home has moved up between 0.05 and 0.1 since the early 1980s. Therefore, the average

household buying a house in 2004 would have increased its debt-income ratio considerably more than the average household buying a house when prices were lower. However, to calculate the magnitude of this front-loading effect on the aggregate debt-income ratio would require keeping track of the share of households buying a house in each year, as well as changes in house values relative to homebuyers' income and changes in loan-to-value ratios (apart from those associated with financial innovation, which we consider separately).

As described previously, rising house values can also affect indebtedness by inducing portfolio rebalancing directly and by providing additional collateral that can be used for portfolio rebalancing or for consumption. According to Canner, Dynan, and Passmore (2002), households that took cash out when they refinanced their mortgages in 2001 and early 2002 reported using about one-fifth of their extracted equity for investments in financial assets, real estate, or businesses, one-fourth to pay off other debt, one-third for home improvements, and one-sixth for consumer expenditures.[14] These findings suggest that gains in home values induce some combination of rebalancing and spending, but they do not allow us to distinguish between the direct rebalancing effect and the effect of relaxing liquidity constraints, nor do they indicate whether the spending was caused by rising house values or was determined by other factors and simply financed through this mechanism.

Financial Innovation

One mechanism through which financial innovation may have boosted household debt is by giving more households access to credit. Indeed, the share of households with some debt

[14] Greenspan and Kennedy (2007) provide estimates of the uses of home equity liquefied through cash-out refinancing and other channels. They identify the same categories as the most important uses, although the shares going to the various categories are somewhat different. Bucks, Kennickell, and Moore (2006) report that respondents to the 2004 SCF used home equity lines of credit mainly for home improvements and debt consolidation.

increased from 70 percent in 1983 to 77 percent in 2004, as shown in the top-left panel of Figure 6. Yet if new borrowers had the same debt-income ratio as the average borrower, this expansion of debt holding would explain a rise in the aggregate debt-income ratio of 10 percent (= [77 - 70] / 70)—only one-seventh of the actual rise. The top-right panel of Figure 6 illustrates this point graphically. Moreover, this calculation overstates the effect of financial innovation for two reasons. First, households that have only recently gained access to credit likely hold smaller-than-average amounts of debt (even relative to their incomes). Second, financial innovation probably explains only part of the expansion in debt holding. For example, the shares of different education groups having positive debt barely edged up over time, as we showed in the middle-left panel of Figure 4; this finding suggests that the rising share of borrowers may largely reflect the rising educational attainment of the population. Thus, the "democratization of credit" appears to have played only a small role in the rise in U.S. household indebtedness.

Financial innovation may also have boosted household debt, as we noted earlier, by relaxing quantity constraints or lowering the price of credit to households that already had some access. Clearly, the financial system has evolved in important ways over the past several decades, including improved assessment and pricing of risk; expanded lending to households without strong collateral; and more-widespread securitization of loans, which has likely lowered the cost of credit. However, quantifying the effect of financial innovation on borrowing is very difficult because there are few direct measures of credit supply and because innovation has taken place gradually over time. One aspect of innovation that has received some attention is the effect of mortgage securitization on interest rates. A number of papers find that securitization has lowered the spread between mortgage rates and risk-free rates (for example, see Jameson, Dewan, and Sirmans, 1992; and Kolari, Fraser, and Anari, 1998), while others argue that the link

between securitization and mortgage spreads is much weaker (for example, see Rothberg, Nothaft, and Gabriel, 1989; and Todd, 2000). Other empirical evidence tying increased debt use to specific financial innovations can be found in Edelberg (2006), who finds that the increased use of risk-based pricing explains a substantial share of the increases in debt levels seen across the 1990s, and Gerardi, Rosen, and Willen (2006), who present results that suggest that mortgage innovation has increased the capacity of young households to purchase homes that are more in line with their expected higher future incomes.

Suggestive evidence of the importance of financial innovation for debt accumulation comes from the regression results in Table 1. After controlling for house prices and demographic variables, the estimated coefficient on the indicator variable for 2004 is much larger than the estimated coefficients on indicator variables for earlier years. A supporting indication is the very widespread nature of the increase in indebtedness. In the middle-left panel of Figure 6, we show that the debt-income ratio has increased throughout the upper half of the distribution of this ratio. The median debt-income ratio more than tripled between 1983 and 2004, and the debt-income ratio at the 75^{th}, 90^{th}, and 95^{th} percentiles roughly doubled. The top-right panel of Figure 4 showed that the median debt-income ratio increased considerably for all but the oldest age group; higher percentiles of the debt-income ratio (not shown) increased markedly in all age groups. Similarly, as can be seen in the middle-right panel of Figure 4, the median debt-income ratio increased for all education groups, and higher percentiles increased as well. Lastly, in the middle-right panel of Figure 6, the median debt-income ratio increased a good deal for households throughout the income distribution.

In addition, indebtedness may have been further increased by interactions between financial innovation and the climb in house prices. First, innovation that reduced the cost of

liquefying housing equity enabled households to borrow against rising home values more easily; put differently, rising home values gave households additional collateral that enabled them to take advantage of financial innovation. Second, innovation may have helped to generate the sharp run-up in home values. Ortalo-Magné and Rady (2006) point out that a relaxation of borrowing constraints that enables households to buy houses with smaller down payments relative to prices will tend to push up house prices. Third, financial innovation may be endogenous to the rise in house prices. The reward to financial institutions from developing new means of liquefying housing equity is clearly larger when housing equity is larger.

The Consequences of Higher Household Debt

The sharp increase in U.S. household indebtedness during the past quarter-century raises a number of questions for economic policymakers. With regard to monetary policy, the crucial question is how the rise in debt has accentuated or damped the response of household spending to unexpected changes in the economic environment.[15] This question is the focus of the remainder of the paper.

Ways in Which Households Are More Vulnerable to Economic Shocks

The increase in debt-income ratios should have made at least some households more vulnerable to shocks to incomes, all else being equal. Because debt payments represent commitments whose amount and timing cannot usually be altered without a good deal of effort, reductions in income (all else being equal) reduce the cash flow available to fund current consumption

[15] The response of households to the anticipated evolution of the economic environment has also likely changed with higher debt use, especially to the extent that constraints on households' ability to smooth consumption have changed. Presumably the forecasts of central banks should be able to build in such shifts in spending, so we focus on economic shocks.

proportionately more for highly indebted households. As a result, shocks to income may have larger effects on consumer spending and aggregate demand overall than they would have had in an earlier time.[16]

One way to gauge the magnitude of households' payment obligations is the aggregate debt service ratio, which equals an estimate of required debt payments divided by disposable income. The aggregate debt service ratio published by the Federal Reserve—the thick line in the top-left panel of Figure 7—was little changed, on net, in the 1980s and early 1990s but has increased considerably during the past dozen years. The Federal Reserve also publishes a broader measure, the household financial obligations ratio, which includes other types of regular financial commitments such as rent payments and auto lease payments and is therefore less sensitive to substitution of some financial arrangements for others, such as leasing a car rather than buying on credit (see Dynan, Johnson, and Pence, 2003). This ratio, shown as the thin line in the top-left panel, has also risen markedly since the mid-1990s.

As with other aggregate data, the aggregate debt service ratio describes the situation of U.S. borrowers as a whole but does not help us to understand the range of conditions and vulnerability across households. We showed earlier that debt-income ratios have increased substantially over time for a wide range of households, whether sorted by education, age, position in the income distribution, or position in the distribution of debt-income ratios. Presumably, then, debt service has increased for a wide range of households.

The increase in debt-income ratios has also made households more vulnerable to shocks to interest rates. Movements in market rates alter the terms of new borrowing and also alter the burden imposed by previous borrowing because rates on some outstanding debt vary with current

[16] In addition, Carroll and Dunn (1997) argue that precautionary motives make the spending of households with high debt levels more sensitive to *uncertainty* about income than the spending of households with less debt—and therefore high-debt households are more likely to pull back their spending in the face of an adverse shock.

market rates. Thus, the average interest rate on household debt responds gradually to shifts in market rates. When debts are large relative to incomes, this effect is accentuated so that a given change in interest rates has a larger effect on debt service and thus a larger effect on the funds available for consumption.[17]

Although households may be more vulnerable to interest rate and income shocks taken separately, in many cases those shocks will move in offsetting directions. In particular, exogenous shifts in desired spending may well have a smaller ultimate effect on aggregate demand when indebtedness is high because the effects of such shifts on spendable income are offset to a larger extent by the induced increases and decreases in interest rates as central banks seek to stabilize the economy and prices. To be sure, price shocks, such as a rise in the price of imported oil, would involve reinforcing movements in income and interest rates. But with inflation expectations well anchored, such shocks have had diminished effects on inflation in recent years, thereby reducing the need for policy reactions.

