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Refinance and the Accumulation of Home Equity Wealth

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Abstract

Spending financed by home equity extraction helps smooth household consumption and bolster the economy in economic downturns, but may reduce wealth accumulation. We use American Housing Survey (AHS) data to provide cross-sectional, longitudinal and cohort group analysis of the accumulation of home equity, the change in aggregate leverage, and the likelihood of mortgage refinance for the period of 1985 to 2001.

We find that homeowners who are African-American or lower income tend to have less home equity and higher aggregate leverage than others, and they are less likely to take advantage of refinance during our sample period; over 30 years, the failure to refinance to a lower interest rate reduces aggregate wealth by \$22 billion for each group. Further, the decision to refinance is a rational response to changes in market conditions, as the likelihood of refinance is positively tied to interest rate reduction and home value increase.

Introduction

In aggregate across the U.S., home equity totaled \$7.6 trillion by the end of 2002, an increase of \$2 trillion in just three and one-half years.¹ According to the 2001 Survey of Consumer Finance, home equity—the difference between the home value and the amount of mortgage debt on the property—comprised at least 50 percent of net wealth for one-half of all households. Home equity is not only the single largest component of net wealth for most families, but it is also held by a broader cross section of families when compared with other assets. For example, the U.S. homeownership rate was 68.3 percent in 2003 while only 52 percent of American families held stock either directly or indirectly.² Thus, an increase in real home equity (that is, adjusting for general inflation) is the most significant component to overall wealth building.

This is particularly true for lower-income households, who tend to have more limited access to and investment in other forms of wealth. The homeownership rate for families with income below the median was 52 percent in 2003 while only 28 percent held stock market assets. Poterba (2000) reported that in 1998 the top 1 percent of stock equity investors held about one-half of total stock market wealth, while the 1 percent of households with the greatest holdings of real estate owned only 15 percent of all real estate. In fact, about three quarters of all stock market wealth is held by the highest decile of income earners in the U.S. and almost none by families whose earnings fall in the lowest third of the income distribution, whereas home equity wealth has a more equal distribution across income groups, as shown in Exhibit 1. Because home equity wealth is more evenly distributed, lower-, middle-, and higher-income families all benefit from a general rise in home equity.

Calculation of Gini ratios confirms the more equitable distribution of home equity wealth across the American population. The Gini ratio has a value between zero and one with zero designating the financial item under analysis is evenly distributed across income groups, and one indicating the wealthiest household exclusively holds it. Using the 2001 Survey of Consumer Finance, the Gini ratio was 0.40 for home equity, 0.62 for net wealth, and 0.76 for stock market assets. Thus, home equity is more evenly distributed across families than total wealth or stock

¹ Federal Reserve Board, Flow of Funds release Z.1, Table B.100. Home equity was \$5.6 trillion as of June 30, 1999.

² Homeownership data were from www.census.gov. Stock holdings were reported in Aizcorbe, Kennickell, and Moore (2003), Table 6, and reflect 2001 data.

market holdings. Exhibit II shows the Lorenz curves for home equity and stock market assets, with the home equity curve closer to the straight line that indicates equal distribution across all families.³

The first part of this paper investigates the effect on home equity accumulation of different factors such as income, education, racial characteristics, and location. The analysis finds that, after controlling for other variables, racial and income differences continue to play important roles in determining a family's home equity level.

Accumulation of home equity wealth is important for providing a financial cushion to support household consumption when the head is retired and for enabling a household to transfer wealth to a successive generation (for example, from parents to children). Moreover, home equity has also been shown to provide an important stimulus to current consumption. An increase in home equity has been found to have a more powerful "wealth effect" on consumption than an equivalent increase in stock market assets. This occurs because of the more equal holdings of home equity wealth across families and because of the lesser volatility of home values compared to stock market values, which translates into home equity wealth gains being viewed as more "permanent" than the seemingly transitory gains in the stock market. Home equity growth is more stable largely because home values are far less volatile than stock prices. Since 1970, the quarterly growth rate of home values has averaged 6.0 percent (at an annual rate) with a standard deviation of 4.8 percent, while the market value of corporate equities has gained 15.0 percent on average with a standard deviation of 33.4 percent. Clearly, stock values have been far more volatile than house prices. As a consequence, aggregate home equity in the U.S.

³ The Lorenz curve is used in economics to describe inequality in wealth. The Lorenz curve is a function of the cumulative proportion of ordered individuals mapped onto the corresponding cumulative proportion of their wealth. Given a sample of n ordered individuals with x_i the wealth of individual i and $x_1 < x_2 < \dots < x_n$, then the sample Lorenz curve is the polygon joining the points $(h/n, L_h/L_n)$, where $h=0,1,2,\dots,n$, $L_0=0$, and $L_h = \sum_{i=1}^h x_i$. If all individuals have the same wealth, the Lorenz curve is a straight diagonal line, called the line of equality. If there is any inequality in wealth, then the Lorenz curve falls below the line of equality. The total amount of inequality can be summarized by the Gini ratio, which is the ratio between the area enclosed by the line of equality and the Lorenz curve, and the total triangular area under the line of equality. For data ordered by increasing wealth of individuals, the Gini ratio is calculated by $G = \frac{\sum_{i=1}^n (2i-n-1)x_i}{n^2 \mu}$, where μ is the mean wealth of the individuals. In our calculation, we used $n=10$, for the 10 deciles of the population wealth distribution.

has grown 8.6 percent per quarter (annualized) with a standard deviation of 7.9 percent, far less variable than stock market gains.⁴

Case et al (2001) and Bayoumi and Edison (2002) both use a cross-section of nations to separate the home equity and stock equity effects on overall consumption and find that the housing wealth effect is stronger. Based on estimates for 1984-2000 for the U.S., the latter study found that each one-dollar increase in housing wealth led to a 7-cent increase in consumption, whereas a one-dollar increase in stock wealth caused a 4.5-cent increase. Research staff at the Federal Reserve Board have also found stronger marginal propensities to consume out of housing wealth, as reported by Chairman Greenspan (2001); he placed the effect on personal consumption expenditures generated from realized capital gains on home sales to be about 10 to 15 cents on the dollar, compared with a general “wealth effect” of 3 to 5 cents incorporating all components of household wealth. The International Monetary Fund (2003) also reported larger wealth effects from home value changes than from comparable stock equity movements. Skinner (1993) found that increases in housing wealth result in increased consumption spending by younger households, but not by older households.

The growth in home equity has not only stimulated aggregate consumption through a “wealth” effect, but it has provided an opportunity for families to convert some of this equity into cash by placing second mortgage loans (such as with home equity lines of credit) or “cashing-out” equity as part of a refinance of an existing first mortgage.⁵ Greenspan (2001) speculated that families offset declines in spending from falling stock prices by increased spending from real estate wealth. Thus, an increase in home leverage helps smooth and stabilize household consumption. The secondary market activity of Freddie Mac and Fannie Mae has played an important role in ensuring a steady flow of credit to primary market lenders to meet the mortgage credit needs of U.S. families, as noted by Chairman Greenspan:

⁴ Home value growth was measured by Freddie Mac’s Conventional Mortgage Home Price Index (www.freddiemac.com). The market value of corporate equities and aggregate value of home equity were from the Flow of Funds data released by the Board of Governors of the Federal Reserve System (www.federalreserve.gov). The period of analysis was first quarter of 1970 to the first quarter of 2003.

⁵ “Households have been able to extract home equity by drawing on home equity loan lines, by realizing capital gains through the sale of existing homes, and by extracting cash as part of the refinancing of existing mortgages, so-called cash-outs. Although all three of these vehicles have been employed extensively by homeowners in recent years, home turnover has accounted for most equity extraction.... Indeed, of the estimated net increase of \$1.1 trillion in home mortgage debt during the past year and a half, approximately half resulted from existing home turnover.” Greenspan (2003)

Especially important in the United States have been the flexibility and the size of the secondary mortgage market. Since early 2000, this market has facilitated the large debt-financed extraction of home equity that, in turn, has been so critical in supporting consumer outlays in the United States throughout the recent period of stress. (Greenspan (2002))

A second part of the empirical analysis in this paper addresses the determinants of leverage of a home, including the demographic characteristics of households.

Refinance stimulates family consumption and investment in two ways. First, families benefit by paying lower mortgage rates, which saves about \$10 billion per year in total mortgage interest costs. Second, families have engaged in a record level of cash-out refinance, which serves as a cash infusion to a family's balance sheet. Based on calculations made by Freddie Mac, during 2002 and 2003 families converted more than \$200 billion of home equity into cash at the time of their conventional mortgage refinance, which they have plowed back into the economy.⁶ A survey conducted by the Board of Governors of the Federal Reserve System (2002) of senior loan officers at commercial banks found that the median amount cashed out equaled about 10 to 15 percent of the balance of the loan that was paid off. Canner et al (2002) found that 61 percent of the monies obtained in 2001 and early 2002 went toward home improvements and the repayment of other debts; the use of the remaining funds was approximately split between consumer expenditures and various financial or business investments. The recent senior loan officer survey also confirms this pattern: the two most common uses were home improvements and debt consolidation, with consumer expenditures and investments following next.

Variations in the propensity to refinance and the type of refinance—"cash-out" versus "rate-and-term" (that is, to obtain a lower interest rate or better loan term, with no cash-out)—can vary substantially by demographic characteristic of the family and effect the ability of lower-income or minority families to accumulate wealth in the long run. Archer et al. (2002) found little difference between low- or moderate-income families and high-income families in

⁶ To identify the amount of mortgage rate reduction and volume of cash-out activity, we identified refinance loans that Freddie Mac purchased and which paid off a first mortgage loan in Freddie Mac's portfolio. This enabled us to directly measure the average rate reduction, as well as the amount of increase in loan balance for a cash-out refinance. During 2002, the average family reduced its mortgage rate by one and one-eighth percentage points. Based on the average loan size purchased by Freddie Mac this year (about \$130,000 to \$140,000), the average family shaved \$100 per month off their mortgage payment, or an estimated \$10 billion per year across all families in the U. S.

mortgage prepayment activities. Van Order and Zorn (2002) found that low-income and minority households are significantly less likely to refinance when interest rates drop. Susin (2003) reported that blacks pay a higher interest on their mortgages than whites, and concluded that this is partially due to the lower propensity of blacks to refinance, and the lower likelihood of reducing their interest rate when they do refinance. Susin's study linked the mortgage interest rate to the refinance propensity by ethnic and racial groups, yet his study was based on one-year's survey data and his focus was on household mortgage rates in a particular survey rather than the refinance decision made by households. Boehm et al. (2003) observed that black borrowers pay a significantly higher APR than white borrowers for both purchases and refinancing loans, and pricing differences largely explains the rate differential for refinance loans, indicating that black borrowers are experiencing negative impact in the refinance market. Instead of looking at individual household decisions in a defined period of time, their study offered an overview of all the refinance loans in the period of 1989 to 2001.

This paper uses the national American Housing Survey (AHS), available for odd-numbered years from 1985 to 2001, to explore home equity accumulation, aggregate leverage and refinance behavior among households of different ethnic and socioeconomic characteristics, especially the difference between old and young households, white and minority households, and high-income and low-income households. The longitudinal perspective is particularly important to investigate the factors affecting the refinance decision, including the propensity to refinance, the likelihood of "cashing-out" equity, and the consequences after a household refinances. The regression analysis shows that significant differences exist between these groups; in particular, minority and low-income groups have lower home equity, higher home leverage, and are less likely to take advantage of refinance opportunities. The lower refinance propensity implies a financial loss over time, as the family does not benefit from having the lowest possible mortgage interest rate.

The rest of the paper is organized as follows. Section II focuses on the analysis of home equity, summarizes the accumulation of home equity by age, by year, and by age cohorts through the years, explores the differences between groups in the pattern of accumulation, and presents the results of using weighted generalized least squares (GLS) on grouped data to identify the main determinants of the level of home equity. Section III presents an analysis of aggregate leverage by year and age cohorts, including a variety of demographic and location factors.

Section IV discusses the analysis of refinance propensity and its financial consequences, especially by racial and income differences. Section V concludes with a summary.

Home Equity Study

Data and Methodology

We used the biennial AHS for 1985-2001, yielding nine national data waves. The AHS is ideal for our study since it provides detailed information concerning a homeowner's demographic, housing and mortgage characteristics.

