The Relationship Between Homeowner Age and House Price Appreciation

Office of Policy Development and Research
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Table of Contents

Abstract

This paper focuses on the empirical question: Do the houses of elderly homeowners appreciate at the same rate as the average house in their local market? As the population ages and retirees plan their financial future, owners need to project accurately the value of their single largest asset, their house. The federal government is also concerned about the financial welfare of its elderly citizens, not only because the government funds many elderly programs, but also because the government provides insurance for reverse mortgages. The future liability of the fund depends on the house price appreciation for the properties of elderly owners. Six theories are considered with support from the literature. However, the primary contribution of this paper is the empirical analysis.

Based on estimations from the Health and Retirement Survey (HRS), the house values of elderly (75 years or more) owners appreciate in real terms at 1.0 to 1.2 percentage points less per year than the houses of middle-aged (50 to 74 year old) owners. These estimates are smaller than the findings by Davidoff (2004) who used the American Housing Survey to show 3 percentage point slower appreciation for owners aged more than 75 relative to all other owners. Using Census microdata on non-longitudinal data (1990 and 2000), the estimate is 2.4 percentage point slower appreciation. The conclusion is that elderly homes appreciate in real terms at 1 to 3 percentage points slower than their local markets.

Overview

The focus of this research is to examine the relationship between homeowner age and the rate of house value appreciation. Do the houses of elderly homeowners appreciate at the same rate as the average house in their local market? The answer matters most directly to elderly homeowners making long-range financial plans. For most elderly owners, and especially for low wealth owners, their house is their largest asset. It would be logical to assume the house would appreciate at the long run average house price appreciation rate (5.9 percent per year in nominal terms less 4.1 percent for inflation equals 1.8 percent in real terms).[1] However, elderly owners might have lower appreciation rates because they spend less money on remodeling and maintenance. Most people know of an old woman who has lived in the same house for many years and done little to the update the property. Does this anecdotal evidence represent an outlier or should elderly owners expect lower appreciation?

Elderly owners are not the only ones concerned about their house values and financial planning. Certainly their children have a vested interest in providing for their parents. Local governments rely on property taxes linked to house values. Towns with a high proportion of elderly owners have to provide sufficient social services, particularly for seniors who prefer to stay in their own home. Both the families and their local government want to preserve the older properties as a source of affordable housing for the next generation of homebuyers. Finally, the federal government cares about elderly

[1] The 5.9 percent annual house price appreciation comes from the OFHEO national House Price Index from 1975:I to 2005:I. The inflation rate of 4.1 percent is calculated from the Consumer Price Index less shelter for the same period.

owners and their house values. In particular, the Federal Housing Administration (FHA) insures reverse mortgages called Home Equity Conversion Mortgages (HECM), which allow elderly owners to convert their house equity into cash. The owners do not need to pay off the reverse mortgage until they move or permanently leave their home and then the house is sold to pay off the loan. The long run viability of the HECM insurance fund depends on projected house values exceeding loan balances. Given the potentially long time horizon of 20 years or more before the loan is paid, what should government officials assume about future house price appreciation?

Based on estimations from the Health and Retirement Survey (HRS), the house values of elderly (75 years or more) owners appreciate in constant dollars at a rate of 1.0 to 1.2 percentage points less per year than the houses of middle-aged (50 to 74 year old) owners. This discount in house price appreciation for age is smaller than the 3 percentage point discount estimated in Davidoff (2004) using American Housing Survey data. The HRS estimate compares house value appreciation for elderly owners with middle-aged owners for a period of 10 years or less. Whereas, the AHS estimates the difference in house value appreciation for elderly owners compared to all owners and follows the ownership period for up to 16 years. After adjusting the HRS estimates for the 0.4 percentage point gap between middle-aged owners and all owners, our best estimate for the elderly discount in house value appreciation is 1.4 to 1.6 percentage points relative to all owners.

Both the HRS and AHS data sets are longitudinal and provide the best way to track the change in house values without the confounding effects of changing composition. The appreciation rate can also be tracked using the Census Public Use Microdata Sample (PUMS). The PUMS has a disadvantage in that it consists of two independent cross-sections, 1990 and 2000, which were aggregated by age group and MSA. However, the PUMS data has an advantage beyond large samples. It includes better controls for building age and length of tenure than are available in the HRS data. The PUMS data show that the house prices of owners 75 years and older appreciate 2.4 percentage points slower per year than younger owners.

The fact that two independent studies, this one and Davidoff (2004), analyzing three separate data sets, HRS, AHS and PUMS, show a negative and significant relation between age and house value appreciation provides credence to the claim. However, the elderly discount from HRS is about half the discount from AHS or PUMS, but that difference could be important in the long run to owners, lenders and insurance funds.

Assuming the findings of an elderly discount are correct, what could explain this phenomenon? Six alternatives are considered:

1) Relative under-maintenance by elderly owners leads to accelerated property depreciation,
2) “Movers” maximize wealth with home improvements while “stayers” minimize expenditure,
3) Elderly retirees locate in elastic supply markets in the South and non-metro areas,
4) Owner age is correlated with length of tenure or building age,
5) Higher variance of house values is associated with older houses, and
6) Self-reported house values are biased from owners being out of the housing market for so long and not realizing how much house prices have increased recently.

The most direct explanation for the elderly discount is that the homes of elderly owners are out-of-date in style and frequently poorly maintained. Most people have known an old woman living by herself in a house that needs a lot of work. Health needs or utilities take priority over home remodeling projects, which not only take money and energy, but a tolerance for disruption and dislocation. Without regular maintenance or occasional remodeling, a house gets discounted in the market compared to newer homes that match buyers' preferences. Evidence from expenditure data by income levels can be used to test this explanation.

A second explanation for the elderly discount could be labeled movers versus stayers. The movers are households who keep their house in good shape because they intend to sell their home and want to get a good price for their most important asset. Movers try to maximize their wealth with timely home improvements so they can sell their current house and move to a better house or a nicer environment. Stayers do not intend to move again, but rather want to stay in their current house as long as they can. Perhaps stayers have a higher time preference[2] or a weaker bequest motive than movers. Stayers maximize their utility by minimizing their housing expenses. Movers tend to dominate among younger households even to the early retirement years. But beyond the age of 70 or 75 years old, the stayers become more prevalent. Similar to the under-maintenance story, the stayers extract value from their house by not spending money on home improvements. However, the under-maintenance is not because health care or heating bills leave the owner liquidity constrained. Rather, stayers don't want to fix the house up for the market because they like it the way it is and have no intention of selling. Evidence on homeownership rates and moving patterns can test this explanation.

A third explanation is based on the observation that many retirees move to the Sunbelt or at least out of the city to obtain lower cost housing and a nicer environment. In general, these destinations are more elastic housing markets. By avoiding the competition for land near employment centers, elderly owners can move to areas with fewer regulations that impede new construction. The only disadvantage is that over time the supply of additional housing keeps up with new demand. The house values of elderly owners do not appreciate at the same rate as properties in metro areas where there is less elastic supply. Evidence on the location of retirees and the supply elasticities of housing in those areas would be valuable to test this explanation.

A fourth explanation for the elderly discount is that old people tend to live for a long time in the same house. The discount attributed to elderly owners is really displaced from the depreciation associated with their old house, especially when the regressions inadequately control for either tenure or building age. A useful test of this explanation is to compare regressions with and without controls for length of tenure or building age and see if including those controls makes the owner age coefficient insignificant.

The last two explanations are associated with the fact that the house values used to calculate the appreciation rates are self-reported estimates of elderly owners, some of whom have not bought a house in twenty-five years. The fifth explanation for an elderly discount is that the variance in house

[2] Time preference is the rate at which a person discounts future utility relative to current utility. In this case the idea is that stayers may discount the long-term gains of moving so much that those gains are less than the short-term costs and disutility of making the move.

values increases with age and owners may reduce the self-reported value due to uncertainty about its market value. Buyers and appraisers may also discount atypical units that have aged with character. Unfortunately, the available data contains self-reported house values so the explanation is framed from the owner's point of view. Ideally, this explanation could be tested by correlating variance in house values with age of owner. Each of the data sets, AHS, HRS and PUMS, have substantial topcoding, which has generally increased over time with concerns about confidentiality. Nevertheless, higher variance in valuations of older houses is a plausible explanation for the elderly discount.

Finally, elderly owners who have not sold a house in many years may not be good judges of the current market values for their homes. There is even a concern that extremely old owners lack the mental capabilities to provide an accurate assessment. Unfortunately, the data is too limited to test some of these plausible explanations. It is also quite possible that several of these explanations contribute to the empirical finding of a discount for elderly homes. Our goal is to search the existing literature and to test the available data looking for evidence to support these explanations.

The remainder of the report is divided into six sections. The first section provides a review of the literature on elderly housing decisions. Several theories have been put forth to explain why elderly houses appreciate at a lower rate and there appears to be some empirical support for the under-maintenance theory. It is less clear whether health spending or a shift in time preferences can explain why elders spend less maintaining and remodeling their homes. The second section presents the Health and Retirement Survey data used for analysis. The HRS has not been used nearly as much as the AHS data for housing analysis, but it is well-suited for this research because the HRS focuses on elderly owners, especially the very aged. The HRS is actually two surveys that have merged. The original HRS was for households near retirement and the companion Study of Assets and Health Dynamics Among the Oldest Old (AHEAD) was for households after retirement. A comparison in house values between these two groups may underestimate the difference relative to the general population of owners, however it does feature the experience of the extreme elderly. The second section ends with estimations of house value appreciation using the HRS/AHEAD data and comparisons to recent findings by Davidoff (2004) using the AHS data. The third section provides a benchmark from Census PUMS data by comparing appreciation rates between 1990 and 2000. A final section summarizes the findings and makes suggestions for policy and future research.

The most obvious federal policy implication is to adjust the expected recovery from house sales under FHA's insurance program for reverse mortgages. More broadly, local governments could support their elderly citizens aging in place by maintenance loans or deferred property taxes to be paid when the owners leave their house for the last time. Towns should also adjust the property taxes to more accurately reflect the current state of the property. Much more could be done in researching the choices of elderly owners with the HRS data. It is extremely rich in measures of health quality and health spending along with detailed measures of wealth. Seniors "forced" to leave their home due to high health bills may sell their house for a lower price than elderly owners who choose their exit time. As a longitudinal survey of elderly households, HRS provides the best data on portfolio decisions of seniors as they cope with declining health, shortened time horizons and ongoing housing expenses.

1. Literature Review

The literature review starts with an overview of elderly housing issues, including preferences for living arrangements and home modifications as well as Medicaid rules that encourage owners to spend down their non-housing wealth. According to an American Association of Retired Persons (AARP, 1996) survey, over 90 percent of the persons aged 65 and over prefer to remain in their own homes. Although assisted living has become more popular in the last decade, three-quarters of persons over 70 years old still live in conventional housing rather than shared or assisted living (Schafer, 2000). Schafer (2000) estimates that the most important factors in determining housing arrangements are: age, need for assistance and availability of children to take care of them. Location, race/ethnicity and marital status have some impact on choice of living arrangements, but curiously education, income, net worth and gender have almost no impact. For a small share of seniors (about 6 percent), housing costs consume more than half of their income, but even those seniors would rather stay in their own space than move.

The most talked about trend is the doubling of the elderly population between 2000 and 2030 as the baby boomers retire. Less well known is that male longevity is increasing faster than female longevity, which means couples will live longer together and probably will want to stay in their own house longer. The ratio of males to females will rise from 0.56 in 1994 to 0.76 in 2030 according to Census projections. This trend may mean more senior households will do remodeling work, not only because 2-person households have more money, but healthy men are more likely to do or supervise such projects. A third important trend is that there will be fewer children for shared living arrangements. The percent of women aged 70-74 with 3 or more children is projected to decline from 57 percent in 2005 to 29 percent in 2030. Assisted living may increase to offset the reduction in shared living arrangements with family, but the high monthly rents for assisted living make it infeasible for low-income seniors. Therefore, it is likely that in-home services will become more common and elderly owners will go to great lengths to remain in their own home for as long as possible.

Health expenditures are often as big or bigger than housing for elderly households and the rules for Medicaid affect how seniors liquidate their wealth. Lieberman (2000) explains that there is a resource test of income and assets. Although the specific amounts vary by state, a common feature is that Medicaid excludes an elderly couple's home, household goods, car and personal effects when determining how much to expect a person to pay for nursing care. An owner can transfer the title to a house to a spouse, minor, disabled child or sibling that has an equity interest in the home and has lived there at least one year before the owner entered nursing care. Parents can transfer their home to an adult child if the child lived with the parents at least 2 years before entering nursing care and provided care that delayed the time when the parent(s) entered nursing care. If the spouse or dependent relative remains in the home, Medicaid cannot count the house among the assets that must be sold before Medicaid begins paying the nursing home bills.

Elder preferences to stay in their own home and Medicaid rules that non-housing assets must be spent on expensive nursing care before getting government assistance combine to affect spending patterns for elderly households. Typically, non-housing wealth is spent before housing equity is liquidated.

As repairs are needed on the house, the surviving owner may have tough decisions between paying for immediate needs or trying to preserve house value for a future bequest.

1.1 Wealth and Elderly Spending

Venti and Wise (2001a, b) have used the HRS/AHEAD data to study the home equity choices of seniors. Using a differences-in-differences approach, they compared the change in equity of movers to the stayers to see if elderly movers want more or less housing equity. The sample sizes of owners are about 12,187 in HRS and 5,556 in AHEAD, but the share of movers is low (7 percent or 836 movers in HRS and 5 percent or 260 movers in AHEAD). What they found was that equity rich, income poor households tend to reduce equity when they sell. However, equity poor, income rich households tend to increase house equity when they buy. On average, house equity increases with a move. People with substantial amounts of non-housing wealth shift their assets into housing. Whereas, people with limited non-housing wealth rebalance their portfolio by reducing the housing equity share.

Overall, housing equity increases until about age 75 and then declines about 1.76 percent per year. Owners with intact households rarely move or refinance to take equity out of their house. Families that remain intact reduced equity by only 0.11 percent for two-person households and by 1.15 percent per year for one-person households. The equity decline among older homeowners is driven primarily by 7.84 percent of households experiencing a health shock to their family status (either a death or move to a nursing home).

Venti and Wise conclude there are three patterns. Elders who think they will live a long time and want to stay in their own home, will shift their non-housing wealth into housing wealth. Elders suffering from bad health or having significant non-housing wealth, will spend the non-housing wealth first and hold onto their home as long as their health permits. Elders suffering bad health outcomes and low non-housing wealth are forced to sell their home and move in with relatives or go to a nursing home.

The life-cycle model (Hurd, 1990) predicts that wealth will be de-cumulated as people age, but the uncertainty of time till death leads people to spend down non-housing wealth first and hang onto their house as long as possible. In fact, the results confirm that non-housing wealth is spent down faster and earlier than home equity. Owned housing is not just an investment, but provides a stream of real consumption and precautionary saving against unexpected costs, especially health costs (Heiss, Hurd and Borsch-Supan, 2003).

The HRS data has also been used to determine the spending patterns of elderly households (Butrica, Goldwyn and Johnson, 2005). Elderly adults devote the largest share of their spending on housing (about 30 percent for married, 36 percent for non-married adults aged 65-74 years old and 41 percent for non-married over 75 years old). As owners age, the share of their house spending to mortgages declines while the share going to utilities and maintenance increases. As an example, for married adults in retirement, utilities represent 9 percent of total spending, followed by property taxes (6 percent), mortgage payments (5 percent), maintenance (5 percent), insurance (2 percent) and rent (1 percent). Minority households tend to spend more on mortgages and rent. After housing, the next largest expenditure category is health spending, which is much less predictable. Given the

unpredictability of health spending and the generally inflexible cost of housing, it is reasonable that unexpected health spending crowds out maintenance spending for low-income elderly owners.

Nelson (2004) and Duncombe, Robbins and Wolf (2001) and also McCarthy and Kim (2005) look at the migration of retirees and the nonearnings income that moves with the seniors. Florida has been a destination state for retirees for many years. In fact, Nelson points out that there has been a widespread shift of retirees and pre-retirees going from the Rustbelt to the Sunbelt. The Rocky Mountain states attract the relocation and investment spending from well-to-do households of the Plains states. Retirees that prefer shorter moves often leave the metropolitan areas for the smaller towns with lower costs of housing and property taxes. The findings of these researchers on retiree location support the explanation that retirees move to places with lower cost and more elastic supply of housing.

1.2 Depreciation Rates and Building Age

The correlation between owner age and building age suggests that old owners may experience higher depreciation in their old houses. Glaeser and Gyourko (2004) found that not only were older houses discounted more than newer houses, but old houses in declining MSA markets had a larger discount than old houses in growing MSAs. The rate of depreciation depends on the building age and local market conditions.

Goodman and Thibodeau (1995 and 1997) found the largest reduction in house value from depreciation occurs in the first 10 years before tapering off to zero by building age 20 and slightly increasing in years 20 to 40 (presumably due to remodeling). This finding suggests that old buildings do not suffer greater depreciation as the owner ages, but the extremely aged owners were probably a small share of the sample. Even more consistent in their findings than the rate of depreciation is the widening variance in house values as a building ages. The range of house values for an old building is usually much wider than for new houses. Part of this age-related heteroskedasticity is due to home improvement projects including additions and remodeling. Capozza, Israelsen and Thomson (2005) refer to the atypicality of a house that has acquired unusual features as it aged. Appraisers may have a difficult time finding comparable houses in the neighborhood and discount the appraisal value. Old owners often have not updated the style of their house for 10 to 20 years, so that it becomes atypical relative to other houses on the market. The dated styles lower demand and increase the search time for a suitable buyer leading to discounts for atypical houses. These findings directly support the fifth explanation for elderly discounts that the higher variance of older house values is a leading cause of lower appreciation rates for older owners.

1.3 Maintenance and Home Improvement Spending to Offset Depreciation

Owners can counteract the effect of depreciation with maintenance and home improvement spending. Boehm and Ihlanfeldt (1986) estimated regression models using data from the Neighborhood Housing Services Project for 20 SMSAs. Based on total maintenance and home improvement expenditures, they found that home improvement has a price elasticity of 2.13 and an income elasticity of 0.54. Homeowners are more likely to improve their house if they have higher income, less crowding, older

building age, more rooms, poor initial condition of the unit, low construction costs and low crime with neighborhood structures in good shape. If the owner expects the improvement to increase the resale value, increase the consumption value or decrease the maintenance cost (despite an increase in taxes), then the owner is more likely to do it. The coefficient on age of the household head is negative, but not significant, and it is almost certain that the sample had very few extremely elderly owners.

Baker and Kaul (2002) updated the empirical work on home improvement projects with a dynamic view. Using a panel of AHS data (1993-1997), they found that additions of household members and recent experience with a major home improvement project are significantly related to a household undertaking a home expansion projects. In effect, add a child, add a room. However, lose an adult and there is no change in house structure. Recent movers are more likely to do discretionary projects, while older owners and long time residents spend less on remodeling and discretionary projects. Also, older units are more likely to need replacements, repairs and renovation. Most of the factors for elderly owners reduce the likelihood of remodeling or home expansion. Older owners tend to be single, long time residents with low income in a metro location with no change in household composition and no recent remodeling projects. The two weak positive factors are that older owners tend to live in older units which need repairs and often have more wealth than younger households.

Maintenance and repair spending increased with transitory income according to Gyourko and Tracy (2005). Using AHS data (1985-1993), they find annual maintenance spending in 1998 dollars is about $2,100 per household. The authors estimate that maintenance spending offsets only 1 to 6 cents for every dollar change in transitory income. Unfortunately, the sample was limited to owners aged 20 to 59 so it does not reflect the behavior of seniors. However, the finding that liquidity constrained households smooth their maintenance spending to fit their fluctuating income may apply to senior households. Elderly owners may not have much fluctuation in earnings, but their unearned income can fluctuate with the market. Perhaps even more importantly, seniors face unexpected fluctuations in health expenditures, which are likely to crowd out discretionary home improvement projects as well as routine maintenance.

The most relevant paper to measuring house value discounts for elderly owners is by Davidoff (2004). He uses the panel of national AHS data from 1985 to 2001 to measure the house price appreciation of homes owned by the elderly as well as linked maintenance spending to owner age. He found that elderly owners spend less on maintenance. Homeowners over 75 spend $270 less on routine maintenance than younger owners of similar homes and $1,100 less on all home improvements. Older owners also realize lower house price appreciation by about 3 percentage points per year than younger owners for similar homes in similar markets and times. Although the sample had between 7,000 and 8,000 households per year (11 percent aged 75+), there were 2,780 sales and probably less than 300 sales for elderly owners. The main equation is a regression of the natural log of resale price to reported value in 1985 on the set of independent variables: number of years from 1985 to resale that owner exceeded age 75, square footage of unit, building age, and MSA fixed effects interacted with year sold. Neither unit size nor building age are significant, but owner age is significant at the one percent level. Ideally the comparison of house values over time would use sales prices instead of self-reported owner valuations. However, a regression comparing resale price to purchase price is hampered by a very small sample of 59. Nevertheless, the coefficient on age is –3.6 percent and significant at the 0.05 level of significance. This finding supports the claim

that house prices appreciate at a slower rate for elderly owners and elderly owners spend less on maintenance and home improvements than younger owners.

Quercia (1997) uses data from the 1968-1989 Panel Study of Income Dynamics (PSID) to estimate house value appreciation rates for elderly homeowners. The overall group of elderly owners (aged 62 and above) experienced house price appreciation that averaged 6.4 percentage points in nominal terms, which is higher than the average predicted by FHA of 4.6 percent, when designing the HECM Program. On the other hand, a smaller group of older seniors (aged 71 and above) experienced average house price appreciation of only 2.1 percentage points. It is important to note the sample sizes for the older seniors start at 120 and shrink to just 21.

1.4 Incentives for Maintenance under Reverse Mortgages

An owner has an incentive to spend on maintenance when that spending increases the house value and the owner's equity. However, if the owner has a reverse mortgage, maintenance benefits the insurer more than the owner because the owner cannot increase her borrowing as the house appreciates in value. In fact, the owner's incentive is to minimize maintenance spending unless it threatens to shorten how long she can stay in the house. Miceli and Sirmans (1994) develop a theoretical model that separately identifies market risk and maintenance risk, which are both related to longevity risk. Shiller and Weiss (2000) suggests sharing some of the appreciation risk with the owner by increasing the borrowing limit according to a local market index. If the house appreciation exceeds the local average growth, the owner benefits from higher borrowing limits.

Relative to longevity risk, Davidoff and Welke (2004) find accelerated HECM terminations related to increased house prices. When house prices increase at an unexpectedly high rate, the owners pay off their HECM loan to access their increased equity. The insurance fund benefits from early terminations because there is so little risk of claim, but it also suggests a selection process whereby low risk loans leave early and high-risk loans stay longer. In a soft housing market, the share of late terminations might be much larger. The combination of very elderly owners who have little incentive to maintain their property and a soft housing market could greatly reduce the asset value of the insurance fund.

