



## **Changes in Homeowners' Financial Security during the Recent Housing and Mortgage Boom**

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*Abstract*

From the late 1990s through 2005, the U.S. experienced an unprecedented housing boom, which boosted the asset values of many families. This meant, on the one hand, that families with homes had more collateral to borrow against, but it also meant that new home buyers needed to take out larger mortgages to afford a home. After 2001, the U.S. saw a sharp acceleration in the growth rate of household debt. Using data from the Survey of Consumer Finances conducted by the Federal Reserve, which we supplement with data from the Flow of Funds Accounts generated by the Federal Reserve, we consider the effect of the housing and mortgage boom on the financial security of homeowners. The data indicate that all measures of vulnerability are increasing and suggest declining financial security for homeowners after 2000. The increases in financial vulnerability were especially pronounced for minorities, younger families, and lower income families.

Keywords: Mortgages, mortgage payments, variable interest debt, home equity, portfolio allocation.

## **I. Introduction**

Starting in the late 1990s, the U.S. experienced an unprecedented boom in house prices. For those families who stayed in their homes, this meant that they had more collateral to borrow against, and for families looking to buy a new house, it meant that they had to borrow more than in the past to buy a new or bigger home. The housing boom thus went hand in hand with a boom in mortgages.

As families experienced two offsetting phenomena, the question naturally arises as to their combined effect. In particular, it is possible that the growth in home values was large enough to compensate for the rise in mortgages, leaving families with more total wealth and more financially secure.

It is, however, also possible that families' were left with less financial security and greater vulnerability. This greater vulnerability could be ascribed to a number of factors. Importantly, a run-up in house prices may have impeded increases in homeownership, thereby excluding families from taking advantage of wealth creation opportunities. In addition, the assets of homeowners may have become less diversified. Also, if mortgages grew faster than home values, families may have owned an ever smaller share of their homes, making them particularly vulnerable to possible, future declines in home values. Further, despite falling interest rates, the rise in debt may have led to an increase in debt payments. Finally, borrowers may have become more exposed to higher payments on existing loans due to a greater reliance on variable interest debt than in past. This paper considers the evidence on all of these trends to study the overall effect of the housing and mortgage boom on the financial security of families.

The rest of the paper is organized as follows. In section II, we provide a review of the relevant literature, followed by a discussion of the housing and mortgage boom in section III. In section IV, we present data on the combined effects of the housing and mortgage boom, both in the aggregate and broken down by demographic characteristics. This is followed in section V by a summary discussion of household financial security measures, also in aggregate and broken down by demographic characteristics. The paper finishes with our concluding remarks in section VI.

## **II. Literature Review**

For many families, the home they own is the largest investment that they will ever make and one of the greatest steps they can take to achieve greater stability and move up the economic ladder. This investment is so critical that it is even encouraged by the federal government through the tax code, which allows for a deduction of the mortgage interest payments from taxable income.<sup>1</sup> The basic notion that the government should subsidize homeownership since it confers benefits onto the individual and onto society appears to be supported by the existing literature, although there is some debate over whether the

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<sup>1</sup> The amount that a family can deduct is limited, especially by the alternative minimum tax calculation under the tax code, and because it is a tax deduction, the tax benefit increases with higher incomes under a progressive tax code that taxes higher incomes at a higher marginal tax rate.

size of the tax incentives offered to homeowners are justified by the resulting benefits (Coulson, 2002). In the face of rapidly increasing house prices, homeownership may be harder to attain for families. And, less access to homeownership may inhibit greater wealth creation.<sup>2</sup>

The link between housing wealth and overall wealth creation is somewhat ambiguous. Wealth accumulates due to the appreciating value of the home over time as supply is limited. It is also due to the fact that homeowners no longer have to pay rent and thus have more resources available to save. Offsetting these effects, though, is that there may be a wealth effect, whereby greater housing wealth may increase consumption and reduce saving.

The literature does find evidence for a positive rate of return on residential real estate. For instance, Jud and Winkler (2005) found housing is associated with a rate of return that is greater than that of treasuries, but lower than that of stocks. That is, there may be a direct wealth benefit from homeownership, as this particular asset provides a higher rate of return than others, in particular bonds.

An additional benefit of homeownership is that owners tend to invest more than renters in the maintenance of their home, precisely because they are the primary beneficiaries of this investment (Galster, 1983; DiPasquale and Glaeser, 1999; Harding et al., 2000). This is evident in the slower depreciation rates for owner-occupied housing than for rental properties (Shilling et al., 1991). This may help to translate into house price increases, which should translate into greater wealth.

Further, homeowners have a long-term stake in their neighborhood due to the high fixed costs associated with buying and selling a home. Homeowners thus may have an incentive to invest in children – theirs and their neighbors'. One indicator of this may be that children of homeowners may have higher educational outcomes, such as lower high school drop out rates or higher math and reading scores (Green and White, 1997; Haurin et al., 2002). By extension, this implies that, since the quality of the local school system affects house prices (Crone, 2006), homeownership may again help to boost the rate of return on this particular household asset as greater homeownership may be associated with better educational outcomes and thus higher house prices.

An important and potentially growing adverse impact on total household wealth creation is the so-called wealth effect, which threatens to offset the positive effects outlined above. As home prices appreciate, households will feel wealthier and reach their saving goals earlier than expected, leading to an increase in consumption and a decline in overall saving. For instance, Krumm and Kelly (1989) found that homeownership did not

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<sup>2</sup> There are additional benefits associated with homeownership, which may not necessarily feed back into greater wealth creation for households, but which may be beneficial to society. For instance, there is some evidence that homeownership reduces psychological stress, depending, though, on the level of outstanding mortgages, and therefore can have a positive impact on morbidity and mortality (Cairney and Boyle, 2004). Other social benefits from homeownership may include more landscaping, more community involvement, a greater degree of political participation (DiPasquale and Glaeser, 1999).

increase the overall accumulation of household assets, as one would expect. This suggests that the wealth creation effect from homeownership may be offset by lower savings elsewhere. Also, Lehnert (2004) estimated that consumption increased by 0.04 percent to 0.05 percent for each one percent increase in home values. Thus, in the face of accelerated house price increases, families may have reduced their savings. This may have meant a growing relative allocation of household assets in more illiquid real estate assets.

There are problems associated with too many assets being tied up in housing. It is important to first recognize that having assets in residential real estate in addition to stocks and bonds offers households an opportunity to diversify their portfolio and reduce their risk, as the returns on residential real estate tend to be largely unrelated to returns on financial assets (Hu, 2004). As with any investment, there can be too much of a good thing. Specifically, de Roon et al. (2002) suggest that an allocation of 30% of household assets towards residential real estate is an optimal target for U.S. households. Most importantly, too much residential real estate in a family's portfolio may create a problem for families during retirement, when families have to live off their accumulated assets. Residential real estate is not an income-producing asset and is hard to liquidify (Aggar and Di, 2005). Consequently, the run-up in house prices after the late 1990s may have translated into greater volatility for a family's overall portfolio.

A growing lack of diversification in a booming housing market is not the only factor that could increase the risk exposure for families. Another factor results from the fact that residential real estate tends to be a leveraged investment. Families borrow a large share of the home value for the purchase and thus have only a small equity stake. Because of this greater leverage, or higher loan to value ratio, movements in house prices can translate into much larger movements in home equity. As already discussed, Jud and Winkler (2005) found that the resulting risk is greater than for treasuries or stocks, while the average rate of return falls between these two assets. In addition, this risk may be greater when the share of highly leveraged homeowners is greater. Owen and Stein (1999) found that a concentration of highly leveraged homeowners can lead to greater movements in house prices in response to city specific shocks. So, if families had only a fixed amount available for down payments, the rise in house prices may have directly translated into greater leverage – a higher loan to value ratio – and a potential increase in the volatility of the rate of return on residential real estate for families.