We limited our sample to homeowners aged 25 to 74 as these are the primary ages of ownership and mortgage use and because sample sizes became very small for younger and older households. We then grouped individual data by two years of age to form 25 age groups per AHS wave, from the 25-to-26 age group to the 73-to-74 age group. Within each group, sample size runs from 295 to 1541, with an average of 973 per group.

For geographic location, we grouped data by the four Census regions: Northeast, West, South and Midwest. Data were also grouped by three metropolitan-area classifications: location within the primary central city of a metropolitan statistical area (MSA), outside the central city but within the MSA, and outside an MSA.

From the demographic information of the head of the household, we formed three groups according to race/ethnicity: White non-Hispanic, African American and Other minorities; three groups according to marital status: Married, Single male and Single female; four groups according to education level: No high school diploma, High school graduate, Some college, and Bachelor's degree.⁷ For income level, we compared each household's income with its MSA median income, or Consolidated MSA (CMSA) median income if the MSA code was absent. In the case that both the MSA and CMSA codes were missing, we used the median income of the same region and central city/metropolitan status as the basis for comparison. We then divided the population into five income categories: those with income less than or equal to 80 percent of the area median income, those with income above 80 percent but less than or equal to 120

⁷ The wording of the educational attainment item changed beginning with the 1995 AHS. Prior to 1995, the question was "What is the highest grade or year of regular school...has ever completed?" Beginning in 1995, the question became "What is the highest level of school...has completed or the highest degree (he/she) has received?" Since 1995, the education field permits a distinction between attending 12th grade (but not graduating) and being a high school graduate, as well as attending four years of college versus receiving a Bachelor's degree.

percent of the area median, those with income above 120 percent but at or below 160 percent of the area median, those with income between 160 and 200 percent of the area median, and those with income above twice the area median.

Based on housing characteristics, we formed two groups based on whether the dwelling was a condominium/cooperative or not. We also divided the data into two groups according to whether the owner had a mortgage or home equity loan outstanding on the property or owned it free and clear.

Home equity value was calculated as the difference between home value and the balance of all the mortgages and home equity loans outstanding. In the case that the homeowner indicated the existence of a mortgage in the survey yet the debt balance was missing, we used the regional mean value to replace the missing value. All home values and mortgage balances were translated into 2001 dollars using the national Consumer Price Index (urban consumers) published by the Bureau of Labor Statistics (BLS).

Trends in Home Equity Accumulation

Cross-sectional and temporal differences in home equity wealth

Exhibit III shows average home equity for homeowners in the 1985, 1993 and 2001 AHS, grouped by the age of the head of the household. All three years show that home equity increases with age, and this increase is more apparent in 2001 than in 1985 or 1993. Home equity gain from 1985 to 2001 is widespread for all age levels.

Exhibit IV shows average home equity for homeowners in 2001 grouped by age and income (a similar pattern occurs for other AHS years). Homeowners with income above the median have substantially more real home equity, on average, than homeowners with income at or below the median. The home equity wealth gap widens with the age of the household head, from almost zero at the youngest age to about \$40,000-\$50,000 for age groups over 60 years. This likely reflects the fact that higher-income families generally will own higher-valued homes; for a given rate of appreciation, more expensive homes will create more home equity in dollar terms. Higher income families may also be more likely to pay down their mortgage debt more readily.

There are also significant mean home equity differences by location and other demographic characteristics, as shown in Table I. For example, homeowners who live in the West and Northeast have substantially more home equity than those who live in the South and Midwest, likely reflecting the higher value of homes in the former. By race and ethnicity, non-Hispanic White homeowners have more equity, on average, than minorities, while African Americans have less mean equity than other minorities. Married couples, who have the financial resources and greater spatial needs than single-person households, also have higher amounts of home equity. Home equity also rises steadily with educational attainment. Although not shown in the table, we found that the disparity between each of these groups was larger for older-aged households.

Table I also illustrates how home equity wealth has varied over time. There was a pronounced dip in home equity in 1991-93, especially in the Northeast and West regions. This coincided with the economic recession of 1990-91, which hit those two regions particularly hard as described in Dzialo et al (1993). Likewise, home equity increased sharply after 1997, especially in the Northeast and West, reflecting the acceleration in home value appreciation. Over the 16-year period, the West gained the most home equity in both absolute and relative dollars, with a 59 percent increase in real equity. Regional home value trends play an important role in affecting home equity increases for various demographic groups.

Age cohort home equity wealth accumulation

Exhibit V summarizes the trends in home equity accumulation by cohort, by age in 1985. The lowest curve shows the mean home equity values for homeowners aged 25-26 in 1985, the curve immediately above gives home equity values for owners aged 35-36 in 1985, and so on. Within year, the curves show the same pattern as in Exhibit III, that is, that home equity rises with age. This was also generally true over time, as each age cohort had a rise in real home equity over the observation period. In general, younger cohorts have enjoyed more growth in home equity in both absolute and relative terms than older cohorts. The youngest group, age 25-26 in 1985, had a growth of more than \$70,000 through year 2001, or a 213 percent increase.

The cohort aged 35-36 in 1985 experienced a 91 percent increase in mean home equity, while the cohorts aged 45-46 and 55-56 gained 50 percent and 38 percent, respectively.⁸

Regression Estimation Using Grouped Observations

Given the large number of observations and the aggregate nature of the dataset, we decided to apply GLS to grouped data rather than household-level data. A simple explanation of this method is as follows: in the two-regressor case in which the data have already been grouped according to the size of one of the regressors, the method requires recombining the ungrouped data according to the value of the other explanatory variable; the two sets of grouped data are then pooled to form a regression equation. Since our sample data are cross-classified by our explanatory variables, we used the group regression method proposed by Haitovsky (1967) that corrects for the heteroscedasticity associated with grouped data. The regression results presented in Tables III and IV show both the number of ungrouped observations and the number of groups formed from these observations that are used in our regressions.

Deterministic Factors of Home Equity Level

Applying WLS on grouped observations, we examined the effects of multiple factors on determining the level of home equity for each year and for all. The factors in consideration include age, region, metropolitan group, race, marital status/gender, income level and education level. We also controlled for whether the property was classified as a condominium/co-operative or not and whether it had a mortgage or home equity loan on it or not. The results of our regression on the pooled sample are in Table III. The single-year regressions gave very similar results; noteworthy results by single year are discussed in the following.⁹

Homeowner age contributes significantly to increasing home equity values. Each year increase in age brings \$1,600 more in home equity according to the pooled regression results. For individual years, the increase is between \$1,400 in 1985 and \$1,900 in 2001.

Racial/ethnic differences are captured using African-American and other minority binary variables. Coefficients represent differences between the respective race/ethnic group and non-Hispanic whites. Home equity for the African-American group is significantly lower than the

⁸ Appendix Table I shows the equity growth paths for age cohorts. The average growth per age group is \$55,000 in the 16-year span.

⁹ The single-year models are shown in Appendix Table III.

white group for all the years examined. The other race group (primarily a mixture of Hispanic-, Asian- and Native-Americans) is not significantly different from the white group. Everything else equal, an African American family has \$16,000 less in home equity than a white non-Hispanic family.

Income also makes a large contribution to home equity differences. Real home equity varies directly with household income as measured relative to the local-area median income. For example, households with income more than twice the median have \$45,000 more in home equity than low-income households (those with income at or below 80 percent of the median), holding other factors constant.

Home equity also increases directly with educational attainment. Significantly higher home equity levels are observed for groups with a bachelor degree or higher, some college education, and a high-school diploma than those with less-than-high-school education. For example, household heads with a Bachelor's degree had \$50,000 more home equity wealth, on average, than high school dropouts.¹⁰

Married couples have higher home equity wealth than their single counterparts. Single males had \$11,000 less home equity compared to married couples, and single females had \$9,000 less. Our single-wave regressions show a consistent difference over time, with statistically significant gaps in eight of nine waves for single males, and seven of nine years for single females.

Regional differences in home equity level were observed for each year and for the pooled sample. The West and Northeast consistently show higher home equity levels than the Midwest. Reflected in the overall regression, Northeast homeowners have \$38,000 more home equity wealth than Midwest owners, and households in the West region have \$41,000 more home equity than those in the Midwest. The amount of the regional difference differed by year reflecting asynchronous housing cycles. To illustrate, home equity in the West declined relative to other regions in the 1991-93 period, but grew substantially larger in 2001, reflecting the severe recession of the early 1990s and the housing boom of the last few years.

The central city/suburban status of the property affects home equity value as well. The regression for all the years shows that families who reside in metropolitan areas have larger

¹⁰ As shown in Appendix Table III, the coefficient for Bachelor's degree was much larger in 2001 than in previous years.

home equity wealth. Homeowners in a central city average more equity than those in non-metropolitan areas, but less than those who live in suburbs, holding other factors constant. The homeowner in a suburban portion of an MSA had \$33,000 more home equity than those living in a non-metropolitan area, and households in a central city had \$19,000 more home equity.

The year dummies show large home equity increases in 1989 and 2001, in part reflecting periods of relatively rapid real home-value appreciation. In those two years, real home equity was, on average, \$11,000 and \$26,000 greater than in 1985, holding various other factors constant. Likewise, in 1993 home equity values were \$7,000 lower than those in 1985, reflecting weak home-value growth during the immediately preceding years.¹¹

Aggregate Leverage Study

Using the nine waves of the AHS, we applied the same trend analysis and group regression methods to study aggregate leverage as we had for home equity. Aggregate leverage was calculated as the ratio of total mortgage balance in a group over total home value in the same group. The mortgage balance was given the value of zero for those who owned their home without mortgages or home equity loans.

Trends in Aggregate Leverage

Cross-sectional and temporal differences in leverage

Aggregate leverage declines steadily with age, as shown in the age-leverage profiles for 1985, 1993 and 2001 in Exhibit VI. Reflecting the weakness in home values during the early 1990s, the 1993 profile shows higher leverage ratios across nearly all age groups than for the other two years. The leverage ratio and dollar amount of home equity are inversely related for any given homeowner; all else the same, a larger amount of equity implies a lower leverage. This pattern is also generally borne out in the aggregate data, as 1993 age groups usually had the lowest amount of real home equity of these three years, as was observed in Exhibit III.

Within each age group, leverage ratios appear higher for higher-income families. Using 2001 data, Exhibit VII shows two age-leverage profiles that differ only by homeowner income:

¹¹ Real home-value appreciation, measured by deflating Freddie Mac's Conventional Mortgage Home Price Index by the BLS' Consumer Price Index, showed negative change each year from 1990 to 1993. Real price growth was especially strong in the latter part of the 1980s as well as since 1998.

those above the area median and those at or below. Those with income above area median have higher leverage in every age group than those with income at or below area median. However, the Exhibit does not control for other factors that are correlated with income which may determine aggregate leverage ratios.

Cross-sectional analysis on leverage reveals that, from 1985 to 2001, all the groups we observed experienced growth in their aggregate leverage. The results are listed in Table II. By region, homeowners in the Northeast had lower leverage values than those in other regions, while owners in the West had the highest leverage ratios. White, non-Hispanic owners had the lowest leverage compared with African-American and other minority groups. Leverage appears to increase as income increases: homeowners with income at or below 80 percent of area median had the lowest leverage, and leverage rises with income up to homeowners with income twice the area median, above which the leverage ratio begins to decline. This is consistent with Merry's (2002) findings using 1989, 1993 and 1998 SCF data. Leverage also generally rises with educational attainment: owners with less than a high school education had the lowest leverage while those with a college degree and above were typically the most highly leveraged. Single males tended to be higher leveraged than married couples or single females, and single females had the lowest leverage. Homeowners in central cities were the most highly leveraged, and those living in a non-MSA area were the least leveraged.