1.5 Accuracy of Self-Reported House Values

Most of the house value data that is publicly available uses information reported by the owners. Presumably the owners will remember what they paid for the house and adjust that amount according to the more recent prices of properties sold in the neighborhood. Older owners tend to live in older properties, which means they have been out of the market for a long time, and often have poor memories. It is plausible that any difference in reported house price appreciation reflects a systematic bias by older owners to underestimate the current value of their house relative to younger owners. How reliable are the self-reports of house values by elderly owners?

Most of the work on this topic has been done using the American Housing Survey (AHS). Goodman and Ittner (1992) used the national AHS to look at houses sold between 1985 and 1987. They compared the homeowners' valuations in 1985 with the recorded sales prices in the 1987 survey. The average homeowner overvalues his or her house by 6 percent with an average absolute error of 14

percent. Future or prospective sellers overvalue their homes relative to non-sellers. The authors speculate that this could be a list price effect (owners report the list price or asking price rather than the final sales price). Another possibility is simply a selection effect – the owners who expect high values for their properties are the ones most likely to pursue a sale. There could also be some confusion about what share of the closing costs or financing costs were included in the sale price.

DiPasquale and Somerville (1995) used the AHS to compare the rate of appreciation in house prices based on transaction units vs. the entire stock. They found the units with longer tenure had lower house values and lower appreciation. They also found that a hedonic regression based on house values had different coefficient estimates for unit characteristics than a hedonic regression based on sales prices.

Kiel and Zabel (1999) followed the most thorough approach using the confidential metro AHS data merged to census tract level information for the neighborhood around each unit. For the selected metro areas, the sample sizes were modest, Chicago (376), Denver (297), and Philadelphia (437), but they tracked the units through four surveys from 1979-1990. The main results were that recent buyers report house values that were 8.4 percent higher than the stated sales price, whereas owners with longer tenure overvalue their houses by only 3.3 percent. On average, the self-reports were 5.1 percent too high, but the upward bias was not related to the characteristics of the house, occupants (except tenure) or neighborhood. Also, the effect of the age of the owner on owners' valuations seems to decline with the length of tenure. They also observed that controlling for maintenance or remodeling, which they did, reduces the difference between value and sales price by one percentage point.

It is curious that recent buyers would have greater error in their valuation than owners with longer tenure and less recent market experience. For the purposes of our study, where there are so few recent movers, it is a reassuring outcome that the self-reports are reasonably accurate. However, none of these studies had a significant sample of the elderly over 75. Also, the tenure effect may be too closely related to age to precisely measure the separate impact of age. Until more research is conducted, we will have to assume that any difference in over-estimation of house value is not related to owner age.

2. Health and Retirement Survey Data and Models

The Health and Retirement Survey (HRS/AHEAD[3]) is a particularly useful data source for investigating the relationship between homeowner age and the rate of house value appreciation. Many studies, particularly longitudinal ones, have very little coverage of the elderly population because they are out of the labor force and have previously represented a small share of the population. However, HRS/AHEAD focuses on the pre-retirement and elderly population and surveys them roughly every two years. The survey includes variables on family structures, living arrangements, retirement decisions, financial state and health status. As a source on housing data it has not been used nearly as much as the AHS. The HRS/AHEAD provides opportunities to corroborate findings from other studies as well as further their analyses on elderly health and wealth issues.

The purpose of the Health and Retirement Survey is to track the same households as they enter retirement and ultimately go into nursing homes. HRS began with a longitudinal sample of over 12,600 persons in 7,600 households who were born from 1931 through 1941, i.e. 41 to 51 years of age at the time of the initial survey in 1992. Follow-up surveys of the same households were conducted in even years until 1998, when it was merged with AHEAD (Study of Assets and Health Dynamic Among the Oldest Old). AHEAD surveyed 7,447 persons in about 6,000 households where one member was born before 1923, i.e. 70 years of age or older at the initial survey in 1993. A follow-up survey was conducted in 1995. The sample of persons 70 years of age or older from the HRS household screening was supplemented with persons 80 years of age or older from the Medicare Master Enrollment File to form the 1993 AHEAD sample. In addition, a small number of HRS sample members were moved to the AHEAD sample creating a minor overlap between the 1992 HRS and 1993 AHEAD sample. Both HRS and AHEAD over-sampled African Americans, Hispanics and Florida residents. In part because of this over-sampling by race and location, weights are used throughout the analysis. Nevertheless, if weights were insufficient to restore the representativeness of the data, it is possible that lower house price appreciation found in the HRS results are linked to the sampling. In 1998, two additional birth cohorts of 1924-30 (CODA: Children of the Depression Age) and 1942-47 (WB: War Babies) were also added. Moreover, additions from marriage, divorce and household reconfiguration are made in each follow-up survey. Therefore the current HRS/AHEAD/CODA/WB sample exceeds 22,000 persons and 14,000 households of which over 18,000 people in more than 12,000 households were interviewed in 2002.

2.1 Sample Selection

We used the HRS tracker and region files prepared in 2002 in conjunction with the core HRS/AHEAD survey files of each even year from 1992 through 2002 as well as 1993 and 1995 to select our sample. We identified almost 12,000 households that owned a single-family, non-farm, non-mobile, non-condominium primary home in at least one of the survey years from 1992 through 2002. About 9,500 of those households were observed in at least two survey years in the same

[3] The Health and Retirement Survey (HRS) merged with the Study of Assets and Health Dynamic Among the Oldest Old (AHEAD) in 1998 and now they are collectively referred to as HRS/AHEAD or simply HRS.

primary home, providing two different snapshots of house values and other mutable characteristics of the same home as well as the same owners in two distinct points in time. Since our unit of analysis is a primary home and some households are observed in more than one distinct primary home between 1992 and 2002, the number of unique single-family, non-farm, non-mobile, non-condominium owned primary homes observed in at least two different survey years is 10,129.[4] After imputation for missing data and conversion of dollar amounts to 2002 dollars using seasonally unadjusted Consumer Price Index minus shelter for all urban consumers, we calculated the compound annual growth rate (CAGR) of house values.

2.2. Description of HRS Data

Demographic characteristics are available from both the core survey files and the tracker file. As recommended by HRS, we used the data from the tracker file as much as possible. To obtain person information at the household level, we used the characteristics of the financial respondent.[5] When the financial respondent could not be identified or when the household did not participate in the financial section of the surveys in the wave we were interested in, we used the characteristics of the family respondent. We obtained fixed characteristics such as the date of birth, gender, race and ethnicity of the financial or the family respondents from the tracker file. Some demographic characteristics such as whether respondents are in a nursing home and their coupled status change over time. In many instances, we used the characteristics from the end year, also available from the tracker file. We also obtained the household weights from the tracker file.

In Exhibit 1, we summarize demographic characteristics of homeowners. It should be noted that some homeowners who are represented in multiple homes are counted multiple times in our sample of unique homes. But no household appears more than three times and 88 percent of households appear only once as shown by home sequence number in Exhibit A-1. Almost all household respondents are financial respondents, i.e. they answered the financial sections of the survey.

[4] House values were self-reported by the financial household respondent in each wave. We extracted values from the waves when the home was first and last observed and call them starting and ending house values. Even though the HRS survey wave years are 1992, 1993, 1994, 1995, 1996, 1998, 2000 and 2002, actual interview years range from 1991 to 2003. We call the actual interview years of first and last observation as our start (interview) and end (interview) years. Dollar adjustments to 2002 are made on the basis of interview years, not wave years. See Appendix A for more details.

[5] The financial respondent is the person responsible for overseeing the financial matters of the elderly person, often the senior herself and usually the same person as the family respondent. If the financial respondent information was missing, the family respondent information (some other person from the same family) was substituted.

Exhibit 1: Demographic Characteristics of Owners of Primary Homes

Demographic Characteristics [1]	HRS/WB N	HRS/WB %	AHEAD/CODA N	AHEAD/CODA %	All N	All %
Respondent Type **						
Financial	5403	99.4%	2461	99.9%	7864	99.6%
Family	36	0.6%	3	0.1%	39	0.4%
Age in Start Year **						
54 and Younger	2198	46.7%	10	0.5%	2208	32.3%
65 - 64	2907	48.0%	44	2.6%	2951	33.8%
65 - 74	325	5.1%	1466	60.7%	1791	22.5%
75 - 84	9	0.2%	802	31.6%	811	10.0%
85 and Older	0	0.0%	142	4.6%	142	1.5%
Average Age **	5439	55.4	2464	73.8	7903	61.1
Median Age [2]	5439	56.0	2464	73.0	7903	59.0
Age in End Year **						
54 and Younger	506	11.5%	3	0.1%	509	7.9%
65 - 64	2968	59.3%	16	1.1%	2984	41.2%
65 - 74	1847	27.1%	477	20.4%	2324	25.0%
75 - 84	116	2.0%	1487	61.0%	1603	20.4%
85 and Older	2	0.0%	481	17.4%	483	5.5%
Average Age **	5439	61.0	2464	79.1	7903	66.7
Median Age [2]	5439	62.0	2464	79.0	7903	66.0
Years Age 75 or Older Between Start and End Years **						
0	5357	98.5%	665	28.1%	6022	76.5%
1 - 5	74	1.4%	1151	46.4%	1225	15.4%
6 - 10	8	0.1%	648	25.5%	656	8.1%
Average Years **	5439	0.0	2464	3.3	7903	1
Median Years [2]	5439	0.0	2464	3.0	7903	0.0
Coupled or Partnered in End Year **	3843	71.5%	1028	41.2%	4871	62.0%
In Nursing Home in End Year ** [3]	18	0.3%	74	2.8%	92	1.1%
Female **	2772	47.9%	1509	61.8%	4281	52.2%
Race **						
White/Caucasian	4504	89.0%	2226	93.4%	6730	90.4%
Black or African American	742	7.6%	206	5.4%	948	6.9%
Other	176	3.2%	27	1.0%	203	2.5%
Unknown	17	0.2%	5	0.2%	22	0.2%
Ethnicity **						
Mexican Hispanic	253	3.5%	65	1.5%	318	2.9%
Other Hispanic	127	1.6%	36	1.1%	163	1.4%
Non Hispanic	5042	94.8%	2359	97.3%	7401	95.5%
Unknown	17	0.2%	4	0.2%	21	0.2%

Notes:

** indicates that difference between the HRS/WB and AHEAD/CODA groups are statistically significant at the 1% level and * denotes significance at the 5% level. $\chi 2$ tests were conducted for crosstab comparisons and t-tests were performed for average comparisons. The observation level of the sample in this report is a primary home. Some households have as many as 3 primary homes in the survey period from 1992 through 2002. Only single family, non-farm, non-mobile and non-condo owned primary homes are considered in the sample, which is also confined to homes with non-imputed and non-missing house values reported by respondents in both start and end years. The sample sizes and medians presented in this table are unweighted but the percentages and averages reported are weighted using household weights provided by HRS/AHEAD to make inference on the US population of the same age, gender and race/ethnicity profile as the HRS/AHEAD sample. All dollar amounts are adjusted to 2002 using non-seasonally adjusted CPI minus shelter.

1 From the tracker and region files, characteristics of the financial respondent for each wave were obtained. Where there were no financial respondents, characteristics of the family respondent were obtained. Where the information on respondent type was unavailable, characteristics of the oldest respondent was obtained. Information on homes, such as house values, were obtained from the year specific HRS/AHEAD survey data files.

2 Medians are calculated without weights and no statistical tests for significance of the difference between the HRS/WB and AHEAD/CODA groups were conducted.

3 This variable captures whether the respondent or her spouse/partner was in a nursing home in the end year.

Venti and Wise (2001a, b) show that housing equity increases for homeowners until about age 75 and then declines. At both start and end years, only a few household respondents for the HRS/WB group were 75 years or older while almost no household respondents for the AHEAD/CODA group were younger than 65. The percentages of homeowners who are 75 years of age or older in the start year is almost zero for the HRS/WB group and 36 for the AHEAD/CODA group and this comparison grows even more pronounced in the end year. Even though there is some overlap in the near-elderly age group of 65 to 74 years between the HRS/WB and AHEAD/CODA groups, tabulating characteristics for the HRS/WB versus AHEAD/CODA groups provides a good to way to compare the middle-aged or pre-retirement households to the elderly household respondents.

The main distinctions in Exhibit 1 between the middle-aged (HRS/WB) and the elderly (AHEAD/CODA) besides age are:

1) declining share of households are couples (71.5 vs. 41.2 percent)
2) increasing share are female headed households (47.9 vs. 61.8 percent), and
3) smaller share of minorities among the elderly.

Appendix A-2 provides much more detail on geographic detail and tenure: the younger cohort is more likely to live in the South Atlantic Census Division (22.3 vs. 18.3 percent) and have much shorter average tenure (15.8 vs. 26.0 years). In terms of financial and health characteristics (see Exhibit A-3), the younger cohort is more likely to own a second home (15.2 vs. 8.8 percent), but has lower average liquid assets ($179,559 vs. $192,241) and lower medical expenses ($2,055 vs. $2,837). There is no direct measure of maintenance expenditures in HRS, but home improvement or major additions is reported in Exhibit 2 and A-4. The younger cohort has a higher percentage of home improvements (26.9 vs. 19.2 percent) and a higher average biannual home improvement costs ($4,084 vs. $2,826). Even though the older households have more liquid assets, they are spending less on home improvement and perhaps that is a proxy for spending less on maintenance. House price appreciation (measured by the compound annual growth rate in constant 2002 dollars) is shown in Exhibit 2 and A-5. The distributions of growth rates range widely, but the average CAGR is significantly higher for the younger cohort than the elderly (2.28 vs. 1.52 percent). Even without a regression model, the average house price appreciation is about 0.75 percentage points lower for the elderly.

2.3. Estimation of House Value Appreciation Using HRS Data

In the previous section, we presented the HRS data and compared the HRS/WB and AHEAD/CODA cohorts, which have different age profiles. In order to isolate the age effect on home value appreciation and control for other effects such as demographic, time, geographic, wealth and cognition, we perform ordinary least squares regression analyses. In our regressions, like the tabulations, we use weights provided by HRS to make inference on the US population of the same gender and age profile as the HRS sample. We use the survey regression commands in STATA to correctly estimate coefficients and standard errors for survey data since HRS is a survey data with 52 strata.[6]

[6] The un-weighted regressions had nearly identical results, so we decided to report all tables and regressions in weighted terms.

Exhibit 2: Home Improvement and House Price Appreciation

	HRS/WB		AHEAD/CODA		All	
	N	%	N	%	N	%
Home Improvement or Major Addition[1]						
Reported in End Year **						
Yes	1388	26.9%	463	19.2%	1851	24.5%
No	4039	72.9%	1995	80.6%	6034	75.3%
Unknown	12	0.2%	6	0.2%	18	0.2%
Average Biannual Home Improvement Costs	5392	$4,084	2442	$2,826	7834	$3,691
Median Biannual Home Improvement Costs	5392	$0	2442	$0	7834	$0
House Price Appreciation						
CAGR[2] of Primary Home **						
-10% or Less	173	2.8%	116	4.6%	289	3.3%
-10.01% to -5%	271	4.8%	135	5.5%	406	5.0%
-5.01% to -3%	222	3.9%	130	4.9%	352	4.2%
-3.01% to -1%	848	14.8%	484	19.2%	1332	16.2%
-1.01% to 0%	511	8.8%	192	7.9%	703	8.6%
0.01% to 1%	507	8.8%	219	9.1%	726	8.9%
1.01% to 3%	1057	18.6%	370	15.0%	1427	17.5%
3.01% to 5%	680	12.9%	275	11.5%	955	12.5%
5.01% to 10%	742	15.5%	311	12.9%	1053	14.7%
10.01% or More	428	9.1%	232	9.5%	660	9.2%
Average CAGR of Primary Home **	5439	2.28%	2464	1.52%	7903	2.04%
Median CAGR of Primary Home [3]	5439	1.30%	2464	0.73%	7903	1.19%

Notes:

** indicates that difference between the HRS/WB and AHEAD/CODA groups are statistically significant at the 1% level and * denotes significance at the 5% level. Chi-square tests were conducted for crosstab comparisons and t-tests were performed for average comparisons. The observation level of the sample in this report is a primary home. Some households have as many as 3 primary homes in the survey period from 1992 through 2002. Only single family, non-farm, non-mobile and non-condo owned primary homes are considered in the sample, which is also confined to homes with non-imputed and non-missing house values reported by respondents in both start and end years. The sample sizes and medians presented in this table are unweighted but the percentages and averages reported are weighted using household weights provided by HRS/AHEAD to make inference on the US population of the same age, gender and race/ethnicity profile as the HRS/AHEAD sample. All dollar amounts are adjusted to 2002 using non-seasonally adjusted CPI minus shelter.

1 From the tracker and region files, characteristics of the financial respondent for each wave was obtained. Where there were no financial respondents, characteristics of the family respondent were obtained. Where the information on respondent type was unavailable, characteristics of the oldest respondent was obtained. Information on homes, such as house values, were obtained from the year specific HRS/AHEAD survey data files.

2 Compound Annual Growth Rate, CAGR = $(FV/PV)^{1/n} - 1$, where PV is the beginning value, FV is the ending value and n is the number of intervening years. This is a very similar measure to ln(FV/PV)/n, which assumes continous compounding. We prefer CAGR because most house price growth rates, like interest rate growth rates are reported in annual growth rates.

3 Medians are calculated without weights and no statistical tests for significance of the difference between the younger and the older groups were conducted.

The first set of models replicate two models from Davidoff (2004) using the HRS data. His final models control for building age and square footage—two variables that are not available in HRS. Therefore we are only able to replicate two of his simpler models. In the first model, Davidoff regresses the natural log of resale value divided by 1985 value on independent variables for the number of years between 1985 and resale year the homeowner is 75 years of age or older and the interactions of the MSA and resale year dummy variables. He shows that for each additional year the homeowner is 75 years or older, total appreciation of her house price between 1985 and resale year decreases by 2.3 percentage points. In his second model, Davidoff divides the log growth rate by the number of years from 1985 to year sold. The annualized growth rate is regressed on a dummy variable indicating whether the homeowner was 75 years of age or older in 1985 and the interactions of the MSA and resale year dummy variables. This AHS regression shows that homes of owners who are 75 years or older appreciate 2.2 percentage points less per year than homes of younger owners. We present Davidoff's regression in Exhibit 3 as regressions (1) and (2).

Exhibit 3: Comparison of HRS/AHEAD Regressions to AHS Regressions

	AHS [1]		HRS/AHEAD [2]			
	(1)	(2)	(3)	(4)	(5)	(6)
	$\ln \frac{\text{Resale Value}}{\text{1985 Value}}$	$\frac{\ln \frac{\text{Resale Value}}{\text{1985 Value}}}{\text{Year Sold - 1985}}$	$\ln \frac{\text{End Value}}{\text{Start Value}}$	$\frac{\ln \frac{\text{End Value}}{\text{Start Value}}}{\text{End - Start Year}}$	CAGR	CAGR
Years Age 75 or Older Between Start and End Years [3]	-0.023 (0.009)*		-0.0074 (0.0018)**		-0.0023 (0.0003)**	
Age 75 or Older in Start Year [4]		-0.022 (0.016)		-0.0107 (0.0029)**		-0.0103 (0.0028)**
Constant	0.167 (0.013)**	0.026 (0.004)**	0.239 (0.055)**	0.043 (0.013)**	0.047 (0.015)**	0.046 (0.015)**
Fixed Effects	MSA x Year Sold	MSA x Year Sold	Division x End Year	Division x End Year	Division x End Year	Division x End Year
N	2,781	2,757	7,309	7,309	7,309	7,309
R^2	0.36	0.30	0.08	0.07	0.06	0.06

Notes:

Source: 1992 to 2002 HRS/AHEAD

** indicates significance at the 1% level and * at the 5% level.

1. AHS results are from Davidoff (2004).

2. Additional regressions are reported in Appendix A. The observation level of the sample in this report is a primary home. Some households have as many as 3 primary homes in the survey period from 1992 through 2002. Only single family, non-farm, non-mobile and non-condo owned primary homes are considered in the sample, which is also confined to homes with non-imputed and non-missing house values reported by respondents in both start and end years. CAGR, the dependent variable, is compound annual growth rate, a similar measure to annualized difference in natural logs of end and start values in (4). Results are weighted to make inference on the US population of the same age, gender and race/ethnicity profile as the HRS/AHEAD sample using household weights provided by HRS. All dollar amounts are adjusted to 2002 using using non-seasonally adjusted CPI minus shelter.

3. Davidoff (2004) calls this variable YEARSa75. His start year is 1985 and end year is actual year when the home was sold.

4. Davidoff (2004) calls this variable a75. His start year is 1985.

In regressions (3) and (4), we replicated the AHS models using HRS data. Given that we do not have resale value or year sold, we substituted self-reported house values in the beginning and end years. In addition, instead of MSAs we have census divisions as our location covariates. The census division fixed effects control for differences in average appreciation rates by division, but they do not capture the variation among MSAs within the division. If the elderly disproportionately live in MSAs with low house appreciation but the model omits controls for that MSA, it is possible that the lower

appreciation of the MSA will be transferred to the coefficient on the elderly. In fact, the PUMS models presented below show that the negative coefficient on elderly is even greater at the MSA level. The dependent variables are calculated as the natural logs of end value divided by start value and annualized the ratio by dividing by the number of elapsed years.

The coefficients for the HRS models are smaller than for the AHS models. The HRS coefficients show that for each additional year the homeowner is 75 years or older, total appreciation of her house value decreases by 0.7 percentage points and that homes of owners who are 75 years or older appreciate 1.1 percentage points less per year than homes of middle-aged owners. Given that our sample has almost no homeowners below the age of 45 in the start year and 35 percent of homeowners in the AHS sample are below 45 years of age, our lower coefficients are not surprising. The elderly homeowners will have smaller differences in house value appreciation when compared with the near-elderly and the middle-aged homeowners than when they are compared with the general population of owners. In addition, the AHS maximum observation period for a home is 16 years between 1985 and 2001 while the HRS maximum observation period is10 years between 1992 and 2002.

Given that house value appreciation can have both location and time variations, some differences in the magnitude of AHS and HRS coefficients can be expected because HRS has a different as well as a shorter time frame and not as detailed a geographic breakdown. In fact, the inability of the census division dummy variables to pick up location variation as much as the MSA dummy variables shows up as a lower R-squared in the HRS versus AHS models.

Instead of the log difference of house values, we prefer to use the CAGR of house values. The log difference assumes continuous compounding. CAGR, on the other hand, reports annual growth rate like that of interest rates and is suitable for house value growth rates. Having said that, however, the two measures are more alike than different in terms of computation.[7] In regressions (5) and (6), we used CAGR of house values as the dependent variable and the similarity of annualized log difference and CAGR becomes evident by comparing the coefficients of the age dummy variable in regressions (4) and (6). They are essentially the same. We also ran similar regressions with the deviation of house value CAGR from the census division CAGR as the dependent variable. Those results are virtually indistinguishable from (5) and (6), and are presented in the lower panel of Appendix B-1.