The risks associated with leverage may be further increased by the use of adjustable rate mortgages (ARMs). While an ARM may offer the borrower a stable real capital value, it tends to increase the short-term variability of the requirement payments, which can translate into a higher default risk for homeowners, who have only limited access to more debt and to liquid assets (Campbell and Cocco, 2003). Moreover, high risk borrowers – borrowers with low liquidity and with borrowing constraints – may self-select into ARMs (Posey and Yavas, 2001). The result is a higher default risk associated with ARMs (VanderHoff, 1996). Hence, if the boom in house prices since the late 1990s meant that more borrowers faced liquidity and borrowing constraints, we would expect an increase

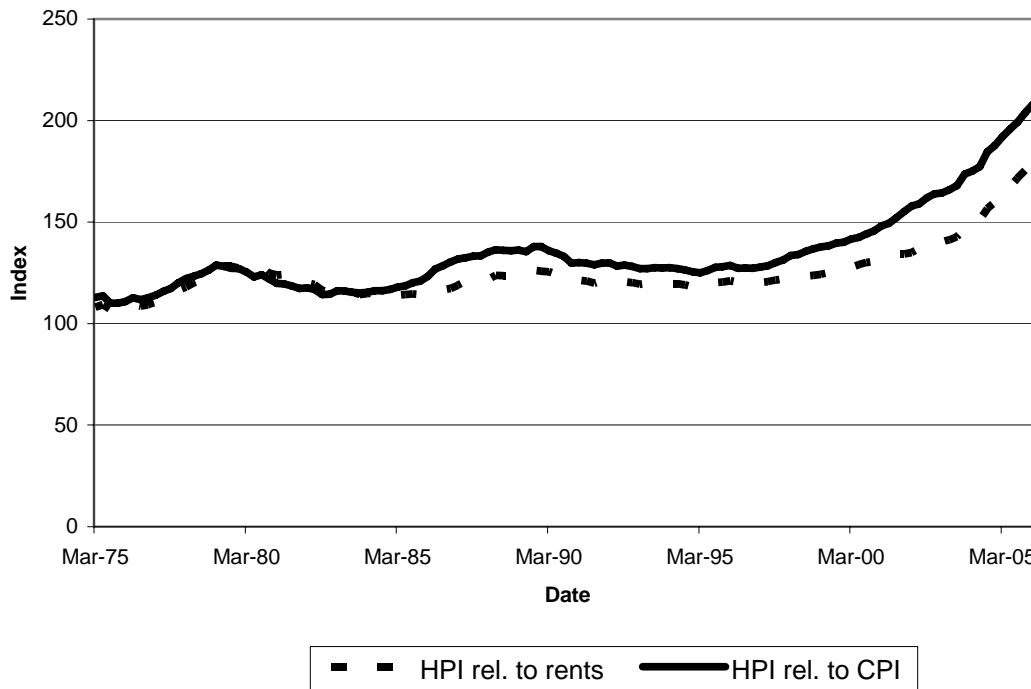
in the use of adjustable rate mortgages (and other variable interest debt), which may have resulted in greater default risk for homeowners in the aggregate.

### III. Background

#### III.1 House prices

For the past decade, home prices in the U.S. have reached new and historic highs, quickly leaving comparable prices, particularly rents, behind. As both reflect the price of a roof over one's head, home prices and rents traditionally tended to rise and fall at the same pace with only minor fluctuations. In 1975, the home price index was equal to 108% of the rent index. By 1995, that difference had grown to 118%, but that was the same ratio as in 1978 and 1987, merely a fluctuation at the high end of a rather predictable correlation between rents and home prices. That changed in 2000, when the ratio of home prices to rents jumped above 130% for the first time. By the beginning of 2006, that ratio had grown even further to 178%. Similarly, home prices compared to other prices remained relatively stable until 1999, when the ratio of home prices to other prices surpassed all previous ratios and grew to 208% by the beginning of 2006 (figure 1).

Figure 1: House Price Index (HPI) Relative to Rents and Other Prices

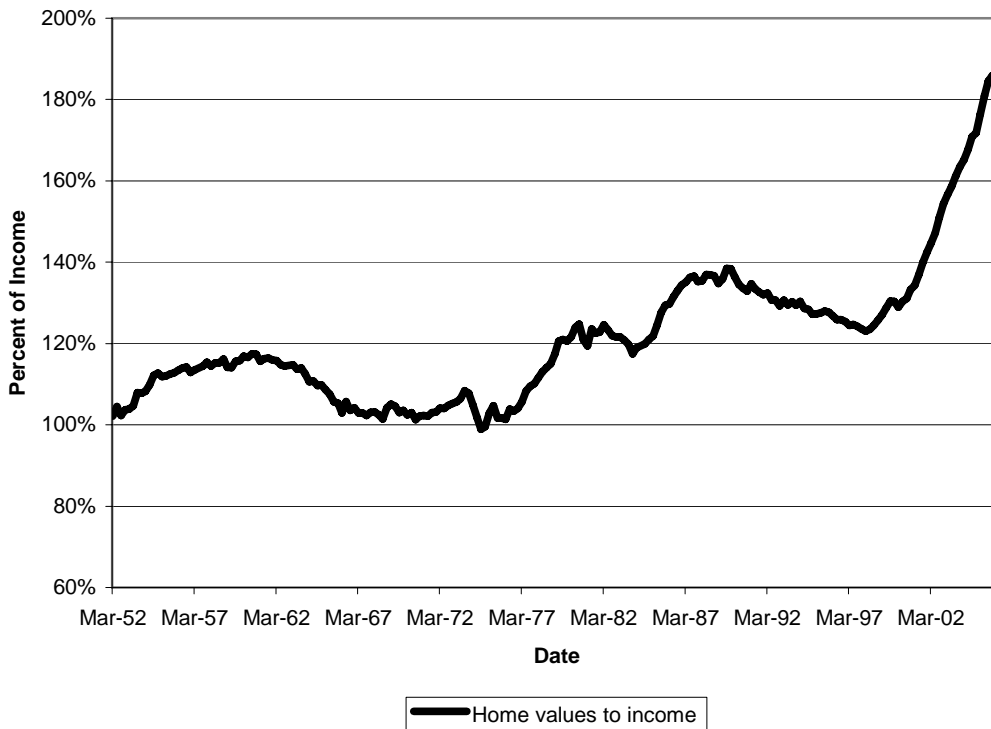


Notes: CPI stands for consumer price index and HPI denotes House Price Index. Author's calculations based on data from the BLS (2006a) and OFHEO (2006). The consumer price index for other goods refers to the non-shelter CPI.

Due to this acceleration in home prices, the value of homeowners' residences rapidly outpaced their incomes. For more than four decades, home values did not grow higher on average than 138% of income. This relationship changed in 2001, when home values

relative to income broke all records, soaring to 186% in early 2006 (figure 2).<sup>3</sup>

Figure 2: Home Values Relative to Income



Notes: Calculations based on BOG (2006a).

### III.2 Homeownership rates

Not surprisingly, the rapid rise in home prices made it harder for families to become homeowners. Though homeownership rates did continue to rise after 2001 as home prices rapidly accelerated, that rate of growth was much slower than in the late 1990s (table 1). The second half of the 1990s witnessed an unprecedented boom in homeownership rates, particularly for racial minorities, and particularly for African Americans. Over this period, homeownership rates grew annually by 0.8 percentage points for African American families. After 2000, however, homeownership growth rates slowed markedly. African American homeownership grew by only 0.2 percentage points annually between 2000 and 2005—a 75% decline from the previous five years. Moreover, for African Americans, this sharp slowdown in homeownership growth came at a time when they had disproportionately low homeownership rates compared to Whites. By 2005, Black families still had homeownership rates below 50%. In other words, assuming that homeownership has a positive effect on overall family wealth, minorities were particularly disadvantaged by the rise in house prices during the recent housing boom.

<sup>3</sup> The same acceleration after 2001 is noticeable for the median family. It also holds for almost all demographic groups, except low income families and families 65 and older. The sharpest acceleration in home values relative to income came for middle income families, for young families and for Hispanic families (table A-1).

**Table 1**  
**Homeownership Rates, 1995 to 2005, by Demographic Characteristics**

	Total	Whites	Blacks	Hispanics	Less than 35 years old	55 to 64 years of age
1995	64.7	68.7	42.7	42.1	38.6	79.5
1996	65.4	69.1	44.1	42.8	39.1	80
1997	65.7	69.3	44.8	43.3	38.7	80.1
1998	66.3	70	45.6	44.7	39.3	80.9
1999	66.8	70.5	46.3	45.5	39.7	81
2000	67.4	71.1	47.2	46.3	40.8	80.3
2001	67.8	71.6	47.7	47.3	41.2	81.3
2002	67.9	71.8	47.4	47	41.3	81.1
2003	68.3	72.1	48.1	46.7	42.2	81.4
2004	69	72.8	49.1	48.1	43.1	81.7
2005	68.8	72.7	48.1	49.4	43.1	81.1
Annual pct. pt. change						
1995 to 2000	0.6	0.6	0.8	0.8	0.6	0.2
2000 to 2005	0.3	0.3	0.2	0.6	0.5	0.2

Notes: All figures are in percent. Changes are in percentage points. Sources are Census (2006a, 2006b).