Age cohort leverage trends

Exhibit VIII shows the time series of aggregate leverage for four age cohorts, by age in 1985. The highest curve reflects the average leverage over time of those homeowners that were aged 25-26 in 1985, the curve immediately below it shows aggregate leverage of those aged 35-36 in 1985, and so on. Compared with the amount of leverage they had in 1985, each age cohort had reduced their aggregate leverage ratio by 2001, with an average reduction across all age cohorts of 14 percentage points. The declines were more pronounced for younger cohorts, with a drop of 19 percentage points for the youngest cohorts versus about 12 percentage points for the oldest. Nonetheless, additional analysis shows that each age cohort in 2001 had higher leverage than its counterpart in 1985. That is, the cohort aged 41-42 in 2001 (who had been aged 25-26 in 1985) had higher leverage than the 41-42 year-olds in 1985. Overall the increase was 6

percentage points across all the age cohorts, with a larger increase among younger cohorts.¹² The mean increase for the homeowners aged 25-40 in 1985 was 8 percentage points, double the mean increase of 4 percentage points for those aged 41-58 in 1985. This confirms the findings of Nothaft (2000) comparing 1989 and 1999 AHS data, and suggests that younger cohorts may be more willing to take on mortgage debt than older cohorts.

Deterministic Factors of Leverage

We applied the same regression method on grouped data as in our home equity analysis to identify significant determinants of aggregate leverage. Including both homeowners with a mortgage on their home at the time of interview and those owning free and clear, we found that most of the factors that affect home equity accumulation also determine aggregate leverage. Table IV presents the regression results for the pooled sample. The single-year models gave similar results, and interesting findings are noted in the following discussion.¹³

The regression analysis confirms the pattern in Exhibit VI: Leverage decreases with age. One year's advance in age brings a 0.7 percentage point drop in leverage. In the annual regressions, the effect remains consistently between 0.6 and 0.8 percentage points over the 1985-2001 period, despite the substantial increase in cash-out activity during the past decade. Aggregate home equity extraction as part of a prime, conventional refinance has been estimated to have grown from \$20 billion during the 1993 refinance boom year, to \$40 billion during the 1998 refinance boom, to more than \$80 billion during 2001.¹⁴

African-American homeowners had a significantly higher leverage ratio, estimated at 2 percentage points above that of white, non-Hispanic homeowners. Other minorities had a leverage rate that was insignificantly different from that of white, non-Hispanic owners.

In contrast to the pattern in Exhibit VII, higher income is associated with lower aggregate leverage once other factors are controlled for in the regression. Homeowners with income above 80 percent but no more than 120 percent of area median income had leverage that was 8 percentage points lower than those with income less than or equal to 80 percent of area median income; those with income above 120 percent of area median income and no greater than twice

¹² A table with leverage ratios by year and age cohort is presented in Appendix Table II.

¹³ Regression estimates for each of the nine AHS years are in Appendix Table IV.

¹⁴ Freddie Mac's estimates of the amount of home equity "cashed-out" rose to about \$140 billion during 2003; see http://www.freddiemac.com/news/finance/refi_archives.htm.

area median income had leverage that was 9 percentage points less; and those with income more than double area median had 10 percentage points less. In the annual models, this difference between the highest and lowest income groups increased between 1985 and 1991, where the largest difference was observed at 12 percentage points, and gradually decreased to 2001, where the lowest difference was measured at less than 8 percentage points.

Educational attainment was also inversely related to leverage. High school graduates and homeowners with some college education had 12 percentage points lower leverage than high school dropouts. Homeowners with a college degree and higher had leverage that was 13 percentage points less. This distinction between education groups increased from 1985 to 1993, peaking with an 18 percentage point difference between highest and lowest education groups, and declined to 2001, where the difference was less than 10 percentage points. Marital status had little effect on aggregate leverage, after controlling for other factors.

We observed significant leverage differences by Census region and central-city-MSA location. Homeowners in the Northeast had 5 percentage points less leverage than Midwest owners. Families in the South and West had 3 percentage points and 2 percentage points more leverage, respectively, than those in the Midwest. Homeowners in metropolitan areas generally had lower leverage ratios than those who lived outside of MSAs. Central city families had 2 percentage points less leverage than non-MSA families. Families in an MSA but outside the central city had 4 percentage points less leverage than non-MSA families.

The goodness-of-fit is higher in the model that allows for separate year effects. Aggregate leverage ratios reached 8 percentage points above the 1985 level by 1993, reflecting the relatively slow pace of home-value growth in the early 1990s related to the economic recession. The pickup in appreciation after 1993 gradually reduces the difference to 3 percentage points by 2001.

Comparison of home equity and leverage models

The first two empirical portions of this paper have examined the determinants of home equity both in absolute dollar terms and also relative to home value (for any given homeowner, the leverage ratio equals one less the ratio of home equity-to-home value). The two sets of analyses lead to similar conclusions. For example, home equity increases and leverage decreases as age increases; in other words, homeowners increase their home equity in real dollars and also

relative to their home value as they age. The duality also flows to comparisons by race/ethnicity, income, and other variables. Compared with white, non-Hispanic homeowners, African-Americans have lower average home equity and higher average leverage. Compared with the highest income group (homeowners with income double the area median), the lowest income group had less home equity wealth and also a higher leverage ratio.

The year dummies show that aggregate leverage is always higher than in 1985. This result is different from the pattern in the home equity model, which had some years in which real equity was below the 1985 level, and some years above. Over the entire 1985-2001 sample period, the average home equity value increased about \$600 per year, and the average leverage increased about 0.3 percentage points per year. The main reason that both real home equity wealth and aggregate leverage increased over the sample period is because home values appreciated more than the CPI; between 1985 and 2001, home values increased 4.8 percent per year (from 91.0 to 193.5), as measured by Freddie Mac's Conventional Mortgage Home Price Index, while the CPI-urban consumers increased by 3.2 percent per year (from 107.6 to 177.1). Thus, real home value growth allowed both real home equity and the leverage ratio to increase over the sample period.

Refinance Study

Data and Methodology

Our refinance study focuses on the decision made by the homeowner to refinance, take cash-out, and/or place additional second mortgages. The AHS is well suited for this task because it goes back to the same dwelling unit every survey and one knows whether the same homeowner is still in the home. By comparing the mortgage information provided at each survey, we determined whether the homeowner had chosen to refinance, place an additional mortgage, or leave their mortgage unchanged in the two-year period the two surveys bookend. We used logit regressions to identify the effect of household characteristics and mortgage-related variables on the likelihood of a household's decision. There were four major refinance booms during our sample period: 1986, 1992-1993, 1998 and 2001-2002, so we studied the following consecutive surveys that correspond: 1985-1987, 1991-1993, 1997-1999, and 1999-2001.

We identified the same household in consecutive survey years by longitudinally matching the control numbers and keeping those reported as ‘same household’ and ‘same unit’. We also required that the reported move-in year and month were the same in both years’ surveys. Additional restrictions we imposed on our sample were: mortgage characteristic values were not assigned; the year of obtaining the first mortgage had to be non-missing; and the year of obtaining the first mortgage provided in the latter survey cannot pre-date the year provided in the former survey.

We study three kinds of choices made by homeowners that affect their mortgage loan profile. The first one is refinance. This is identified by a change in the origination year of the first mortgage loan in the subsequent survey, or, in the case that the same mortgage initiation year is reported in the two surveys, a change in loan amount or fixed-rate mortgage interest rate.¹⁵ The second kind of decision is whether to cash-out some home equity. This includes an increase in the unpaid loan balance reported in the subsequent survey, or a second mortgage is present in the subsequent survey where there wasn’t one in the previous survey.¹⁶ The third kind of finance decision we explore is the placement of a second mortgage. Households may elect to cash-out home equity by placing a second mortgage or increasing their second mortgage indebtedness (for example, by paying off a second mortgage and placing another with a larger balance). We identified households in this category by comparing the second mortgage characteristics reported in consecutive surveys to determine whether they had placed a new second mortgage or reported an increase in the unpaid loan balance of the second mortgage in the subsequent survey.

Deterministic Factors of Refinance Probability

We used logit regression techniques to separately model the probability of refinance, of cash-out, and of second mortgage placement, where a binary dependent variable indicates

¹⁵ In the case where the same origination year and loan amount is reported in the two surveys, we exclude ARMs and define refinance only if the fixed-rate interest rate has changed; ARMs are otherwise included in the analysis if the origination years or the loan amounts differ. As a robustness check when the origination years were the same, we defined a loan amount change several ways: loan amounts unequal; differ by more than \$5,000; differ by more than \$10,000; differ by 5 percent; differ by 10 percent. Likewise, we considered two cases for fixed-rate change: interest rates unequal and interest rates differ by more than 0.4 percentage points. The resulting logit estimates did not vary substantively with the alternative cuts. The Table V results use a loan amount change of more than \$5,000 and a fixed interest rate change of more than 0.4 percentage points.

¹⁶ We conducted sensitivity analysis by specifying several alternative definitions of loan balance increase: loan balance greater; greater by \$5,000; greater by \$10,000; greater by 5 percent; and greater by 10 percent. The estimates were not sensitive to the definition used. The Table V results use a loan balance increase of more than \$10,000.

whether the homeowner had refinanced, cashed-out equity, or placed a second mortgage, respectively. For each probability, we estimated the model for an overall sample pooled across the four refinance booms (1985-1987, 1991-1993, 1997-1999, 1999-2001).¹⁷ The results for the pooled regressions are presented in Table V.¹⁸

To capture the incentive to refinance, we put in a binary variable that indicates whether the real house value had increased over the two-year period between surveys (that is, that home value had increased by more than CPI inflation), and another binary variable that showed whether the mortgage interest rate (or if there was a second lien, the average interest rate on both mortgages, weighted by unpaid balance) had declined over the same period. We found that both the value increase and interest rate reduction variables were positively related to the refinance probability, indicating that refinance is a rational decision by households in reaction to market changes. Both of these variables were also positively related to the cash-out likelihood and additional second mortgage likelihood, which means that they are not actions solely driven by a need for cash, but actions driven by economic incentives as well.

Our two racial indicators, black and other minorities, were both negative and significant, indicating minorities have a smaller likelihood of refinancing. This is consistent with the findings of Susin (2003), though Archer et al (2002) find no significant difference in the pre-termination risk of loans for blacks and Hispanics. Furthermore, when they do refinance, the average rate reduction is lower than those whose head of household is white. The average rate reduction experienced by a household headed by African Americans is 0.39 percentage points, compared to a rate reduction of 1.33 percentage points on average for white households.

Our income variable had five values to match the five relative income groupings used in our home equity and leverage regressions (“1” for income at or below 80 percent of the area median, “2” for income greater than 80 percent but no more than 120 percent of area median, and so on). The coefficient on income was positive and significant. While the estimation controlled for loan size, education level, payment-to-income and age, income may also proxy for financial sophistication and wealth of the household. Higher-income applicants generally have

¹⁷ Pooling may introduce serial correlation because the same homeowner may appear in successive refinance periods. For simplicity, we chose to ignore this effect. To ascertain whether that would alter our conclusions, we also re-estimated the model eliminating duplicate records from the same homeowner, thus eliminating serial correlation caused by multiple homeowner records. We re-estimated the model keeping only the first homeowner record, and then keeping only the last homeowner record. The parameter estimates in these models did not differ in any substantive fashion from those reported in Table V.

¹⁸ Logit models for each of the four periods were also estimated separately and are shown in Appendix Table V.

higher loan origination rates, as shown in Canner and Gabriel (1992). Giliberto and Thibodeau (1989) and Dickinson and Heuson (1993) find that income contributes directly to the likelihood of interest rate-driven mortgage terminations.

Homeowner's age was negatively related to the refinance probability. This may show a difference in attitude toward refinancing: younger homeowners are more willing to try refinance. Younger owners were also more prone to take out cash through refinance or placing an additional second mortgage.

Our first-time homebuyer indicator was negative and significant in all three models: refinance, cash-out and placing an additional second mortgage. This is in line with the results of Archer et al (2002), which showed that first-time homebuyers who obtained their first mortgage less than five years earlier were less likely to prepay their mortgage.

Our educational attainment variable had four values, representing the four education groups used in our home equity and leverage models ("1" for high school dropouts, "2" for high school graduates, and so on). As a proxy for financial sophistication, our education level variable was positive and significant in the refinance regression, meaning that higher educational attainment increased the likelihood to refinance. This finding agrees with that of Archer et al (2002) and Quigley (1987).