The rise in real asset holdings that has been associated with the increase in indebtedness has also indirectly made households more vulnerable to shocks to asset prices. As can be seen in the top-right panel of Figure 7, the ratios of equity wealth and housing wealth to personal income have both increased significantly, on net, over time. Part of these increases reflects new saving, part reflects increases in equity and home prices, and part reflects decisions by households to allocate their total portfolios between assets and liabilities in certain combinations. The rise in the leverage of household portfolios facilitated by the increase in debt means that household wealth now swings more widely in response to given fluctuations in equity and home prices. Thus, consumer spending and aggregate demand have become more sensitive to asset prices.

[17] Higher debt payments also imply higher interest income; however, net borrowers are likely to have higher propensities to consume out of income than net lenders.

Lastly, the ability to borrow more easily or cheaply means that households with unreasonable expectations about future income or asset appreciation can take on more debt than may be appropriate. Dynan, Elmendorf, and Sichel (2006a) note a straightforward analogy in the business sector: The high-tech investment boom of the late 1990s was fueled by a combination of optimism about the payoff from new information technology and a ready supply of credit to finance investment in such technology.

Ways in Which Households Are Less Vulnerable to Economic Shocks

Increasing indebtedness is not the only change in households' financial situations during the past quarter-century. Other financial changes have made households less vulnerable to economic shocks.

First, the greater availability of credit, noted earlier in the paper, could lessen the sensitivity of household spending to downturns in income. Specifically, households that can borrow when their income experiences a transitory slump can better maintain their spending. Indeed, Dynan, Elmendorf, and Sichel (2006a) found that the estimated marginal propensity to consume (MPC) out of contemporaneous aggregate income has diminished over time. The middle panel of Figure 7 reproduces a chart from that paper; the solid line shows the estimated MPC from forty-quarter rolling regressions, and the dashed lines show the 95 percent confidence intervals. Although the confidence bands are wide, the point estimates move much closer to zero in recent years. The paper also showed that the change in the MPC was more pronounced for income declines than for increases, which is consistent with the notion that financial innovation likely relaxed constraints on borrowing more than on saving.

Note that this smoothing effect of borrowing is not inconsistent with the disruptive effect of additional debt described earlier. As Dynan, Elmendorf, and Sichel (2006a) explain, the link between financial innovation and spending volatility depends not on the average amount of borrowing but on marginal borrowing that smoothes spending in the face of income fluctuations.[18] Financial innovation appears to have increased both the amount of debt held during good times and the availability of additional debt in bad times; these forces push the volatility of spending in different directions. This standoff is consistent with Johnson and Li's (2007) finding that households with high debt service payments do not appear to be more sensitive to income shocks than those with low debt service payments.[19] They argue that this result might arise because the former group has greater access to additional credit, which offsets the effect of their more-restricted cash flow.

A second change that has made households less vulnerable to economic shocks is that household wealth has increased a good deal relative to income over the past several decades. Assets are much larger than liabilities, so the arithmetic gap between assets and liabilities can widen even when assets rise less rapidly than liabilities do. According to the FOF accounts and as shown in the bottom-left panel of Figure 7, the ratio of household wealth to personal income averaged 4.7 in the first part of this decade, compared with an average of 4.0 in the 1980s.[20]

Once again, however, movements in aggregate liabilities and assets have limited utility in considering household vulnerability. The bottom-right panel of Figure 7 plots ratios of net worth

[18] These authors also explain that greater capacity to borrow can boost the volatility of spending by giving households the wherewithal to purchase capital goods more quickly when their target stocks of those goods increase. In other words, financial innovation augments the traditional accelerator response to positive shocks to expected income or wealth. If expected income or wealth decline, perhaps because of a drop in asset prices, spending may then suffer a sharp retrenchment.

[19] Similarly, Benito, Waldron, Young, and Zampolli (2007) find evidence suggesting that higher debt levels have not raised the sensitivity of spending to income shocks for households in the United Kingdom.

[20] The aggregate ratio of net worth to income in the SCF data displays a somewhat different pattern than in the FOF data, but it also increased considerably between the 1980s and the early 2000s.

to income at the 25th, 50th, 75th, and 90th percentiles of the distribution of those ratios in the SCF. The most dramatic increases have occurred at the higher percentiles, but even at the 25th percentile net worth has increased a bit relative to income. Therefore, from the perspective of the full balance sheet, most households appear to have strengthened their financial positions over time. Higher net worth implies a greater ability to smooth through temporary shortfalls in income or increases in interest rates by selling or borrowing against assets.

Debt and Financial Distress: Evidence from the SCF

In the 2004 SCF, 6.9 percent of households reported having been sixty or more days late on a required debt payment over the previous year. To understand the determinants of such delinquency, we estimated logit regressions for which the independent variables were the debt-income or debt-asset ratio, an indicator variable for homeownership, indicator variables for SCF waves, and the demographic variables discussed earlier. We dropped the 1983 wave because the delinquency variable was not comparable, and we omitted the 1989 indicator variable to achieve identification.

The regressions showed that the likelihood of missing payments is strongly related to the amount of debt held and that the debt-asset ratio has more explanatory power than the debt-income ratio. This latter point is depicted graphically in the top panels of Figure 8, in which the shaded bars refer to households in the 90th percentiles of the debt-asset and debt-income distributions and the hollow bars refer to households in the 75th percentiles. Households with higher debt-income ratios had only a slightly higher probability of having been delinquent (shown on the left), while households with higher debt-asset ratios had a noticeably higher

probability of having been delinquent (shown on the right). The likelihood of missing payments is significantly lower for homeowners, perhaps because they have more to lose by defaulting.

We also found that the likelihood of missing payments has increased over time. One factor behind this change is an increase in the number of households with very high debt-asset ratios. As shown in the middle-left panel of Figure 8, debt-asset ratios have risen throughout the upper half of the distribution of those ratios, but they remained fairly low at the median and the 75th percentile. However, debt-asset ratios climbed to just below 1 at the 90th percentile and well above 1 at the 95th percentile; these latter households are insolvent.

Debt and Financial Distress: Recent Developments in the Subprime Mortgage Market

Recent developments in the subprime mortgage sector in the United States provide a concrete illustration of some of the risks associated with the upper tail of the debt distribution and, relatedly, with financial innovation. By way of background, the U.S. subprime mortgage market emerged more than two decades ago and then began to expand in earnest in the mid-1990s; it was spurred in large part by innovations that reduced the costs for lenders of assessing and pricing risks. This expansion made homeownership possible for households that in the past might not have qualified for a mortgage and has thereby contributed to the significant rise in the U.S. homeownership rate—from 65 percent in 1995 to 69 percent in 2006.

The most recent episode in the subprime mortgage sector started with a boom in lending beginning in mid-2004 and lasting through much of 2006. Subprime delinquency rates fell to multiyear lows in mid-2005 amid a robust the housing market but then began to rise, particularly those for variable-rate loans. The rate of serious delinquencies among these loans—corresponding to mortgages in foreclosure or with payments ninety days or more overdue—has

now reached 13 percent, more than double its earlier low. This rise in delinquencies has, in turn, shown through to new foreclosures: In the first quarter of 2007, an estimated 325,000 foreclosure proceedings were initiated, up from an average quarterly rate of 230,000 over the preceding two years.[21]

The dramatic deterioration in the performance of subprime variable-rate mortgages has stemmed from several factors. To be sure, the moderation of economic growth and, in some cases, higher interest rates have probably made it more difficult for some borrowers to service their loans. However, a key determinant appears to have been the sheer amount of debt relative to the value of the house taken on by some borrowers. Many of the troubled borrowers appear to have had very high loan-to-value ratios particularly once second-liens or so-called piggyback loans were taken into account, a result consistent with a loosening of underwriting standards during the period in which subprime loans were expanding rapidly. The factors contributing to this loosening are not, as yet, fully understood, but it seems likely that at least some borrowers and lenders may have been expecting a continuation of the rapid rates of house-price appreciation seen in the preceding few years. In the event, house prices slowed sharply in 2006, leaving some borrowers who had recently originated a high loan-to-value mortgage with little or no equity to draw on should they have trouble making mortgage payments. Indeed, in the past, many subprime borrowers facing the end of the interest-rate lock period on their mortgages have refinanced before their payments began to reset; in the current episode, the ability to do so has been limited by the lack of accumulated home equity.