The lackluster growth in homeownership rates leveled off after 2004 and homeownership actually began to decline for the population as a whole. The overall homeownership rate was 69.2% at the end of 2004, but by the second quarter of 2006 it had declined to 68.7% (Census 2006a, 2006b). If the homeownership rate had remained the same as at the end of 2004 –the last peak of the homeownership rate - there would have been 547,000 more homeowners by the second quarter of 2006.

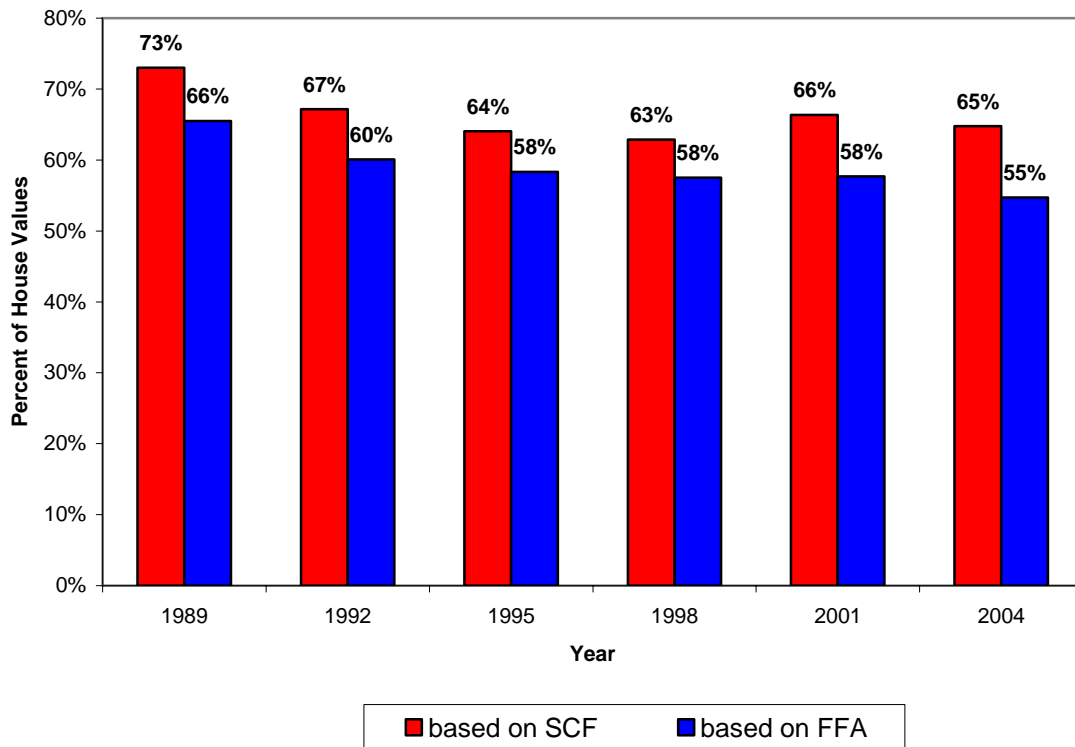
### **III.3 Debt levels and debt payments**

Record home price increases meant that those who became homeowners for the first time or who wanted to upgrade to a bigger home had to take on more debt than before. Household debt, especially in the form of mortgages, rose to record high levels. In 2001, total credit became larger than disposable income for the first time since these data were first collected in 1952. By the middle of 2006, total household credit was the equivalent of 129.3% of disposable income. Importantly, the rate of increase in consumer credit relative to disposable income during the business cycle that started in March 2001 was more than four times faster than the rate of increase in the 1990s.

Mortgage debt also increased faster than home values. This is best reflected in the relative size of home equity to total home values, which declined from 2001 to 2004. The share of home equity in homes' values dropped to the lowest level on record, from 58%

in 2001 to 55% in 2004, according to calculations based on BOG (2006a).<sup>4</sup> Based on BOG (2006b), the home equity-to-home value ratio declined to 65% by the end of 2004 from 66% in 2001 (figure 4).<sup>5</sup> These small percentage point drops occurred at a time when house prices were rising at an accelerated rate, indicating that families increased their mortgage debt even faster than their homes appreciated.

**Figure 3: Home Equity as Share of House Values**



Notes: SCF denotes Survey of Consumer Finances (BOG, 2006b). FFA indicates Flow of Funds Accounts (BOG, 2006a). Calculations based on BOG (2006a, 2006b).

Thanks to lower interest rates, families could borrow at a faster rate than their homes appreciated. Interest rates declined after 2001, easing the burden for borrowers. In fact, the share of total mortgage payments relative to total debt payments declined to 58% in 2004 from 59% in 2001 (figure 5).

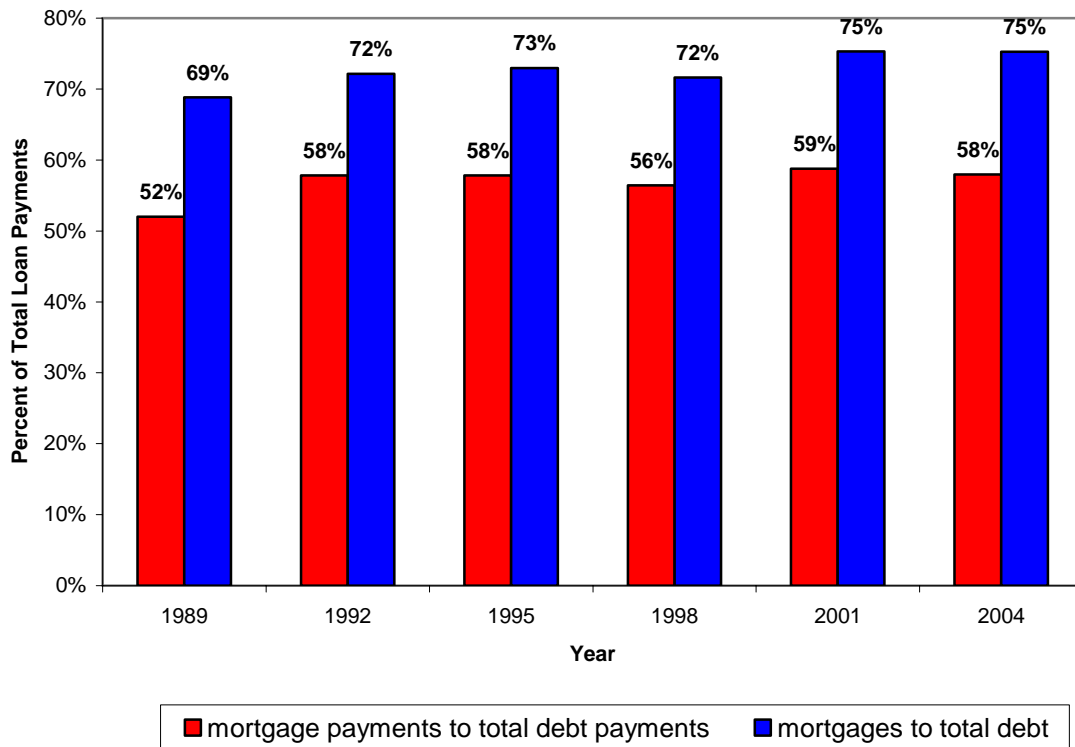
At the same time, mortgages as a share of total debt remained at a comparatively high level of 75%. This only means that the relative burden of mortgages declined while other

<sup>4</sup> Since then the ratio has decline to 54 percent in the second quarter of 2006 (BOG, 2006a).