We included four variables that show the financial condition of the families in the earlier year of the matched survey, or for those who refinanced, their financial conditions prior to their refinance decision: a loan size variable, which is the natural log of the unpaid principal balance of the mortgage in the first year of the matched surveys, proxies for the strength of the incentive to refinance; the loan-to-value ratio in the earlier year, proxies for collateral and liquidity constraints; a binary top-code variable is included, which equals one whenever the home value or loan size is at the AHS top code (maximum value released by the Census Bureau) for that survey year, to capture the effects of a truncated value distribution; and payment-to-income, which is the ratio of monthly payments to household income. We found that higher loan-to-value reduced the likelihood of refinance in some years, and significantly reduced the chances of taking-cash out or placing new second mortgages for all the years. Archer et al (2002), Archer et al (1996) and Hurst and Stafford (1996) all point out that increased collateral constraints reduce the probability of prepayment. We find evidence that high loan-to-value also reduces the odds of cashing out equity or placing second mortgages. Homeowners with larger loan sizes were more prone to

refinance, cash-out equity, or obtain second mortgages. Controlling for other factors, this shows that a larger loan balance provides more incentive for a homeowner to reduce monthly payments through refinance motivated by interest-rate reduction, or that a homeowner with larger wealth had more opportunity to refinance or cash-out equity. The payment-to-income ratio in the prior year of the matched surveys had insignificant effects.

Implications of Regression Results

Our refinance study indicates that minorities, especially blacks, and lower-income homeowners were less likely to take advantage of refinance opportunities to reduce the interest rates on their mortgages, even after adjusting for other demographic, loan, and property characteristics. A cause of such findings, of course, may be one or more omitted variables. For example, the AHS lacks credit score or self employment data; Avery et al. (2000) have shown that median credit scores among homeowners with a mortgage are lower in ZIP code areas with higher minority composition, suggesting a correlation of score with race that could account for our finding. Likewise, self-employed workers generally have more volatile income, which may reduce their loan acceptance rates for prime loans or lead them to apply for so called “alt-A” or “A-minus” loans, which carry higher interest rates than prime loans.¹⁹ Another explanation for our findings is that minority and lower-income homeowners are less knowledgeable of the refinance process and have less access to information on current mortgage rates. Some of this may reflect language barriers and cultural differences (especially for immigrants), lack of access to the Internet and personal computers, and a generally lower level of financial literacy.

A refinance boom driven by low interest rates allows homeowners to reduce their mortgage interest payments, freeing up income to meet other expenses or increase savings, or use the funds taken out from home equity extraction to payoff high-rate consumer debts such as credit card and automobile loans. Missed refinance opportunities have a negative effect on household finances in many ways, and represent a sizable loss in wealth over time.

We illustrate the cost of this missed-opportunity effect to a black homeowner through a simulation summarized in Table VI. Assuming two homeowners with exactly the same characteristics except one is an African-American household head and the other is a white non-

¹⁹ The AHS had no self-employment information prior to 1997. Beginning that year, there is a question that refers to the number of self-employed hours worked in the week prior to the survey, but no information is available regarding the past year or whether the previous week was a typical workweek.

Hispanic household head, we calculated the probability of refinance for each based on the coefficients from our refinance regression. The characteristics we choose were: married, aged 35-36, income between 1.2 and 1.6 times the area median, living in the Northeast, college degree or above, owning a house (not a condo or co-op) with an 80 percent loan-to-value and 18 percent payment-to-income ratio. The African-American household would have a 16.5 percent lower refinance probability than their white, non-Hispanic counterpart. Over our sample, the average interest rate was 7.944 percent for white homeowners who refinanced, and the average rate reduction they achieve through refinance is 1.327 percent. Assuming a loan balance of \$100,000, we calculated the value of the benefit of refinance, or the value lost for the black household that does not refinance, assuming a 30-year fixed-rate mortgage. The simple aggregate interest overpaid is \$33,960 over the life of the mortgage. Taking the number of African-American families with a mortgage from the 2001 AHS and the lowered propensity to refinance, the group as a whole overpays \$22.0 billion in mortgage interest over 30 years because of missed refinance opportunities; alternatively, this is the amount of foregone wealth. Discounted at 8.39 percent, the average yield on thirty-year Treasury constant maturities from 1977 to 2002, the overpayment by those who missed the refinance opportunity equals \$12,394 in present value; alternatively, these homeowners are paying interest sufficient to borrow \$112,394, even though they have borrowed only \$100,000. (The present value of overpayments averaged across all black homeowners, not solely the estimated 16.5 percent who missed refinancing, is $(\$12,396) \times (0.165) = \$2,040$ per homeowner.)

Furthermore, there is an opportunity cost to the forgone monthly savings that would have accrued if the black homeowners had refinanced at the same rate as white homeowners. For example, the monies could have been invested in interest-generating securities or mutual funds. Recent studies have shown an average annualized return of 15.2-17.8 percent on pension funds (Ferson and Khang (2002)), 16.9 percent on equity mutual funds, 15.4 percent on S&P 500 (Wermers (2000)), 11.0-17.8 percent on stock returns (Fama and French (2002)), and 18.7 percent on household stock holdings (Barber and Odean (2000)). Assuming an investment return at 15 percent compounded monthly (based on the monthly payment savings of \$94.33 shown in Table VI), this additional income could generate a total value of \$653,095 30 years later, per homeowner who had missed refinancing.

We also simulated the case of lowest income class (those at or below 80 percent of area median income) versus highest income class (those above twice area median income) using our refinance regression coefficients. We made identical assumptions as for the first row of Table VI, but chose white, non-Hispanic homeowners. Holding these characteristics constant, a low-income family was 6.9 percent less likely to refinance. This translates into a loss of \$34,682 in aggregate interests over the life of the loan, or a \$21.9 billion loss for the group as a whole. The present value equals \$12,657, which may also be viewed as an increase of \$12,657 in loan amount today. Assuming the families could make an investment that generates a return of 15 percent, the opportunity cost is \$666,982 in 30 years.

In the case of a low-income African-American family compared to a high-income white, non-Hispanic family, the difference in refinance probability becomes greater. Based on our calculation, a low-income family whose head of household is African-American is 23.6 percent less likely to refinance than a high-income white, non-Hispanic family. The foregone benefit is \$35,196 over the life of the loan, or \$12,845 in present value, and the reduction in wealth from the lost opportunity is \$10.2 billion for the group as a whole. The opportunity cost of foregone investment returns is \$676,862 in 30 years.

The losses calculated above only take into account the direct cost of higher mortgage payments as a result of not refinancing to a lower rate. These estimates may be high or low, but at provide a reference point for quantifying the magnitude of the foregone wealth. As noted earlier, there have been studies that suggest that African-American and lower-income borrowers, even when they refinance, may not receive the lowest possible interest rate that they could have received; we ignore this phenomenon, so our estimates of wealth loss may be too low as a result. Further, we ignore the benefits that could accrue from more optimal cash-out refinancing, and the consolidation of high-cost consumer loans within the cheaper mortgage loan. However, to the extent that African-Americans and lower-income families have worse credit histories on average, then the average interest rate reduction obtained through refinance would not be as large as we have assumed, and our estimates of wealth loss may be too high. A complete calculation of the loss to the family should include losses in these areas as well. Nonetheless, the cumulative loss in wealth over time is sizable.

Summary

This paper analyzed the growth in home equity and its determinants. From our cohort and cross-sectional study, we found that the home equity increase from 1985 to 2001 was widely experienced by every age, geographic and demographic group.

Through the period we studied, an increase in leverage was observed for the same age groups. Our cohort study found that the increase in leverage by age cohort in 2001 over their counterpart in 1985 was bigger for younger cohorts than for older cohorts. In other words, today's younger generation is more leveraged today than their predecessors. They also were more likely to refinance, cash-out home equity, or take a second mortgage. This may reflect a shift in attitude toward more current-period consumption as well as a greater acceptance of having mortgage debt by younger generations.

We also found that the decision of the household to choose a "rate-and-term" refinance, cash-out refinance, or extract home equity through a second mortgage was related to the amount of the interest rate reduction and to real house value increases, and therefore was a rational response to market forces.

Disparities exist between income, education, and racial groups as to the home equity value in a particular year and the extent of growth through the years. This was also confirmed by our regression results that isolate the contribution of each factor to equity values. Minority, especially black, and low-income are both negatively related to the home equity level. Furthermore, our aggregate leverage regression showed that, holding everything else equal, household heads with lower educational attainment, lower income, or who are African-American have higher leverage. Our refinance study further showed that lower-income and African-American families experience significant wealth reductions over time because of a failure to refinance at opportune moments. Because of these missed opportunities, these homeowners pay about \$34,000 to \$35,000 in additional interest payments over a 30-year horizon. As a group, African-American homeowners forego \$22 billion in wealth 30 years hence because of missed refinance opportunities; lower-income homeowners are estimated to also experience a \$22 billion loss over 30 years.

Table I. Average Home Equity in Real Dollars from 1985 to 2001

	1985	1987	1989	1991	1993	1995	1997	1999	2001
Region									
West	108,083	105,135	130,843	118,184	103,971	110,646	102,368	131,684	171,542
Midwest	65,991	67,970	69,575	64,655	64,688	73,839	77,389	87,481	91,981
South	71,234	70,861	73,008	65,970	63,740	65,813	72,853	76,042	90,351
Northeast	112,982	142,264	147,071	119,786	109,032	106,111	97,032	109,193	140,560
Race/ethnicity									
Black	49,487	53,040	61,882	49,517	45,520	52,879	59,485	64,686	77,907
White, non-Hispanic	88,051	93,706	100,426	88,084	83,294	87,876	87,796	100,627	119,900
Other	85,244	90,122	107,054	96,198	85,252	86,374	73,415	92,436	116,826
Income group									
<80	67,863	73,484	79,420	72,039	71,897	76,505	76,195	86,448	96,011
<120	75,880	81,395	86,822	74,681	73,129	76,482	74,018	77,830	90,680
<160	79,055	85,690	88,465	76,935	71,616	77,639	76,157	82,772	101,103
<200	85,055	90,282	96,417	82,903	75,704	77,978	80,022	86,678	104,900
>200	112,081	117,457	129,448	113,014	100,104	102,139	103,121	126,090	157,332
Education									
No high school diploma	65,462	69,723	74,441	63,868	61,201	69,142	68,406	74,577	84,244
High school graduate	77,394	82,474	85,717	74,743	70,985	76,235	78,450	81,192	91,254
Some college	85,246	90,031	96,629	84,685	77,612	81,815	78,925	88,972	103,703
College graduate	114,186	121,057	131,460	115,986	104,770	105,517	102,751	127,832	162,808
Marital status									
Married	89,155	94,870	102,774	90,079	85,030	88,946	89,299	102,930	125,825
Single male	70,102	77,016	84,527	72,792	63,959	71,180	68,947	80,935	97,236
Single female	76,206	81,930	88,075	78,378	75,016	79,106	76,636	85,512	95,634
MSA or non MSA									
Central city	83,683	90,031	95,814	83,960	75,647	79,285	75,501	91,368	115,377
MSA (non central city)	98,694	107,736	117,135	102,337	94,212	96,210	90,560	103,656	124,968
non MSA	58,961	60,300	59,159	56,228	56,194	63,183	74,387	77,281	86,263