Regression model (6) serves as the HRS foundation model for further specification testing. In Exhibit 4, we performed the same regression without the interactions between end years and census division dummy variables in (11). The two coefficients are very close but the R-squared of (11) is practically zero. The interaction dummy variables do not influence the age effect but explain some location variations to make the regression a better fit. As more covariates were added to the model, the coefficient of age decreased very slightly in magnitude, but its significance remained strong. The sequence of regressions is shown in Appendix B-2, but model (14) captures the general result well.

[7] If house value for 1992 is $100,000 and 2002 is $250,000 in real terms, the CAGR is 9.6 percent while the annualized log difference is 9.2 percent and log difference is 91.6 percent. Compare those to crude percent change of 150 percent and percent change per year of 15 percent.

Exhibit 4: Regressions of Compound Annual Growth Rates (CAGRs) of House Values

	(11)		(14)		(16)	
Covariates	**Coeff**	**Std Err**	**Coeff**	**Std Err**	**Coeff**	**Std Err**
Respondent Older Than 74 Years in Start Year	-0.0121	0.0028 **	-0.0097	0.0029 **	-0.0098	0.0029 **
Interval Between End and Start Years			-0.0027	0.0004 **	-0.0027	0.0004 **
Suburban Location of Home			-0.0060	0.0023 **	-0.0060	0.0023 **
Rural Location of Home			-0.0062	0.0024 **	-0.0063	0.0024 **
Liquid Assets Indicator			0.0082	0.0038 *	0.0082	0.0038 *
TICS Score Less Than 5					-0.0060	0.0078
TICS Score Missing					0.0039	0.0047
Mexican Hispanic Respondent			-0.0117	0.0060	-0.0117	0.0060
Other Hispanic Respondent			-0.0057	0.0069	-0.0056	0.0069
Constant	0.0218	0.0010 **	0.0607	0.0159 **	0.0603	0.0156 **
Fixed Effects	None		Division x End Year		Division x End Year	
Other Covariates	None		Yes		Yes	
N	7,903		7,903		7,903	
R^2	0.00		0.08		0.08	

Notes:

Source: 1992 to 2002 HRS/AHEAD

** indicates significance at the 1% level and * denotes significant at the 5% level. Additional covariates are reported in Appendix B. The observation level of the sample in this report is a primary home. Some households have as many as 3 primary homes in the survey period from 1992 through 2002. Only single family, non-farm, non-mobile and non-condo owned primary homes are considered in the sample, which is also confined to homes with non-imputed and non-missing house values reported by respondents in both start and end years. CAGR, the dependent variable, is compound annual growth rate, a similar measure to annualized difference in natural logs of end and start values. Results are weighted to make inference on the US population of the same age, gender and race/ethnicity profile as the HRS/AHEAD sample using household weights provided by HRS. All dollar amounts are adjusted to 2002 using using non-seasonally adjusted CPI minus shelter.

The TICS[8] cognition score (for mental acuity) did not have a significant coefficient and the coefficient on age barely changed from -0.0097 to -0.0098. The 1.0 percentage point decrease in annual house value appreciation rate for elderly homeowners is a lower bound of the estimate. The upper bound is 1.2 percentage point decrease in CAGR as shown in model (11).

Three more specifications are shown in Appendix C-1 using different age variables relative to model 16. In regression (19), we used linear age in the start year instead of a dummy age variable as the age covariate and in regression (20), we used the number of years between start and end years a homeowner is 75 years of age or older. Both age controls are significant. The fit of the models does not change across models and neither does the coefficients of other covariates. The coefficients of different age covariates are telling the same story even though they are different in magnitude because they are measuring different aspects of age. For example, when -0.0006 in regression (19) is multiplied by the difference in mean age between the two age groups (75 years or older and younger than 75 years) of 19 years, we obtain -0.011, which is clearly in the range of 1.0 to 1.2 percentage points.

Other significant covariates in the regressions were the interval between start and end years, suburban and rural location of a home as opposed to an urban location, presence of liquid assets, TICS cognition score and homeowner being Mexican Hispanic. The longer the interval between the start and end years, the lower is the annual appreciation. Suburban and rural homes have lower annual appreciation than urban homes. Homes with owners possessing liquid assets have higher annual appreciation. The significance of the Mexican Hispanic dummy variable is consistent across models while no other demographic variable is significant. Homes with Mexican Hispanic owners apparently have lower annual appreciation. This control variable may be picking a neighborhood effect that the census division variables are not able to pick up.

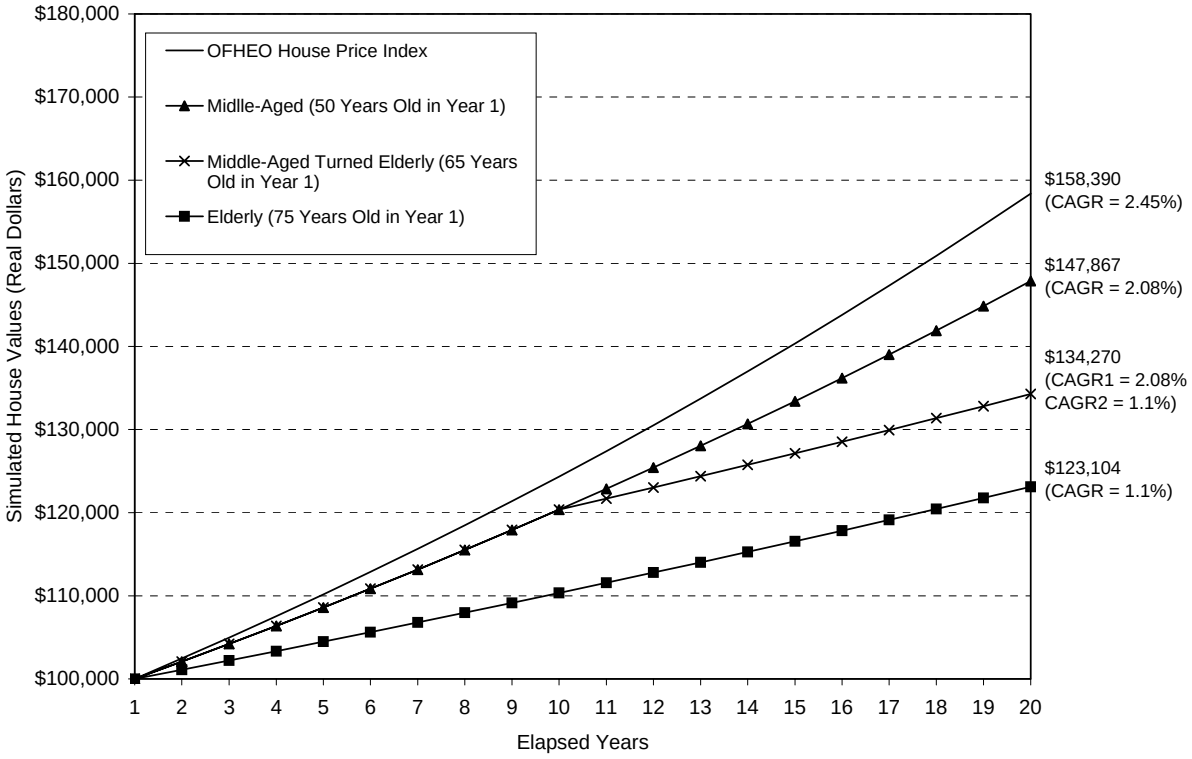
A graphical representation of how lower appreciation rates affect values of homes over 20 years is shown in Exhibit 5. The owner types are:

1) an average US homeowner (follows OFHEO House Price Index)[9]
2) a middle-aged owner who starts at age 50
3) a middle-aged owner who starts at age 65 and straddles the change at age 75, and
4) an elderly owner who starts at 75 years old.

[8] TICS stands for Telephone Interview Cognition Score and it is a standard measure of mental acuity. The values range from 1 to 10 with higher scores meaning better mental cognition.

[9] OFHEO appreciation rates assume there have been no home improvements in between the repeat sales. If the home improvement projects were known and controlled for, the index for a constant quality home would be somewhat lower.

Exhibit 5: Simulated Appreciation of House Values for Different Age Cohorts



It is a simplified representation with smooth appreciation every year, but this representation is able to convert the appreciation rate differences into constant dollar amounts. We start off all four types of households in the first year with homes worth $100,000. The elderly home grows at the rate of 1.1 percent every year while the middle-aged home grows at the rate of 2.08 percent per year. The home owned by a middle-aged homeowner who turns elderly in middle of the stream grows at the rate of 2.08 percent per year until she reaches 75 years after which the home grows at 1.1 percent year. The average US home however grows at a rate of 2.45 percent per year. The annual appreciation rate for the middle-aged group of 2.08 percent is lower than the 2.45 percent of the average US home. But as we explained earlier, it is to be expected since our sample has fewer young homeowners than the general US population.

At the end of the 20th year, the home owned by an elderly owner is worth the least. This simulation assumes there are no differences in quality between the homes of the young and old. Typically, the newer homes of younger households were built more recently and include larger rooms with more amenities, but in this simulation we assume away those differences. The elderly home is then followed by the home owned by a middle-aged turned elderly owner and then followed by the home owned by a middle-aged owner. The home owned by an average US homeowner does the best. The difference in real dollar terms between the home owned by an elderly owner and the home owned by a middle-aged owner at the end of the 20th years is almost $25,000. The difference between the home owned by an elderly owner and the home of an average US homeowner is over $35,000. Our

estimate of 1.0 to 1.2 percentage points lower appreciation per year for homes owned by the elderly is smaller in magnitude than Davidoff's estimate of 3 percentage points per year. But the decrease in annual appreciation of even 1.0 percentage point is not at all trivial when a longer time horizon is considered as shown by our simulation in Exhibit 5.

3. Census (PUMS) Data and Models

Census (PUMS) data provide another useful source for investigating the relationship between homeowner age and house value appreciation. Unlike the HRS data, which are longitudinal samples for the elderly and near-elderly households, census data provide cross-sections of the US population every ten years. PUMS data contain variables such as building age, tenure and MSA that are poorly reported or absent in the HRS data, but PUMS excludes information on maintenance or home improvement expenditures and other household level information present in the HRS data. Moreover, the cross-sectional nature of the census data make it necessary to summarize house values at a geographical level such as the MSA before matching two census years in order to calculate house value appreciation.

However, using the census data enables us to verify the general validity of our HRS results as well as determine if the omission of building age and poor reporting of tenure in the HRS data biases the HRS estimates of house price appreciation. We used the Integrated Public Use Microdata Series (IPUMS) compiled by the University of Minnesota Population Center. IPUMS is useful for making extracts from multiple census years because it combines and standardizes census data from 1850 to 2000.

3.1 Sample Selection

The data for household heads are extracted from the 1 percent PUMS samples in 1990 and 2000. There were respectively 918,782 and 1,054,797 households in the 1990 and 2000 PUMS 1 percent samples. To investigate the relationship between homeowner age and house value appreciation, we pared down our sample to only homeowners of non-commercial, non-condominium single-family detached houses, respectively 497,175 and 563,222 households in 1990 and 2000. We calculated house price appreciation at the national, census division and MSA levels using the PUMS geographical identifiers. While matching MSAs in 1990 and 2000, we excluded all MSAs that were defined differently in 1990 and 2000 as well as all non-metro areas. There were 105 MSAs that were common in 1990 and 2000. From the sample of non-commercial, non-condominium single-family detached houses, we drew three types of comparison samples.

The first sample consists of two types of households:

1) Young: These are the households with 50 to 59 year old heads in the 1990 cross-section, who would become 60 to 69 in 2000 and hence matched to households with 60 to 69 year old heads in the 2000 cross-section. There are 85,235 young households in 1990 and 82,881 in 2000.
2) Old: These are the households with 65 to 74 year old household heads in the 1990 cross-section, who would become 75 to 84 in 2000 and thus matched to household with 75 to 84 year old head in the 2000 cross-section. There are 79,007 old households in 1990 and 52,794 in 2000.

The second sample contains the households of the same age groups but both groups are now restricted to only those household heads who had lived at their current address for at least 11 years in 1990 or at

least 21 years in 2000. By restricting the sample to non-movers, there is a lower likelihood that the appreciation rate calculated between the two census years represents a change in mobility (especially to new construction). Therefore, the second sample is called the sample with restricted tenure while the first is called the sample with unrestricted tenure. The second sample respectively has 58,949 and 44,551 young households in 1990 and 2000, and 63,149 and 36,834 old households in 1990 and 2000.

The third sample consists of households of three age groups in both 1990 and 2000:

1) 60 and younger (331,051 households in 1990 and 384,756 in 2000),
2) 61 to 74 (113,843 households in 1990 and 111,393 in 2000), and
3) 75 and older (52,281 households in 1990 and 67,073 in 2000).

Regression analyses were conducted on the MSA level summary data for the first two samples where an observation represented the old or the young group for each of the 105 MSAs that matched between 1990 and 2000.

3.2 Extraction and Limitations of PUMS Data

As mentioned above, the first limitation of the PUMS data is that the census sample is cross-sectional, therefore households cannot be matched from one census year to the next. This prevents any analysis at the household level other than cross-sectional descriptions and comparisons. The second limitation, as indicated above, is that the PUMS does not contain more detailed variables found in the HRS data such as expenditure on home improvement. On the other hand, it has some variables, such as building age, not present in the HRS data.

The third limitation of the PUMS data is that variables critical to our analysis are reported in categories and are bottom-coded and top-coded. House values are reported in categories with narrower width ($5,000) for the lower values and wider band ($50,000) for the higher values. Such reporting makes it harder to identify even a large appreciation at the higher end of the distribution. The wide bands would affect high-cost housing areas on the east and west coasts. In addition, house values were top-coded at $400,000 in 1990 and $1 million in 2000. Top-codes also make it harder to identify appreciation at the higher end of the distribution. Moreover, different top-codes in 1990 and 2000 make it difficult to standardize house values across the two census years. We imputed the house values to be the midpoint of reported categories and top-coded the 2000 data at $500,000. We adjusted the top-codes in 1990 of $400,000 and in 2000 of $500,000 by a factor of 1.25. We also adjusted the 1990 dollar amounts to the 2000 dollar amounts by using seasonally unadjusted CPI minus shelter. Despite these adjustments, top-codes and wider categories at the top end of the distribution confounded the problem of identifying appreciation at the top end of the distribution. Therefore, we have used the median house values in our analyses in this report. Like house values, household income was also top- and bottom-coded. We also use the median household income adjusted for inflation to 2000 dollars in our analysis.

The fourth limitation of the PUMS data is under-identification of the MSA variable. PUMS does not identify MSAs for some households given the available geographic data. In addition, in 2000, geographical areas were not identified by PUMS for any area with population less than 400,000 for

confidentiality purposes. Therefore, population estimates of these MSAs will be low by approximately the proportion of under-identification. In addition, MSAs were not always comparable between 1990 and 2000. For the MSA level analyses in this report, we used only the MSAs in both 1990 and 2000 as defined by PUMS. Moreover, the1990 PUMS contained some MSAs that spanned two census divisions and identified as belonging to mixed census divisions. Those were included for analysis at the national level as well as the MSA level.

For the regression models, we extracted age, marital status, race and ethnicity, and tenure at current address of the household head. Age was used for sample selection as described above and an identifier for household with head 75 years or older was generally used to analyze the relationship between homeowner age and house value appreciation. We combined the PUMS marital status categories to create three variables: single; married; and separated, divorced or widowed. We also combined the race and ethnicity categories to create five race variables: Mexican Hispanic, Other Hispanic, Non-Hispanic White, Non-Hispanic Black, and Other Non-Hispanic. Tenure categories were slightly modified from the PUMS categories to create four variables: 0 to 10 years, 11 to 20 years, 21 to 30 years and 31 or more years.

We also extracted building age and the number of rooms in the house. We created six building age variables from the PUMS categories: 0 to 10 year, 11 to 20 years, 21 to 30 years, 31 to 40 years, 41 to 50 years and 51 or more years. Similarly, we created four number of rooms variables: 0 to 3 rooms, 4 to 5 rooms, 6 to 8 rooms, and 9 or more rooms. This variable excludes bathrooms, half rooms, hallways, porches etc. but includes kitchens, dining rooms and living rooms.

In the MSA level regressions, medians were calculated for house values and household income for the young and old subgroups. But MSA proportions for each age subgroup were used as the control variables. For example, the Mexican Hispanic variable contains the proportion of households in the young or the old age group in a particular MSA with a Mexican Hispanic head.

3.3 House Value and Appreciation by Age Categories

The PUMS data is well suited for dividing house values by location because the sample sizes are large enough to reliably estimate median house values at the MSA level with age categories. Median house values are reported to avoid the problems of top-coding. All dollar values have been converted into constant 2000 dollars using CPI less shelter. Each table shows the median house values for 1990 and 2000 for two or three age categories. House price appreciation is calculated as the compound annual growth rate (CAGR) between 1990 and 2000 for each age category and region. The last column is the difference between CAGR for the oldest group (75 or older) and the next younger group (61 to 74 years old). The PUMS data are independent cross-sections for 1990 and 2000, so the CAGR calculates the growth rate between aggregates rather than the average of individual property growth rates. A negative value in the last column means the oldest owners have lower house price appreciation than younger retirees. A positive value, as shown on the national level at the end of the first line, means the oldest owners are enjoying a higher rate (0.64 percent) of annual appreciation than the younger retirees. Exhibit 6 presents the house values and appreciation rates by census division. The New England division was the worst place for elderly owners with a loss in real terms of 2.74 percent and a loss relative to younger retirees of 1.64 percentage points. At the other extreme, the oldest owners in the Pacific division enjoyed an absolute gain of 2.36 percent and a gain relative

to the younger retirees of 3.70 percentage points. Given the information on this table, it does not appear that the oldest owners suffer lower house price appreciation, at least not outside New England.

Medians for census divisions are not necessarily good indicators at the MSA level and Exhibit 7 lists house values and appreciation for the largest 30 MSAs. The order of MSAs is according to the sample size of single family owners in 2000 PUMS. Elderly owners did well in Los Angeles, Detroit, Houston and Dallas relative to younger retirees, whereas elderly owners did relatively less well in Chicago, Atlanta, St. Louis and Tampa. The most extreme differences in relative appreciation by MSA are listed in Appendix D-1, which includes small as well as large MSAs. It is difficult to recognize a geographical pattern, although Florida is represented among the largest relative losses by Jacksonville, Miami and Tampa. This result provides some evidence that the HRS results of a 1 percentage point elderly discount could be based on the HRS over-sampling of Florida residents.

The HRS data is a longitudinal sample that follows the same properties over 10 years. The Census is not longitudinal, but an age cohort can be created by age of the household head. In this case two samples are compared. The young are aged 50 to 59 in 1990 who would be 60 to 69 in 2000. The old are aged 65 to 74 in 1990 and 75 to 84 in 2000. The PUMS is a 1-percent sample, so few of the 1990 households would also appear in the 2000 sample. Nevertheless, it is assumed that the medians from the included sample is a fair representation of the households had they been included in both samples. The restricted tenure sample further limits the cohorts by requiring the households to have not moved in the last 10 years in 1990 and not moved for the last 20 years in the 2000 sample. In other words, the restricted tenure sample tracks the stayer cohort by excluding movers and new construction. The unrestricted tenure sample follows the same cohort by age, but includes the movers and new construction.

Median house values and appreciation rates for the cohorts, both restricted and unrestricted tenure samples, are shown in Exhibit 8. At the national level, the restricted tenure sample of stayers shows that the old cohort did 0.31 percentage points worse than the younger cohort. By census division, the West South Central had the highest relative gain for the old cohort or a 1.9 percentage point difference. The lower panel gives the results for the unrestricted tenure sample. The growth rate for the old cohort is the same (0.64 percent) as for the restricted tenure sample, but the young cohort experienced almost no growth (0.03 percent). As a result, the relative gain for the old cohort is 0.62 percentage points.

A listing of the largest 30 MSAs for the restricted tenure sample is presented in Appendix D-2. The old cohort of stayers did relatively well in Seattle, Sacramento, Oakland and Detroit and relatively less well in Riverside, Nassau County (NY), Newark and Minneapolis. MSAs with extreme differences for the restricted sample are listed in Appendix D-3. The largest 30 MSAs for the unrestricted tenure sample is provided in Appendix D-4 with the corresponding extreme differences in Appendix D-5.

Exhibit 6: Median House Values and House Price Appreciation, 1990 to 2000, by Age Category

	1990				2000				CAGR [1]			(B)
		Median House Value [2]				Median House Value				(A)	(B)	Less
Geographical Area	N	60 or Younger [3]	61 to 74 Years	75 or Older	N	60 or Younger	61 to 74 Years	75 or Older	60 or Younger	61 to 74 Years	75 or Older	(A)
National	497,175	$112,200	$95,700	$75,900	563,222	$137,500	$112,500	$95,000	2.05%	1.63%	2.27%	0.64%
New England	25,619	$214,500	$181,500	$181,500	28,750	$162,500	$162,500	$137,500	-2.74%	-1.10%	-2.74%	-1.64%
Middle Atlantic	67,574	$181,500	$125,400	$102,300	70,971	$137,500	$137,500	$112,500	-2.74%	0.93%	0.95%	0.03%
East North Central	92,440	$89,100	$75,900	$62,700	104,852	$112,500	$112,500	$95,000	2.36%	4.01%	4.24%	0.23%
West North Central	41,069	$82,500	$69,300	$56,099	46,932	$112,500	$85,000	$75,000	3.15%	2.06%	2.95%	0.88%
South Atlantic	83,285	$112,200	$89,100	$75,900	102,268	$112,500	$112,500	$95,000	0.03%	2.36%	2.27%	-0.09%
East South Central	32,317	$75,900	$62,700	$56,099	37,801	$95,000	$85,000	$75,000	2.27%	3.09%	2.95%	-0.14%
West South Central	54,918	$82,500	$69,300	$56,099	63,218	$85,000	$75,000	$65,000	0.30%	0.79%	1.48%	0.69%
Mountain	26,050	$102,300	$95,700	$82,500	35,489	$137,500	$137,500	$112,500	3.00%	3.69%	3.15%	-0.54%
Pacific	64,184	$214,500	$214,500	$148,500	73,540	$187,500	$187,500	$187,500	-1.34%	-1.34%	2.36%	3.70%

Notes:

Source: 1990 and 2000 IPUMS

Sample sizes are the total for all age groups and are unweighted. The median house values and CAGRs are weighted by the household weight provided by IPUMS.

1. CAGR is compound annual growth rate of median house values between 1990 and 2000 for each geographical entity. (B) - (A) is the difference in CAGRs of the old and near-old groups.

2. Median house values were calculated instead of the mean because house values were topcoded. Median house values are in 2000 dollars.