<sup>5</sup> The difference in levels stems from several factors. The FFA data includes non-profits, while the SCF does not. The FFA data refers to values at the end of September, while SCF data are collected in the latter part of the year, spanning several quarters. The original sources differ between the two data sets. The SCF is a household survey. The FFA is a secondary data source that incorporates data from several primary data sources. Home values in the SCF refer to owner occupied housing, while home values in the FFA can cover both owner occupied and investment properties. Both sources are used here to show the robustness of the trend between 2001 and 2004 and between 1989 and 2004.

forms of credit became relatively more costly. Debt levels overall rose at accelerated rates. As a result, mortgage payments relative to income still rose after 2001. Specifically, for all families the increase in mortgage payments relative to income increased four times faster after 2001 than during the 1990s.<sup>6</sup> For the typical family, the rise in debt levels offset the decrease in the cost of borrowing (table A-2).

**Figure 4: The Relative Size of Mortgages and Mortgage Payments**



Notes: Calculations based on BOG (2006b).

The trend towards higher debt payments continued after 2004. The average share of debt service rose from 13.5% in the third quarter of 2004 to 14.5 percent in June 2006, the highest level since the Federal Reserve started collecting this data in 1980 (BOG, 2007).

#### **IV. Household Vulnerability Measures**

##### **IV.1 Changes in Variable Interest Rate Debt**

One way in which families managed to take on more debt and reduce their initial loan payments was through the use of variable interest rate debt instead of fixed rate mortgages. Variable interest rate products, particularly ARMs and home equity lines, allow families to ease the initial borrowing constraints. In exchange, however, borrowers become more exposed to greater payment volatility over the life of the loan.

<sup>6</sup> See table A-2 in the appendix for more details.

A similar logic underlies home equity lines of credit. Many homeowners financed the purchase of their homes at least in part by borrowing against the equity they held in their homes. In addition, many home equity lines also offered low rates that were initially lower than those of fixed rate mortgages.

The growth in ARMs between 2001 and 2004 accounted for about two thirds of the relative increase in variable interest debt, with the other one third coming from home equity lines of credit. The fast growth of ARMs also meant that more borrowers relied on them in 2004 than in 2001.

The importance of such variable rate mortgage products declined between 1989 and 2001, but since 2001 both ARMs and home equity lines have jumped as a share of total mortgage debt (figure 6). The share of ARMs out of total mortgage debt rose to 19% in 2004 from 13% in 2001, and the share of ARMs and home equity lines grew to 25% of total mortgage debt from 16% over the same period.<sup>7</sup>

In 2004, 16% of all families with a mortgage had an ARM, compared to 13% in 2001.<sup>8</sup> But some types of homeowners found ARMs more attractive than others. The share of families with ARMs was higher at both ends of the nation's income distribution than in the middle,<sup>9</sup> suggesting the possibility that first-time homeowners were increasingly turning to ARMs for their first mortgage and the possibility that richer homeowners were opting more often for ARMs to purchase a second home. Yet, ARMs were also tapped more often by white families than by minority families, and by homeowners between the ages of 45 and 54 than by homeowners 65 and older. Still, the increase in the share of families with ARMs between 2001 and 2004 was almost across the board; it was particularly sharp among families at the very top of the income distribution, among white families and among families 65 and older.

The same is true when comparing the average share of variable interest rate debt relative to total mortgage debt. Once again, the use of ARMs was higher at either end of income distribution than in the middle. In 2004, 22% of families with incomes in the bottom fifth of income earners—less than \$19,104—turned to ARMs for their mortgage financing needs. 25% of families with incomes in the next quintile—between \$19,104 and \$35,835—tapped ARMs. Families with incomes in the middle fifth of the income distribution with incomes between \$35,835 and \$57,077 opted for ARMs only 12% of the time and families in the fourth quintile, with incomes between \$57,077 and \$90,945, used them 15% of the time. In line with the bottom quintile, 22% of families with incomes in the top fifth of the income distribution with incomes above \$90,945 turned to ARMs for their mortgage finance needs (table A-4).<sup>10</sup>

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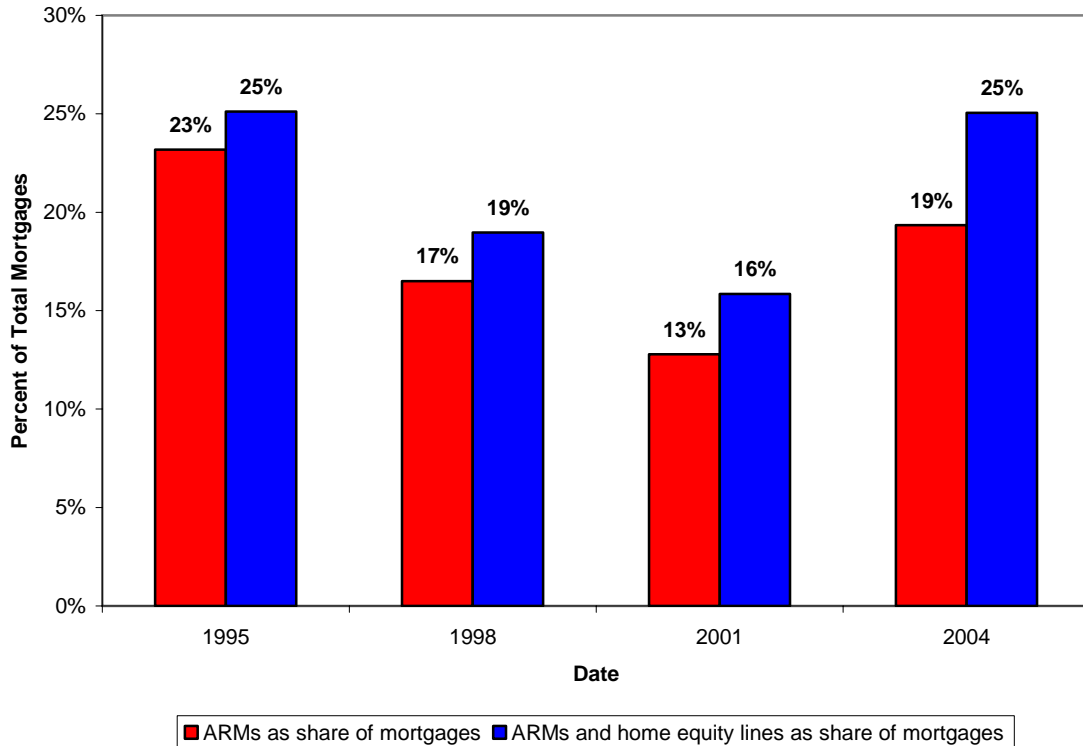
<sup>7</sup> More recent figures suggest that the growth in variable interest rate instruments continued after 2004 (GAO, 2006).

<sup>8</sup> See table A-3 in the appendix for more details.

<sup>9</sup> It is worth noting that low income and minority families are more likely than their counterparts to obtain non-traditional mortgage products in the subprime market with higher costs (Calhoun, 2006; CRL, 2006)

<sup>10</sup> See table A-4 in the appendix for more details.

Figure 5: The Relative Size of Variable Interest Rate Mortgages



Notes: Mortgage debt refers to mortgages and home equity lines. ARM stands for adjustable rate mortgage. Calculations based on BOG (2006b).

Clearly, homeowners' dependence on ARMs increased sharply after 2001.<sup>11</sup> While these variable interest rate mortgage instruments helped home buyers to purchase a home in the middle of a housing boom, they also exposed them to greater payment volatility. To see how vulnerable families may have been in 2006, consider the following calculation. Data from BOG (2006a) indicate that mortgage debt in June 2006 amounted to 98% of disposable income. If we make the conservative assumption that the share of variable interest rate debt to total mortgage debt remained steady at 25% after 2004,<sup>12</sup> it is possible to calculate that if interest rates increased by one percentage point, the debt service burden relative to disposable income would rise on average by 0.25 percentage points.

## IV.2 Leverage

The growth of homeowners' share of equity in their own home declined substantially after 2001. Between 1989 and 2001, home equity relative to income declined on average by 1.6 percentage points per year, but then grew at an annual rate of 9.5 percentage points between 2001 and 2004—from 125% of income in 2001 to 153% of income in 2004

<sup>11</sup> The trends are similar when ARMs and home equity lines are considered. Details are available from the author.

<sup>12</sup> Given continued growth in variable interest products after 2004, this assumption likely understates the size of the effect of higher interest rates on debt payments.

(table 2). This increase in home equity relative to income after 2001 was especially pronounced among minority families and middle income families (table 2).