Table II. Aggregate Leverage from 1985 to 2001

	1985	1987	1989	1991	1993	1995	1997	1999	2001
Region									
West	30.6%	30.7%	30.6%	30.5%	31.0%	31.0%	31.3%	31.7%	32.0%
Midwest	21.2%	21.2%	21.4%	21.8%	22.3%	22.5%	22.6%	22.7%	22.8%
South	31.3%	31.4%	31.6%	31.7%	31.9%	32.4%	32.7%	32.9%	33.1%
Northeast	34.7%	35.0%	34.7%	35.1%	35.5%	35.6%	36.0%	36.2%	36.7%
Race/ethnicity									
Black	28.6%	28.7%	28.7%	28.8%	29.2%	29.4%	29.6%	29.8%	30.1%
White, non-Hispanic	37.2%	37.1%	37.0%	37.1%	36.9%	36.9%	38.0%	38.3%	38.5%
Other	37.4%	37.5%	37.8%	38.1%	38.7%	38.8%	39.0%	39.5%	38.9%
Income group									
<80	20.1%	20.4%	20.7%	20.9%	21.5%	21.5%	21.5%	21.5%	21.7%
<120	27.5%	27.8%	27.9%	28.1%	28.6%	28.7%	28.7%	28.9%	28.9%
<160	31.8%	31.7%	31.9%	32.0%	32.1%	32.2%	32.1%	32.3%	32.5%
<200	32.8%	33.3%	33.2%	33.5%	34.1%	34.2%	34.7%	35.3%	35.5%
>200	32.7%	32.8%	32.5%	32.6%	32.7%	33.2%	33.6%	33.8%	34.1%
Education									
No high school diploma	20.1%	20.3%	20.2%	20.3%	20.5%	20.4%	20.5%	20.3%	20.4%
High school graduate	26.7%	26.9%	27.0%	27.3%	27.6%	27.7%	28.0%	28.1%	28.2%
Some college	33.5%	33.5%	33.6%	33.9%	34.4%	34.7%	34.8%	35.3%	35.5%
College graduate	34.0%	34.1%	34.0%	34.0%	34.3%	34.6%	34.9%	35.2%	35.5%
Marital status									
Married	30.2%	30.3%	30.3%	30.4%	30.7%	31.0%	31.3%	31.5%	31.7%
Single male	33.9%	34.1%	34.0%	34.5%	35.1%	34.8%	34.9%	35.0%	35.0%
Single female	23.4%	23.7%	23.6%	23.8%	24.1%	24.2%	24.5%	24.8%	25.2%
MSA or non MSA									
Central city	31.9%	31.9%	31.8%	31.9%	32.0%	32.3%	32.4%	32.3%	32.3%
MSA (non central city)	29.0%	29.2%	29.3%	29.5%	30.0%	30.2%	30.4%	30.8%	31.0%
non MSA	27.4%	27.6%	27.5%	27.7%	27.9%	27.8%	28.4%	28.8%	29.5%

Table III. Home Equity Value Regression Results

Parameter	MODEL 1		MODEL 2	
	Estimate	p-value	Estimate	p-value
Age	1,590	0.000	1,595	0.000
Region-Northeast	37,894	0.000	37,800	0.000
Region-South	-1,847	0.414	-2,111	0.267
Region-West	41,367	0.000	41,219	0.000
Metro-Central city	19,015	0.000	19,037	0.000
Metro-Non central city	32,925	0.000	32,838	0.000
Race-Black	-16,333	0.000	-16,309	0.000
Race-Other	781	0.818	755	0.792
Single-Male	-10,540	0.000	-10,517	0.000
Single-Female	-8,566	0.001	-8,579	0.000
Income-80+	10,644	0.000	10,459	0.000
Income-120+	16,669	0.000	16,514	0.000
Income-160+	21,306	0.000	21,257	0.000
Income-200+	44,691	0.000	44,679	0.000
Education-High school	15,598	0.000	16,011	0.000
Education-Some college	24,531	0.000	24,957	0.000
Education-Bachelor	50,117	0.000	50,451	0.000
No Mortgage on House	41,755	0.000	41,717	0.000
Condo or Co-op	-13,994	0.001	-13,696	0.000
Constant Term	-132,176	0.000	-82,084	0.000
Year (1985-2001)	579	0.001		
Year 1987 dummy			5,443	0.085
Year 1989 dummy			11,027	0.001
Year 1991 dummy			-176	0.956
Year 1993 dummy			-6,672	0.040
Year 1995 dummy			-3,608	0.255
Year 1997 dummy			-6,302	0.054
Year 1999 dummy			5,567	0.078
Year 2001 dummy			26,045	0.000
R-square	0.974		0.982	
Number of Groups	387		387	
Number of Observations	218,816		218,816	

Table IV. Aggregate Leverage Regression Results

Parameter	MODEL 1		MODEL 2	
	Estimate	p-value	Estimate	p-value
Age	-0.006	0.000	-0.007	0.000
Region-Northeast	-0.046	0.000	-0.046	0.000
Region-South	0.025	0.000	0.026	0.000
Region-West	0.015	0.073	0.015	0.043
Metro-Central city	-0.022	0.007	-0.021	0.004
Metro-Non central city	-0.039	0.000	-0.037	0.000
Race-Black	0.022	0.031	0.023	0.016
Race-Other	-0.009	0.368	-0.009	0.331
Single-Male	0.010	0.224	0.010	0.187
Single-Female	-0.013	0.094	-0.013	0.063
Income-80+	-0.081	0.000	-0.081	0.000
Income-120+	-0.090	0.000	-0.089	0.000
Income-160+	-0.091	0.000	-0.090	0.000
Income-200+	-0.097	0.000	-0.097	0.000
Education-High school	-0.121	0.000	-0.123	0.000
Education-Some College	-0.123	0.000	-0.124	0.000
Education-Bachelor	-0.127	0.000	-0.129	0.000
No Mortgage on House	-0.504	0.000	-0.504	0.000
Condo or Co-op	0.046	0.001	0.045	0.000
Constant Term	0.774	0.000	0.991	0.000
Year (1985-2001)	0.003	0.000		
Year 1987 dummy			0.016	0.106
Year 1989 dummy			0.021	0.046
Year 1991 dummy			0.053	0.000
Year 1993 dummy			0.084	0.000
Year 1995 dummy			0.068	0.000
Year 1997 dummy			0.063	0.000
Year 1999 dummy			0.066	0.000
Year 2001 dummy			0.025	0.018
R-square	0.987		0.990	
Number of Groups	387		387	
Number of Observations	218,816		218,816	

Table V. Refinance Probability Regression Results

Parameter	Refinance		Cash-Out		Take Out Additional Second Mortgage	
	Estimate	p-Value	Estimate	p-Value	Estimate	p-Value
Age	-0.019	0.000	-0.020	0.000	-0.020	0.000
Region-Northeast	-0.173	0.006	0.095	0.192	0.022	0.824
Region-South	-0.364	0.000	-0.193	0.009	-0.170	0.082
Region-West	0.001	0.993	0.363	0.000	-0.194	0.065
Metro-Central city	0.010	0.892	-0.018	0.836	0.105	0.414
Metro-Non central city	0.155	0.018	0.065	0.408	0.277	0.015
Race-Black	-0.669	0.000	-0.013	0.924	0.523	0.001
Race-Other	-0.160	0.066	-0.251	0.015	-0.133	0.394
Single-Male	-0.056	0.437	0.087	0.298	0.195	0.093
Single-Female	0.015	0.838	-0.139	0.129	-0.158	0.241
Income Level	0.074	0.000	0.131	0.000	0.122	0.000
Education Level	0.072	0.003	0.049	0.082	-0.010	0.799
First-Time Homebuyer	-0.156	0.001	-0.307	0.000	-0.362	0.000
Condo or Co-op	-0.175	0.074	-0.372	0.007	-0.813	0.001
House Value Increase?	0.063	0.160	0.412	0.000	0.288	0.000
Interest Rate Reduced?	2.131	0.000	1.093	0.000	0.394	0.000
Loan-to-Value	-0.026	0.474	-2.332	0.000	-1.994	0.000
Log (Loan Size)	0.346	0.000	0.257	0.000	0.312	0.000
At Top Code?	0.217	0.056	0.129	0.232	-0.236	0.168
Payment-to-Income	0.003	0.184	0.002	0.447	-0.006	0.137
Year 2001 dummy	0.512	0.091	1.004	0.001	0.644	0.078
Year 1999 dummy	0.349	0.228	0.529	0.105	-0.991	0.182
Year 1993 dummy	0.687	0.000	0.275	0.000	-0.223	0.003
Constant Term	-5.866	0.000	-4.510	0.000	-4.977	0.000
R-square	0.3557		0.1283		0.0560	
Number of Observations	13,152		15,201		15,201	

Table VI. Cost of Lost Opportunity to Refinance

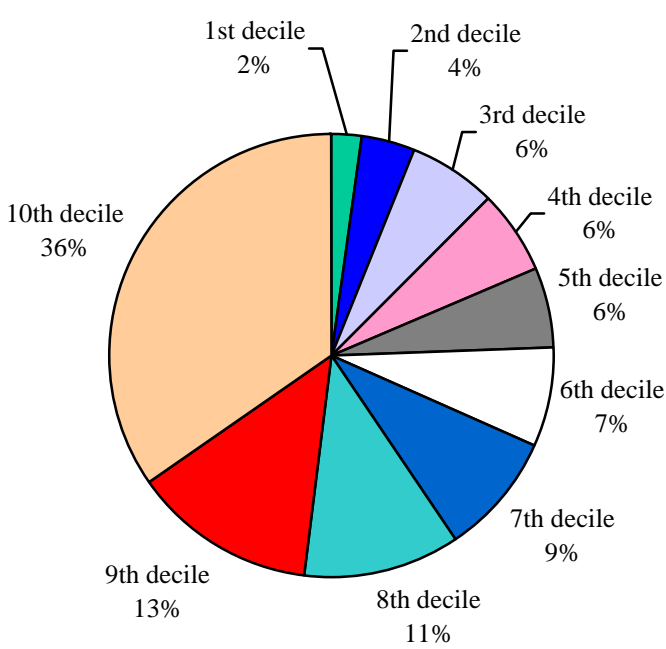
	Lower Refinance Probability	Loan Size	Interest Rate Reduction through Refinance	Current Interest Rate (Post Refinance)	Monthly Payment Difference	Simple Aggregate Overpaid Interest	Present Value of Foregone Benefit Over Life of Loan	Future Value of Opportunity Cost at Retirement	Number of Homeowners with Mortgages (2001 AHS)	Group Wealth Loss (\$Billion)
Black	-0.165	\$100,000	-1.327%	7.944%	\$94.33	\$33,960	\$12,394	\$653,095	3,938,515	\$22.0
Low-Income	-0.069	\$100,000	-1.361%	7.792%	\$96.34	\$34,682	\$12,657	\$666,982	9,145,090	\$21.9
Black and Low-Income	-0.236	\$100,000	-1.381%	7.786%	\$97.77	\$35,196	\$12,845	\$676,862	1,230,859	\$10.2

Note:

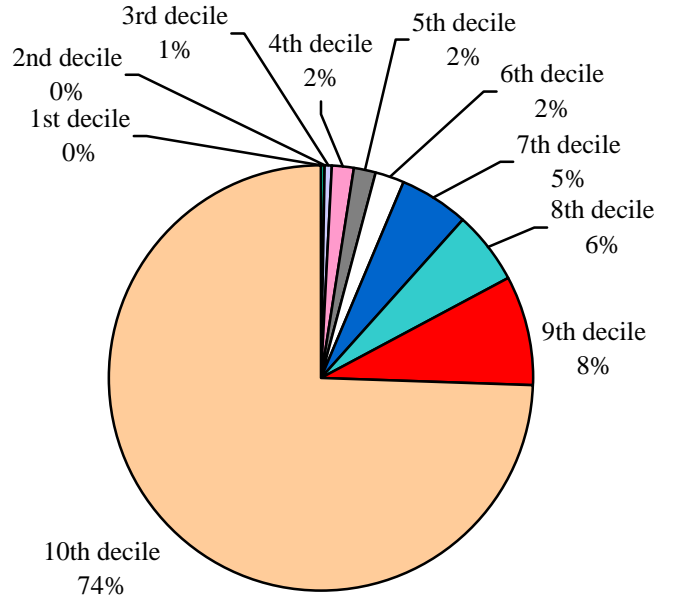
Simple Aggregate Overpaid Interest=Monthly Payment Difference * 360 months;

Group Wealth Loss=Number of Homeowners with Mortgages * Simple Aggregate Overpaid Interest * Lower Refinance Probability.