To put these developments in a macroeconomic context, the loosening of credit standards along with unrealistic expectations for house prices probably boosted housing demand in 2005

[21] Delinquency rates are based on data from First American LoanPerformance; foreclosure rates are based on data from the Mortgage Bankers Association, which have been adjusted to reflect the limited coverage of the association's sample.

and 2006, and the subsequent correction is contributing to the extent and persistence of the softness in the housing market. With regard to aggregate household consumption, the number of troubled subprime borrowers may be sufficiently small that the direct effect will be modest. That said, some households will surely face significant financial distress, and one cannot rule out the possibility that the events will materially reduce investors' willingness to provide mortgage credit to a broader group and thereby have a more significant effect on aggregate spending. A full discussion of the related developments in financial markets and of the steps being taken by policymakers to address the problems is outside of the scope of this paper. However, the broad lesson with regard to financial innovations that enhance access to credit is that regulators need to carefully consider what additional regulations or oversight might be needed to protect consumers and promote safe and sound underwriting practices, particularly when such innovations are new and not fully understood by households and lenders.

Higher Debt and the Adequacy of Retirement Savings

Another consequence of the higher level of indebtedness is that households may find themselves with insufficient savings when they retire. For example, households that extract equity from their houses without recognizing the long-run consequences of the reduction in net worth or that fail to recognize that the cost of shelter is rising along with the price of houses may need to make substantial adjustments to their consumption paths later in life. Whether inadequate savings is a widespread problem—or has become more widespread over time—is not clear. A substantial literature examining the adequacy of retirement savings has not reached a consensus, partly because of disagreements about assumptions and techniques and partly because savings

adequacy may be evolving over time.[22] Resolving this question is important for entitlement and tax policy but probably not for monetary policy because the macroeconomic effects of households' consumption responses would be gradual. Nevertheless, we can glean some casual evidence from the SCF.

Today's households nearing retirement have accumulated as much or more wealth relative to their incomes as did their forebears.[23] Looking at 50- to 59-year-olds during the past twenty-five years—shown in the bottom-right panel of Figure 8—we see that the ratio of net worth to income has been essentially unchanged for households at the 25th percentile, has risen a little for households at the 50th percentile, and has increased considerably for households at the 75th percentile and above. Of course, this assessment does not account for many important complexities that are addressed in sophisticated analyses of savings adequacy. For example, one cannot control for the value of defined benefit pensions using the SCF without fairly complicated calculations and assumptions, and this approach makes no adjustment for the rising cost of health care.

Similar casual evidence for younger households may raise greater concern. For 40- to 49-year-olds, shown in the bottom-left panel, ratios of net worth to income have also increased over time but to a lesser extent. Moreover, one might be concerned that today's younger households might not enjoy the run-ups in stock prices and home prices that their older counterparts experienced. These points apply with even greater force to30- to 39-year-olds, shown in the middle-right panel.

[22] For a sampling of this analysis, see Bernheim, Skinner, and Weinberg (2001); Engen, Gale, and Uccello (2004); Scholz, Seshadri, and Khitatrakun (2006); and Smith and Love (2007).

[23] For a more comprehensive examination of the relative wealth of different cohorts at different stages in the life cycle, see Gale and Pence (2006).

Conclusion

The debt of U.S. households has risen very substantially relative to income, especially in the past five years or so. This increase mainly reflects the efforts of households to smooth consumption over time in response to shifting perceptions about future income, wealth, and interest rates, along with the effects of financial innovation that has reduced constraints on the ability of households to realize desired consumption patterns.

The information we looked at did not suggest that households have become more impatient—that they are more inclined to bring a given amount of future consumption forward. Nor did we unearth strong evidence of reduced risk aversion or perceived risk as a motive for borrowing and spending more now instead of saving. To be sure, aggregate income flows have become less volatile as part of the "Great Moderation," but individual households appear to face, if anything, the potential for greater swings in earnings due to the churning associated with technological change and globalization. Although households showed some decline in their reported need to accumulate savings for precautionary purposes, the effects of this decrease are likely to account for only a very small part of the trend in debt.

Demographics have probably contributed to greater indebtedness, through both the greater concentration now of baby boomers in the part of the lifecycle where debt use is highest and the increases in educational attainment, likely a proxy for higher lifetime earnings as well as more-sophisticated use of financial instruments. Declines in longer-term interest rates and increases in expected incomes may have also boosted debt to some extent. With regard to the latter, the step-up in productivity growth in the mid-1990s in the United States should have raised calculations of lifetime incomes. But median real incomes have not grown very rapidly in recent years, and survey responses suggest that households have not been very optimistic about

their earnings in the immediate future over the past several years, when the growth in debt has been especially strong.

The most important factors behind the rise in debt and the associated decline in saving out of current income have probably been the combination of increasing house prices and financial innovation. We noted a number of channels by which higher house prices can lead to higher debt. And causality probably runs to some extent in the other direction as well, especially in light of financial innovation that has reduced the cost and increased the availability of housing finance. Innovation has opened up greater opportunities for households to enter the housing market and for homeowners to liquefy their housing wealth, thereby helping them smooth consumption of all goods and services. One implication of this analysis is that a portion of the rise in debt relative to income probably reflects a shift in the level of spending that is not likely to be repeated unless house prices continue to increase as quickly as in the past and financial innovation continues to erode cost and availability constraints at a rapid pace.

With regard to the implications of greater household indebtedness, it seems unlikely that households have deliberately put themselves in a position in which they see their consumption as more vulnerable to unexpected economic developments, especially given that risk aversion and risk perceptions among households are probably largely unchanged. Although higher debt service obligations relative to income would appear to leave households more open to unexpected changes in income and interest rates, many macroeconomic shocks involve the demand for goods and services and tend to lead to offsetting movements in income and interest rates. Moreover, the increase in access to credit and levels of assets over time should give households, on average, a greater ability to smooth through any shocks.

That said, there are a number of reasons to be cautious about concluding that rising debt levels have not increased macroeconomic vulnerabilities. For one, household spending is probably more sensitive to unexpected asset-price movements than previously. A higher wealth-to-income ratio naturally amplifies the effects of a given percentage change in asset prices on spending. Further, financial innovation has facilitated households' ability to allow current consumption to be influenced by expected future asset values. When those expectations are revised, easier access to credit could well induce consumption to react more quickly and strongly than previously. In addition, to the extent that households were counting on borrowing against a rising collateral value to allow them to smooth future spending, an unexpected leveling out or decline in that value could have a more marked effect on consumption by, in effect, raising the cost or reducing the availability of credit.

Another caution involves the distribution of credit and, in particular, a tendency for some households to become very highly indebted relative to income and wealth. The spending of those households is likely to be constrained by negative income or asset-price shocks as well as by households' capacity to service their loans. Although these households represent a relatively small share of the population, in some circumstances such developments could have effects large enough to show through to the macroeconomy.