This acceleration in home equity relative to income was the residual effect of house price appreciation and the growth in mortgages. Because these were leveraged investments, families' portfolios became vulnerable to declines in house prices. If home prices since the mid-1990s had increase at an annual rate similar to rents (the historic norm), then they would have been 20% lower in 2004 than they actually were.<sup>13</sup>

If home prices are adjusted for some of this overvaluation, most of the acceleration in home equity after 2001 disappears. If home values in 2004, for example, had declined by just 10% (less than half the estimated overvaluation) then the median home equity-to-income ratio would have risen by 0.7 percentage points per year from 2001 to 2004, instead of the 9.5 percentage points actual increase (table 2). The growth rate would have been reduced by 93% as a result of this correction – reflecting the aforementioned increase in volatility due to leverage. If home values are adjusted down by the entire overvaluation of 20%, home equity relative to income would have *dropped* by 8.3 percentage points each year—a swing of 187% compared to the actual growth. Homeowners had become highly leveraged and thus very vulnerable to moderate declines in house prices.

Any losses in home equity relative to income would be largest for those families who have large exposures to the real estate market relative to their income. This is especially true for low-income families, Hispanics, and homeowners 65 years of age and older (table 2). Had homeowners faced a 10% downward adjustment to home values in 2004, then America's families in the bottom quintile would have seen a drop in their home equity relative to income by 62 percentage points, compared to a drop of only 21 percentage points for the wealthiest one fifth of families.

### **IV.3 Diversification**

If the increase in house values has been mirrored by an increase in the house's share out of total assets, families' portfolios may also have become more exposed to potential volatility. If houses are only 25% of a family's total assets, a 10% decline in home values translates into a 2.5% drop in total assets. However, if the share of houses in a family's portfolio is equal to 50%, that same 10% decline equals a 5% drop in total assets.

The most recent figures on families' total assets show that families have become substantially more exposed to the real estate market. In 2001, houses made up 28% of total assets and all residential real estate made up 33% of total assets (BOG, 2006b). By 2004, the ratios had grown to 34% and 41%, respectively. These were the highest ratios since the Federal Reserve collected these data in 1989 (figure 6).

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<sup>13</sup> See the appendix for a detailed discussion of the underlying figures.

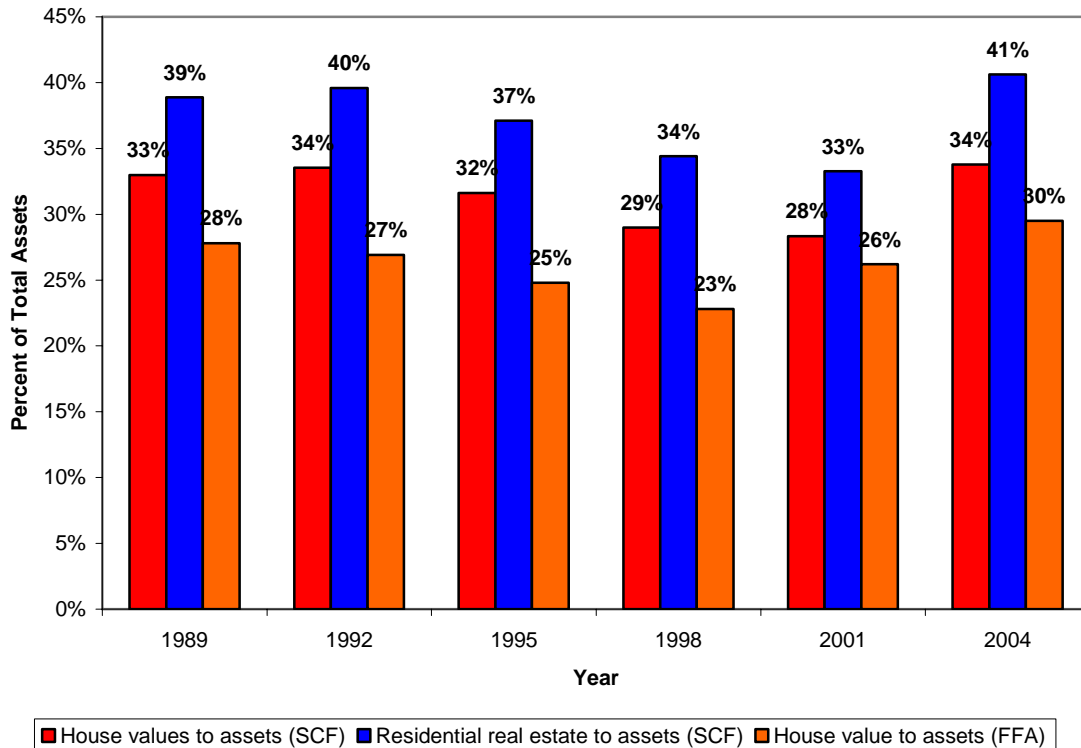
**Table 2**  
**Home Equity Relative to Income, With and Without Adjustments for Bubble, by Demographic Characteristics, 2001 to 2004**

	2001	2004	Annual change, 1989 to 2001	Annual change, 2001 to 2004			Difference between actual and adjusted ratio in 2004			
				Actual	With 5 pct. adjustment	With 10 pct. Adjustment	With 20 pct. adjustment	With 5 pct. adjustment	With 10 pct. adjustment	With 20 pct. adjustment
<b>Total</b>	125%	153%	-1.6	9.5	5.1	0.7	-8.3	-13	-26	-53
<b>By income</b>										
bottom quintile	449%	482%	7.1	10.8	2.8	-9.8	-33.3	-24	-62	-132
second quintile	232%	250%	-0.6	5.7	-0.4	-6.4	-15.9	-18	-36	-65
middle quintile	123%	156%	-2.1	11.1	6.2	1.9	-8.6	-15	-27	-59
fourth quintile	95%	127%	-0.3	10.7	5.4	1.4	-6.2	-16	-28	-51
top quintile	85%	110%	-1.4	8.3	4.7	1.2	-6.1	-11	-21	-43
<b>By race/ethnicity</b>										
white	133%	154%	-0.9	6.8	2.6	-1.5	-10.6	-13	-25	-52
black	69%	138%	-7.5	22.8	19.4	16.2	5.8	-10	-20	-51
hispanic	96%	152%	-2.3	18.9	15.8	8.9	-2.2	-9	-30	-63
<b>By age</b>										
25 to 34	46%	60%	-1.5	4.6	-0.5	-4.2	-11.1	-15	-26	-47
45 to 54	108%	131%	-2.1	7.8	2.7	-1.3	-9.5	-15	-27	-52
65 and older	345%	369%	4.7	8.1	1.9	-4.9	-17.5	-19	-39	-77

Notes: All figures are in percent. Calculations are done only for homeowners. Changes are in percentage points. Calculations are based on BOG (2006b).

Calculations based on BOG (2006a) show a similar upward trend, from 26% in 2001 to 30% in 2004. In fact, calculations based on this data show that the share of home values to total assets never exceeded 29% before 2004 and that it continued to increase to 31% by June 2006.<sup>14</sup> The share of houses out of total assets is largest for minorities, middle income families, and young families.<sup>15</sup> Moreover, the share of houses out of total assets grew faster for middle income families, for White and Hispanic families, and for young families, leaving them especially vulnerable to corrections in the housing market.

**Figure 6: The Relative Importance of Houses In Family Assets**



Notes: SCF denotes Survey of Consumer Finances (BOG, 2006b). FFA indicates Flow of Funds Accounts (BOG, 2006a). Calculations based on BOG (2006a, 2006b).

A particular wrinkle in the discussion of the share of residential real estate out of total family assets arises from the fact that individual investors often tend to allocate more of their money in assets that have recently appreciated, thereby possibly perpetuating a real estate asset boom (Mitchell and Utkus, 2004). So, the question is whether increased investment in residential real estate was a substantial part of the run-up in house values and thus a contributing factor to the growing risk exposure of home owning families.

<sup>14</sup> Even though the levels differ between SCF and FFA values, the FFA data are reported here to show for the robustness of the trends and to allow for a discussion of trends longer than what would be possible solely with SCF data.

<sup>15</sup> See table A-5 in the appendix for more details.