Exhibit I. Home Equity and Stock Holdings by Income Group



Home Equity



Stock Holdings

Exhibit II. Lorenz Curve and Gini Ratio for Stocks and Home Equity

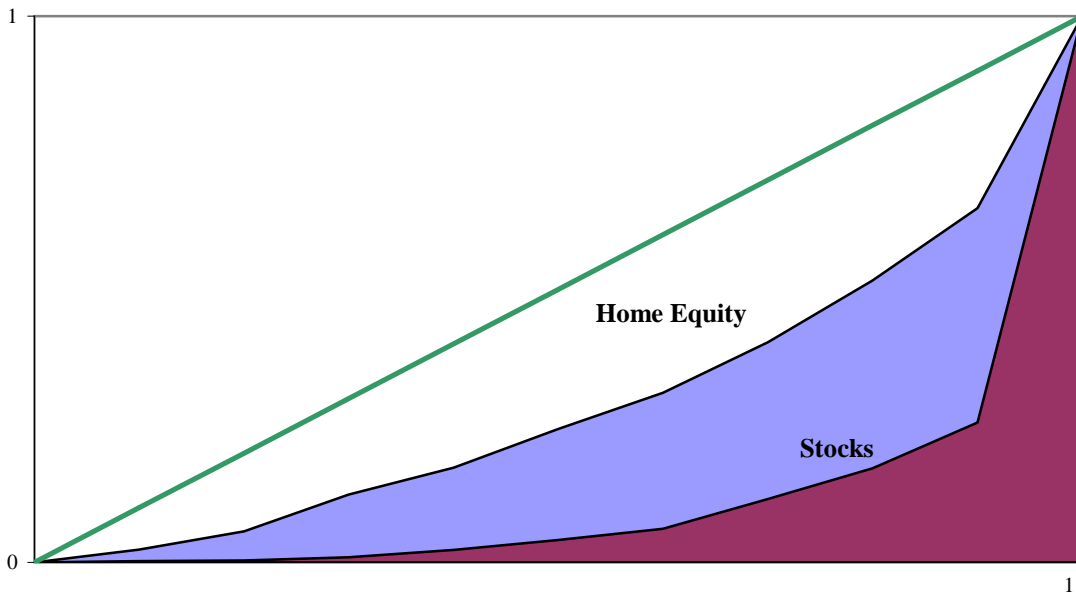


Exhibit III. Average Home Equity by Age

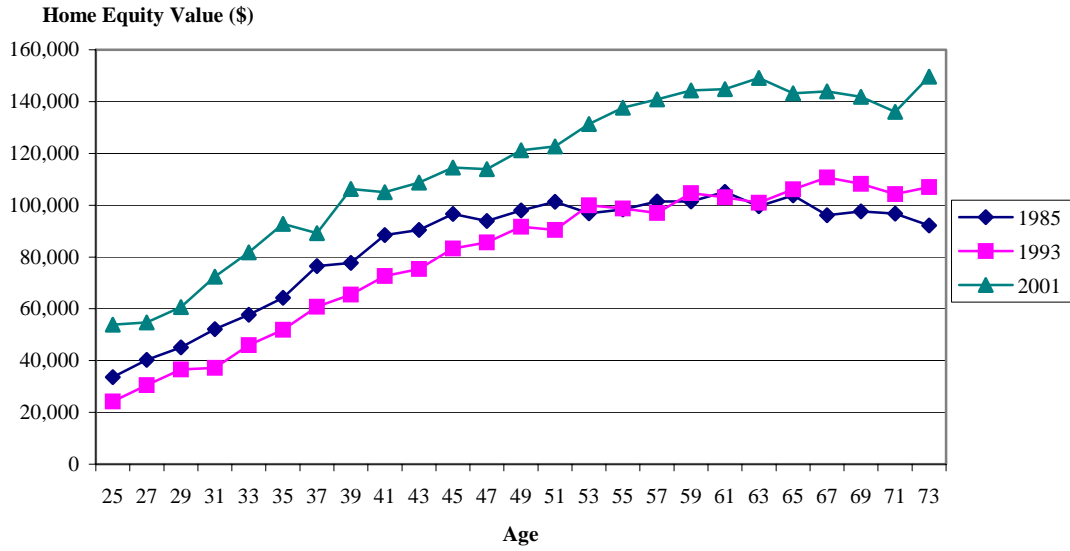


Exhibit IV. Average Home Equity by Age and Income in 2001

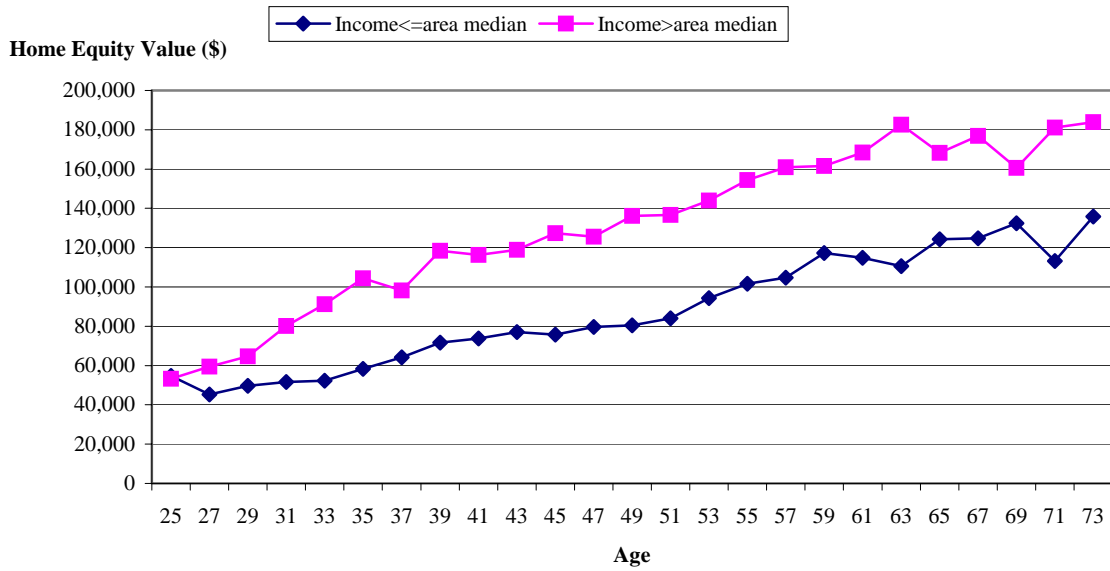


Exhibit V. Home Equity Value by Age Cohorts

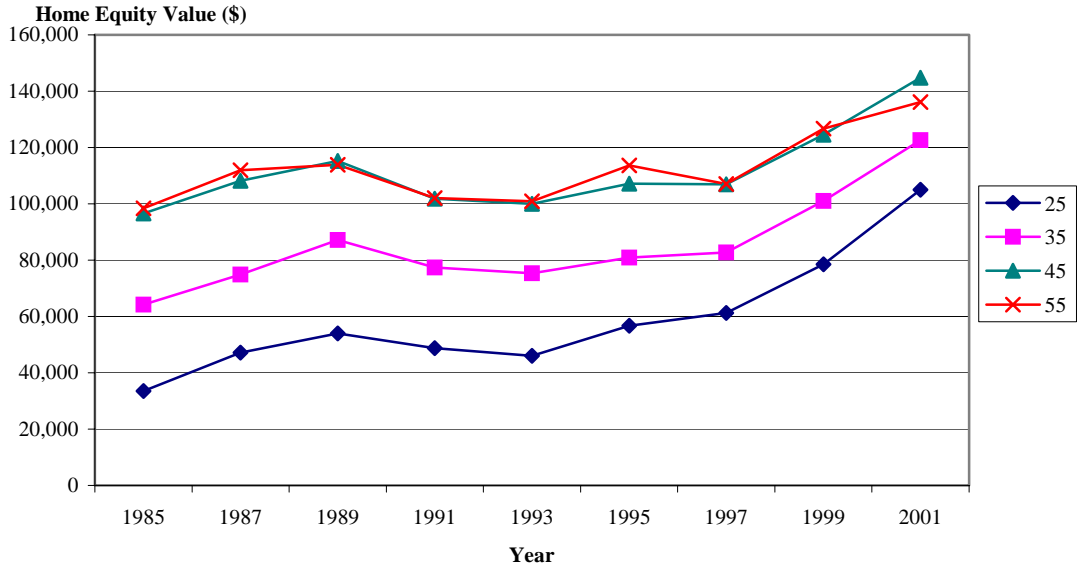


Exhibit VI. Aggregate Leverage by Age

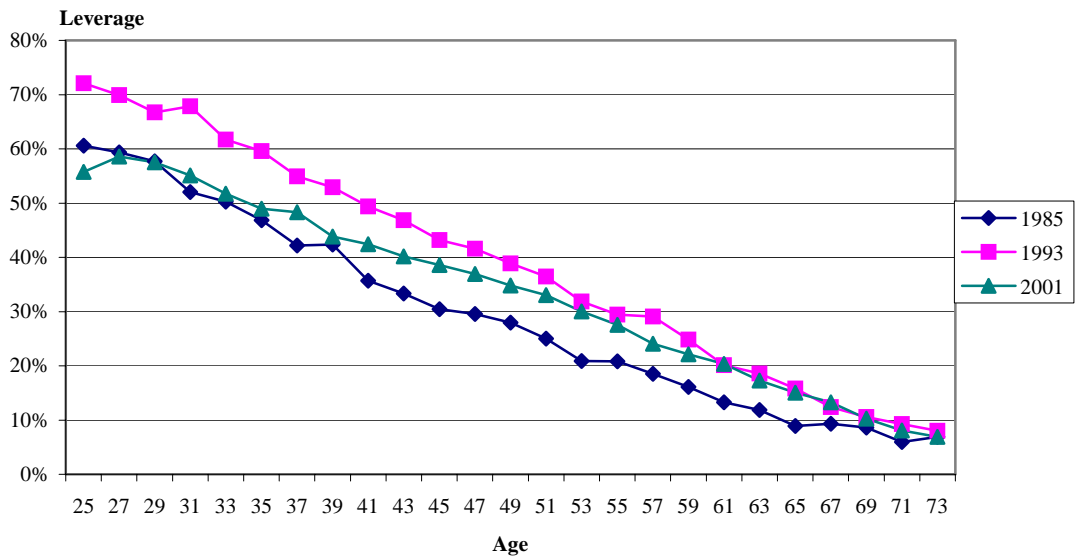


Exhibit VII. Aggregate Leverage by Age and Income in 2001

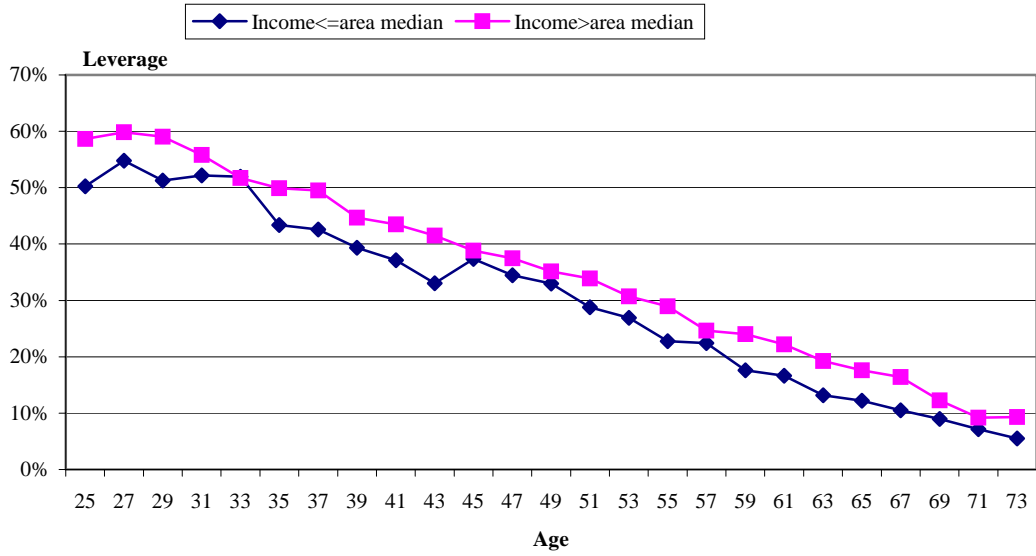
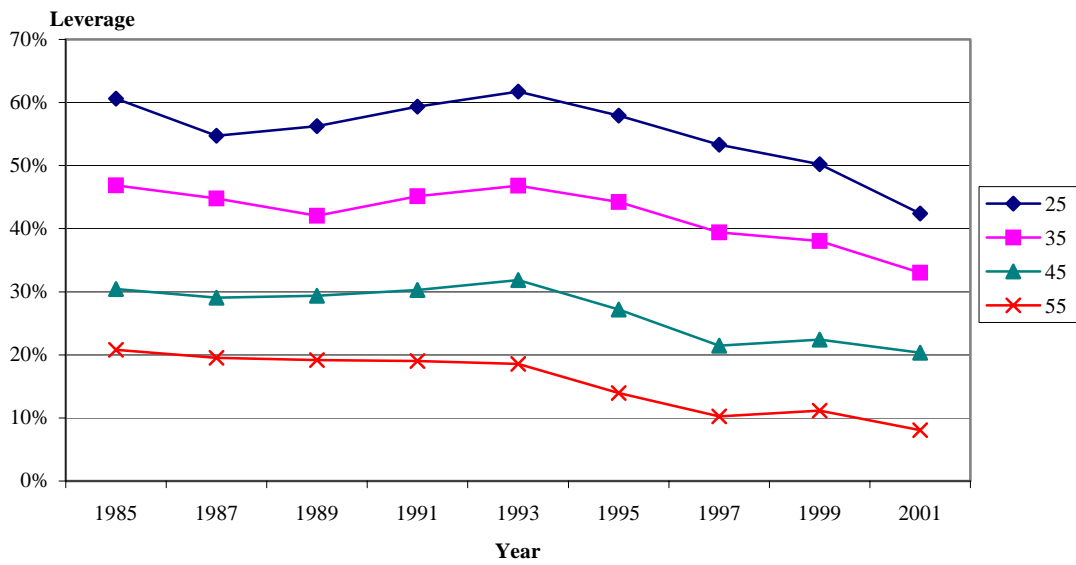