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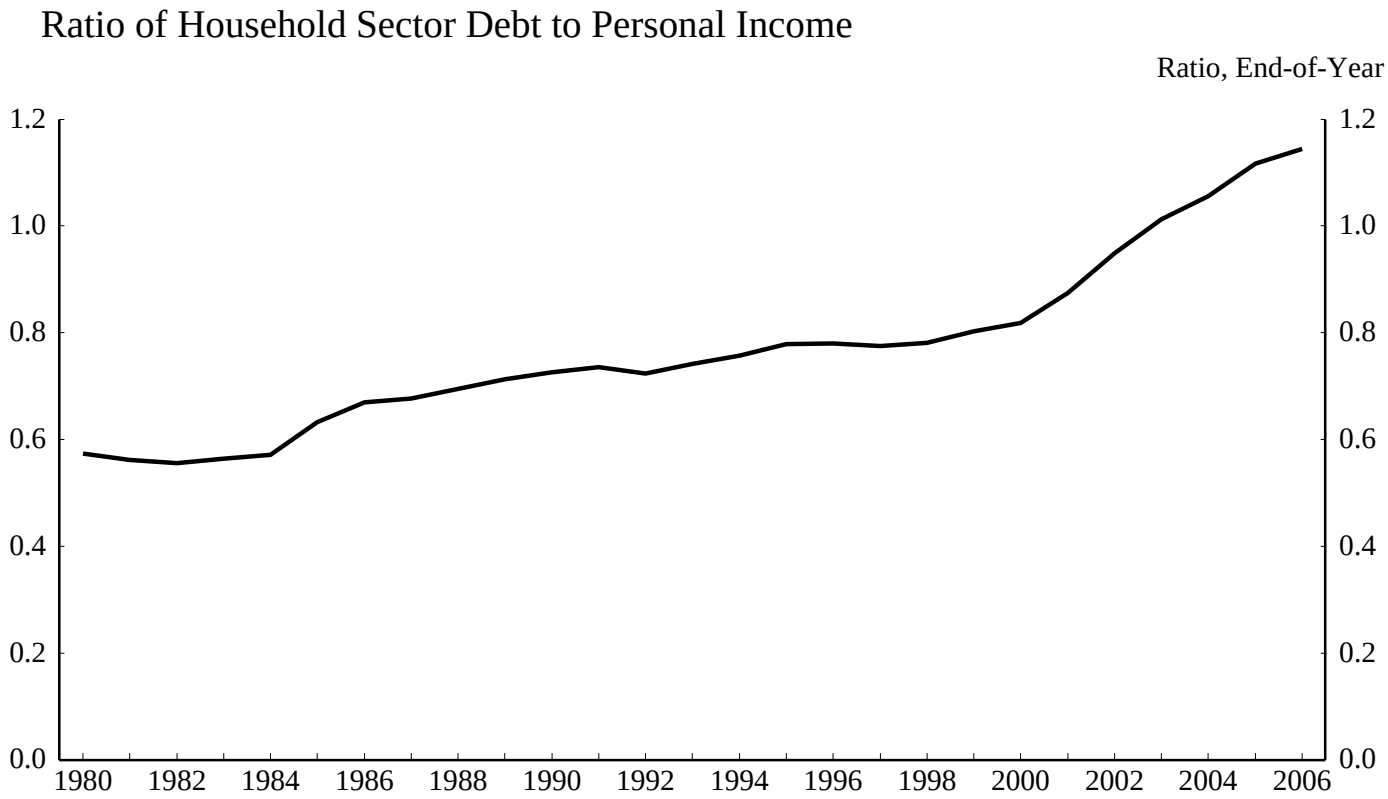
Table 1
Estimation Results from Median Regressions of D/Y on Relative House Prices and Controls
Standard Errors in Parentheses

Constant	0.221	0.217	-0.278	-0.159
	(0.005)	(0.020)	(0.045)	(0..058)
Relative house prices	0.050	0.063	0.076	0.026
	(0.005)	(0.013)	(0.002)	(0.003)
Region indicators included?	No	Yes	No	Yes
P-value for F-test of Significance	…	0.000	…	0.000
Indicator for 1989 SCF	0.130	0.113	0.022	0.053
	(0.004)	(0.008)	(0.001)	(0.002)
Indicator for 1992 SCF	0.134	0.127	0.048	0.083
	(0.004)	(0.008)	(0.002)	(0.004)
Indicator for 1995 SCF	0.225	0.225	0.070	0.107
	(0.003)	(0.006)	(0.005)	(0.004)
Indicator for 1998 SCF	0.319	0.307	0.103	0.168
	(0.004)	(0.013)	(0.003)	(0.005)
Indicator for 2001 SCF	0.273	0.243	0.057	0.124
	(0.006)	(0.013)	(0.004)	(0.005)
Indicator for 2004 SCF	0.485	0.456	0.166	0.276
	(0.012)	(0.022)	(0.002)	(0.008)
Age of head	…	…	0.060	0.064
			(0.004)	(0.005)
Age of head squared	…	…	-0.001	-0.001
			(0.000)	(0.000)
Age of head cubed	…	…	0.000	0.000
			(0.000)	(0.000)
Head has HS degree			0.095	0.102
			(0.003)	(0.002)
Head has college degree	…	…	0.143	0.143
			(0.003)	(0.003)
Homeowner	…	…	1.010	1.031
			(0.004)	(0.006)
Log(income)	…	…	-0.066	-0.075
			(0.002)	(0.002)
Number of observations	19,957	19,957	19,957	19,957

Figure 1

The Evolution of Household Saving and Debt in the United States

Source. U.S. National Income and Product Accounts.



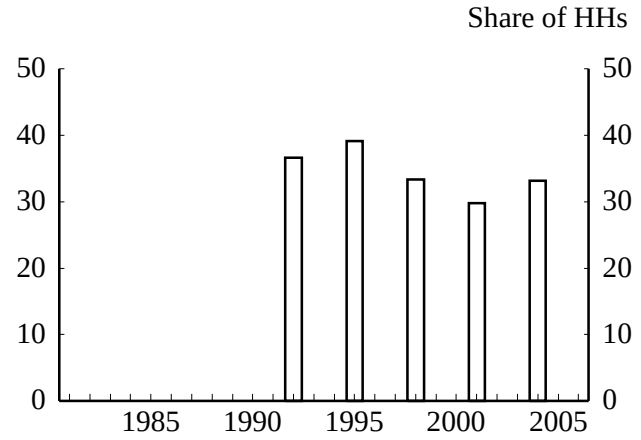
Source. U.S. Flow of Funds Accounts and National Income and Product Accounts.