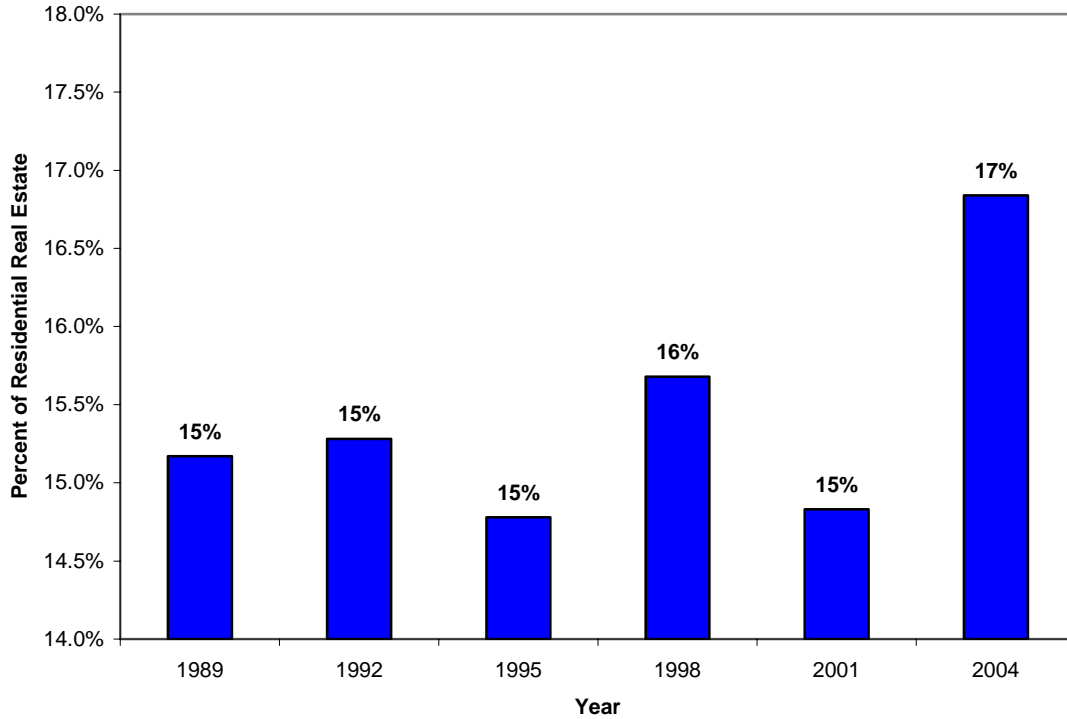
**Table 3**  
**Changes in Mortgage Debt Attributable to Changes in Other Residential Real Estate, 2001 to 2004**

	(1) 2001	(2) 2004	(3) Difference in mortgages (2)-(1))	(4) Change in mortgages attributable to other real estate if share had remained constant (0.15*(3))	(5) Changes in mortgages attributable only to increase in other real estate (0.02*(2))	(6) Change in mortgages attributable to other residential real estate (4)+(5))	(7) Share of change attributable to other real estate ((6)/(3))
	\$ trillion	\$ trillion	\$ trillion	\$ trillion	\$ trillion	\$ trillion	Percent
Total mortgages (based on SCF)	\$4.39	\$6.72	\$2.33	\$0.35	\$0.14	\$0.48	20.6
Total mortgages (based on FFA)	\$5.17	\$7.56	\$2.39	\$0.35	\$0.15	\$0.51	21.3

Notes: SCF stands for Survey of Consumer Finances. FFA stands for Flow of Funds Accounts. FFA data refer to September of the respective year. Calculations are based on BOG (2006a, 2006b). Sums do not add to totals due to rounding.

During the housing boom, investment properties appeared to play an increasing role in the rising housing market, although the vast majority of the appreciation was in owner-occupied housing. The share of residential properties other than families' own homes out of total residential real estate grew to 17% in 2004 from 15% in 2001 (figure 7).

**Figure 7: Other Residential Real Estate as Share of Total Residential Real Estate**



Notes: Calculations based on BOG (2006b).

Because the available data do not specifically allocate mortgages to specific property uses, we assume that mortgage debt dedicated to these residential real estate investment properties grew at the same proportion as they grew relative to all residential real estate. That is, the share of the increase in mortgages that could be ascribed to investments in residential real estate other than owner-occupied houses would be equal to 15% of the increase between 2001 and the end of 2004 plus the three percentage points – equal to the rate of change - of the final amount of mortgages relative to the total change in mortgage debt (table 3).

The calculations are detailed in table 3. In 2004, total mortgage debt amounted to \$6.7 trillion, as compared to \$4.4 trillion in 2001, based on BOG (2006b). The difference amounted to \$2.3 trillion over this three-year period. Had the share of other residential real estate not changed, \$350 billion of the increase would have been attributable to investment properties. Because the share of other residential real estate out of total residential real estate grew by two percentage points, an additional \$140 billion, equal to 2% of total mortgages in 2004, can be attributed to these investments.

Based on these calculations, 20.6% of the increase in mortgages can be attributed to investment properties. The results are similar when the calculations are based on BOG (2006a). The data suggest that small, non-trivial parts of the housing and mortgage booms were indeed driven by a movement towards more investment properties. However, the vast majority of the increase was concentrated in owner-occupied housing.

## V. Summary of Vulnerability Measures

The data suggest that as a result of the housing and mortgage boom, the share of homeowners vulnerable to adverse changes in the housing market increased after 2001. As discussed, indicators of vulnerability include a growing share of variable interest debt out of total mortgage debt, increasing leverage, and decreasing diversification. Finally, because of their higher debt service ratios, homeowners also became more vulnerable to adverse trends in the economy.

In the following discussion, we use four threshold measures to identify homeowners who are especially vulnerable under each of those four indicators. First, ARMs and home equity lines in excess of 50% of income are used as the threshold measure for variable interest debt. Second, homeowners are considered vulnerable if their home equity is less than 25% of the house's value. Third, the threshold for a home's share out of total assets is set for 90%. And fourth, mortgage payments in excess of one third of income are used as the threshold measure for debt service.

Table 4 provides several summary statistics of these vulnerability measures. It first shows the total share of homeowners for whom the respective vulnerability measures apply. Then, it shows the share of homeowners for whom *exactly* one measure, *exactly* two measures, *exactly* three measures, and *all* four measures apply. The final line shows the share of homeowners for whom *at least* one vulnerability measure applies.

Homeowners became more vulnerable after 2001 by all measures. In the cases of exposure to variable interest debt and the share of houses as percent of total assets, the shares rose to the highest levels on record. The share of homeowners with at least 90% of their assets tied up in their homes grew to 29.8% in 2004, up from 22.1% in 2001. And the share of homeowners with variable interest debt in excess of 50% of their income rose to 12.3% in 2004, up from 8.0% in 2001 and higher than at any point since 1995.

In the remaining two instances of vulnerability, the increases after 2001 erased much of the improvements during the previous three years, from 1998 to 2001. For instance, the share of homeowners who owned less than one fourth of their homes declined from its highest point of 19.5% in 1998 to 17.9% in 2001 before increasing again to 19.1% in 2004. Also, the share of homeowners with debt payments above one third of their income rose to 8.1% in 2004, up from 7.1% in 2001, reversing almost half of the decline from 9.2% in 1998, the highest point of this series.

The most prevalent and fastest rising vulnerability measure is the share of families who have at least 90% of their assets in residential real estate. In 2004, 29.8% of homeowners

met this threshold, up from 22.1% in 2001, an increase of 2.6 percentage points. This increase is almost twice as much as the second largest increase, that in the share of homeowners who had variable interest rate mortgage debt in excess of 50% of their income.

The share of homeowners with at least one indicator of vulnerability increased to the highest level since 1995, with close to half of all homeowners exposed to at least one of the measures of vulnerability. This reflects the trends in the combined measures. For example, the share of homeowners who met exactly one of the threshold measures rose to 32.4% in 2004, up from 27.2% in 2001 and close to the series' high point of 32.7% in 1995 (table 4). The shares of homeowners who met either exactly two or exactly three vulnerability thresholds reached the highest levels on record, since 1995. As a result, the share of homeowners who met at least one vulnerability threshold grew to 49.1% in 2004, an increase of almost 10 percentage points from 39.4% in 2001.