Exhibit VIII. Aggregate Leverage by Age Cohorts



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Appendix

Appendix Table I. Average Real Home Equity for Age Cohorts

Age in 1985	1985	1987	1989	1991	1993	1995	1997	1999	2001
25-26	33,571	47,200	54,010	48,765	45,972	56,704	61,206	78,473	105,052
27-28	40,278	48,936	59,303	53,011	51,925	60,968	66,525	82,698	108,776
29-30	45,101	56,163	66,993	64,183	60,825	69,497	74,875	85,452	114,529
31-32	52,098	65,276	75,350	67,007	65,498	71,553	76,186	96,453	113,890
33-34	57,714	68,725	81,565	74,059	72,684	77,864	82,107	94,811	121,145
35-36	64,239	74,876	87,165	77,441	75,348	80,962	82,774	101,000	122,644
37-38	76,494	83,391	99,429	84,333	83,290	91,303	95,000	109,729	131,375
39-40	77,767	84,409	99,261	91,296	85,663	90,581	92,928	108,905	137,628
41-42	88,426	95,765	106,339	96,228	91,658	97,250	98,417	115,408	140,835
43-44	90,395	94,322	103,459	94,648	90,475	100,656	105,255	120,320	144,332
45-46	96,599	108,160	115,265	101,797	99,945	107,159	106,887	124,593	144,814
47-48	93,861	99,229	109,148	99,764	98,683	109,241	108,352	123,031	149,137
49-50	98,035	103,986	116,528	102,374	96,991	107,351	109,005	130,594	143,245
51-52	101,331	106,249	118,177	104,733	104,688	110,473	107,726	128,376	143,921
53-54	96,875	101,220	116,389	103,453	103,075	107,390	109,641	123,838	141,788
55-56	98,366	111,985	113,846	102,069	100,905	113,673	107,092	126,753	136,081
57-58	101,395	115,021	125,936	112,292	106,105	113,242	114,795	121,170	149,598
59-60	101,491	114,371	121,823	112,455	110,754	115,266	111,638	123,585	NA
61-62	105,116	110,982	117,540	108,874	108,275	108,302	104,581	NA	NA
63-64	99,606	105,929	116,700	105,704	104,250	111,896	NA	NA	NA
65-66	103,836	111,491	122,878	107,512	107,017	NA	NA	NA	NA
67-68	96,097	102,393	109,817	105,225	NA	NA	NA	NA	NA
69-70	97,558	103,237	103,861	NA	NA	NA	NA	NA	NA
71-72	96,775	102,923	NA	NA	NA	NA	NA	NA	NA
73-74	92,130	NA	NA	NA	NA	NA	NA	NA	NA

Appendix Table II. Aggregate Leverage by Age Cohorts

Age in 1985	1985	1987	1989	1991	1993	1995	1997	1999	2001
25-26	61%	55%	56%	59%	62%	58%	53%	50%	42%
27-28	59%	56%	54%	58%	60%	56%	50%	49%	40%
29-30	58%	54%	52%	52%	55%	52%	47%	47%	39%
31-32	52%	50%	48%	51%	53%	50%	45%	42%	37%
33-34	50%	48%	45%	48%	49%	47%	42%	41%	35%
35-36	47%	45%	42%	45%	47%	44%	39%	38%	33%
37-38	42%	42%	38%	42%	43%	40%	35%	34%	30%
39-40	42%	41%	38%	39%	42%	40%	34%	34%	28%
41-42	36%	35%	34%	36%	39%	36%	30%	30%	24%
43-44	33%	35%	33%	34%	36%	32%	26%	27%	22%
45-46	30%	29%	29%	30%	32%	27%	21%	22%	20%
47-48	30%	30%	28%	30%	29%	23%	20%	21%	17%
49-50	28%	26%	26%	27%	29%	21%	18%	16%	15%
51-52	25%	25%	23%	26%	25%	20%	16%	15%	13%
53-54	21%	23%	19%	21%	20%	17%	12%	12%	10%
55-56	21%	20%	19%	19%	19%	14%	10%	11%	8%
57-58	19%	14%	14%	15%	16%	11%	8%	9%	7%
59-60	16%	13%	12%	12%	12%	10%	6%	7%	NA
61-62	13%	12%	12%	11%	11%	10%	6%	NA	NA
63-64	12%	11%	10%	10%	9%	8%	NA	NA	NA
65-66	9%	9%	7%	8%	8%	NA	NA	NA	NA
67-68	9%	9%	8%	6%	NA	NA	NA	NA	NA
69-70	9%	8%	8%	NA	NA	NA	NA	NA	NA
71-72	6%	5%	NA	NA	NA	NA	NA	NA	NA
73-74	7%	NA	NA	NA	NA	NA	NA	NA	NA

Appendix Table III. Home Equity Value Regression Results by Year

Parameter	1985		1987		1989		1991		1993	
	Estimate	p-value	Estimate	p-value	Estimate	p-value	Estimate	p-value	Estimate	p-value
Age	1,444	0.000	1,535	0.000	1,615	0.000	1,602	0.000	1,595	0.000
Region-Northeast	36,524	0.000	63,433	0.000	66,085	0.000	44,831	0.000	33,484	0.000
Region-South	6,335	0.102	4,338	0.242	2,970	0.455	1,221	0.693	-1,468	0.675
Region-West	36,178	0.000	30,333	0.000	52,515	0.000	45,489	0.000	33,210	0.000
Metro-Central city	19,288	0.000	23,127	0.000	28,268	0.000	22,012	0.000	18,346	0.000
Metro-Non central city	31,544	0.000	36,755	0.000	46,510	0.000	39,186	0.000	34,544	0.000
Race-Black	-18,277	0.004	-18,923	0.003	-13,781	0.032	-15,981	0.003	-18,067	0.003
Race-Other	613	0.927	3,325	0.607	6,955	0.291	7,152	0.170	6,075	0.265
Single-Male	-10,111	0.059	-8,601	0.084	-6,902	0.173	-8,240	0.041	-12,693	0.007
Single-Female	-6,387	0.140	-7,428	0.078	-7,068	0.116	-6,878	0.054	-8,691	0.030
Income-80+	14,888	0.003	15,475	0.002	15,819	0.003	12,846	0.002	9,066	0.040
Income-120+	20,082	0.000	22,658	0.000	22,917	0.000	18,482	0.000	11,407	0.020
Income-160+	25,313	0.000	27,289	0.000	29,694	0.000	24,980	0.000	17,560	0.002
Income-200+	45,151	0.000	47,114	0.000	54,450	0.000	47,784	0.000	34,599	0.000
Education-High school	16,845	0.000	17,830	0.000	15,962	0.002	17,116	0.000	19,367	0.000
Education-Some college	25,688	0.000	26,749	0.000	27,475	0.000	27,187	0.000	29,217	0.000
Education-Bachelor	48,121	0.000	48,888	0.000	50,720	0.000	48,436	0.000	49,604	0.000
No Mortgage on House	28,757	0.000	33,528	0.000	38,214	0.000	39,692	0.000	43,522	0.000
Condo or Co-op	-15,707	0.064	-9,306	0.233	-8,925	0.261	-16,309	0.015	-16,276	0.021
Constant Term	-73,059	0.000	-83,386	0.000	-97,431	0.000	-92,428	0.000	-85,275	0.000
R-square	0.995		0.996		0.996		0.997		0.995	
Number of Grouped Observations	43		43		43		43		43	
Number of Observations	21,676		25,631		22,608		26,027		23,195	

Appendix Table III. Home Equity Value Regression Results by Year (Continued)

Parameter	1995		1997		1999		2001	
	Estimate	p-value	Estimate	p-value	Estimate	p-value	Estimate	p-value
Age	1,661	0.000	1,515	0.000	1,679	0.000	1,857	0.000
Region-Northeast	24,421	0.000	14,387	0.000	16,170	0.000	39,189	0.000
Region-South	-7,733	0.019	-6,590	0.038	-12,513	0.000	-5,580	0.117
Region-West	32,675	0.000	23,015	0.000	40,135	0.000	73,321	0.000
Metro-Central city	15,566	0.000	1,843	0.633	9,874	0.022	20,075	0.000
Metro-Non central city	30,896	0.000	14,772	0.000	20,913	0.000	28,954	0.000
Race-Black	-17,666	0.001	-12,315	0.012	-15,772	0.002	-15,903	0.004
Race-Other	1,444	0.741	-5,880	0.178	-4,202	0.313	-1,912	0.672
Single-Male	-8,508	0.033	-12,808	0.002	-11,708	0.004	-13,655	0.003
Single-Female	-5,855	0.091	-7,248	0.035	-8,596	0.016	-14,681	0.001
Income-80+	9,694	0.017	8,644	0.029	4,561	0.242	5,144	0.235
Income-120+	15,665	0.001	14,455	0.001	10,234	0.019	14,440	0.004
Income-160+	17,702	0.001	17,921	0.000	14,754	0.003	18,426	0.001
Income-200+	34,947	0.000	36,976	0.000	44,673	0.000	59,808	0.000
Education-High school	13,001	0.003	14,604	0.001	11,773	0.008	9,679	0.044
Education-Some college	21,638	0.000	19,307	0.000	22,398	0.000	22,301	0.000
Education-Bachelor	39,230	0.000	38,107	0.000	53,371	0.000	68,400	0.000
No Mortgage on House	39,144	0.000	43,284	0.000	51,376	0.000	55,079	0.000
Condo or Co-op	-16,259	0.008	-14,617	0.013	-19,750	0.002	-5,671	0.376
Constant Term	-71,953	0.000	-51,620	0.000	-62,002	0.000	-80,991	0.000
R-square	0.996		0.996		0.997		0.998	
Number of Grouped Observations	43		43		43		43	
Number of Observations	25,698		22,720		26,640		24,621	