3. Age categories are the same for the 1990 and 2000 cross-sections.

Exhibit 7: Median House Values and House Price Appreciation by Age Category for 30 Largest MSAs

		1990				2000				CAGR [1]			(B)
			Median House Value [2]			Median House Value					(A)	(B)	Less
	MSA	N	60 or Younger [3]	61 to 74 Years	75 or Older	N	60 or Younger	61 to 74 Years	75 or Older	60 or Younger	61 to 74 Years	75 or Older	(A)
1	Chicago-Gary-Lake, IL	8,705	$148,500	$125,400	$112,200	12,122	$162,500	$162,500	$137,500	0.91%	2.63%	2.05%	-0.58%
2	Los Angeles-Long Beach, CA	12,051	$297,000	$297,000	$247,500	12,109	$225,000	$225,000	$225,000	-2.74%	-2.74%	-0.95%	1.79%
3	Detroit, MI	7,909	$95,700	$75,900	$62,700	7,826	$137,500	$112,500	$112,500	3.69%	4.01%	6.02%	2.01%
4	Atlanta, GA	5,355	$125,400	$112,200	$102,300	7,147	$137,500	$137,500	$112,500	0.93%	2.05%	0.95%	-1.10%
5	Nassau Co, NY	6,668	$247,500	$247,500	$214,500	6,882	$225,000	$225,000	$187,500	-0.95%	-0.95%	-1.34%	-0.39%
6	Houston-Brazoria, TX	5,411	$89,100	$75,900	$62,700	6,625	$95,000	$85,000	$85,000	0.64%	1.14%	3.09%	1.95%
7	Washington, DC/MD/VA	5,614	$247,500	$247,500	$214,500	6,472	$225,000	$225,000	$187,500	-0.95%	-0.95%	-1.34%	-0.39%
8	Philadelphia, PA/NJ	6,346	$181,500	$148,500	$148,500	6,441	$162,500	$137,500	$137,500	-1.10%	-0.77%	-0.77%	0.00%
9	Phoenix, AZ	3,940	$112,200	$112,200	$95,700	5,919	$137,500	$137,500	$112,500	2.05%	2.05%	1.63%	-0.42%
10	Dallas-Fort Worth, TX	4,889	$112,200	$95,700	$82,500	5,515	$112,500	$95,000	$95,000	0.03%	-0.07%	1.42%	1.49%
11	St. Louis, MO-IL	4,968	$95,700	$75,900	$75,900	5,220	$112,500	$95,000	$85,000	1.63%	2.27%	1.14%	-1.13%
12	Cleveland, OH	3,561	$102,300	$89,100	$82,500	5,180	$137,500	$112,500	$112,500	3.00%	2.36%	3.15%	0.79%
13	Tampa-St. Petersburg-Clearwater, FL	4,596	$102,300	$89,100	$75,900	4,998	$95,000	$95,000	$75,000	-0.74%	0.64%	-0.12%	-0.76%
14	Seattle-Everett, WA	3,763	$181,500	$148,500	$148,500	4,228	$225,000	$225,000	$225,000	2.17%	4.24%	4.24%	0.00%
15	Oakland, CA	3,889	$297,000	$247,500	$214,500	4,196	$350,000	$275,000	$275,000	1.66%	1.06%	2.52%	1.46%
16	Boston, MA	4,505	$247,500	$247,500	$214,500	4,181	$275,000	$225,000	$225,000	1.06%	-0.95%	0.48%	1.43%
17	Riverside-San Bernardino, CA	3,998	$181,500	$148,500	$125,400	4,171	$137,500	$137,500	$112,500	-2.74%	-0.77%	-1.08%	-0.31%
18	Minneapolis-St. Paul, MN	4,198	$125,400	$112,200	$95,700	4,027	$137,500	$137,500	$112,500	0.93%	2.05%	1.63%	-0.42%
19	San Diego, CA	3,495	$247,500	$247,500	$214,500	3,960	$225,000	$225,000	$225,000	-0.95%	-0.95%	0.48%	1.43%
20	Newark, NJ	3,412	$247,500	$247,500	$214,500	3,667	$225,000	$187,500	$162,500	-0.95%	-2.74%	-2.74%	0.00%
21	Denver-Boulder-Longmont, CO	3,127	$125,400	$112,200	$95,700	3,658	$187,500	$162,500	$162,500	4.10%	3.77%	5.44%	1.67%
22	Orlando, FL	2,151	$112,200	$102,300	$89,100	3,292	$112,500	$112,500	$112,500	0.03%	0.95%	2.36%	1.41%
23	Baltimore, MD	3,240	$181,500	$148,500	$125,400	3,275	$162,500	$137,500	$137,500	-1.10%	-0.77%	0.93%	1.70%
24	Kansas City, MO-KS	2,972	$95,700	$75,900	$62,700	3,224	$112,500	$95,000	$95,000	1.63%	2.27%	4.24%	1.97%
25	Sacramento, CA	2,844	$181,500	$148,500	$148,500	3,203	$162,500	$162,500	$137,500	-1.10%	0.91%	-0.77%	-1.68%
26	Pittsburgh-Beaver Valley, PA	4,564	$82,500	$69,300	$62,700	3,112	$85,000	$85,000	$75,000	0.30%	2.06%	1.81%	-0.25%
27	New York-Northeastern NJ	4,012	$297,000	$297,000	$247,500	2,927	$275,000	$225,000	$225,000	-0.77%	-2.74%	-0.95%	1.79%
28	Fort Worth-Arlington, TX	2,703	$102,300	$82,500	$69,300	2,894	$95,000	$85,000	$75,000	-0.74%	0.30%	0.79%	0.49%
29	Norfolk-VA Beach-Newport News, VA	2,201	$125,400	$102,300	$95,700	2,733	$112,500	$112,500	$95,000	-1.08%	0.95%	-0.07%	-1.02%
30	Monmouth-Ocean, NJ	2,575	$214,500	$181,500	$148,500	2,727	$187,500	$162,500	$112,500	-1.34%	-1.10%	-2.74%	-1.64%

Notes:

Source: 1990 and 2000 IPUMS

Sample sizes are the total for all age groups and are unweighted. The median house values and CAGRs are weighted by the household weight provided by IPUMS.

1. CAGR is compound annual growth rate of median house values between 1990 and 2000 for each geographical entity. (B) - (A) is the difference in CAGRs of the old and near-old groups.

2. Median house values were calculated instead of the mean because house values were topcoded. Median house values are in 2000 dollars.

3. Age categories are the same for the 1990 and 2000 cross-sections.

Exhibit 8: Median House Values and Appreciation by Census Division, Cohort Selection With and Without Restricted Tenure

	1990			2000			CAGR [1]		(B)
		Median House Value [2]			Median House Value		(A)	(B)	Less
Geographical Area	N	Young [3]	Old	N	Young	Old	Young	Old	(A)
Restricted Tenure [4]									
National	122,098	$102,300	$89,100	81,385	$112,500	$95,000	0.95%	0.64%	-0.31%
New England	6,474	$214,500	$181,500	4,338	$162,500	$137,500	-2.74%	-2.74%	0.00%
Middle Atlantic	18,859	$148,500	$125,400	12,446	$137,500	$112,500	-0.77%	-1.08%	-0.31%
East North Central	23,312	$89,100	$75,900	15,720	$95,000	$85,000	0.64%	1.14%	0.50%
West North Central	9,712	$82,500	$62,700	6,946	$85,000	$75,000	0.30%	1.81%	1.51%
South Atlantic	19,722	$95,700	$82,500	13,753	$95,000	$85,000	-0.07%	0.30%	0.37%
East South Central	8,294	$69,300	$62,700	5,889	$75,000	$75,000	0.79%	1.81%	1.01%
West South Central	13,035	$75,900	$62,700	8,801	$65,000	$65,000	-1.54%	0.36%	1.90%
Mountain	5,306	$95,700	$89,100	3,675	$112,500	$112,500	1.63%	2.36%	0.73%
Pacific	14,869	$247,500	$214,500	9,817	$225,000	$187,500	-0.95%	-1.34%	-0.39%
Unrestricted Tenure [4]									
National	164,242	$112,200	$89,100	135,675	$112,500	$95,000	0.03%	0.64%	0.62%
New England	8,159	$214,500	$181,500	6,446	$162,500	$137,500	-2.74%	-2.74%	0.00%
Middle Atlantic	23,063	$181,500	$125,400	17,398	$137,500	$112,500	-2.74%	-1.08%	1.66%
East North Central	29,893	$89,100	$75,900	24,394	$112,500	$95,000	2.36%	2.27%	-0.09%
West North Central	13,096	$82,500	$62,700	11,531	$95,000	$75,000	1.42%	1.81%	0.39%
South Atlantic	28,488	$102,300	$89,100	25,547	$112,500	$95,000	0.95%	0.64%	-0.31%
East South Central	11,172	$75,900	$62,700	9,768	$85,000	$75,000	1.14%	1.81%	0.67%
West South Central	18,342	$82,500	$62,700	15,672	$75,000	$65,000	-0.95%	0.36%	1.31%
Mountain	8,011	$102,300	$95,700	7,892	$137,500	$112,500	3.00%	1.63%	-1.37%
Pacific	20,794	$247,500	$181,500	17,027	$225,000	$187,500	-0.95%	0.33%	1.27%

Notes:

Source: 1990 and 2000 IPUMS

Sample sizes are the total for all age groups and are unweighted. The median house values and CAGRs are weighted by the household weight provided by IPUMS.

1. CAGR is compound annual growth rate of median house values between 1990 and 2000 for each geographical entity. (B) - (A) is the difference in CAGRs of the old and young groups.

2. Median house values were calculated instead of the mean because house values were topcoded. Median house values are in 2000 dollars.

3. The young group consists of 50 to 59 year olds in 1990 and 60 to 69 year olds in 2000. The old group consists of 65 to 74 in 1990 and 75 to 84 in 2000.

4. Sample with restricted tenure is confined to households who had been living at their current address for 11 years or longer in 1990 and 21 years or longer in 2000. Sample with unrestricted tenure can have any length of tenure.

3.4 PUMS Model Results

The tabulations of house value appreciation offer limited controls beyond age and place. A linear regression model can include other control variables for length of tenure, building age, unit size, demographics and household income. The PUMS limitation of independent samples means that the unit-level values are aggregated to the MSA-by-age cohort level. There are 105 MSAs and 2 age cohorts, so the sample size is 210. Income has been divided by 10,000 and the values are in year 2000 dollars. The main purpose of the regression is to test the hypothesis that elderly owners have a lower appreciation rate for their houses, particularly when the owner is older than 75 years old. A second purpose is to gauge the degree of bias that might be introduced in the HRS results from omitting building age or length of tenure. The PUMS data allows us at the aggregate level to include controls for building age and length of tenure. Therefore, by comparing specifications with and without those controls, we can see how much the coefficient on owner age is influenced by the omission of those correlated variables.

The full regression results for the restricted tenure sample are presented in Appendix E-1 and for the unrestricted tenure sample in Appendix E-2. The primary focus is on the coefficient for owner age, which is summarized in Exhibit 9. For the stayer sample or cohort with tenure restriction, the age coefficient for the full model is –0.032. This coefficient means that houses of owners 75 years old or older who lived in the same house at least 10 years had an annual appreciation rate of 3.2 percent lower than houses owned by the younger cohort. Omitting the building age variables increases the elderly discount to –3.4 percentage points. On the other hand, omitting length of tenure but including the building age reduces the discount to –2.7 percentage points. Omitting both tenure and building age reduces the discount to –2.5 percentage points. These findings suggest that the HRS results may be biased downward (towards zero) by omitting controls for length of tenure and building age, but the size of the bias is modest. In fact, if the regression includes a simple specification of owner age, number of rooms and household income, the estimated discount is –2.9 percent points.

Exhibit 9: Discount to Elderly Owners (75+ years) in House Price Appreciation, PUMS data

Controlling for:	Cohorts with Tenure Restriction	No Tenure Restriction
Tenure and Building Age	-0.032	-0.023
Tenure, Not Building Age	-0.034	-0.025
Not Tenure, Building Age	-0.027	-0.021
Not Tenure, Not Building Age	-0.025	-0.021

Source: Census PUMS, 1990 and 2000. Full results in Appendix E.

The same series of regressions were estimated on the cohort sample without tenure restriction and the results are shown on the right half of Exhibit 9. As expected, the elderly discount is smaller when the sample includes movers and new construction, but the estimate is about –2.3 percentage points. This estimate is about twice as large as the HRS elderly discount even though the data come from approximately the same timeframe and age groups. The most important difference is that HRS is a

longitudinal data set while PUMS has two independent cross-sections. A second, potentially important difference, is that HRS omits controls for length of tenure and building age. However, the PUMS specifications that exclude those variables have relatively little impact on the elderly discount. The simplest specification of age, house size and income produces the very same discount of –2.3 percentage points.

4. Conclusion

The main conclusion from the HRS/AHEAD data is that elderly owners report lower house value appreciation than middle-aged owners, as summarized in Exhibit 10. Measured in constant dollars, houses owned by people 75 years or older appreciate at 1.0 to 1.2 percentage points lower annually than houses owned by middle-aged people under 75. The larger discount corresponds to regressions that do not control for memory acuity and thus the age coefficient captures the combined effect. By comparison, Davidoff estimated a discount for elderly owners of –2.3 to –3.6 percentage points using AHS data. A similar regression model on aggregated PUMS data produced elderly discounts in the range of –2.1 to –3.4 percentage points.

Exhibit 10: Summary Comparison of House Price Appreciation Discounts for Elderly Owners

Models	Range of Discount
Models on HRS Data	-1.0% to -1.2%
Models on AHS Data	-2.3% to -3.6%
PUMS Models With Tenure Restriction	-2.5% to -3.4%
PUMS Models Without Tenure Restriction	-2.1% to -2.5%

There are several differences in the data that could account for the HRS age discount being smaller than the AHS discount. The HRS data (including the AHEAD, WB and CODA supplements) represent an older distribution of owners than the AHS. Based on the ending year, 25.9 percent of the HRS data consists of owners age 75 and older compared to 10.7 percent for AHS. The higher concentration of elderly owners improves the precision of the HRS estimates, but the AHS may provide a better representation of the elderly discount relative to the overall population of owners. As shown in Exhibit 5, the average house price appreciation for the overall population is 2.45 percent compared to 2.08 percent for the middle-aged owners. Adding that difference (0.37) to our estimate generates an elderly discount in the range of 1.4 to 1.6 percentage points relative to all owners and narrows the difference between the HRS and AHS results. However, that same adjustment would apply to the PUMS results and shift the range up somewhat, but the ranges for AHS and PUMS still overlap for the most part.

A second important distinction is that the spells measured by HRS, from 1992 to 2002 or less, are generally shorter than the spells in AHS, 1985 to 2001. Not only is the span of survey years shorter for HRS, but a substantial portion of the HRS sample started after 1992 or left before 2002. The HRS models clearly showed a negative coefficient on length of spell from beginning to end. It may well be that if HRS spells had been as long as AHS spells on average, the age discount for HRS would have been just as large as Davidoff found in AHS or estimated from PUMS.

As stated in the introduction, there are several plausible “stories” to explain the lower house price appreciation for elders. The explanation featured in Davidoff (2004) is that elderly owners under-maintain their property and thus their houses do not appreciate as fast as the average. Unfortunately,

HRS does not ask about maintenance spending per se, but there is supporting evidence from home improvement projects. Elderly owners are significantly less likely than middle-aged owners to do a home improvement or major addition (19.2 vs. 26.9 percent). Similarly, the amount spent on home improvement projects is less for elderly owners than middle-aged owners ($2,826 vs. $4,084), but the difference is not significant.[10] It is difficult to determine whether this difference in home improvement spending is enough to account for the lower house price appreciation. However, lower home improvement spending by elderly owners fits the story that elders invest less in, if not under-maintain, their housing as younger owners.

A related explanation for under-maintenance is the disutility of remodeling. Older owners may strongly prefer to avoid the disruption associated with remodeling projects. Quite aside from the financial aspects, seniors may prefer to keep the house as it is rather than deal with the noise and dust that comes with remodeling. Elderly owners may also be fearful of contractor scams or not being able to recover the remodeling cost when they ultimately sell their house. Whatever the reason, elderly owners do less home improvement and that may contribute to lower house value appreciation.

Elderly owners have higher out-of-pocket medical expenses than middle-aged owners ($2,837 vs. $2,055), but the difference is not significant whether or not the zero cases are included. Also, medical expenses as a share of liquid assets are not higher for the elderly. This unexpected result of lower medical expense relative to liquid assets of the elderly may be due to the higher rate of missing for the elderly (26.3 vs. 19.7 percent). Nevertheless, the difference in health spending on average does not seem to be enough, considering the available liquid assets, to crowd out maintenance spending.

Another measure of housing investment is the ownership of second homes. Only 8.8 percent of elderly owners have a second home compared to 15.2 percent of middle-aged owners. There is not a significant difference in the average liquid assets between elderly and middle-aged homeowners (though it is a significant variable in the regressions). Both second homes and financial assets provide a cushion so that health expenses do not force owners to under-maintain their houses.

The decline in second home ownership may correspond with the decline in the share of movers as seen in the PUMS data. Movers are motivated to keep their home in a marketable condition. Whereas, stayers do not plan to sell so they are more concerned with minimizing expense and enjoying "familiar surroundings as they have always been." As owners age, they are less likely to move and they are less likely to have second homes. If preferences shift away from housing investment, then elderly owners may allow their properties to depreciate as a way to extract housing equity without having to move. The PUMS results show that stayers or the cohort with restricted tenure have the largest elderly discounts in house value appreciation.

Another explanation is that retirees move to housing markets with elastic supply. To the extent that the South, West and non-metro markets are more elastically supplied, this explanation remains plausible. However, the variation in relative gains for elderly as shown in the listing of divisions or MSAs suggests the story is more complicated. The PUMS regressions show that the Pacific division fixed effect is about the same as the South Atlantic and both are about 2 percent higher than New

[10] The difference in non-zero home improvement spending (exclude the zeros from the averages) is also not significant.

England. The Pacific division is dominated by states known for inelastic supply, whereas the South Atlantic is considered a region with relatively high elasticity. The area noted by Nelson as a destination for retirees, namely the Rocky Mountains, has nearly the highest fixed effect in the PUMS regressions. The effect of approximately 3 percentage points is about the right amount to offset the elderly discount. Ironically, the Rocky Mountain effect is often second to the West North Central division, which is area so many retirees are leaving.

The correlation of age with building age and length of tenure is supported in the PUMS data, but omitting those variables seems to have little effect on the size of the elderly discount. Based on those results, the omission of building age and tenure from the HRS models should not greatly effect the estimate of the elderly discount.

The memory measure, TICS Cognition Score, did not have a significant coefficient or a significant effect on the age variables. Taken at face value, this finding suggests that self-reported house values are not affected by memory problems. This might be true, though given the difficulty that elderly people have remembering most things, it seems equally likely that the TICS score does not pick up the memory problems that could impair an owner's estimate of house value. More experimentation with other cognition and health measures in HRS might identify a better memory indicator.

Memory and mental capacity are important for distinguishing whether low house value appreciation by elders is a real phenomenon or the result of downward biased estimations. Owners who have not purchased a house in over 20 years may not realize how much their house has increased in value over that time. The evidence from Kiel and Zabel (1999) on AHS data is that seasoned owners have unbiased self-appraisals, but those results may not apply to the very aged. The "poor memory" explanation of low house value appreciation remains viable, in our view, and requires more direct evidence before it can be refuted in favor of alternative explanations.

In summary, two independent studies, this one and Davidoff's (2004), analyzing three separate data sets, HRS, AHS and PUMS, have shown a negative and significant relation between age and house value appreciation. However, the elderly discount from HRS is about half the discount from AHS or PUMS and that difference is very important to long run planners including elderly homeowners. Although we lack a definitive explanation for why elderly homes appreciate at a slower rate, several explanations warrant further investigation. Under-maintenance is a leading contender based on the reduction in home improvement spending, but the difference in spending is relatively modest and probably reported with error. The driving force may not be health spending or utilities crowding out maintenance, but rather the preference of elderly owners with long tenure not to change the house where they hope to stay for a long time.

4.1 Policy Implications

Assuming the finding is real, what are the public policy implications? Lower house value appreciation by elderly owners can affect three groups: owners, neighbors and the government. First and foremost, the owners may not realize that low-cost maintenance procedures could slow the rate of depreciation. We assumed that owners fully realize and accurately appraise their house value, but the distribution of growth rates is quite wide and that is after we trimmed the top and bottom 1 percent. Some of those extreme changes may be wild guesses. The government may justify greater attention

to elderly houses based on protecting vulnerable citizens and preserving the stock of affordable housing. Social workers should call in building inspectors to help elderly owners avoid unsafe living conditions. Repair loans, like deferred property taxes, could be offered to elderly owners as long as those loans are repaid when the owner eventually moves out of the property. In addition, a sweat equity program could facilitate the transfer of depreciated homes left by old owners as a more affordable alternative to new construction for young homebuyers.

The Federal Housing Administration (FHA) through its Home Equity Conversion Mortgage (HECM) Program insures reverse mortgages. These mortgages allow owners to age in place by borrowing against the equity built up in their house. Private lenders have been reluctant to offer reverse mortgages at affordable rates due to the uncertainty of repayment. FHA mortgage insurance protects the lender against loss by transferring the risk to the government insurance fund. Insurance premiums are added to the outstanding balance of the loan to pay for insurance claims. One challenge in setting the premiums is predicting how much the house values will appreciate over the long run. In previous actuarial models (HUD, 2003; Rodda et al., 2004) the nominal house price appreciation rate has been arbitrarily reduced by 2.4 percentage points on the assumption that elderly houses may not appreciate as fast as the general market. The reasoning was sound, but the empirical support was lacking. In fact, we had no basis for estimating how much to discount expected house prices for elderly owners.

Somewhat surprisingly, the nominal discount of 2.4 percentage points corresponds fairly closely to the real discount of 1.0 to 1.2 percentage points. The elderly discount in the HECM actuarial model was set at 40 percent of the nominal house price appreciation rate (5.9 percent). The real house price appreciation rate is the nominal rate (5.9 percent) less inflation (CPI-U averaged 2.4 percent) or 3.5 percent. Applying the same elderly discount (40 percent) to the real house price appreciation rate of 3.5 percent equals 1.4 percent. The 2.4 percentage point nominal discount that was arbitrarily chosen for the HECM actuarial model corresponds to a 1.4 percent real discount. The 1.4 real discount is surprisingly close to the 1.2 percentage point real discount that we estimated from HRS. It is fair to say that is a lucky coincidence.

HECM Program requirements include a home inspection at origination to make sure the house is in good physical shape or initial proceeds are used to repair the house. Also the mortgage on the house has been paid off or the initial advance on the HECM-insured loan pays off the old mortgage. A comparison between HECM borrowers and AHS elderly owners (HUD, 2000) showed that HECM borrowers are slightly older (75 vs. 72), more likely to be a female living alone (56.3 vs. 27.6 percent), more likely to have an older house (41 vs.38 years old), but more likely to have a house that is worth more ($107,000 vs. $87,000). In sum, a smaller discount may be justified because the typical HECM borrower lives in a better house with fewer liquidity constraints than the average for the elderly population sampled in HRS, AHS or Census.