A breakdown of the vulnerability measures for homeowners by demographic characteristics shows important differences both in levels of and changes over time in vulnerability. For instance, minorities are much more likely than whites to meet at least one vulnerability threshold (table 5). In 2004, 72.0% of black homeowners and 64.8% of Hispanic homeowners met at least one vulnerability threshold measure. In comparison, only 45.1% of white homeowners did.

Further, the share of homeowners that met at least one vulnerability measure rose with income. At the low end of the income scale, 78.2% of homeowners met at least one threshold measure of financial vulnerability, compared to 31.6% of homeowners in the top income quintile. That is, homeowners in the bottom quintile were more than twice as likely to show signs of financial vulnerability than homeowners in the top quintile in 2004.

Finally, the share of financially vulnerable families appears to decline with age. Homeowners 65 and older are about half as likely to meet at least one threshold of financial vulnerability than homeowners between the ages of 35 and 44. The primary explanation for this decline is the fact that homeowners reduce their outstanding mortgages and thus their loan payments and their likelihood of having variable interest rate mortgages as they age.

The pattern with respect to changes in financial vulnerability of homeowners is not quite as regular. While minorities saw their financial vulnerability increase more than whites, financial vulnerability for almost all income groups, except the bottom quintile rose at a similar rate, between two and four percentage points from 2001 to 2004. In contrast, the share of homeowners in the bottom quintile that met at least one vulnerability threshold grew by 6.5 percentage points over the same period. There are also no systematic differences in the change of financial vulnerability by age. For all represented age groups, the share of financially vulnerable homeowners rose by three to four percentage points from 2001 to 2004 (table 5).

**Table 4**  
**Summary of Homeowner Vulnerability Thresholds, 1989 to 2004**

Share of homeowners who...	1989	1992	1995	1998	2001	2004	Annual pct. pt. change, 1989 to 2001	Annual pct. pt. change, 2001 to 2004
Have mortgage payments in excess of one third of income	5.5%	7.9%	7.5%	9.2%	7.1%	8.1%	0.1	0.3
Have adjustable rate mortgages and home equity lines in excess of 50% of income	n.a.	n.a.	10.8%	9.7%	8.0%	12.3%	0.7	1.4
Have home equity less than 25% of home value	10.4%	14.1%	18.0%	19.5%	17.9%	19.1%	0.6	0.4
Have residential real estate greater than 90% of assets	27.4%	29.6%	28.3%	21.4%	22.1%	29.8%	-0.4	2.6
Meet exactly one vulnerability threshold	n.a.	n.a.	32.7%	30.6%	27.2%	32.4%	n.a.	1.8
Meet exactly two vulnerability thresholds	n.a.	n.a.	10.5%	10.6%	9.5%	12.4%	n.a.	1.0
Meet exactly three vulnerability thresholds	n.a.	n.a.	3.7%	3.0%	2.4%	4.0%	n.a.	0.6
Meet all four vulnerability thresholds	n.a.	n.a.	0.3%	0.2%	0.4%	0.3%	n.a.	0.0
Meet at least one vulnerability threshold	n.a.	n.a.	47.3%	44.3%	39.4%	49.1%	n.a.	3.2

Notes: All figures are in percent. Calculations are done only for homeowners. Changes are in percentage points. Calculations based on BOG (2006b).

**Table 5**  
**Share of Homeowners Who Meet At Least One Vulnerability Threshold, by Demographic Characteristics, 1989 to 2004**

Share of homeowners who...	1995	1998	2001	2004	Annual pct. pt. change, 2001 to 2004
White	45.4%	41.1%	36.3%	45.1%	2.9
Black	60.7%	64.3%	53.8%	72.0%	6.1
Hispanic	64.9%	60.7%	60.6%	64.8%	1.4
Bottom quintile	61.7%	68.6%	58.8%	78.2%	6.5
Second quintile	49.7%	42.8%	45.7%	54.1%	2.8
Middle quintile	49.8%	47.4%	43.8%	55.0%	3.7
Fourth quintile	46.6%	42.0%	39.0%	48.2%	3.1
Top quintile	34.0%	28.1%	22.5%	31.6%	3.0
25 to 34	71.3%	69.8%	66.6%	76.1%	3.2
45 to 54	43.9%	39.4%	37.2%	49.5%	4.1
65 and older	29.4%	29.8%	26.2%	35.5%	3.1

Notes: All figures are in percent. Calculations are done only for homeowners. Changes are in percentage points. Calculations based on BOG (2006b).

## **VI. Conclusion**

The housing and mortgage boom that started in the late 1990s has on net contributed to a growing vulnerability of homeowners. Specifically, the share of homeowners with variable interest rate mortgages increased sharply. The leverage of homeowners increased as well, by some measures to the highest level on record. In addition, the concentration of family assets in residential real estate rose to the highest level on record. Finally, at the same time, debt payments rose, despite lower interest rates.

The growth in homeowners' vulnerability is reflected in the fact that close to half of all homeowners met at least one threshold of financial vulnerability in 2004: variable interest mortgage debt in excess of 50% of income, home equity that is less than 25% of a home's value, residential real estate in excess of 90% of total assets, and/or debt payments in excess of one third of income. The increases in financial vulnerability were especially pronounced for minorities, younger families, and lower income families

On the other side of this increase in vulnerabilities stands a sharp increase in home equity relative to homeowners' income. Specifically, after declining relative to income from 1989 to 2001, home equity grew rapidly for the median homeowner between 2001 and 2004. However, because of the increase in leverage, a decline of house prices by 10% in 2004 - equal to about half of the estimated overvaluation in the residential housing market - would eliminate all gains in home equity relative to income between 2001 and 2004.

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Appendix: A.1 Detailed Tables

Table A-1  
Median Home values Relative to Income, by Demographic Characteristics, 1989 to 2004

Year	1989	1992	1995	1998	2001	2004	Annual pct. pt. change, 1989 to 2001	Annual pct. pt. change, 2001 to 2004
<b>Total</b>	213%	222%	220%	224%	231%	281%	1.5	16.7
<b>By income</b>								
bottom quintile	412%	569%	577%	557%	572%	591%	13.3	6.2
second quintile	300%	293%	330%	329%	327%	376%	2.3	16.5
middle quintile	220%	244%	222%	226%	236%	304%	1.4	22.7
fourth quintile	173%	182%	193%	191%	203%	253%	2.5	16.6
top quintile	168%	156%	152%	156%	166%	209%	-0.2	14.1
<b>By race/ethnicity</b>								
white	210%	222%	220%	222%	233%	277%	2.0	14.5
black	215%	213%	217%	223%	209%	271%	-0.5	21.0
hispanic	240%	251%	244%	247%	216%	349%	-2.0	44.4
<b>By age</b>								
25 to 34	180%	176%	191%	187%	195%	246%	1.2	17.2
45 to 54	188%	183%	191%	200%	205%	253%	1.4	16.1
65 and older	314%	346%	374%	376%	389%	405%	6.3	5.2

Notes: All figures are in percent. Changes are in percentage points. Calculations are done only for homeowners. Calculations are based on BOG (2006b).

Table A-2  
Median Mortgage Payments Relative to Income, by Demographic Characteristics, 1989 to 2004

Year	1989	1992	1995	1998	2001	2004	Annual pct. pt. change, 1989 to 2001	Annual pct. pt. change, 2001 to 2004
<b>Total</b>	13%	16%	16%	16%	15%	16%	0.1%	0.4%
<b>By income</b>								
bottom quintile	30%	37%	43%	47%	41%	38%	0.9%	-0.9%
second quintile	18%	21%	23%	27%	22%	25%	0.3%	1.0%
middle quintile	15%	19%	18%	18%	18%	20%	0.3%	0.4%
fourth quintile	13%	16%	15%	15%	14%	16%	0.1%	0.7%
top quintile	10%	11%	11%	12%	11%	12%	0.1%	0.3%
<b>By race/ethnicity</b>								
white	13%	16%	15%	16%	14%	16%	0.1%	0.4%
black	14%	15%	18%	19%	16%	20%	0.1%	1.4%
hispanic	17%	21%	23%	22%	20%	22%	0.3%	0.4%
<b>By age</b>								
25 to 34	17%	18%	18%	18%	16%	18%	-0.1%	0.7%
45 to 54	11%	14%	13%	16%	14%	15%	0.3%	0.3%
65 and older	14%	16%	17%	17%	18%	17%	0.3%	-0.5%

Notes: All figures are in percent. Changes are in percentage points. Calculations are done only for homeowners. Calculations are based on BOG (2006b).