Figure 2

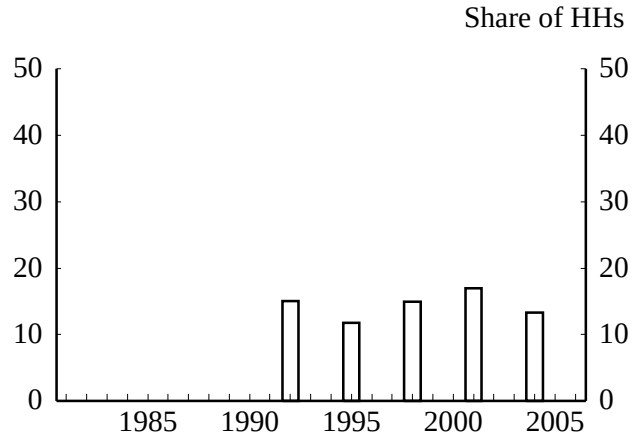
Evidence on Impatience

Survey of Consumer Finances

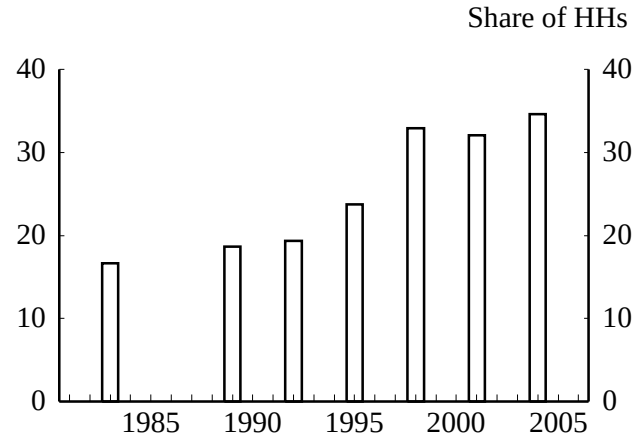
Planning Horizon 1 Year or Less



Planning Horizon 10 Years or More

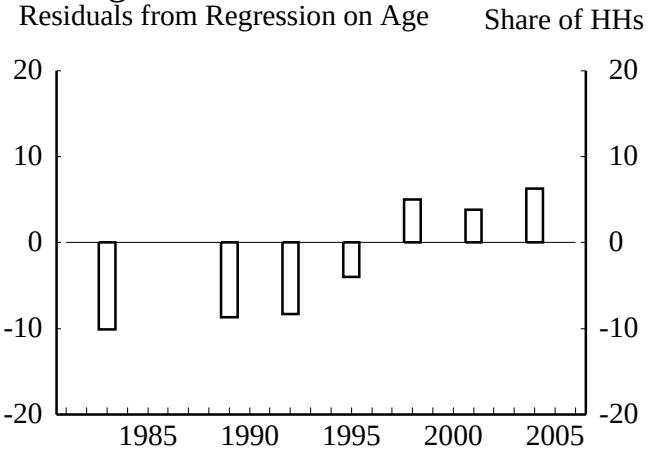


Saving for Retirement

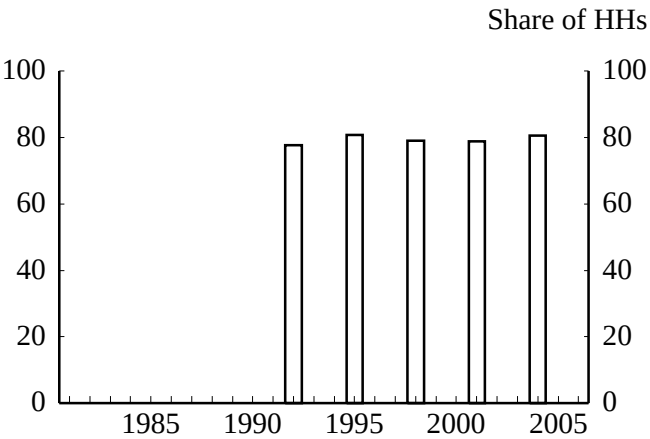


Saving for Retirement

Residuals from Regression on Age



Okay to Borrow for Car Purchase



Okay to Borrow for Vacation

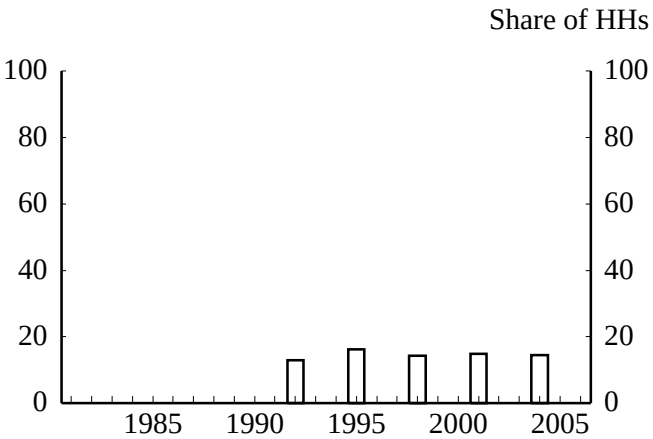
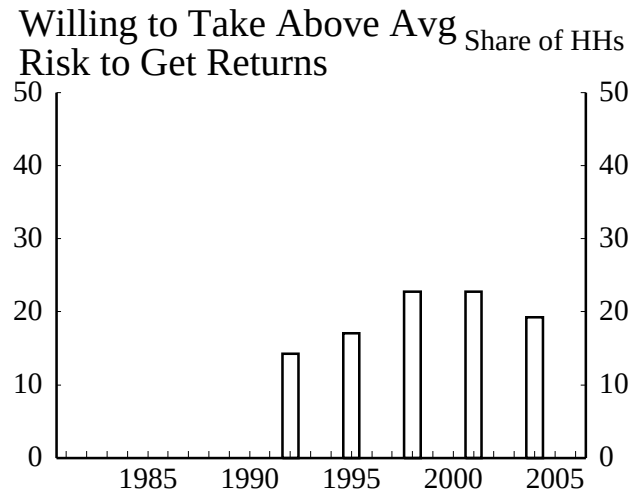
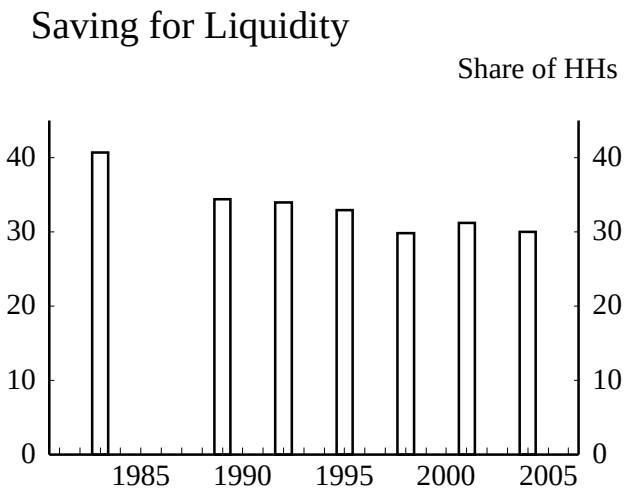


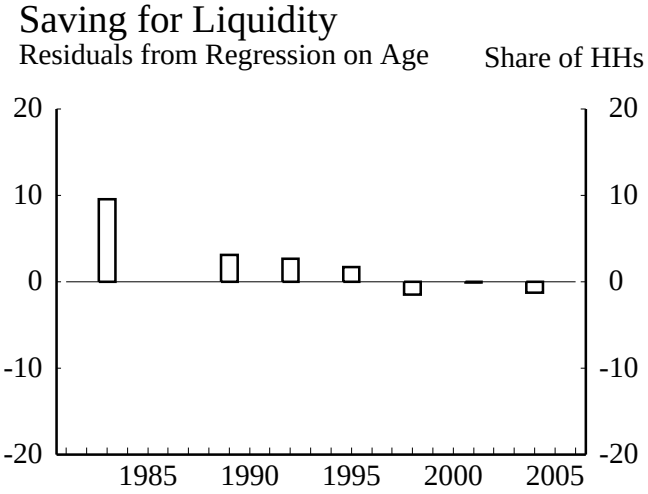
Figure 3

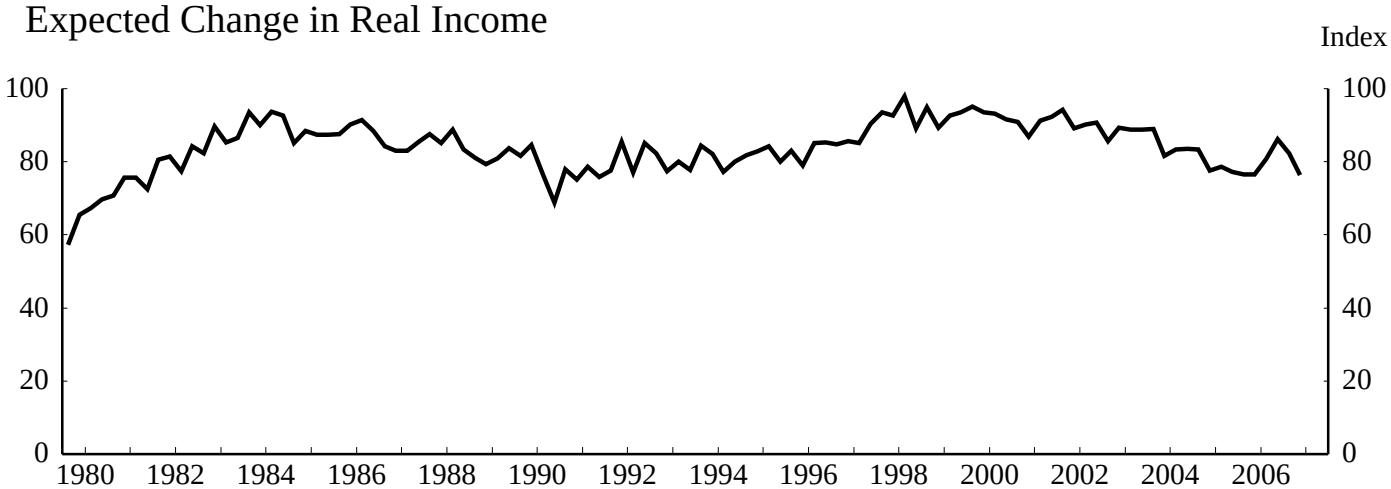
Evidence on Precautionary Saving and Expected Income