If Davidoff's AHS model or our PUMS models are correct, a real 1.2 percentage point age discount is not enough. The real age discount should be closer to 3.0 percentage points. The difference between 1.2 and 3.0 percentage points is not trivial. According to the 2003 HUD Report (p. 23) with interest rates at 7.8 percent, the reduction in house price appreciation from 3 to 2 percent, changes the projected value of the insurance fund from $54.0 million surplus to $51.8 million deficit. Current, low interest rates mean the HECM insurance fund is running a much larger surplus than previously estimated. However, the key point is that the HECM insurance fund is sensitive to the expected

house price appreciation. The seemingly small difference between a 1.2 and 3.0 percent discount has large ramifications for the fund.

4.2 Recommendations for Future Research

A number of additional research steps could be taken to refine the estimates and better define the underlying story. First, the HRS analysis looked at all the surveys, but treated each primary home as a single spell. Whether the owner was in the home for 10 years (1992 to 2002) or only 2 years, that home ownership constituted one observation in our analysis. The owner estimates the value of their house in each survey and we used the first and last surveys as long as they represented the same home. This approach runs the danger of putting too much emphasis on the endpoints and ignoring the interim data points. We could generate more observations and a little more information by treating each interval between surveys as a spell. It is assumed that owners gradually increase their estimates of home value along with the neighborhood housing market. But the erratic estimates of growth rates reported by some respondents appears out of line with the market averages. More careful trimming or down-weighting of extraordinary changes could result in more reliable estimates. One regression approach would be to estimate an individualized trend line through the multiple observations to get an average CAGR per household. Then, the average CAGRs could be used in place of our endpoint-estimated CAGRs to measure the elderly discount. An alternative would be to allow household level fixed or random effects so that group average estimates are less susceptible to extraordinary individual estimates.

A second extension would be to experiment with various aggregations of health and wealth measures. The HRS surveys offer a rich set of questions on health conditions and wealth measures that we barely utilized. Our expectation was that owners would spend down non-housing wealth before depleting housing wealth to pay for health expenditures. In effect, hospital and drug bills would crowd out home repair projects. The reduction in second homes by the elderly does represent a re-balancing of their portfolio in favor of more immediate housing needs. But the relation between primary house equity, total wealth and health spending is far from clear.

The issue of memory and self-reported house values deserves further consideration. The TICS score may not be able to capture memory lapses related to poor house valuations, but there are other variables in HRS that indicate memory capacity. More analysis may reveal that some of the extreme house value estimates are associated with owners suffering from poor memory. It is certainly possible that low house value estimates essentially reflect a poor awareness of inflation or local house markets. Even if downward biased estimates are not the whole story, they could be a significant part of the explanation for apparently low house value appreciation for elderly owners. Ultimately, it may require a separate survey that compares owner valuations to professional appraisals or the unbiased estimates from automated valuation models (AVMs) to verify the accuracy of elderly owner valuations.

One test for the degree of error or bias among the self-reported house values is to compare those house values with the prices for homes that sold. The sales price is being reported from memory, so problems with poor memory may degrade the accuracy of both. A second issue is that the HRS has sales prices for both the purchase and sale of relatively few primary homes. In most cases, the house price appreciation will entail a difference between the selling price and the self-reported value in the

first survey. A difference between two self-reports may be more accurate if the self-report is consistent over time. The third issue is trying to relate medical costs to the sale. Owners "forced" to leave due to high medical bills may have lower appreciation than seniors who move by choice. Reverse mortgages may reduce the financial pressure from medical bills, so those owners move according to their health needs rather than their financial imperatives.

Abbreviations

AHEAD	Study of Assets and Health Dynamic Among the Oldest Old
AHS	American Housing Survey
CAGR	Compound Annual Growth Rate
CODA	Children of the Depression Age
CPI	Consumer Price Index
HECM	Home Equity Conversion Mortgage
HPI	Housing Price Index
HRS	Health and Retirement Survey
IPUMS	Integrated Public Use Microdata Series
MSA	Metropolitan Statistical Area
OFHEO	Office of Federal Housing Enterprise Oversight
OOPME	Out of Pocket Medical Expenses
PUMS	Public Use Microdata Samples
TICS	Telephone Interview for Cognitive Status
WB	War Babies

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Appendix A

Details on Health and Retirement Survey Sample Selection

Not all of the 10,129 observations from the selected sample have usable house value data. About 7 percent or 719 primary homes do not have starting or ending house values. We excluded those homes from our sample. Of homes that have both starting and ending house values, 15 percent of owners report one of the values by category rather than as a specific dollar amount. Initially, we imputed house values from categories by taking the midpoint of the bracket (e.g. between $50,000 and $150,000) or 1.25 times the lower end of the open-ended category (e.g. more than $400,000). After imputation and conversion of dollar amounts to 2002 dollars using seasonally unadjusted Consumer Price Index minus shelter for all urban consumers, we calculated the compound annual growth rate (CAGR) of house values, which we will discuss in detail in the following sections.

We found some CAGR values to be questionable. For example, low starting house values coupled with extremely high ending house values resulted in extremely high CAGR. To remove such outliers from the sample, we excluded the top and the bottom one percent of the CAGR distribution, further reducing the sample size of primary homes to 9,224. About half of these excluded outliers arose because either the starting or the ending house values were imputed from brackets. When we investigated the brackets used in reporting house values, we realized that the interval of brackets used in the HRS surveys were quite large. The calculation of house value appreciation is very sensitive to how house values are imputed from large brackets. For example, one of the reported categories is between $50,000 and $150,000 and picking the midpoint of $100,000 when the actual house value is, say, $60,000 can mean a large difference between the actual and imputed values and a measure of appreciation based on imputed house values can be quite inaccurate. After excluding all homes with either the starting or ending house values reported in categories, our final sample consists of 7,903 homes with non-missing, exact house values in both start and end interview years.

The process of excluding homes with house values that are missing or reported in categories affects the older population in the AHEAD/CODA group (34%) more than the younger population in the HRS/WB group (14%). There is no clear indication of how this disproportionate selection of sample affects our estimation of the relationship between homeowner age and house value appreciation but the reader should be aware of this selection issue that can possibly affect our results.

Exhibit A-1 summarizes the sample characteristics of 7,903 homes using household weights provided by HRS to make inference on the US population resembling the age, gender and race profile of the HRS sample. HRS makes up the majority of our sample, followed by AHEAD and WB. CODA constitutes the smallest group in our sample. As evident in the tabulation of study groups, even though WB and CODA homes are similar in raw numbers, WB homes are weighted more; in fact, they are weighted the most. A majority of start years—the calendar interview years when a home was first observed—are the baseline interview years as expected (1992/93 for HRS, 1993/94 for AHEAD and 1998/99 for WB and CODA). Two-thirds of homes have end years—the calendar interview years when a home was last observed—in 2002/03 and another 13 percent have 2000 as the end year. Most homes were observed for a slightly shorter period of time for the AHEAD/CODA

Exhibit A-1: Sample Characteristics of Primary Home

Sample Characteristics [1]	HRS/WB N	HRS/WB %	AHEAD/CODA N	AHEAD/CODA %	All N	All %
Study Group **						
HRS	4641	66.9%	0	0.0%	4641	46.0%
WB (War Babies)	798	33.1%	0	0.0%	798	22.8%
AHEAD	0	0.0%	1844	73.9%	1844	23.1%
CODA (Children of the Depression Age)	0	0.0%	620	26.1%	620	8.1%
Start Year ** [2]						
1992	3152	45.8%	0	0.0%	3152	31.5%
1993	320	4.5%	795	31.3%	1115	12.8%
1994	256	3.6%	740	29.9%	996	11.8%
1995	0	0.0%	64	2.7%	64	0.8%
1996	423	6.1%	61	2.3%	484	4.9%
1997	40	0.6%	0	0.0%	40	0.4%
1998	940	32.3%	678	28.9%	1618	31.2%
1999	78	2.7%	32	1.3%	110	2.3%
2000	230	4.5%	94	3.7%	324	4.2%
Average Start Year **	5439	1995	2464	1995	7903	1995
Median Start Year [3]	5439	1992	2464	1994	7903	1993
End Year ** [2]						
1994	520	7.5%	0	0.0%	520	5.2%
1995	0	0.0%	154	5.9%	154	1.8%
1996	423	6.0%	129	4.9%	552	5.7%
1997	16	0.2%	0	0.0%	16	0.2%
1998	407	6.2%	249	9.3%	656	7.2%
1999	20	0.3%	7	0.2%	27	0.3%
2000	582	11.5%	414	17.1%	996	13.3%
2002	3434	67.3%	1503	62.2%	4937	65.7%
2003	37	1.0%	8	0.3%	45	0.8%
Average End Year	5439	2001	2464	2001	7903	2001
Median End Year [3]	5439	2002	2464	2002	7903	2002
Interval Between Start and End Years						
1 - 5	2438	56.6%	1369	55.4%	3807	56.2%
6 - 11	3001	43.4%	1095	44.6%	4096	43.8%
Average Interval **	5439	5.7	2464	5.4	7903	5.6
Median Interval [3]	5439	6.0	2464	4.0	7903	6.0
Home Sequence Number for Household **						
1	4601	87.5%	2309	93.7%	6910	89.4%
2	761	11.4%	150	6.1%	911	9.8%
3	77	1.1%	5	0.2%	82	0.8%

Notes:

Source: 1992 to 2002 HRS/AHEAD

** indicates that difference between the HRS/WB and AHEAD/CODA groups are statistically significant at the 1% level and * denotes significance at the 5% level. $\chi 2$ tests were conducted for crosstab comparisons and t-tests were performed for average comparisons. The sample sizes and medians presented in this table are unweighted but the percentages and averages reported are weighted using household weights provided by HRS/AHEAD to make inference on the US population of the same age, gender and race/ethnicity profile as the HRS/AHEAD sample. All dollar amounts are adjusted to 2002 using non-seasonally adjusted CPI minus shelter.

1 The observation level of the sample in this report is a primary home. Some households have as many as 3 primary homes in the survey period from 1992 through 2002. Only single family, non-farm, non-mobile and non-condo owned primary homes are considered in the sample, which is also confined to homes with non-imputed and non-missing house values reported by respondents in both start and end years.

2 Start and end years are actual calendar interview years when a home was first and last observed even though the survey wave years are the following: 1992, 1994 and 1996 for HRS; 1993 and 1995 for AHEAD; 1998, 2000 and 2002 for HRS/AHEAD/WB/CODA.

3 Medians are calculated without weights and no statistical tests for significance of the difference between the HRS/WB and AHEAD/CODA groups were conducted.

group than the HRS/WB because of how the HRS study waves were timed. AHEAD started a year later than HRS. The median interval between the start and end years for HRS/WB was 6 years as opposed to only 4 for AHEAD/CODA. Home sequence number indicates whether the home in question is the first, second or third unique primary home observed for a household between 1992 and 2002. A slightly higher percentage of AHEAD/CODA homes were the first home to be observed for the household than HRS/WB homes. The reason for this is that a slightly higher percentage of HRS/WB households moved into new or second homes than the AHEAD/CODA households, but such households are not common since almost 90 percent of homes are first homes.

In terms of household composition, almost twice as many HRS/WB respondents as AHEAD/CODA respondents were coupled or partnered in the end year. Relatively few respondents or their spouses were in nursing homes in the end year, but a higher percentage of AHEAD/CODA households (2.8%) were in nursing homes in the end year compared to HRS/WB households (0.3%). Sixty-two percent of AHEAD/CODA respondents are female but only 48 percent of HRS/WB respondents are similar to what Bogdon (1996) reports, single female homeowners may engage in fewer home improvement projects, which can negatively affect house value appreciation. The AHEAD/CODA groups have more single and female owners than the HRS/WB group. There are also slightly more Caucasians and non-Hispanics in the AHEAD/CODA group than in the HRS/WB group. We use these demographic variables as control variables in our regression models described in the next section.

We obtained data on home type, purchase year, house values and ownership of second homes from the housing section of the core survey files. Type of home and purchase year information was extracted at the start year while ownership of second homes was extracted at the end year. House values were obtained from both start and end years. Home type was used to select our sample of single-family, non-farm, non-mobile, non-condominium owned primary homes. The question on purchase year was asked during the baseline survey for the HRS group in 1992 but not for the AHEAD group in 1993. The AHEAD group was only asked if they moved into their current residence more than ten years ago. When WB and CODA groups were introduced in 1998, they and the AHEAD group were asked the question on purchase year, but the responses for the AHEAD group are spotty. In addition, the purchase years for new primary homes mentioned in the survey waves after the baseline year were not collected until the 2002 wave. To fill in these gaps, data on year moved in were extracted from the demographic section of the core surveys in the start year. Even after these imputations, purchase year is missing for homes not observed in the baseline and for the baseline homes of the AHEAD group.

Purchase year is needed to accurately calculate the length of tenure at home in the start year. Length of tenure at a home can capture how deeply invested homeowners are in their homes. Homeowners who have been in a home for a longer period can be expected to have had more time and resources to improve and maintain their homes than those who have only lived in a home a shorter period. But as Baker and Kaul (2002) found recent movers may be more likely to do discretionary projects while long-time residents spend less on remodeling. Moreover, the older a homeowner is, the shorter her remaining tenure in a primary home could be until she retires into a retirement home. The relationship between tenure and age in terms of house value appreciation can be multi-faceted, hence it is an important control variable to use in regression models. If improved and well-maintained homes appreciate more, tenure could be an important control in identifying variation in house value appreciation between age groups.

The lack of the actual purchase year for the AHEAD group makes the creation of an exact tenure variable difficult. But the presence of a flag for having moved in more than ten years ago can be used to create a binary tenure variable. Exhibit A-2 shows that 12 percent of the HRS/WB group and 5 percent of the AHEAD/CODA group have the binary tenure variable missing because of missing purchase year or moved in year. Of those with tenure information, a higher percentage of the AHEAD/CODA group has tenures of 10 years or more than the HRS/WB group. We imputed tenure as 5 years for those with 10 years or less in their home in the AHEAD group, and those with more than 10 years were imputed as 28 years (based on averages from the 1990 census data). These tenure imputations were made for 26 percent of the AHEAD/CODA group. The fact that the average and median tenure for the AHEAD/CODA group is close to 28 years in Exhibit 3 is most likely the result of this imputation. The mean and median tenure for the HRS/WB group is 16 years, a much lower number.

While many house characteristics such as house values and types of home are available from the core survey files at the household level, the geographical characteristics of a home are not. Location measures are important to capture cross-section variation in house value appreciation. We used the region file to obtain geographical information. But the only location measures available from the public use HRS files are the census division and urban/rural status of a home. Census divisions do not represent housing markets as well as MSAs, which Davidoff (2004) used. As shown in Exhibit A-2, about a fifth of those primary homes are in the South Atlantic division and another fifth are in the East North Central division. The next two in descending percentages are Pacific and Mid Atlantic division. About two-fifths of primary homes are in urban areas and the rest are divided almost equally into suburban and rural areas. HRS uses the Beale rural-urban continuum codes to define urban, suburban or rural areas.

To identify homes across survey years, we used multiple flag variables from the core survey. Variables from the preload section identify whether the household moved between survey years. Variables from the coversheet section determine whether the household moved into a secondary home. In addition, the HRS region file calculates the distance in miles between the residences of subsequent survey years up to 2000. As shown in Exhibit A-2, 7 percent of HRS/WB homes and 5 percent of AHEAD/CODA homes may be misidentified as the same home across waves between start and end years. We also tested to see if census divisions for homes we have identified are consistent in the start and end years. We found that they are consistent for 99 percent of homes. For the 1 percent with mismatched census divisions of homes in start and end years, we looked at whether homeowners were identified as having moved a positive number of miles by HRS. Almost none of them were identified as having moved. This calls into question the reliability of the HRS mover variable. Even then, we used the HRS mover flag and the flag for the mismatch of census divisions in start and end years as control variables in our regressions to control for misidentification of homes. Neither control appears to be significant as will be shown later.

Exhibit A-2: Geographic and Tenure Characteristics of Primary Homes

Geographic and Tenure Characteristics [1]	HRS/WB N	HRS/WB %	AHEAD/CODA N	AHEAD/CODA %	All N	All %
Single Family, Non-Farm, Non-Mobile, Non-Condo Owned Homes	5439	100.0%	2464	100.0%	7903	100.0%
Census Division of Home **						
New England	219	5.3%	117	5.7%	336	5.4%
Mid Atlantic	684	13.8%	278	11.4%	962	13.0%
East North Central	919	12.3%	459	19.7%	1378	18.0%
West North Central	446	8.1%	257	11.5%	703	9.2%
South Atlantic	1402	22.3%	565	18.3%	1967	21.1%
East South Central	334	5.6%	117	5.3%	451	5.5%
West South Central	519	8.8%	209	8.4%	728	8.7%
Mountain	248	5.0%	117	5.0%	365	5.0%
Pacific	628	13.5%	335	14.6%	963	13.8%
Unknown	40	0.5%	10	0.3%	50	0.4%
Mismatch Between Census Divisions of Home in Start and End Years	71	1.0%	25	0.8%	96	1.0%
HRS Mover Flag ** [2]	425	6.6%	120	4.6%	545	6.0%
Type of Urban Area Home Is In [3]						
Urban	2350	44.6%	1119	43.5%	3469	44.2%
Suburban	1635	29.4%	735	28.5%	2370	29.1%
Rural	1435	25.9%	609	28.0%	2044	26.6%
Unknown	19	0.2%	1	0.0%	20	0.1%
Tenure at Home in Start Year * [4]						
10 or Fewer Years	1598	31.4%	412	17.0%	2010	26.9%
11 or More Years	3104	57.2%	1941	78.6%	5045	63.8%
Unknown	737	11.5%	111	4.5%	848	9.3%
Average Tenure	4702	15.8	2353	26.0	7055	19.1
Median Tenure [5]	4702	16.0	2353	28.0	7055	20.0
Imputed Tenure at Home in Start Year **	0	0.0%	652	25.9%	652	8.1%

Notes:

Source: 1992 to 2002 HRS/AHEAD

** indicates that difference between the HRS/WB and AHEAD/CODA groups are statistically significant at the 1% level and * denotes significance at the 5% level. $\chi 2$ tests were conducted for crosstab comparisons and t-tests were performed for average comparisons. The observation level of the sample in this report is a primary home. Some households have as many as 3 primary homes in the survey period from 1992 through 2002. Only single family, non-farm, non-mobile and non-condo owned primary homes are considered in the sample, which is also confined to homes with non-imputed and non-missing house values reported by respondents in both start and end years. The sample sizes and medians presented in this table are unweighted but the percentages and averages reported are weighted using household weights provided by HRS/AHEAD to make inference on the US population of the same age, gender and race/ethnicity profile as the HRS/AHEAD sample. All dollar amounts are adjusted to 2002 using non-seasonally adjusted CPI minus shelter.

1 From the tracker and region files, characteristics of the financial respondent for each wave was obtained. Where there were no financial respondents, characteristics of the family respondent were obtained. Where the information on respondent type was unavailable, characteristics of the oldest respondent was obtained. Information on homes, such as house values, were obtained from the year specific HRS/AHEAD survey data files.

2 The region file identified some respondents as having moved a positive number of miles between start and end years.

3 According to the region file, these classifications are based on Beale Rural-Urban Continuum codes.

4 Tenure at primary home was calculated by subtracting the year the home was bought from start year. This proved difficult for the AHEAD group in 1993 and 1995 since home purchase year was not asked in those years. In addtion, it was difficult to determine purchase years for homes respondents moved into after the baseline. Gaps in purchase year were filled by using the 1998 data, data on year moved in and the 1993 flag for whether respondents moved in more than 10 years ago. To create a continuous variable, an imputation of of 5 years for those who moved in 10 or fewer years ago and 28 for those who moved in more than 10 years ago was made. Therefore, this variable is best looked at in that bivariate form.

5 Medians are calculated without weights and no statistical tests for significance of the difference between the younger and the older groups were conducted.

We also collected assets information from the assets and income section, out of pocket medical expense from the health costs section, TICS cognition scores from the cognition section and home improvement costs from the assets and income change section of the core survey files.

Wealth measures can provide important information about how a home is improved or maintained. Poorer homeowners may not have the resources to properly maintain their homes leading to deterioration of their homes and depreciation of their house values. Both Boehm and Ihlanfeldt (1986) and Bogdon (1996) show that wealthier households improve their homes more. Ownership of a second home can be a good indicator of wealth, which is available in the HRS. However, as Cao and Juster (2004) point out, the variable is missing for the AHEAD group in 1993 and the relevant question is incorrectly asked in 1995 and 1996. Since 1993 is not an end year for the AHEAD group and we are interested in the wealth measure in the end year, we do not need to worry about the missing indicator for second home ownership in 1993, but this incorrect asking of the second home ownership question in 1995 and 1996 potentially affects over 7 percent of homes in our sample with end years in 1995 and 1996. However, both the HRS and AHEAD groups in our sample could be equally affected by this error. In our regression analyses, we do not currently use this wealth measure as a covariate. Exhibit A-3 shows that only about half as many AHEAD/CODA homeowners have second homes than HRS/WB homeowners in terms of percentage.

As a second source of wealth, we extracted measures of liquid assets such as IRA/KEOGH accounts, stocks, mutual funds, CDs, Treasury Bills, Government Saving Bonds, money market funds and savings and checking accounts. These liquid assets are the sources homeowners can tap for home improvement and major addition expenses. Although a flag for ownership of liquid assets could be created easily, a reliable dollar amount could not be created due to missing data and amounts being reported in broad categories. But when amounts were reported in categories, imputations were made, resulting in 20 percent of households having imputed values for liquid asset amounts. Exhibit A-3 shows that ownership of liquid assets does not differ between the HRS/WB and AHEAD/CODA groups. But distribution of wealth can vary by age within the two groups. We include this control variable in our regressions.

A measure of strain on wealth and indicator of poor health—both of which detracts from proper upkeep of a home and hence can depreciate home values—is the share of out-of-pocket medical expenses from liquid assets. The larger the share of out-of-pocket medical expenses from liquid assets, the smaller the amount homeowners can spend on maintaining and improving their homes. Although HRS reports the aggregate amount of out-of-pocket medical expenses in later years, we had to aggregate the expenses for 1994 and 1995 ourselves using the same logic as the HRS. Exhibit A-3 shows that even though similar percentages of HRS/WB and AHEAD/CODA households have out-of-pocket medical expenses, the average amount spent by AHEAD/CODA households on a biannual basis is slightly higher. However, the two-year out-of-pocket medical expenses as a share of liquid assets could not be created for every household because of missing asset amounts. In fact, 20 percent of HRS/WB and 26 percent of AHEAD/CODA homes have this measure of strain on wealth missing, so this measure may not be very reliable. In Exhibit A-3, we show that for those homes with non-missing values for this measure, AHEAD/CODA homes have a lower strain than HRS/WB homes. But this difference is not statistically significant.