Table A-3  
Share of Families with Adjustable Rate Mortgages (ARMs), by Demographic Characteristics, 1995 to 2004

Year	1995	1998	2001	2004	Annual pct. pt. change, 1989 to 2001	Annual pct. pt. change, 2001 to 2004
<b>Total</b>	20%	15%	13%	16%	-1.3	1.2
<b>By income</b>						
bottom quintile	30%	12%	18%	18%	-1.9	-0.2
second quintile	17%	17%	17%	19%	0.0	0.4
middle quintile	22%	16%	12%	12%	-1.6	0.1
fourth quintile	22%	16%	12%	15%	-1.6	1.0
top quintile	18%	15%	11%	19%	-1.1	2.7
<b>By race/ethnicity</b>						
white	20%	16%	12%	17%	-1.3	1.6
black	20%	13%	13%	14%	-1.1	0.3
hispanic	24%	6%	18%	16%	-1.1	-0.6
<b>By age</b>						
45 to 54	20%	15%	18%	19%	-0.4	0.4
65 and older	24%	16%	11%	15%	-2.1	1.2

Notes: All figures are in percent. Changes are in percentage points. Calculations are done only for homeowners. Calculations are based on BOG (2006b).

Table A-4  
Share of Adjustable Rate Mortgages (ARMs) out of Mortgage Debt, by Demographic Characteristics, 1995 to 2004

Year	1995	1998	2001	2004	Annual pct. pt. change, 1989 to 2001	Annual pct. pt. change, 2001 to 2004
<b>Total</b>	23%	17%	13%	19%	-1.7	2.2
<b>By income</b>						
bottom quintile	42%	19%	25%	22%	-2.8	-0.9
second quintile	21%	18%	19%	25%	-0.3	2.0
middle quintile	24%	17%	10%	11%	-2.3	0.2
fourth quintile	25%	15%	12%	17%	-2.1	1.7
top quintile	21%	17%	12%	22%	-1.5	3.2
<b>By race/ethnicity</b>						
white	22%	18%	12%	20%	-1.7	2.6
black	27%	16%	11%	15%	-2.8	1.4
hispanic	26%	9%	15%	20%	-1.9	1.6
<b>By age</b>						
45 to 54	23%	15%	16%	24%	-1.2	2.8
65 and older	19%	16%	11%	19%	-1.4	2.9

Notes: All figures are in percent. Changes are in percentage points. Calculations are done only for homeowners. Calculations are based on BOG (2006b).

Table A-5  
Houses as Share of Total Assets, by Demographic Characteristics, 1989 to 2004

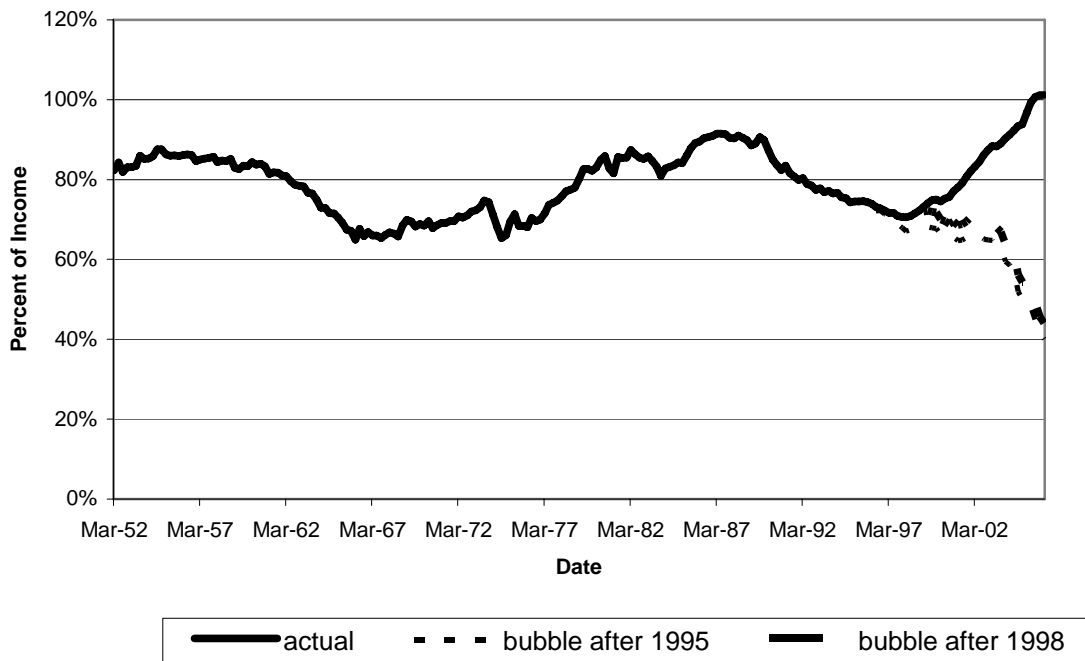
Year	1989	1992	1995	1998	2001	2004	Annual pct. pt. change, 1989 to 2001	Annual pct. pt. change, 2001 to 2004
<b>Total</b>	33%	34%	32%	29%	28%	34%	-0.6	1.8
<b>By income</b>								
bottom quintile	51%	58%	49%	52%	54%	52%	0.2	-0.8
second quintile	50%	51%	51%	46%	50%	53%	0.0	1.2
middle quintile	45%	44%	46%	45%	41%	53%	-0.4	4.1
fourth quintile	44%	46%	43%	40%	40%	46%	-0.4	1.8
top quintile	25%	24%	22%	19%	21%	26%	-0.4	1.7
<b>By race/ethnicity</b>								
white	31%	33%	30%	28%	27%	32%	-0.4	1.7
black	55%	50%	54%	47%	57%	49%	0.2	-2.4
hispanic	57%	48%	55%	45%	48%	53%	-0.8	1.7
<b>By age</b>								
25 to 34	48%	51%	51%	42%	46%	59%	-0.2	4.4
45 to 54	33%	32%	30%	28%	29%	33%	-0.4	1.6
65 and older	25%	29%	26%	26%	24%	30%	-0.1	1.8

Notes: All figures are in percent. Changes are in percentage points. Calculations are done only for homeowners. Calculations are based on BOG (2006b).

## A.2: Adjusting for the home price overvaluations

Traditionally home prices have risen in line with rental prices. This relationship can be used to adjust home equity values for the overvaluation in the housing market. Specifically, home prices are deflated by the difference between the House Price Index (HPI) from the Office of Federal Housing Enterprise Oversight (OFHEO, 2006) and the Consumer Price Index (CPI) for rental properties (BLS, 2006a). The only decision to consider is when the housing bubble really started. Housing values started to outpace rents in 1995. However, it was not until 1998 that home price values had recovered the losses suffered in the early 1990s.<sup>16</sup> Consequently, both starting points – 1995 and 1998 – are used here. If adjustments are made starting in 1995, home equity values relative to income would have stayed flat through 1999 and then would have declined, first gradually and then at an accelerated rate after 2003 (figure A-1). Similarly, if adjustments are made starting in 1998, home equity values relative to income would have fallen after 2003. By September 2004, the ratio of home equity to income would have averaged 52% with adjustments since 1995 and 56% with adjustments after 1998, instead of the actual ratio of 93%.

Figure A-2: Home Equity Relative to Income, With and Without Adjustments for Real Estate Bubble, 1952 to 2006



Notes: Calculations are based on BOG (2006a), BLS (2006a), and OFHEO (2006).

The underlying calculation can be used to arrive at an approximate estimate of the overvaluation in home values. If home values are deflated by the difference between home prices and rents after 1995, they would have been 24% lower in September 2004

<sup>16</sup> Alan Greenspan put the start of the housing market run-up, to which he referred to as “froth”, in 2001 based on accelerated price increases since then (Greenspan, 2005).

than they actually were. If home values are deflated starting in 1998, they would have been 22% lower. Under either scenario, this adjustment process suggests an overvaluation of more than 20% in 2004. Other observers have either put the overvaluation even higher, based, for instance, on the difference between home prices and rents (Baker, 2006, 2002) or implied stronger gains based on accelerated median price increases (Chen, 2004; Zandi, 2002).