Survey of Consumer Finances (unless otherwise noted)







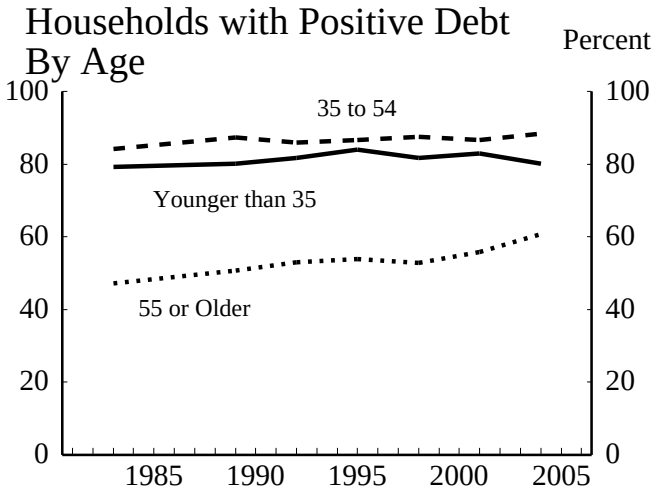


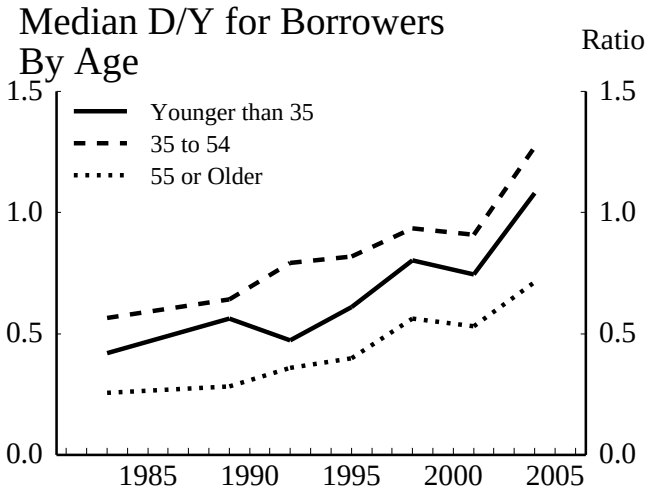
Source. Reuters/University of Michigan Surveys of Consumers. Calculated as the share expecting their income to rise more than prices less the share expecting prices to rise more than their income + 100.

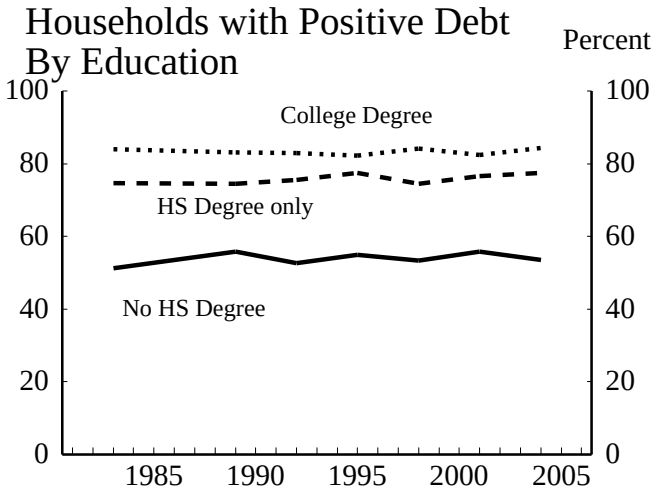
Figure 4

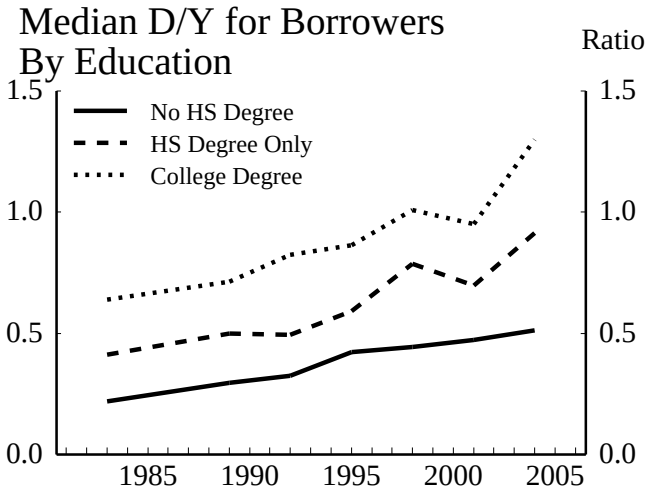
Debt and Demographics

Survey of Consumer Finances









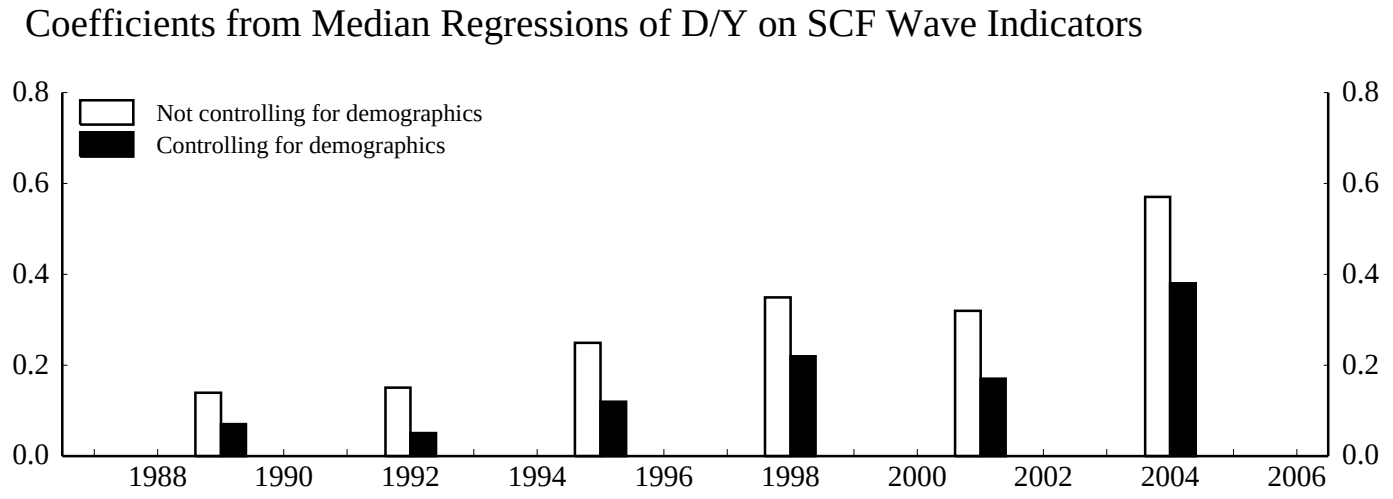
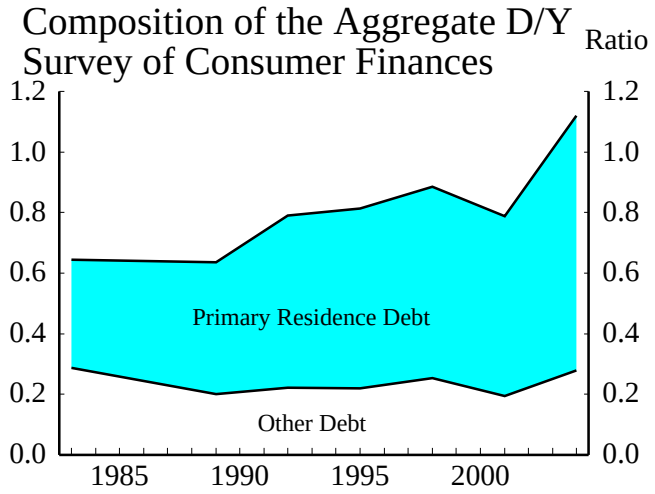
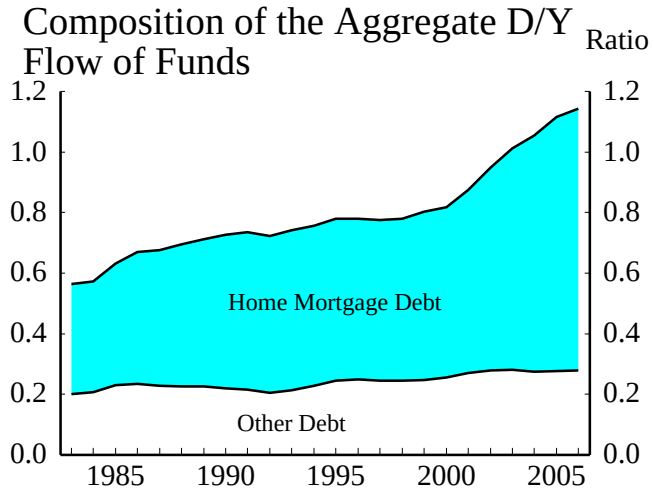