Exhibit A-3: Financial and Health Characteristics of Owners of Primary Homes

Financial and Health Characteristics [1]	HRS/WB N	HRS/WB %	AHEAD/CODA N	AHEAD/CODA %	All N	All %
Ownership of Second Home in End Year **						
Yes	788	15.2%	215	8.8%	1003	13.2%
No	4222	78.7%	1976	80.8%	6198	79.4%
Unknown	429	6.1%	273	10.4%	702	7.4%
Ownership of Liquid Assets in End Year [2]						
Yes	5019	94.4%	2279	93.3%	7298	94.1%
No	395	5.2%	176	6.4%	571	5.6%
Unknown	25	0.4%	9	0.3%	34	0.4%
Average Liquid Assets Value	4669	$179,559	1970	$192,241	6639	$183,332
Median Liquid Assets Value [3]	4669	$35,000	1970	$40,581	6639	$37,000
Imputed Liquid Assets Value in End Year ** [2]	1061	18.9%	562	23.0%	1623	20.2%
TICS Cognition Score in End Year ** [4]						
0 - 4	55	1.0%	25	1.0%	80	1.0%
5 - 10	4704	88.4%	2257	92.6%	6961	89.7%
Unknown	680	10.5%	182	6.5%	862	9.3%
Average TICS Cognition Score **	4042	9.4	2279	9.1	8851	9.3
Median TICS Cognition Score [3]	4042	9.5	2279	10.0	8851	9.5
Biannual OOPME (Out of Pocket Medical Expenses) in End Year * [5]						
Yes	5074	94.1%	2282	93.3%	7356	93.9%
No	335	5.5%	157	5.9%	492	5.6%
Unknown	30	0.4%	25	0.9%	55	0.6%
Average OOPME **	5409	$2,055	2439	$2,837	7848	$2,298
Median OOPME [3]	5409	$832	2439	$852	7848	$835
Biannual OOPME as Share of Liquid Assets in End Year ** [5]						
0%	249	4.0%	111	4.3%	360	4.1%
0.0001 - 0.001%	948	19.2%	406	17.3%	1354	18.6%
0.001 - 0.01%	1681	32.7%	763	31.4%	2444	32.3%
0.01 - 0.1%	1056	18.9%	386	15.6%	1442	17.8%
> 0.1%	331	5.5%	131	5.1%	462	5.4%
Unknown	1174	19.7%	667	26.3%	1841	21.8%
Average OOPME as Share of Liquid Assets	4265	0.080%	1797	0.046%	6062	0.070%
Median OOPME as Share of Liquid Assets [3]	4265	0.002%	1797	0.001%	6062	0.002%

Notes:

Source: 1992 to 2002 HRS/AHEAD

** indicates that difference between the HRS/WB and AHEAD/CODA groups are statistically significant at the 1% level and * denotes significance at the 5% level. $\chi 2$ tests were conducted for crosstab comparisons and t-tests were performed for average comparisons. The observation level of the sample in this report is a primary home. Some households have as many as 3 primary homes in the survey period from 1992 through 2002. Only single family, non-farm, non-mobile and non-condo owned primary homes are considered in the sample, which is also confined to homes with non-imputed and non-missing house values reported by respondents in both start and end years. The sample sizes and medians presented in this table are unweighted but the percentages and averages reported are weighted using household weights provided by HRS/AHEAD to make inference on the US population of the same age, gender and race/ethnicity profile as the HRS/AHEAD sample. All dollar amounts are adjusted to 2002 using non-seasonally adjusted CPI minus shelter.

1 From the tracker and region files, characteristics of the financial respondent for each wave was obtained. Where there were no financial respondents, characteristics of the family respondent were obtained. Where the information on respondent type was unavailable, characteristics of the oldest respondent was obtained. Information on homes, such as house values, were obtained from the year specific HRS/AHEAD survey data files.

2 Ownership of liquid assets was derived from ownership of IRA/KEOGH accounts, stocks, mutuals funds, CDs, Treasury Bills, Government Savings Bonds, checking and savings accounts and money market funds. Although a flag for ownership could be created easily, a reliable dollar amount could not be created due to missing data and amounts being reported in broad categories. But imputations were made from categorical responses.

3 Medians are calculated without weights and no statistical tests for significance of the difference between the younger and the older groups were conducted.

4 TICS is a cognition test score measured by adding up the number of simple cognition questions that were answered correctly. The maximum possible score is 10, which indicates excellent cognition. In 1998, 2000 and 2002, TICS score was computed for new interviews or respondents over 65 years of age. In 1996, respondents 65 years or below had an average of 9.5 TICS score. Thus, this value was imputed for respondents 65 years or below in 1998,

5 OOPME (Out of Pocket Medical Expenses) were aggregated for most survey years. For 1994 and 1995, we aggregated the same categories used by HRS and the same logic. OOPME was not available for 1992 and we did not use it for 1993 either since 1993 is a start year. When OOPME as share of liquid assets were calculated, a significant number of missings were generated becuase of missing values for liquid assets.

As we discussed in the literature review section, memory of homeowners can affect how they report house values. In addition, poor cognition of homeowners can also affect their ability to maintain their homes, for instance by failing to do repairs in time before their home falls into disrepair. HRS provides a TICS cognition score based on how respondents answer ten questions. A perfect score of 10 indicates excellent cognition. We extract the TICS score for the end year, which is 2002 for most homes. The 2002 HRS survey only asks 2 questions out of the battery of 10 questions when the respondent is younger than 65 and had a high score in the last survey. To maintain the TICS score at a 10-point scale, we have imputed the final value based on the average score attained by respondents sharing the same score in the previous survey. As a result, the TICS scores are relatively high and ultimately lacked any significant explanatory power in the regression. The goal was to control for memory impairment, but either there was little problem with memory or the TICS score did not capture that effect.

Home improvement and major additions are an important cause of house value appreciation as shown. Conversely, the lack of home improvement or major additions can stagnate or adversely affect house value appreciation. Exhibit A-4 shows that 27 percent of HRS/WB homes have home improvement or major additions while only 19 percent of AHEAD/CODA homes report home improvement or major additions. The biannual expenses on home improvement or major additions are higher for the HRS/WB group than for the AHEAD/CODA group but this difference is not statistically significant. These are indications that the elderly homeowners conduct fewer of and spend less on home improvement or major additions than the middle-aged owners.

As described above, we obtained house value from the housing section of the core survey files and we only used non-missing exact house values adjusted to 2002 dollars from the start and end years. Exhibit A-4 shows that the HRS/WB homes have higher mean and median house values in the start year than the AHEAD/CODA homes and an even higher mean and median house values in the end year. This difference is a clear indication that homes of middle-aged owners are appreciating at a higher rate than homes of elderly owners.

To calculate house value appreciation, we used the compound annual growth rate (CAGR) of reported house values, given by $CAGR = (FV/PV)^{1/n} - 1$, where PV is the starting house value, FV is the ending house value and n is the number of intervening years between the two values. This calculation is very similar to the annualized difference of natural logs of ending and starting house values, or $\ln(FV/PV)/n$. The average CAGR computed for our sample of 2.0 percent is close to the CAGR of 2.4 percent obtained by using the OFHEO Housing Price Index for the U.S. from 2002 and 1992 adjusted to the 2002 dollars. The fact that the average CAGR from HRS based on older owners is lower than the OFHEO average CAGR from all owners is consistent with our general message that house value appreciation is lower for elderly owners.

In Exhibit A-5, we show the distribution in annual growth rates for house values. Average and median CAGRs for AHEAD/CODA homes are lower than those for HRS/WB homes. Clearly, homes belonging to the elderly have lower house value appreciation than homes belonging to middle-aged owners. To capture locational variations of house value appreciation, we also calculated the deviation of CAGR of each home from the CAGR for the census division where the home is located for the same start and end years. Division CAGRs were calculated by using OFHEO Housing Price Index for census divisions. Average and median division CAGRs are higher for AHEAD/CODA

homes than HRS/WB homes. Despite a favorable difference of division CAGRs for AHEAD/CODA homes, the deviations from primary home CAGR to division CAGR is higher on average for AHEAD/CODA homes than HRS/WB homes as shown in Exhibit A-5.

Exhibit A-4: House Value and Home Improvement of Primary Homes

Primary House Values and Home Improvement [1]	HRS/WB N	HRS/WB %	AHEAD/CODA N	AHEAD/CODA %	All N	All %
House Value in Start Year ** [2]						
$50,000 or Less	710	10.6%	387	14.1%	1097	11.7%
$50,001 - $100,000	1827	30.2%	895	36.2%	2722	32.1%
$100,001 - $150,000	1117	21.5%	534	22.4%	1651	21.8%
$150,001 - $200,000	758	15.4%	279	11.7%	1037	14.2%
$200,001 - $250,000	452	9.8%	171	7.1%	623	8.9%
$250,001 - $300,000	168	3.6%	65	2.9%	233	3.4%
$300,001 - $350,000	142	3.1%	41	1.7%	183	2.6%
$350,001 - $400,000	80	1.6%	19	0.8%	99	1.4%
More than $400,000	185	4.3%	73	3.1%	258	3.9%
Average House Value in Start Year **	5439	$155,504	2464	$133,882	7903	$148,758
Median House Value in Start Year [3]	5439	$106,160	2464	$96,634	7903	$103,219
House Value in End Year ** [2]						
$50,000 or Less	562	8.2%	382	14.0%	944	10.0%
$50,001 - $100,000	1697	28.2%	862	34.8%	2559	30.2%
$100,001 - $150,000	1232	22.8%	530	21.9%	1762	22.5%
$150,001 - $200,000	765	15.0%	296	12.2%	1061	14.1%
$200,001 - $250,000	418	8.9%	135	6.0%	553	8.0%
$250,001 - $300,000	255	5.4%	90	3.8%	345	4.9%
$300,001 - $350,000	156	3.4%	46	2.2%	202	3.0%
$350,001 - $400,000	112	2.6%	34	1.3%	146	2.2%
More than $400,000	242	5.6%	89	3.8%	331	5.0%
Average House Value in End Year **	5439	$176,066	2464	$151,984	7903	$168,553
Median House Value in End Year [3]	5439	$120,000	2464	$100,000	7903	$113,386
Home Improvement or Major Addition Reported in End Year **						
Yes	1388	26.9%	463	19.2%	1851	24.5%
No	4039	72.9%	1995	80.6%	6034	75.3%
Unknown	12	0.2%	6	0.2%	18	0.2%
Average Biannual Home Improvement Costs	5392	$4,084	2442	$2,826	7834	$3,691
Median Biannual Home Improvement Costs	5392	$0	2442	$0	7834	$0
Imputed Home Improvement Costs in End Year	63	1.1%	30	1.3%	93	1.2%

Notes:

Source: 1992 to 2002 HRS/AHEAD

** indicates that difference between the HRS/WB and AHEAD/CODA groups are statistically significant at the 1% level and * denotes significance at the 5% level. $\chi 2$ tests were conducted for crosstab comparisons and t-tests were performed for average comparisons. The observation level of the sample in this report is a primary home. Some households have as many as 3 primary homes in the survey period from 1992 through 2002. Only single family, non-farm, non-mobile and non-condo owned primary homes are considered in the sample, which is also confined to homes with non-imputed and non-missing house values reported by respondents in both start and end years. The sample sizes and medians presented in this table are unweighted but the percentages and averages reported are weighted using household weights provided by HRS/AHEAD to make inference on the US population of the same age, gender and race/ethnicity profile as the HRS/AHEAD sample. All dollar amounts are adjusted to 2002 using non-seasonally adjusted CPI minus shelter.

1 From the tracker and region files, characteristics of the financial respondent for each wave were obtained. Where there were no financial respondents, characteristics of the family respondent were obtained. Where the information on respondent type was unavailable, characteristics of the oldest respondent was obtained. Information on homes, such as house values, was obtained from the year specific HRS/AHEAD survey data files.

2 These are house values adjusted to 2002 dollars. House values reported in categories are not included.

3 Medians are calculated without weights and no statistical tests for significance of the difference between the younger and the older groups were conducted.

Exhibit A-5: Compound Annual Growth Rate (CAGR) of Primary House Value

Compound Annual Growth Rates [1,2]	HRS/WB N	HRS/WB %	AHEAD/CODA N	AHEAD/CODA %	All N	All %
CAGR of Primary Home **						
-10% or Less	173	2.8%	116	4.6%	289	3.3%
-10.01% to -5%	271	4.8%	135	5.5%	406	5.0%
-5.01% to -3%	222	3.9%	130	4.9%	352	4.2%
-3.01% to -1%	848	14.8%	484	19.2%	1332	16.2%
-1.01% to 0%	511	8.8%	192	7.9%	703	8.6%
0.01% to 1%	507	8.8%	219	9.1%	726	8.9%
1.01% to 3%	1057	18.6%	370	15.0%	1427	17.5%
3.01% to 5%	680	12.9%	275	11.5%	955	12.5%
5.01% to 10%	742	15.5%	311	12.9%	1053	14.7%
10.01% or More	428	9.1%	232	9.5%	660	9.2%
Average CAGR of Primary Home **	5439	2.28%	2464	1.52%	7903	2.04%
Median CAGR of Primary Home [3]	5439	1.30%	2464	0.73%	7903	1.19%
Division CAGR ** [4]						
0.99% or Less	907	13.5%	254	9.7%	1161	12.3%
1% to 1.99%	833	12.9%	267	10.2%	1100	12.0%
2% to 2.49%	1092	15.1%	281	10.5%	1373	13.7%
2.5% to 2.99%	908	19.2%	608	25.9%	1516	21.3%
3% to 3.99%	807	13.9%	499	19.9%	1306	15.8%
4% or More	892	25.4%	555	23.9%	1447	25.0%
Average Division CAGR **	5439	2.82%	2464	3.12%	7903	2.91%
Median Division CAGR [3]	5439	2.45%	2464	2.97%	7903	2.69%
CAGR of Primary Home Less Division CAGR **						
-10% or Less	238	4.5%	191	7.7%	429	5.5%
-10.01% to -5%	601	12.6%	446	17.8%	1047	14.3%
-5.01% to -3%	778	14.1%	398	16.1%	1176	14.7%
-3.01% to -1%	1090	18.9%	396	15.9%	1486	18.0%
-1.01% to 0%	584	9.8%	224	9.4%	808	9.7%
0.01% to 1%	465	8.4%	157	6.6%	622	7.8%
1.01% to 3%	641	11.7%	206	8.6%	847	10.7%
3.01% to 5%	351	6.7%	127	5.2%	478	6.2%
5.01% to 10%	425	8.5%	192	7.8%	617	8.3%
10.01% or More	266	4.9%	127	5.0%	393	4.9%
Average CAGR Deviation **	5439	-0.54%	2464	-1.60%	7903	-0.87%
Median CAGR Deviation [3]	5439	-0.99%	2464	-2.13%	7903	-1.28%

Notes:

Source: 1992 to 2002 HRS/AHEAD

** indicates that difference between the HRS/WB and AHEAD/CODA groups are statistically significant at the 1% level and * denotes significance at the 5% level. $\chi 2$ tests were conducted for crosstab comparisons and t-tests were performed for average comparisons. The observation level of the sample in this report is a primary home. Some households have as many as 3 primary homes in the survey period from 1992 through 2002. Only single family, non-farm, non-mobile and non-condo owned primary homes are considered in the sample, which is also confined to homes with non-imputed and non-missing house values reported by respondents in both start and end years. The sample sizes and medians presented in this table are unweighted but the percentages and averages reported are weighted using household weights provided by HRS/AHEAD to make inference on the US population of the same age, gender and race/ethnicity profile as the HRS/AHEAD sample. All dollar amounts are adjusted to 2002 using non-seasonally adjusted CPI minus shelter.

1 From the tracker and region files, characteristics of the financial respondent for each wave was obtained. Where there were no financial respondents, characteristics of the family respondent were obtained. Where the information on respondent type was unavailable, characteristics of the oldest respondent was obtained. Information on homes, such as house values, were obtained from the year specific HRS/AHEAD survey data files.

2 CAGR = $(FV/PV)^{1/n} - 1$, where PV is the beginning value, FV is the ending value and n is the number of intervening years. This is a very similar measure to ln(FV/PV)/n, which assumes continous compounding. We prefer CAGR because most house price growth rates, like interest rate growth rates are reported in annual growth rates.

3 Medians are calculated without weights and no statistical tests for significance of the difference between the younger and the older groups were conducted.

4 Division CAGRs were calcuated to correpond to the actual start and end years of house values as well as the actual census division of a primary home. OFHEO HPI for the appropriate start and end years and census divisions were adjusted to 2002 dollars to compute census division CAGRS.

Appendix B

Exhibit B-1: Comparison of HRS/AHEAD Regressions to AHS Regressions

	AHS [1]		HRS/AHEAD [2]			
	(1)	(2)	(3)	(4)	(5)	(6)
	$\ln \frac{\text{Resale Value}}{\text{1985 Value}}$	$\ln \frac{\text{Resale Value}}{\text{1985 Value}}$ / Year Sold - 1985	$\ln \frac{\text{End Value}}{\text{Start Value}}$	$\ln \frac{\text{End Value}}{\text{Start Value}}$ / End - Start Year	CAGR	CAGR
Years Age 75 or Older Between Start and End Years [3]	-0.023 (0.009)*		-0.0074 (0.0018)**		-0.0023 (0.0003)**	
Age 75 or Older in Start Year [4]		-0.022 (0.016)		-0.0107 (0.0029)**		-0.0103 (0.0028)**
Constant	0.167 (0.013)**	0.026 (0.004)**	0.239 (0.055)**	0.043 (0.013)**	0.047 (0.015)**	0.046 (0.015)**
Fixed Effects	MSA x Year Sold	MSA x Year Sold	Division x End Year	Division x End Year	Division x End Year	Division x End Year
N R^2	2,781 0.36	2,757 0.30	7,309 0.08	7,309 0.07	7,309 0.06	7,309 0.06
			(7)	(8)	(9)	(10)
			Division CAGR - CAGR	Division CAGR - CAGR	Division CAGR - CAGR	Division CAGR - CAGR
No of Years Age 75 or Older Between Start and End Years [3]			-0.0016 (0.0003)**		-0.0019 (0.0003)**	
Age 75 or Older in Start Year [4]				-0.0109 (0028)**		-0.0112 (0028)**
Constant			-0.002 (0.013)	-0.002 (0.013)	-0.007 (0.001)**	-0.007 (0.001)**
Fixed Effects			Division x End Year	Division x End Year	None	None
N R^2			7,309 0.05	7,309 0.05	7,309 0.00	7,309 0.00

Notes:

Source: 1992 to 2002 HRS/AHEAD

** indicates significance at the 1% level and * at the 5% level.

1. AHS results are from Davidoff (2004).

2. The observation level of the sample in this report is a primary home. Some households have as many as 3 primary homes in the survey period from 1992 through 2002. Only single family, non-farm, non-mobile and non-condo owned primary homes are considered in the sample, which is also confined to homes with non-imputed and non-missing house values reported by respondents in both start and end years. CAGR, the dependent variable, is compound annual growth rate, a similar measure to annualized difference in natural logs of end and start values in (4). Results are weighted to make inference on the US population of the same age, gender and race/ethnicity profile as the HRS/AHEAD sample using household weights provided by HRS. All dollar amounts are adjusted to 2002 using non-seasonally adjusted CPI minus shelter.

3. Davidoff (2004) calls this variable YEARSa75. His start year is 1985 and end year is actual year when the home was sold.

4. Davidoff (2004) calls this variable a75. His start year is 1985.

Exhibit B-2: Regressions of Compound Annual Growth Rates (CAGRs) of House Values

	CAGR												Division CAGR - CAGR	
	(11)		(12)		(13)		(14)		(15)		(16)		(17)	
Covariates	**Coeff**	**Std Err**	**Coeff**	**Std Err**	**Coeff**	**Std Err**	**Coeff**	**Std Err**	**Coeff**	**Std Err**	**Coeff**	**Std Err**	**Coeff**	**Std Err**
Respondent Older Than 74 Years in Start Year	-0.0121	0.0028 **	-0.0099	0.0028 **	-0.0096	0.0029 **	-0.0097	0.0029 **	-0.0098	0.0029 *	-0.0098	0.0029 **	-0.0103	0.0029 **
Interval Between End and Start Years			-0.0028	0.0004 **	-0.0028	0.0004 **	-0.0027	0.0004 **	-0.0028	0.0004 **	-0.0027	0.0004 **	0.0008	0.0004 *
Suburban Location of Home			-0.0062	0.0023 **	-0.0061	0.0023 **	-0.0060	0.0023 **	-0.0061	0.0023 **	-0.0060	0.0023 **	-0.0065	0.0023 **
Rural Location of Home			-0.0058	0.0024 *	-0.0063	0.0024 **	-0.0062	0.0024 **	-0.0064	0.0024 **	-0.0063	0.0024 **	-0.0061	0.0024 **
Tenure at Home Less Than 11 Years					-0.0012	0.0022	-0.0012	0.0022	-0.0012	0.0022	-0.0012	0.0022	-0.0004	0.0022
Tenure at Home Imputed					0.0045	0.0064	0.0048	0.0064	0.0046	0.0064	0.0049	0.0064	0.0029	0.0064
Tenure at Home Missing					0.0054	0.0042	0.0055	0.0042	0.0055	0.0042	0.0056	0.0042	0.0035	0.0042
Liquid Assets Indicator							0.0082	0.0038 *			0.0082	0.0038 *	0.0083	0.0038 *
TICS Score Less Than 5									-0.0064	0.0078 **	-0.0060	0.0078	-0.0057	0.0075
TICS Score Missing									0.0036	0.0047	0.0039	0.0047	0.0029	0.0047
Home Number					-0.0012	0.0046	-0.0014	0.0046	-0.0014	0.0046	-0.0015	0.0046	-0.0021	0.0046
Respondent in Nurshing Home					-0.0028	0.0065	-0.0021	0.0065	-0.0045	0.0070	-0.0040	0.0070	-0.0061	0.0071
Coupled Respondent					0.0015	0.0021	0.0012	0.0021	0.0014	0.0021	0.0011	0.0021	0.0008	0.0021
Black Respondent					-0.0023	0.0036	-0.0010	0.0037	-0.0022	0.0036	-0.0008	0.0037	-0.0011	0.0037
Respondent of Other Race					-0.0039	0.0064	-0.0034	0.0064	-0.0040	0.0064	-0.0035	0.0064	-0.0025	0.0065
Mexican Hispanic Respondent					-0.0128	0.0060 *	-0.0117	0.0060	-0.0129	0.0060 *	-0.0117	0.0060	-0.0122	0.0060 *
Other Hispanic Respondent					-0.0067	0.0069	-0.0057	0.0069	-0.0066	0.0069	-0.0056	0.0069	-0.0059	0.0067
Female Respondent					-0.0017	0.0020	-0.0017	0.0020	-0.0016	0.0020	-0.0016	0.0020	-0.0021	0.0020
Start and End Division Mismatch					-0.0069	0.0114	-0.0071	0.0114	-0.0069	0.0114	-0.0071	0.0114	0.0082	0.0152
HRS Mover Flag					0.0033	0.0035	0.0033	0.0035	0.0033	0.0035	0.0033	0.0035	0.0036	0.0036
Constant	0.0218	0.0010 **	0.0668	0.0147 **	0.0683	0.0156 **	0.0607	0.0159 **	0.0681	0.0153 **	0.0603	0.0156 **	-0.0080	0.0147
Fixed Effects	None		Division x End Year		Division x End Year		Division x End Year		Division x End Year		Division x End Year		Division x End Year	
N	7,903		7,903		7,903		7,903		7,903		7,903		7,903	
R^2	0.00		0.07		0.08		0.08		0.08		0.08		0.06	

Notes:

Source: 1992 to 2002 HRS/AHEAD

** indicates significance at the 1% level and * denotes significant at the 5% level. The observation level of the sample in this report is a primary home. Some households have as many as 3 primary homes in the survey period from 1992 through 2002. Only single family, non-farm, non-mobile and non-condo owned primary homes are considered in the sample, which is also confined to homes with non-imputed and non-missing house values reported by respondents in both start and end years. CAGR, the dependent variable, is compound annual growth rate, a similar measure to annualized difference in natural logs of end and start values. Results are weighted to make inference on the US population of the same age, gender and race/ethnicity profile as the HRS/AHEAD sample using household weights provided by HRS. All dollar amounts are adjusted to 2002 using non-seasonally adjusted CPI minus shelter.