Appendix Table IV. Aggregate Leverage Regression Results by Year

Parameter	1985		1987		1989		1991		1993	
	Estimate	p-value	Estimate	p-value	Estimate	p-value	Estimate	p-value	Estimate	p-value
Age	-0.006	0.000	-0.006	0.000	-0.006	0.000	-0.006	0.000	-0.007	0.000
Region-Northeast	-0.063	0.015	-0.062	0.009	-0.050	0.034	-0.047	0.042	-0.041	0.095
Region-South	0.013	0.559	0.043	0.036	0.048	0.022	0.020	0.308	0.009	0.660
Region-West	0.013	0.619	0.055	0.028	0.017	0.463	0.012	0.622	0.025	0.322
Metro-Central city	-0.020	0.407	-0.032	0.159	-0.035	0.133	-0.033	0.147	-0.036	0.150
Metro-Non central city	-0.046	0.038	-0.052	0.009	-0.061	0.004	-0.061	0.003	-0.060	0.007
Race-Black	0.036	0.284	0.040	0.208	0.010	0.741	0.039	0.221	0.053	0.113
Race-Other	-0.010	0.795	-0.009	0.792	-0.020	0.535	-0.010	0.746	-0.021	0.516
Single-Male	0.028	0.341	0.027	0.292	0.006	0.808	0.020	0.401	0.037	0.162
Single-Female	0.002	0.918	0.003	0.888	-0.001	0.970	-0.006	0.780	-0.009	0.686
Income-80+	-0.076	0.007	-0.084	0.001	-0.085	0.001	-0.094	0.000	-0.090	0.002
Income-120+	-0.086	0.005	-0.093	0.001	-0.095	0.001	-0.100	0.001	-0.102	0.001
Income-160+	-0.088	0.009	-0.099	0.002	-0.102	0.001	-0.117	0.000	-0.108	0.001
Income-200+	-0.093	0.002	-0.097	0.000	-0.109	0.000	-0.121	0.000	-0.108	0.000
Education-High school	-0.100	0.000	-0.111	0.000	-0.103	0.000	-0.129	0.000	-0.163	0.000
Education-Some college	-0.103	0.001	-0.114	0.000	-0.121	0.000	-0.139	0.000	-0.176	0.000
Education-Bachelor	-0.121	0.000	-0.128	0.000	-0.124	0.000	-0.149	0.000	-0.177	0.000
No Mortgage on House	-0.440	0.000	-0.479	0.000	-0.485	0.000	-0.537	0.000	-0.567	0.000
Condo or Co-op	0.083	0.086	0.046	0.266	0.023	0.550	0.050	0.217	0.061	0.134
Constant Term	0.948	0.000	0.966	0.000	0.984	0.000	1.085	0.000	1.167	0.000
R-square	0.990		0.992		0.992		0.994		0.994	
Number of Grouped Observations	43		43		43		43		43	
Number of Observations	21,676		25,631		22,608		26,027		23,195	

Appendix Table IV. Aggregate Leverage Regression Results by Year (Continued)

Parameter	1995		1997		1999		2001	
	Estimate	p-value	Estimate	p-value	Estimate	p-value	Estimate	p-value
Age	-0.007	0.000	-0.008	0.000	-0.007	0.000	-0.006	0.000
Region-Northeast	-0.039	0.064	-0.027	0.154	-0.025	0.089	-0.047	0.001
Region-South	0.031	0.095	0.018	0.259	0.029	0.028	0.024	0.045
Region-West	0.014	0.507	0.028	0.138	0.008	0.589	-0.030	0.034
Metro-Central city	-0.005	0.818	0.024	0.235	0.002	0.911	-0.028	0.063
Metro-Non central city	-0.021	0.259	0.009	0.590	-0.007	0.620	-0.018	0.147
Race-Black	0.010	0.695	0.001	0.972	0.009	0.606	0.015	0.366
Race-Other	-0.012	0.628	0.011	0.624	-0.012	0.472	-0.003	0.815
Single-Male	-0.005	0.806	0.003	0.860	-0.009	0.571	-0.004	0.771
Single-Female	-0.038	0.060	-0.028	0.114	-0.031	0.028	-0.005	0.704
Income-80+	-0.100	0.000	-0.090	0.000	-0.068	0.000	-0.046	0.003
Income-120+	-0.114	0.000	-0.089	0.000	-0.074	0.000	-0.052	0.002
Income-160+	-0.114	0.000	-0.080	0.001	-0.067	0.001	-0.044	0.012
Income-200+	-0.104	0.000	-0.089	0.000	-0.093	0.000	-0.074	0.000
Education-High school	-0.141	0.000	-0.148	0.000	-0.119	0.000	-0.083	0.000
Education-Some college	-0.138	0.000	-0.124	0.000	-0.114	0.000	-0.075	0.000
Education-Bachelor	-0.120	0.000	-0.111	0.000	-0.122	0.000	-0.097	0.000
No Mortgage on House	-0.519	0.000	-0.509	0.000	-0.526	0.000	-0.472	0.000
Condo or Co-op	0.060	0.074	0.061	0.040	0.046	0.054	-0.008	0.683
Constant Term	1.104	0.000	1.078	0.000	1.040	0.000	0.927	0.000
R-square	0.995		0.996		0.998		0.998	
Number of Grouped Observations	43		43		43		43	
Number of Observations	25,698		22,720		26,640		24,621	

Appendix Table V. Refinance Probability Regression Results by Year

1. Period 1985-1987

Parameter	Refinance		Cash-Out		Take Out Additional Second Mortgage	
	Estimate	p-Value	Estimate	p-Value	Estimate	p-Value
Age	-0.031	0.000	-0.030	0.000	-0.018	0.033
Region-Northeast	-0.044	0.759	0.341	0.040	0.411	0.045
Region-South	-0.159	0.237	0.118	0.476	0.198	0.331
Region-West	-0.097	0.504	0.378	0.027	-0.003	0.988
Metro-Central city	0.121	0.478	-0.125	0.518	-0.049	0.844
Metro-Non central city	0.249	0.111	-0.089	0.611	0.042	0.853
Race-Black	-0.928	0.002	0.138	0.617	0.684	0.016
Race-Other	-0.377	0.078	0.060	0.796	0.194	0.503
Single-Male	-0.118	0.504	0.025	0.902	-0.057	0.833
Single-Female	0.058	0.743	-0.057	0.791	-0.103	0.699
Income Level	0.035	0.392	0.217	0.000	0.197	0.001
Education Level	0.033	0.537	0.074	0.226	-0.041	0.579
First-Time Homebuyer	-0.182	0.090	-0.345	0.005	-0.289	0.061
Condo or Co-op	-0.002	0.992	-0.232	0.467	-1.046	0.069
House Value Increase?	0.132	0.200	0.488	0.000	0.285	0.059
Interest Rate Reduced?	1.862	0.000	0.662	0.000	0.140	0.321
Loan-to-Value	0.142	0.138	-1.908	0.000	-2.253	0.000
Log (Loan Size)	0.425	0.000	0.246	0.011	0.392	0.002
At Top Code?	0.052	0.848	-0.019	0.944	-0.121	0.712
Payment-to-Income	-0.001	0.246	0.000	0.935	-0.001	0.682
Constant Term	-5.929	0.000	-4.334	0.000	-6.082	0.000
R-square	0.3008		0.1001		0.0646	
Number of Observations	3,019		3,744		3,744	

Appendix Table V. Refinance Probability Regression Results by Year (Continued)

2. Period 1991-1993

Parameter	Refinance		Cash-Out		Take Out Additional Second Mortgage	
	Estimate	p-Value	Estimate	p-Value	Estimate	p-Value
Age	-0.012	0.004	-0.013	0.011	-0.019	0.025
Region-Northeast	-0.248	0.036	-0.061	0.656	-0.334	0.098
Region-South	-0.476	0.000	-0.379	0.006	-0.482	0.013
Region-West	0.067	0.564	0.382	0.003	-0.277	0.157
Metro-Central city	-0.017	0.902	0.099	0.541	0.204	0.437
Metro-Non central city	0.125	0.285	0.191	0.176	0.480	0.035
Race-Black	-0.582	0.005	-0.112	0.662	0.397	0.219
Race-Other	-0.082	0.597	-0.465	0.014	-0.486	0.153
Single-Male	-0.042	0.736	0.117	0.420	0.313	0.135
Single-Female	0.036	0.783	-0.154	0.341	-0.137	0.593
Income Level	0.094	0.003	0.089	0.017	0.080	0.170
Education Level	0.089	0.048	0.036	0.492	0.030	0.706
First-Time Homebuyer	-0.150	0.095	-0.300	0.005	-0.451	0.006
Condo or Co-op	-0.265	0.129	-0.522	0.037	-0.758	0.094
House Value Increase?	-0.004	0.961	0.329	0.001	0.164	0.268
Interest Rate Reduced?	2.298	0.000	1.548	0.000	0.717	0.000
Loan-to-Value	-0.084	0.305	-2.300	0.000	-1.570	0.001
Log (Loan Size)	0.327	0.000	0.213	0.013	0.174	0.189
At Top Code?	0.239	0.247	0.196	0.302	-0.417	0.242
Payment-to-Income	0.001	0.567	0.001	0.345	-0.001	0.739
Constant Term	-5.368	0.000	-4.225	0.000	-4.118	0.002
R-square	0.3474		0.1617		0.0594	
Number of Observations	3,619		4,523		4,523	

Appendix Table V. Refinance Probability Regression Results by Year (Continued)

3. Period 1997-1999

Parameter	Refinance		Cash-Out		Take Out Additional Second Mortgage	
	Estimate	p-Value	Estimate	p-Value	Estimate	p-Value
Age	-0.011	0.012	-0.015	0.004	-0.012	0.342
Region-Northeast	-0.386	0.002	-0.339	0.021	-0.626	0.100
Region-South	-0.315	0.003	-0.205	0.100	0.260	0.337
Region-West	0.218	0.058	0.464	0.000	-0.101	0.753
Metro-Central city	-0.248	0.094	-0.308	0.071	0.601	0.176
Metro-Non central city	-0.064	0.621	-0.118	0.418	0.335	0.418
Race-Black	-0.136	0.465	-0.025	0.914	-15.101	0.983
Race-Other	-0.293	0.040	-0.233	0.179	-0.436	0.278
Single-Male	-0.215	0.095	-0.331	0.044	-0.409	0.308
Single-Female	-0.089	0.481	-0.165	0.293	0.069	0.845
Income Level	0.016	0.615	0.105	0.007	0.011	0.903
Education Level	0.031	0.509	0.016	0.773	-0.089	0.480
First-Time Homebuyer	-0.156	0.091	0.010	0.923	0.335	0.170
Condo or Co-op	-0.073	0.694	-0.386	0.141	-1.204	0.171
House Value Increase?	0.358	0.000	0.347	0.001	0.215	0.358
Interest Rate Reduced?	1.539	0.000	0.884	0.000	0.135	0.529
Loan-to-Value	-0.078	0.412	-1.181	0.000	0.088	0.655
Log (Loan Size)	0.102	0.112	-0.057	0.502	0.443	0.026
At Top Code?	-0.253	0.210	0.133	0.537	-0.871	0.198
Payment-to-Income	0.000	0.875	0.000	0.880	0.000	0.663
Constant Term	-2.256	0.002	-0.709	0.409	-8.533	0.000
R-square	0.1940		0.0987		0.0595	
Number of Observations	3,458		4,041		4,041	

Appendix Table V. Refinance Probability Regression Results by Year (Continued)

4. Period 1999-2001

Parameter	Refinance		Cash-Out		Take Out Additional Second Mortgage	
	Estimate	p-Value	Estimate	p-Value	Estimate	p-Value
Age	-0.006	0.162	-0.017	0.000	-0.023	0.000
Region-Northeast	-0.396	0.002	-0.254	0.045	-0.102	0.533
Region-South	-0.583	0.000	-0.357	0.002	-0.090	0.531
Region-West	-0.005	0.967	0.092	0.423	0.023	0.880
Metro-Central city	-0.321	0.038	-0.080	0.613	0.332	0.131
Metro-Non central city	-0.083	0.535	0.050	0.719	0.318	0.107
Race-Black	0.428	0.019	0.362	0.050	-0.020	0.940
Race-Other	-0.380	0.007	-0.245	0.084	-0.332	0.079
Single-Male	-0.059	0.655	-0.251	0.069	-0.207	0.247
Single-Female	-0.168	0.181	-0.464	0.001	-0.485	0.009
Income Level	-0.003	0.916	0.025	0.456	-0.036	0.404
Education Level	-0.077	0.108	-0.119	0.012	-0.042	0.504
First-Time Homebuyer	0.060	0.528	-0.204	0.031	-0.228	0.063
Condo or Co-op	-0.637	0.001	-0.356	0.084	-0.089	0.723
House Value Increase?	0.496	0.000	0.487	0.000	0.220	0.057
Interest Rate Reduced?	0.892	0.000	0.492	0.000	-0.075	0.495
Loan-to-Value	0.096	0.246	-0.225	0.091	-0.028	0.795
Log (Loan Size)	0.443	0.000	0.241	0.001	0.322	0.001
At Top Code?	-0.249	0.163	-0.594	0.002	-0.985	0.001
Payment-to-Income	0.000	0.595	0.000	0.645	-0.002	0.184
Constant Term	-5.665	0.000	-3.171	0.000	-4.604	0.000
R-square	0.1292		0.0674		0.0385	
Number of Observations	3,208		4,065		4,065	