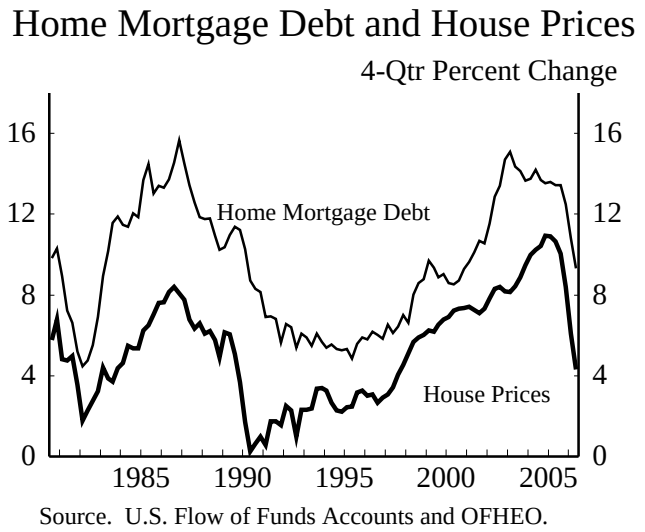
Figure 5

Debt and House Prices

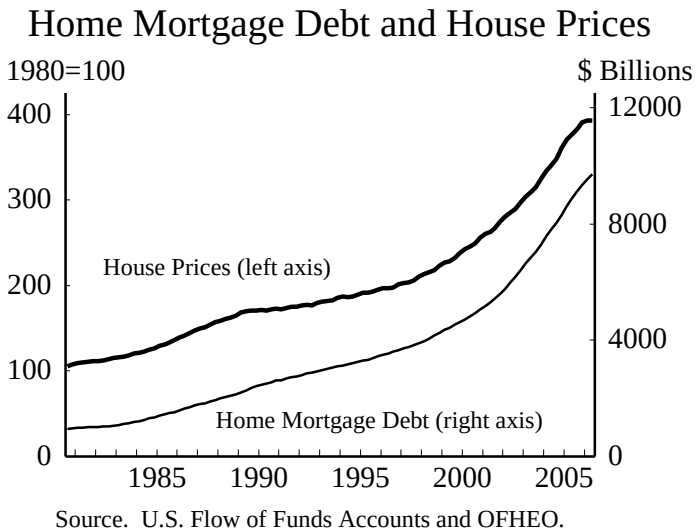
Survey of Consumer Finances (unless otherwise noted)







Source. U.S. Flow of Funds Accounts and OFHEO.



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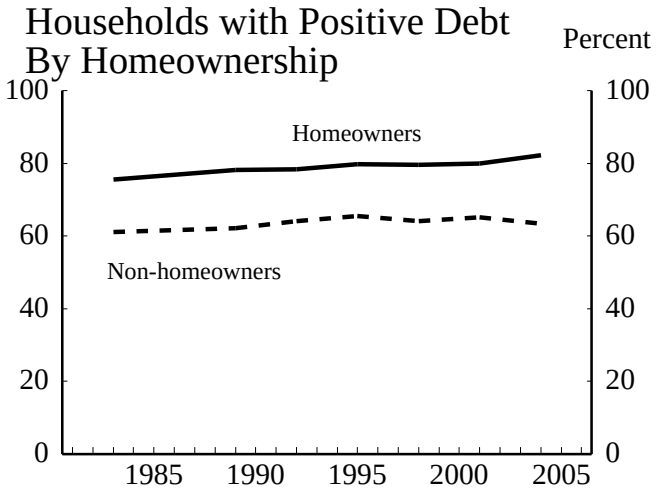


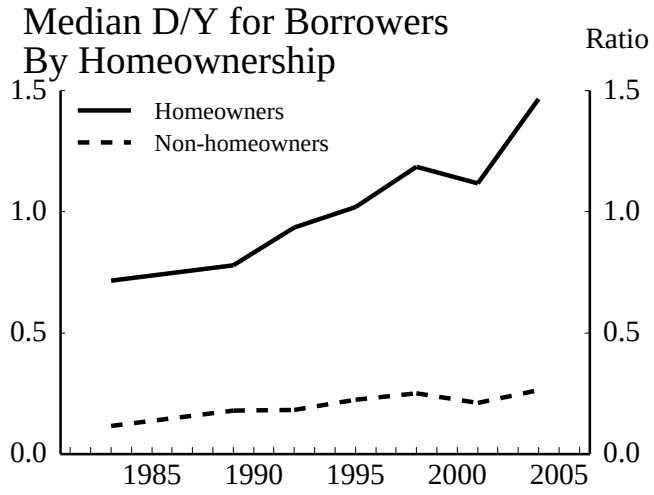
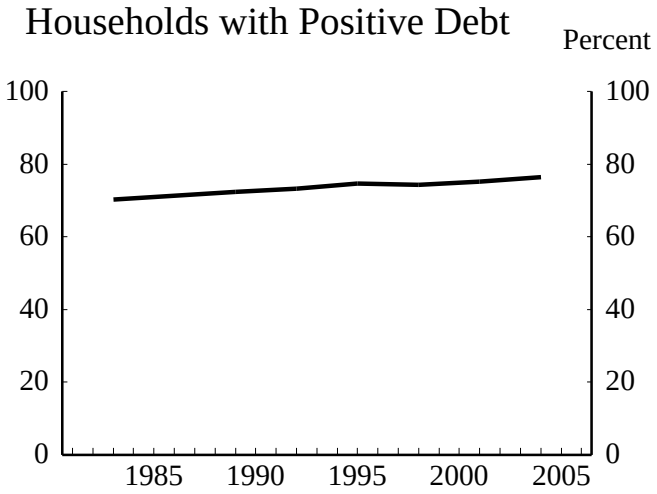
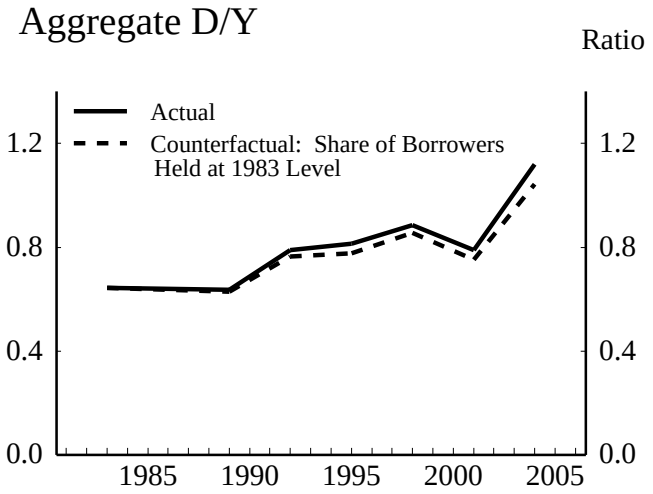


Figure 6

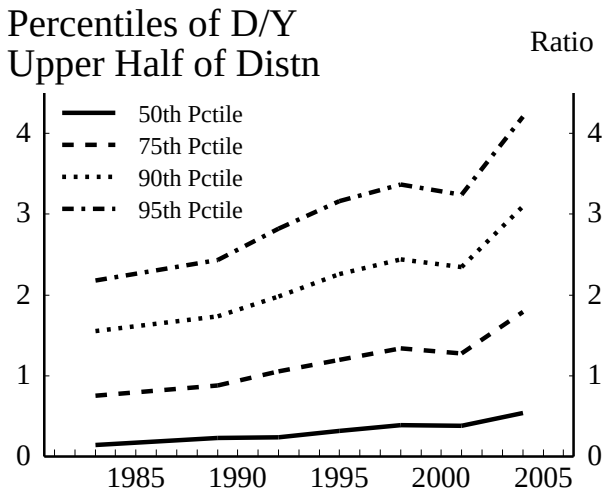
Financial Innovation and Debt

Survey of Consumer Finances (unless otherwise noted)





Source. U.S. Flow of Funds Accounts and authors' calculations.