Appendix C

Exhibit C-1: Regressions of Compound Annual Growth Rates (CAGRs) of House Values

	(16)		(18)		(19)		(20)		(21)	
Covariates	**Coeff**	**Std Err**	**Coeff**	**Std Err**	**Coeff**	**Std Err**	**Coeff**	**Std Err**	**Coeff**	**Std Err**
Respondent Older Than 74 Years in Start Year	-0.0098	0.0029 **								
Respondent Older Than 74 Years in End Year			-0.0109	0.0020 **						
Respondent's Age in Start Year					-0.0006	0.0001 **				
Respondent's Age in End Year							-0.0006	0.0001 **		
Years Age 75 or Older Between Start and End Years									-0.0017	0.0003 **
Interval Between End and Start Years	-0.0027	0.0004 **	-0.0027	0.0004 **	-0.0028	0.0004 **	-0.0022	0.0004 **	-0.0025	0.0004 **
Suburban Location of Home	-0.0060	0.0023 **	-0.0061	0.0023 **	-0.0062	0.0023 **	-0.0062	0.0023 **	-0.0061	0.0023 **
Rural Location of Home	-0.0063	0.0024 **	-0.0061	0.0024 **	-0.0063	0.0024 **	-0.0063	0.0024 **	-0.0063	0.0024 **
Tenure at Home Less Than 11 Years	-0.0012	0.0022	-0.0019	0.0022	-0.0027	0.0022	-0.0027	0.0022	-0.0015	0.0022
Tenure at Home Imputed	0.0049	0.0064	0.0040	0.0064	0.0056	0.0064	0.0056	0.0064	0.0048	0.0064
Tenure at Home Missing	0.0056	0.0042	0.0043	0.0042	0.0049	0.0042	0.0049	0.0042	0.0050	0.0042
Liquid Assets Indicator	0.0082	0.0038 *	0.0080	0.0038 *	0.0078	0.0038 *	0.0078	0.0038 *	0.0081	0.0038 *
TICS Score Less Than 5	-0.0060	0.0078	-0.0064	0.0080	-0.0070	0.0079	-0.0070	0.0079	-0.0061	0.0079
TICS Score Missing	0.0039	0.0047	0.0043	0.0046	0.0052	0.0046	0.0052	0.0046	0.0039	0.0046
Home Number	-0.0015	0.0046	-0.0018	0.0046	-0.0008	0.0046	-0.0008	0.0046	-0.0021	0.0046
Respondent in Nurshing Home	-0.0040	0.0070	-0.0032	0.0068	-0.0023	0.0069	-0.0023	0.0069	-0.0034	0.0069
Coupled Respondent	0.0011	0.0021	0.0001	0.0021	-0.0010	0.0021	-0.0010	0.0021	0.0007	0.0021
Black Respondent	-0.0008	0.0037	-0.0014	0.0037	-0.0016	0.0036	-0.0016	0.0036	-0.0011	0.0037
Respondent of Other Race	-0.0035	0.0064	-0.0042	0.0064	-0.0045	0.0065	-0.0045	0.0065	-0.0036	0.0064
Mexican Hispanic Respondent	-0.0117	0.0060	-0.0124	0.0060 *	-0.0131	0.0060 *	-0.0130	0.0060 *	-0.0120	0.0060 *
Other Hispanic Respondent	-0.0056	0.0069	-0.0056	0.0069	-0.0060	0.0069	-0.0059	0.0069	-0.0055	0.0069
Female Respondent	-0.0016	0.0020	-0.0018	0.0020	-0.0024	0.0020	-0.0024	0.0020	-0.0017	0.0020
Start and End Division Mismatch	-0.0071	0.0114	-0.0060	0.0114	-0.0063	0.0112	-0.0063	0.0112	-0.0064	0.0114
HRS Mover Flag	0.0033	0.0035	0.0029	0.0035	0.0026	0.0035	0.0026	0.0035	0.0029	0.0035
Constant	0.0603	0.0156 **	0.0627	0.0156 **	0.0930	0.0171 **	0.0926	0.0171 **	0.0604	0.0156 **
Fixed Effects	Division x End Year		Division x End Year		Division x End Year		Division x End Year		Division x End Year	
N	7,903		7,903		7,903		7,903		7,903	
R^2	0.08		0.08		0.08		0.08		0.08	

Notes:

Source: 1992 to 2002 HRS/AHEAD

** indicates significance at the 1% level and * denotes significant at the 5% level. The observation level of the sample in this report is a primary home. Some households have as many as 3 primary homes in the survey period from 1992 through 2002. Only single family, non-farm, non-mobile and non-condo owned primary homes are considered in the sample, which is also confined to homes with non-imputed and non-missing house values reported by respondents in both start and end years. CAGR, the dependent variable, is compound annual growth rate, a similar measure to annualized difference in natural logs of end and start values. Results are weighted to make inference on the US population of the same age, gender and race/ethnicity profile as the HRS/AHEAD sample using household weights provided by HRS. All dollar amounts are adjusted to 2002 using non-seasonally adjusted CPI minus shelter.

Appendix D

Exhibit D-1: Median House Values and House Appreciation, MSAs with Extreme Differences Between 61-74 and 75+ Age Categories

MSA	1990 N	1990 Median House Value [2] 60 or Younger [3]	1990 Median House Value 61 to 74 Years	1990 Median House Value 75 or Older	2000 N	2000 Median House Value 60 or Younger	2000 Median House Value 61 to 74 Years	2000 Median House Value 75 or Older	CAGR [1] 60 or Younger	CAGR [1] 61 to 74 Years (A)	CAGR [1] 75 or Older (B)	(B) Less (A)
CAGR (75 or Older) Below CAGR (61 to 74 Years)												
Salt Lake City-Ogden, UT	1,770	$95,700	$95,700	$82,500	2,145	$162,500	$162,500	$112,500	5.44%	5.44%	3.15%	-2.29%
Columbia, SC	847	$95,700	$89,100	$82,500	1,035	$112,500	$112,500	$85,000	1.63%	2.36%	0.30%	-2.06%
Ventura-Oxnard-Simi Valley, CA	1,112	$363,000	$297,000	$297,000	1,298	$275,000	$275,000	$225,000	-2.74%	-0.77%	-2.74%	-1.97%
Jacksonville, FL	1,327	$89,100	$69,300	$66,000	2,378	$112,500	$95,000	$75,000	2.36%	3.20%	1.29%	-1.91%
Bergen-Passaic, NJ	2,338	$297,000	$247,500	$247,500	2,324	$225,000	$225,000	$187,500	-2.74%	-0.95%	-2.74%	-1.79%
Sacramento, CA	2,844	$181,500	$148,500	$148,500	3,203	$162,500	$162,500	$137,500	-1.10%	0.91%	-0.77%	-1.68%
Monmouth-Ocean, NJ	2,575	$214,500	$181,500	$148,500	2,727	$187,500	$162,500	$112,500	-1.34%	-1.10%	-2.74%	-1.64%
Youngstown-Warren, OH-PA	1,140	$69,300	$62,700	$56,099	1,200	$85,000	$85,000	$65,000	2.06%	3.09%	1.48%	-1.61%
Knoxville, TN	1,357	$82,500	$69,300	$62,700	1,013	$112,500	$95,000	$75,000	3.15%	3.20%	1.81%	-1.39%
St. Louis, MO-IL	4,968	$95,700	$75,900	$75,900	5,220	$112,500	$95,000	$85,000	1.63%	2.27%	1.14%	-1.13%
Atlanta, GA	5,355	$125,400	$112,200	$102,300	7,147	$137,500	$137,500	$112,500	0.93%	2.05%	0.95%	-1.10%
Norfolk-VA Beach-Newport News, VA	2,201	$125,400	$102,300	$95,700	2,733	$112,500	$112,500	$95,000	-1.08%	0.95%	-0.07%	-1.02%
Miami-Hialeah, FL	2,517	$125,400	$102,300	$112,200	2,244	$137,500	$112,500	$112,500	0.93%	0.95%	0.03%	-0.92%
Boise City, ID	311	$95,700	$82,500	$89,100	686	$112,500	$112,500	$112,500	1.63%	3.15%	2.36%	-0.79%
Tampa-St. Petersburg-Clearwater, FL	4,596	$102,300	$89,100	$75,900	4,998	$95,000	$95,000	$75,000	-0.74%	0.64%	-0.12%	-0.76%
CAGR (75 or Older) Above CAGR (61 to 74 Years)												
Los Angeles-Long Beach, CA	12,051	$297,000	$297,000	$247,500	12,109	$225,000	$225,000	$225,000	-2.74%	-2.74%	-0.95%	1.79%
Grand Rapids, MI	1,173	$95,700	$89,100	$62,700	1,736	$112,500	$112,500	$95,000	1.63%	2.36%	4.24%	1.88%
Houston-Brazoria, TX	5,411	$89,100	$75,900	$62,700	6,625	$95,000	$85,000	$85,000	0.64%	1.14%	3.09%	1.95%
Baton Rouge, LA	932	$89,100	$75,900	$62,700	1,101	$112,500	$95,000	$95,000	2.36%	2.27%	4.24%	1.97%
Kansas City, MO-KS	2,972	$95,700	$75,900	$62,700	3,224	$112,500	$95,000	$95,000	1.63%	2.27%	4.24%	1.97%
Pensacola, FL	758	$82,500	$75,900	$56,099	915	$95,000	$95,000	$85,000	1.42%	2.27%	4.24%	1.97%
Detroit, MI	7,909	$95,700	$75,900	$62,700	7,826	$137,500	$112,500	$112,500	3.69%	4.01%	6.02%	2.01%
West Palm Beach-Boca Raton-Delray Beach, FL	1,512	$148,500	$148,500	$102,300	1,982	$137,500	$162,500	$137,500	-0.77%	0.91%	3.00%	2.09%
San Antonio, TX	2,415	$82,500	$69,300	$56,099	2,342	$75,000	$65,000	$65,000	-0.95%	-0.64%	1.48%	2.12%
Birmingham, AL	1,887	$89,100	$69,300	$56,099	1,101	$95,000	$75,000	$75,000	0.64%	0.79%	2.95%	2.16%
Tacoma, WA	1,038	$112,200	$102,300	$82,500	1,438	$162,500	$137,500	$137,500	3.77%	3.00%	5.24%	2.24%
San Francisco-Oakland-Vallejo, CA	2,127	$462,000	$462,000	$363,000	1,727	$450,000	$450,000	$450,000	-0.26%	-0.26%	2.17%	2.43%
Greensboro-Winston Salem-High Point, NC	2,124	$102,300	$89,100	$69,300	2,720	$112,500	$95,000	$95,000	0.95%	0.64%	3.20%	2.56%
New Orleans, LA	2,090	$95,700	$89,100	$75,900	1,509	$112,500	$85,000	$95,000	1.63%	-0.47%	2.27%	2.74%
Columbus, OH	2,804	$102,300	$89,100	$75,900	1,942	$137,500	$95,000	$112,500	3.00%	0.64%	4.01%	3.37%

Notes:

Source: 1990 and 2000 IPUMS

Sample sizes are the total for all age groups and are unweighted. The median house values and CAGRs are weighted by the household weight provided by IPUMS.

1. CAGR is compound annual growth rate of median house values between 1990 and 2000 for each geographical entity. (B) - (A) is the difference in CAGRs of the old and near-old groups.

2. Median house values were calculated instead of the mean because house values were topcoded. Median house values are in 2000 dollars.

Exhibit D-2: Median House Values and Appreciation for Largest 30 MSAs, Cohort Selection With Restricted Tenure

		1990			2000			CAGR [1]		(B)
			Median House Value [2]			Median House Value		(A)	(B)	Less
	MSA	N	Young [3]	Old	N	Young	Old	Young	Old	(A)
1	Chicago-Gary-Lake, IL	2,884	$148,500	$125,400	2,541	$162,500	$137,500	0.91%	0.93%	0.02%
2	Los Angeles-Long Beach, CA	4,166	$297,000	$297,000	2,937	$225,000	$225,000	-2.74%	-2.74%	0.00%
3	Detroit, MI	2,488	$95,700	$75,900	1,652	$112,500	$112,500	1.63%	4.01%	2.38%
4	Atlanta, GA	1,477	$125,400	$112,200	1,190	$112,500	$112,500	-1.08%	0.03%	1.11%
5	Nassau Co, NY	2,332	$247,500	$247,500	1,626	$225,000	$187,500	-0.95%	-2.74%	-1.79%
6	Houston-Brazoria, TX	1,614	$89,100	$75,900	1,242	$85,000	$85,000	-0.47%	1.14%	1.61%
7	Washington, DC/MD/VA	1,781	$247,500	$247,500	1,341	$225,000	$187,500	-0.95%	-2.74%	-1.79%
8	Philadelphia, PA/NJ	2,114	$181,500	$148,500	1,453	$162,500	$137,500	-1.10%	-0.77%	0.33%
9	Phoenix, AZ	1,141	$112,200	$102,300	1,200	$137,500	$112,500	2.05%	0.95%	-1.10%
10	Dallas-Fort Worth, TX	1,417	$112,200	$95,700	976	$95,000	$95,000	-1.65%	-0.07%	1.58%
11	St. Louis, MO-IL	1,497	$95,700	$75,900	1,194	$95,000	$85,000	-0.07%	1.14%	1.21%
12	Cleveland, OH	1,215	$112,200	$89,100	1,265	$112,500	$112,500	0.03%	2.36%	2.33%
13	Tampa-St. Petersburg-Clearwater, FL	1,613	$102,300	$89,100	1,281	$95,000	$85,000	-0.74%	-0.47%	0.27%
14	Seattle-Everett, WA	1,070	$181,500	$148,500	772	$225,000	$225,000	2.17%	4.24%	2.07%
15	Oakland, CA	1,237	$297,000	$247,500	901	$275,000	$275,000	-0.77%	1.06%	1.83%
16	Boston, MA	1,531	$247,500	$214,500	974	$225,000	$225,000	-0.95%	0.48%	1.43%
17	Riverside-San Bernadino, CA	1,167	$181,500	$148,500	808	$137,500	$112,500	-2.74%	-2.74%	0.00%
18	Minneapolis-St. Paul, MN	1,075	$125,400	$102,300	652	$137,500	$137,500	0.93%	3.00%	2.07%
19	San Diego, CA	1,165	$247,500	$247,500	952	$225,000	$225,000	-0.95%	-0.95%	0.00%
20	Newark, NJ	1,134	$297,000	$247,500	760	$225,000	$162,500	-2.74%	-4.12%	-1.38%
21	Denver-Boulder-Longmont, CO	841	$125,400	$112,200	612	$187,500	$162,500	4.10%	3.77%	-0.33%
22	Orlando, FL	651	$112,200	$102,300	688	$112,500	$112,500	0.03%	0.95%	0.92%
23	Baltimore, MD	1,027	$181,500	$125,400	711	$137,500	$137,500	-2.74%	0.93%	3.67%
24	Kansas City, MO-KS	942	$95,700	$69,300	620	$112,500	$95,000	1.63%	3.20%	1.57%
25	Sacramento, CA	890	$181,500	$148,500	713	$162,500	$137,500	-1.10%	-0.77%	0.33%
26	Pittsburgh-Beaver Valley, PA	1,693	$75,900	$69,300	871	$85,000	$75,000	1.14%	0.79%	-0.35%
27	New York-Northeastern NJ	1,540	$297,000	$297,000	789	$225,000	$225,000	-2.74%	-2.74%	0.00%
28	Fort Worth-Arlington, TX	792	$102,300	$75,900	563	$85,000	$75,000	-0.02%	0.00%	0.02%
29	Norfolk-VA Beach-Newport News, VA	765	$112,200	$102,300	672	$112,500	$95,000	0.03%	-0.74%	-0.77%
30	Monmouth-Ocean, NJ	874	$214,500	$181,500	679	$162,500	$137,500	-2.74%	-2.74%	0.00%

Notes:

Source: 1990 and 2000 IPUMS

Sample sizes are the total for all age groups and are unweighted. This sample with restricted tenure is confined to households who had been living at their current address for 11 years or longer in 1990 and 21 years or longer in 2000. The median house values and CAGRs are weighted by the household weight provided by IPUMS.

1. CAGR is compound annual growth rate of median house values between 1990 and 2000 for each geographical entity. (B) - (A) is the difference in CAGRs of the old and young groups.

2. Median house values were calculated instead of the mean because house values were topcoded. Median house values are in 2000 dollars.

3. The young group consists of 50 to 59 year olds in 1990 and 60 to 69 year olds in 2000. The old group consists of 65 to 74 in 1990 and 75 to 84 in 2000.

Exhibit D-3: Median House Values and Appreciation for MSAs with Extreme Difference Between Old and Young Cohorts with Restricted Tenure

	1990			2000			CAGR [1]		(B)
		Median House Value [2]			Median House Value		(A)	(B)	Less
MSA	N	Young [3]	Old	N	Young	Old	Young	Old	(A)
CAGR (Old) Below CAGR (Young)									
Lakeland-Winterhaven, FL	312	$82,500	$82,500	235	$95,000	$75,000	1.42%	-0.95%	-2.37%
Little Rock-North Little Rock, AR	294	$82,500	$69,300	218	$95,000	$65,000	1.42%	-0.64%	-2.06%
Albuquerque, NM	289	$112,200	$112,200	225	$137,500	$112,500	2.05%	0.03%	-2.02%
Nassau Co, NY	2,332	$247,500	$247,500	1,626	$225,000	$187,500	-0.95%	-2.74%	-1.79%
Washington, DC/MD/VA	1,781	$247,500	$247,500	1,341	$225,000	$187,500	-0.95%	-2.74%	-1.79%
Salt Lake City-Ogden, UT	478	$95,700	$95,700	392	$162,500	$137,500	5.44%	3.69%	-1.75%
West Palm Beach-Boca Raton-Delray Beach, FL	492	$148,500	$148,500	457	$162,500	$137,500	0.91%	-0.77%	-1.68%
Fresno, CA	334	$112,200	$112,200	308	$112,500	$95,000	0.03%	-1.65%	-1.68%
Jersey City, NJ	63	$214,500	$214,500	46	$162,500	$137,500	-2.74%	-4.35%	-1.61%
McAllen-Edinburg-Pharr-Mission, TX	175	$42,900	$49,500	145	$45,000	$45,000	0.48%	-0.95%	-1.43%
Newark, NJ	1,134	$297,000	$247,500	760	$225,000	$162,500	-2.74%	-4.12%	-1.38%
Akron, OH	452	$89,100	$75,900	341	$112,500	$85,000	2.36%	1.14%	-1.22%
Phoenix, AZ	1,141	$112,200	$102,300	1,200	$137,500	$112,500	2.05%	0.95%	-1.10%
Miami-Hialeah, FL	934	$112,200	$102,300	582	$137,500	$112,500	2.05%	0.95%	-1.10%
Spokane, WA	232	$82,500	$69,300	192	$112,500	$85,000	3.15%	2.06%	-1.09%
CAGR (Old) Above CAGR (Young)									
Allentown-Bethlehem-Easton, PA/NJ	415	$181,500	$148,500	252	$112,500	$112,500	-4.67%	-2.74%	1.93%
Springfield-Holyoke-Chicopee, MA	381	$181,500	$148,500	228	$112,500	$112,500	-4.67%	-2.74%	1.93%
Charlotte-Gastonia-Rock Hill, SC	775	$95,700	$79,200	214	$137,500	$137,500	3.69%	5.67%	1.98%
Seattle-Everett, WA	1,070	$181,500	$148,500	772	$225,000	$225,000	2.17%	4.24%	2.07%
Minneapolis-St. Paul, MN	1,075	$125,400	$102,300	652	$137,500	$137,500	0.93%	3.00%	2.07%
Tacoma, WA	313	$125,400	$102,300	293	$162,500	$162,500	2.63%	4.74%	2.11%
Scranton-Wilkes-Barre, PA	630	$95,700	$69,300	448	$95,000	$85,000	-0.07%	2.06%	2.13%
Tulsa, OK	459	$89,100	$62,700	237	$85,000	$75,000	-0.47%	1.81%	2.28%
Cleveland, OH	1,215	$112,200	$89,100	1,265	$112,500	$112,500	0.03%	2.36%	2.33%
Detroit, MI	2,488	$95,700	$75,900	1,652	$112,500	$112,500	1.63%	4.01%	2.38%
Columbus, OH	872	$95,700	$89,100	386	$95,000	$112,500	-0.07%	2.36%	2.43%
San Jose, CA	821	$462,000	$363,000	572	$450,000	$450,000	-0.26%	2.17%	2.43%
Fort Wayne, IN	239	$89,100	$69,300	247	$85,000	$85,000	-0.47%	2.06%	2.53%
New Orleans, LA	673	$95,700	$82,500	383	$85,000	$95,000	-1.18%	1.42%	2.60%
Baltimore, MD	1,027	$181,500	$125,400	711	$137,500	$137,500	-2.74%	0.93%	3.67%

Notes:

Source: 1990 and 2000 IPUMS

Sample sizes are the total for all age groups and are unweighted. This sample with restricted tenure is confined to households who had been living at their current address for 11 years or longer in 1990 and 21 years or longer in 2000. The median house values and CAGRs are weighted by the household weight provided by IPUMS.

1. CAGR is compound annual growth rate of median house values between 1990 and 2000 for each geographical entity. (B) - (A) is the difference in CAGRs of the old and young groups.

2. Median house values were calculated instead of the mean because house values were topcoded. Median house values are in 2000 dollars.

3. The young group consists of 50 to 59 year olds in 1990 and 60 to 69 year olds in 2000. The old group consists of 65 to 74 in 1990 and 75 to 84 in 2000.