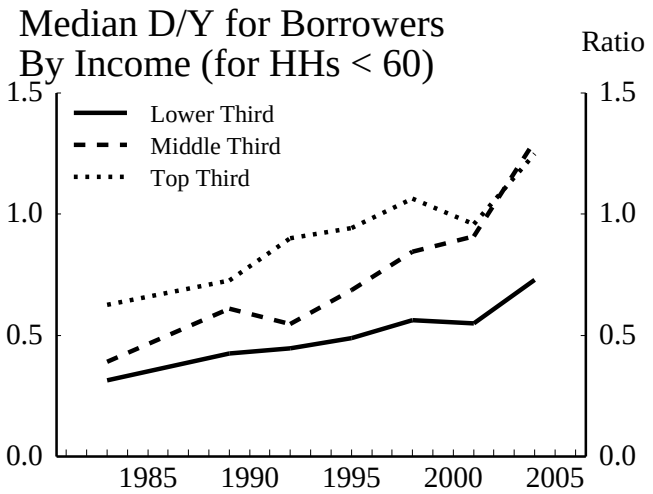
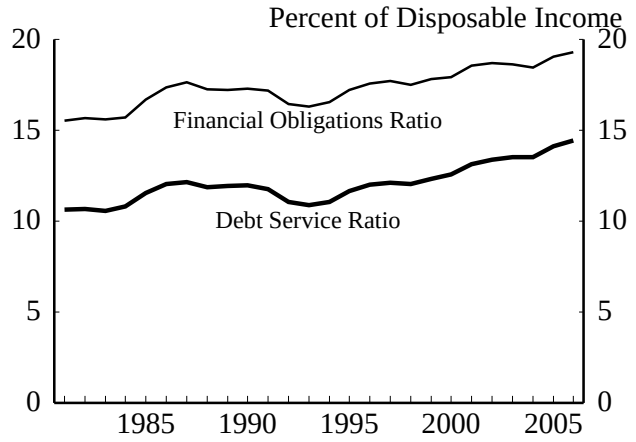


Figure 7

Household Vulnerability to Economic Shocks

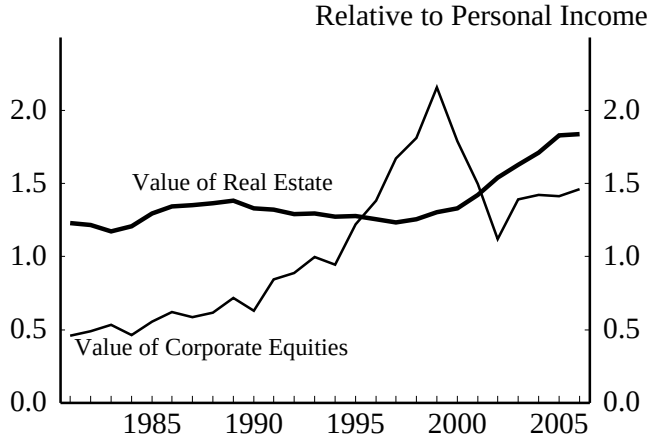
Survey of Consumer Finances (unless otherwise noted)

Household Financial Obligations



Source. Federal Reserve Board.

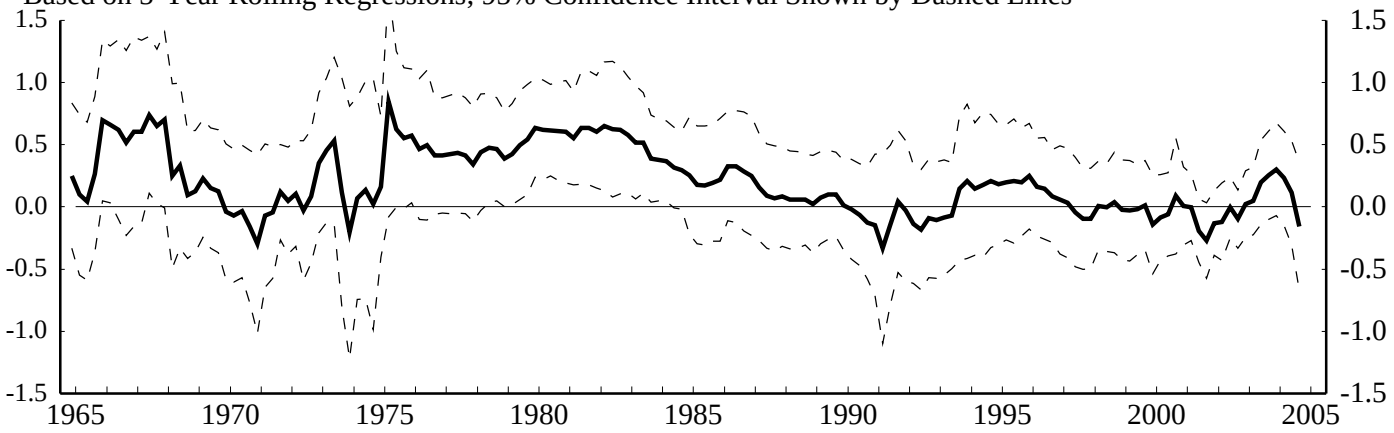
Household Real Estate and Equity Wealth



Source. U.S. Flow of Funds Accounts.

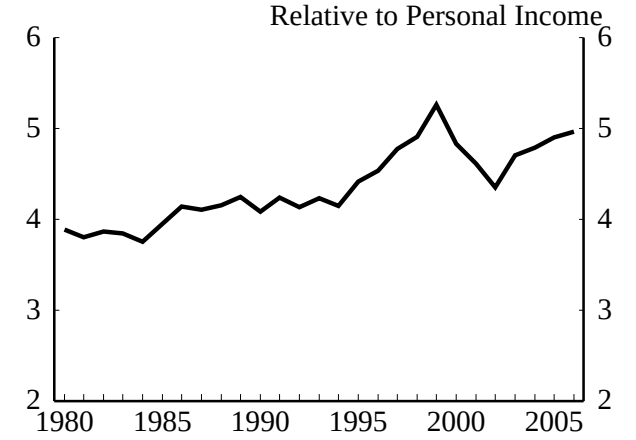
Estimated MPC Out of Contemporaneous Income

Based on 5-Year Rolling Regressions; 95% Confidence Interval Shown by Dashed Lines



Source. Dynan, Elmendorf, and Sichel (2006a).

Household Net Worth



Source. U.S. Flow of Funds Accounts.

Percentiles of NW/Y

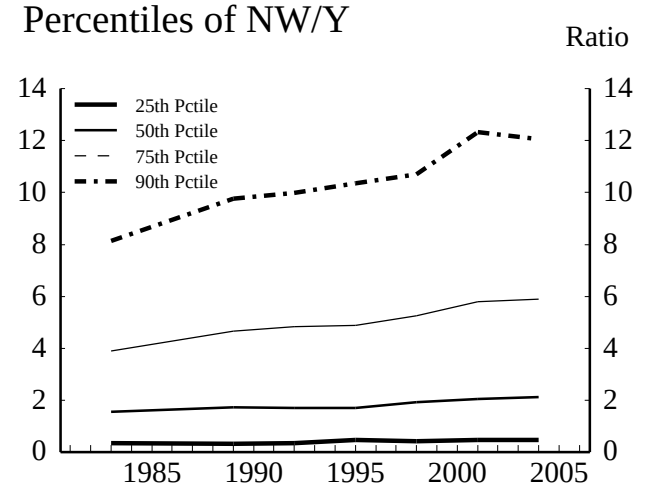


Figure 8

Financial Distress and the Adequacy of Retirement Savings

Survey of Consumer Finances