Exhibit D-4: Median House Values and Appreciation for Largest 30 MSAs, By Cohorts with No Restriction on Tenure

		1990			2000			CAGR [1]		(B)
			Median House Value [2]			Median House Value		(A)	(B)	Less
	MSA	N	Young [3]	Old	N	Young	Old	Young	Old	(A)
1	Chicago-Gary-Lake, IL	2,328	$148,500	$125,400	1,682	$162,500	$137,500	0.91%	0.93%	0.02%
2	Los Angeles-Long Beach, CA	3,297	$297,000	$297,000	2,137	$225,000	$225,000	-2.74%	-2.74%	0.00%
3	Detroit, MI	1,951	$89,100	$75,900	1,155	$112,500	$112,500	2.36%	4.01%	1.65%
4	Atlanta, GA	998	$102,300	$102,300	609	$112,500	$112,500	0.95%	0.95%	0.00%
5	Nassau Co, NY	1,983	$247,500	$247,500	1,228	$225,000	$187,500	-0.95%	-2.74%	-1.79%
6	Houston-Brazoria, TX	1,153	$82,500	$75,900	696	$75,000	$75,000	-0.95%	-0.12%	0.83%
7	Washington, DC/MD/VA	1,328	$247,500	$247,500	891	$187,500	$187,500	-2.74%	-2.74%	0.00%
8	Philadelphia, PA/NJ	1,721	$181,500	$148,500	1,050	$162,500	$137,500	-1.10%	-0.77%	0.33%
9	Phoenix, AZ	640	$102,300	$95,700	393	$112,500	$95,000	0.95%	-0.07%	-1.02%
10	Dallas-Fort Worth, TX	960	$102,300	$89,100	575	$85,000	$85,000	-1.84%	-0.47%	1.37%
11	St. Louis, MO-IL	1,189	$89,100	$75,900	781	$85,000	$85,000	-0.47%	1.14%	1.61%
12	Cleveland, OH	1,008	$102,300	$89,100	923	$112,500	$112,500	0.95%	2.36%	1.41%
13	Tampa-St. Petersburg-Clearwater, FL	871	$89,100	$82,500	511	$85,000	$75,000	-0.47%	-0.95%	-0.48%
14	Seattle-Everett, WA	797	$181,500	$148,500	469	$225,000	$225,000	2.17%	4.24%	2.07%
15	Oakland, CA	995	$297,000	$247,500	617	$275,000	$275,000	-0.77%	1.06%	1.83%
16	Boston, MA	1,307	$247,500	$214,500	765	$225,000	$225,000	-0.95%	0.48%	1.43%
17	Riverside-San Bernadino, CA	630	$148,500	$148,500	325	$137,500	$112,500	-0.77%	-2.74%	-1.97%
18	Minneapolis-St. Paul, MN	843	$112,200	$102,300	479	$137,500	$112,500	2.05%	0.95%	-1.10%
19	San Diego, CA	814	$247,500	$214,500	531	$225,000	$225,000	-0.95%	0.48%	1.43%
20	Newark, NJ	890	$297,000	$247,500	568	$225,000	$162,500	-2.74%	-4.12%	-1.38%
21	Denver-Boulder-Longmont, CO	635	$112,200	$112,200	395	$162,500	$162,500	3.77%	3.77%	0.00%
22	Orlando, FL	390	$102,300	$95,700	236	$95,000	$95,000	-0.74%	-0.07%	0.67%
23	Baltimore, MD	811	$181,500	$125,400	514	$137,500	$112,500	-2.74%	-1.08%	1.66%
24	Kansas City, MO-KS	694	$89,100	$69,300	348	$95,000	$85,000	0.64%	2.06%	1.42%
25	Sacramento, CA	604	$181,500	$148,500	372	$137,500	$137,500	-2.74%	-0.77%	1.97%
26	Pittsburgh-Beaver Valley, PA	1,518	$75,900	$62,700	702	$85,000	$75,000	1.14%	1.81%	0.67%
27	New York-Northeastern NJ	1,294	$297,000	$297,000	605	$225,000	$225,000	-2.74%	-2.74%	0.00%
28	Fort Worth-Arlington, TX	564	$89,100	$69,300	313	$75,000	$65,000	-1.71%	-0.64%	1.07%
29	Norfolk-VA Beach-Newport News, VA	582	$112,200	$102,300	429	$95,000	$95,000	-1.65%	-0.74%	0.91%
30	Monmouth-Ocean, NJ	549	$214,500	$181,500	311	$162,500	$162,500	-2.74%	-1.10%	1.64%

Notes:

Source: 1990 and 2000 IPUMS

Sample sizes are the total for all age groups and are unweighted. This sample with unrestricted tenure can have tenure at current residence of any length. The median house values and CAGRs are weighted by the household weight provided by IPUMS.

1. CAGR is compound annual growth rate of median house values between 1990 and 2000 for each geographical entity. (B) - (A) is the difference in CAGRs of the old and young groups.

2. Median house values were calculated instead of the mean because house values were topcoded. Median house values are in 2000 dollars.

3. The young group consists of 50 to 59 year olds in 1990 and 60 to 69 year olds in 2000. The old group consists of 65 to 74 in 1990 and 75 to 84 in 2000.

Exhibit D-5: Median House Values and Appreciation for MSAs with Extreme Differences Between Old and Young Cohorts with No Restrictions on Tenure

	1990			2000			CAGR [1]		(B)
		Median House Value [2]			Median House Value		(A)	(B)	Less
MSA	N	Young [3]	Old	N	Young	Old	Young	Old	(A)
CAGR (Old) Below CAGR (Young)									
Lakeland-Winterhaven, FL	201	$75,900	$69,300	110	$85,000	$55,000	1.14%	-2.28%	-3.42%
Salt Lake City-Ogden, UT	375	$95,700	$89,100	257	$162,500	$112,500	5.44%	2.36%	-3.08%
Akron, OH	367	$82,500	$75,900	260	$112,500	$85,000	3.15%	1.14%	-2.01%
Riverside-San Bernadino, CA	630	$148,500	$148,500	325	$137,500	$112,500	-0.77%	-2.74%	-1.97%
Stockton, CA	208	$148,500	$148,500	135	$137,500	$112,500	-0.77%	-2.74%	-1.97%
Omaha, NE/IA	236	$75,900	$62,700	120	$95,000	$65,000	2.27%	0.36%	-1.91%
Nassau Co, NY	1,983	$247,500	$247,500	1,228	$225,000	$187,500	-0.95%	-2.74%	-1.79%
Sarasota, FL	93	$112,200	$112,200	85	$112,500	$95,000	0.03%	-1.65%	-1.68%
Jersey City, NJ	53	$214,500	$214,500	35	$162,500	$137,500	-2.74%	-4.35%	-1.61%
Newark, NJ	890	$297,000	$247,500	568	$225,000	$162,500	-2.74%	-4.12%	-1.38%
Minneapolis-St. Paul, MN	843	$112,200	$102,300	479	$137,500	$112,500	2.05%	0.95%	-1.10%
Spokane, WA	168	$82,500	$69,300	111	$112,500	$85,000	3.15%	2.06%	-1.09%
Nashville, TN	455	$102,300	$95,700	175	$112,500	$95,000	0.95%	-0.07%	-1.02%
Phoenix, AZ	640	$102,300	$95,700	393	$112,500	$95,000	0.95%	-0.07%	-1.02%
Fresno, CA	247	$102,300	$112,200	184	$95,000	$95,000	-0.74%	-1.65%	-0.91%
CAGR (Old) Above CAGR (Young)									
Seattle-Everett, WA	797	$181,500	$148,500	469	$225,000	$225,000	2.17%	4.24%	2.07%
Greensboro-Winston Salem-High Point, NC	573	$102,300	$82,500	453	$95,000	$95,000	-0.74%	1.42%	2.16%
Oklahoma City, OK	437	$79,200	$62,700	107	$55,000	$55,000	-3.58%	-1.30%	2.28%
Colorado Springs, CO	126	$102,300	$99,000	85	$112,500	$137,500	0.95%	3.34%	2.39%
Austin, TX	260	$95,700	$89,100	105	$95,000	$112,500	-0.07%	2.36%	2.43%
San Jose, CA	651	$462,000	$363,000	412	$450,000	$450,000	-0.26%	2.17%	2.43%
Charleston-N.Charleston,SC	197	$89,100	$82,500	118	$95,000	$112,500	0.64%	3.15%	2.51%
Columbus, OH	684	$89,100	$82,500	256	$95,000	$112,500	0.64%	3.15%	2.51%
West Palm Beach-Boca Raton-Delray Beach, FL	222	$112,200	$102,300	112	$95,000	$112,500	-1.65%	0.95%	2.60%
San Antonio, TX	598	$69,300	$62,700	365	$55,000	$65,000	-2.28%	0.36%	2.64%
Baton Rouge, LA	226	$89,100	$75,900	168	$85,000	$95,000	-0.47%	2.27%	2.74%
Richmond-Petersburg, VA	421	$102,300	$89,100	182	$95,000	$112,500	-0.74%	2.36%	3.10%
Tulsa, OK	337	$82,500	$59,400	142	$75,000	$75,000	-0.95%	2.36%	3.31%
Memphis, TN/AR/MS	431	$82,500	$69,300	162	$55,000	$65,000	-3.97%	-0.64%	3.33%
Tacoma, WA	227	$125,400	$95,700	162	$137,500	$162,500	0.93%	5.44%	4.51%

Notes:

Source: 1990 and 2000 IPUMS

Sample sizes are the total for all age groups and are unweighted. his sample with unrestricted tenure can have tenure at current residence of any length. The median house values and CAGRs are weighted by the household weight provided by IPUMS.

1. CAGR is compound annual growth rate of median house values between 1990 and 2000 for each geographical entity. (B) - (A) is the difference in CAGRs of the old and young groups.

2. Median house values were calculated instead of the mean because house values were topcoded. Median house values are in 2000 dollars.

3. The young group consists of 50 to 59 year olds in 1990 and 60 to 69 year olds in 2000. The old group consists of 65 to 74 in 1990 and 75 to 84 in 2000.

Exhibit D-6: Regressions of House Price Appreciation on Cohorts of PUMS Data with Tenure Restriction

	CAGR											
	(22)			(23)			(24)			(25)		
Covariates	**Coeff**	**Std Err**		**Coeff**	**Std Err**		**Coeff**	**Std Err**		**Coeff**	**Std Err**	
Head Older Than 74 Years in 1990	-0.0324	0.0086	**	-0.0335	0.0084	**	-0.0267	0.0071	**	-0.0253	0.0059	**
Tenure at Home 21 Through 30 Years in 1990	-0.0481	0.0327		-0.0141	0.0232							
Tenure at Home More Than 30 Years in 1990	0.0114	0.0277		0.0264	0.0206							
Building Age 21 Through 30 Years in 1990	0.0574	0.0444					0.0429	0.0368				
Building Age 31 Through 40 Years in 1990	0.0092	0.0368					0.0220	0.0268				
Building Age 41 Through 50 Years in 1990	0.0687	0.0460					0.0000	0.0000				
Building Age More Than 50 Years in 1990	0.0430	0.0340					0.0000	0.0000				
Fewer Than 4 Rooms in 1990	-0.1778	0.1002		-0.1936	0.0985		-0.1757	0.1001		-0.1988	0.0983	*
6 to 8 Rooms in 1990	-0.0237	0.0222		-0.0316	0.0208		-0.0247	0.0219		-0.0309	0.0208	
More Than 8 Rooms in 1990	0.0638	0.0293	*	0.0689	0.0281	*	0.0669	0.0291	*	0.0743	0.0279	**
Married in 1990	-0.0026	0.0977		-0.0432	0.0923		-0.0468	0.0956		-0.0844	0.0889	
Separated Divorced or Widowed in 1990	-0.0142	0.1000		-0.0524	0.0959		-0.0538	0.0986		-0.0920	0.0932	
Non Hispanic Black	-0.0522	0.0241	*	-0.0423	0.0229		-0.0485	0.0242	*	-0.0390	0.0227	
Non Hispanic Other Race	0.0079	0.0243		0.0038	0.0232		0.0112	0.0232		0.0091	0.0229	
Mexican Hispanic	-0.0795	0.0192	**	-0.0802	0.0191	**	-0.0788	0.0193	**	-0.0771	0.0189	**
Other Hispanic	0.0678	0.0438		0.0767	0.0428		0.0678	0.0436		0.0754	0.0429	
Household Income in 1990	-0.0911	0.0184	**	-0.0897	0.0162	**	-0.0946	0.0168	**	-0.0968	0.0156	**
Middle Atlantic	0.0029	0.0060		0.0023	0.0059		0.0030	0.0060		0.0019	0.0059	
East North Central	0.0355	0.0070	**	0.0346	0.0068	**	0.0347	0.0069	**	0.0326	0.0067	**
West North Central	0.0282	0.0085	**	0.0262	0.0083	**	0.0270	0.0084	**	0.0239	0.0082	**
South Atlantic	0.0225	0.0086	**	0.0202	0.0080	*	0.0224	0.0086	**	0.0172	0.0074	*
East South Central	0.0183	0.0099		0.0168	0.0094		0.0179	0.0099		0.0140	0.0091	
West South Central	0.0207	0.0091	*	0.0191	0.0086	*	0.0202	0.0090	*	0.0156	0.0079	
Mountain	0.0357	0.0098	**	0.0323	0.0092	**	0.0352	0.0097	**	0.0289	0.0084	**
Pacific	0.0220	0.0074	**	0.0218	0.0071	**	0.0213	0.0071	**	0.0190	0.0066	**
Mixed Division	-0.0171	0.0386		-0.0076	0.0381		-0.0075	0.0385		-0.0052	0.0381	
Constant	0.0526	0.0964		0.1129	0.0886		0.1031	0.0937		0.1547	0.0852	
N	210			210			210			210		
R^2	0.59			0.58			0.58			0.57		

Notes:

Source: 1990 and 2000 IPUMS

** indicates significance at the 1% level and * denotes significant at the 5% level. The observation level of the sample in this report is a matched MSA. Only non-commercial, non-condo single family detached houses are considered in the sample. CAGR, the dependent variable, is compound annual growth rate, a similar measure to annualized difference in natural logs of end and start values. Results are weighted by sum of weights at the MSA level. Median house values are adjusted to 2000 using non-seasonally adjusted CPI minus shelter and median household income are adjusted to 200o using non-seasonally adjust CPI.

Exhibit D-7: Regressions of House Price Appreciation on Cohorts of PUMS Data without Tenure Restriction

	CAGR											
	(26)			(27)			(28)			(29)		
Covariates	**Coeff**	**Std Err**		**Coeff**	**Std Err**		**Coeff**	**Std Err**		**Coeff**	**Std Err**	
Head Older Than 74 Years in 1990	-0.0230	0.0072	**	-0.0249	0.0070	**	-0.0209	0.0065	**	-0.0211	0.0059	**
Tenure at Home Less Than 11 Years in 1990	-0.0307	0.0551		-0.0839	0.0395	*						
Tenure at Home 21 Through 30 Years in 1990	-0.0587	0.0469		-0.0425	0.0407							
Tenure at Home More Than 30 Years in 1990	-0.0085	0.0359		-0.0293	0.0312							
Building Age Less Than 11 Years in 1990	-0.0570	0.0631					-0.0785	0.0489				
Building Age 21 Through 30 Years in 1990	0.0632	0.0499					0.0240	0.0418				
Building Age 31 Through 40 Years in 1990	-0.0269	0.0402					-0.0408	0.0360				
Building Age 41 Through 50 Years in 1990	0.0484	0.0528					0.0255	0.0477				
Building Age More Than 50 Years in 1990	0.0284	0.0372					0.0107	0.0332				
Fewer Than 4 Rooms in 1990	-0.1244	0.1063		-0.1296	0.1053		-0.1237	0.1045		-0.1556	0.1061	
6 to 8 Rooms in 1990	-0.0100	0.0242		-0.0185	0.0226		-0.0118	0.0233		-0.0065	0.0223	
More Than 8 Rooms in 1990	0.0705	0.0293	*	0.0822	0.0285	**	0.0747	0.0282	**	0.1120	0.0269	**
Married in 1990	-0.0036	0.1115		-0.0566	0.1075		-0.0467	0.1073		-0.1238	0.1024	
Separated Divorced or Widowed in 1990	0.0157	0.1186		-0.0355	0.1154		-0.0248	0.1149		-0.0954	0.1120	
Non Hispanic Black	-0.0504	0.0260		-0.0448	0.0249		-0.0463	0.0252		-0.0265	0.0244	
Non Hispanic Other Race	0.0176	0.0268		0.0181	0.0259		0.0192	0.0257		0.0321	0.0257	
Mexican Hispanic	-0.0564	0.0211	**	-0.0640	0.0208	**	-0.0572	0.0209	**	-0.0611	0.0209	**
Other Hispanic	0.0626	0.0393		0.0641	0.0392		0.0652	0.0387		0.0769	0.0393	
Household Income in 1990	-0.0889	0.0180	**	-0.0932	0.0163	**	-0.0893	0.0165	**	-0.0977	0.0159	**
Middle Atlantic	0.0054	0.0063		0.0054	0.0063		0.0056	0.0062		0.0030	0.0063	
East North Central	0.0358	0.0073	**	0.0357	0.0071	**	0.0361	0.0071	**	0.0348	0.0071	**
West North Central	0.0320	0.0086	**	0.0302	0.0084	**	0.0319	0.0085	**	0.0289	0.0084	**
South Atlantic	0.0278	0.0087	**	0.0260	0.0082	**	0.0282	0.0086	**	0.0186	0.0076	*
East South Central	0.0230	0.0101	*	0.0233	0.0096	*	0.0236	0.0099	*	0.0178	0.0094	
West South Central	0.0236	0.0093	*	0.0225	0.0087	**	0.0246	0.0092	**	0.0196	0.0081	*
Mountain	0.0456	0.0097	**	0.0431	0.0090	**	0.0459	0.0095	**	0.0370	0.0084	**
Pacific	0.0271	0.0076	**	0.0259	0.0075	**	0.0278	0.0074	**	0.0231	0.0071	**
Mixed Division	-0.0702	0.0373		-0.0594	0.0372		-0.0630	0.0369		-0.0612	0.0377	
Constant	0.0509	0.1106		0.1339	0.1022		0.0858	0.1069		0.1510	0.0997	
N	210			210			210			210		
R^2	0.60			0.58			0.60			0.56		

Notes:

Source: 1990 and 2000 IPUMS

** indicates significance at the 1% level and * denotes significant at the 5% level. The observation level of the sample in this report is a matched MSA. Only non-commercial, non-condo single family detached houses are considered in the sample. CAGR, the dependent variable, is compound annual growth rate, a similar measure to annualized difference in natural logs of end and start values. Results are weighted by sum of weights at the MSA level. Median house values are adjusted to 2000 using non-seasonally adjusted CPI minus shelter and median household income are adjusted to 200o using non-seasonally adjust CPI.

Appendix E

Homeownership Rates by Age, Race/Ethnicity and Location

Much of the literature on homeownership is focused on attaining homeownership for the first time. However, elderly owners also contribute to the homeownership rate and their postponement in leaving their house affects house prices especially for affordable units. This subsection presents the patterns of homeownership rates by age, race/ethnicity and location based on the PUMS data.

The most common stylized fact is that homeownership rates increase with age. The age distribution shown in Exhibit E-1 is compressed for the ages below 50 in order to focus on 5-year intervals over 60 years old. The N in Exhibit E-1 is the weighted sample size in millions of households and the Dist column gives the percentage distribution. The Rate column for 1990 presents the homeownership rates for each age category and shows increasing rates to 79.9 percent when the householder reaches the early 60s before gradually declining. Shading in the last 4 age categories highlights the declining ownership rates above 75 years old that is the focus of this study. In the last three columns the age distribution has been updated for householder age in 2000 and it shows a higher peak homeownership rate of 80.9 percent attained at a later age, 65 to 69. Elderly owners are aging in their own homes longer and demographers expect this trend to continue as the Baby Boom retires. The outward shift in declining ownership rates is shown graphically in Exhibit E-2.

The lower panel of Exhibit E-1 presents homeownership rates by race/ethnicity. Every group increased their homeownership rates between 1990 and 2000, but the non-hispanic whites increased the most, from 69.1 percent in 1990 to 82.1 percent in 2000. As a result, the gap between whites and minorities has increased. More detailed distributions of homeownership rates by race/ethnicity are given in Exhibit E-3 and shown graphically in Exhibit E-4. The gap in homeownership rate gradually narrows for owners in their 70s as white owners leave ownership faster than minorities. The white-black gap shrinks from 20.9 percentage points in age 65-69 to 16.9 points in age 75-79 down to 6.5 points in 85-89. The main point is that eventually all ethnic groups shift out of ownership as they move to assisted living or sharing homes with relatives. Despite the expense of utilities and responsibility for maintenance, once the mortgage has been paid down, owned housing is usually the least expensive housing alternative.

Exhibit E-1: Homeownership Rates by Age Distribution and Race/Ethnicity for 1990 and 2000

	1990			2000		
Subgroups	**N**	**Dist**	**Rate**	**N**	**Dist**	**Rate**
Total	91.71	100.0%	64.2%	105.50	100.0%	66.2%
Age[1]						
49 and Younger	52.34	57.1%	54.8%	58.45	55.4%	56.7%
50 - 59	12.58	13.7%	78.2%	17.92	17.0%	77.8%
60 - 64	6.35	6.9%	79.9%	6.46	6.1%	80.1%
65 - 69	6.37	7.0%	79.5%	5.96	5.7%	80.9%
70 - 74	5.39	5.9%	77.4%	5.68	5.4%	80.4%
75 - 79	4.31	4.7%	73.5%	4.91	4.7%	78.0%
80 - 84	2.67	2.9%	68.7%	3.51	3.3%	74.3%
85 - 89	1.25	1.4%	64.5%	1.89	1.8%	69.3%
90 and Older	0.45	0.5%	61.8%	0.70	0.7%	60.6%
Race[2]						
Non Hispanic White	73.66	80.3%	69.1%	79.08	75.0%	82.1%
Non Hispanic Black	9.69	10.6%	43.9%	12.13	11.5%	46.3%
Other Non Hispanic	2.54	2.8%	52.3%	5.08	4.8%	53.3%
Mexican Hispanic	3.27	3.6%	46.8%	5.01	4.8%	48.4%
Other Hispanic	2.54	2.8%	36.2%	4.18	4.0%	42.3%

Notes:

Source: 1990 and 2000 IPUMS

Sample sizes are in millions of households and homeownership rates are percentages of sample size. Sample size, distribution and homeownership rates are weighted by the household weight provided by IPUMS.

1. In 1990, age was topcoded at 90 and in 2000, it was topcoded at 89 and higher values were expressed as the state mean of all values of 89, maximum of which was 94.

2. In 2000, Census respondents could multiple race categories. For this tabulation, respondents picking black as one of their races are counted as black and non-black respondents picking other races than white are counted as other race. Respondents picking only white as their race is counted as white.

Exhibit E-2: Census Homeownership Rates of Households

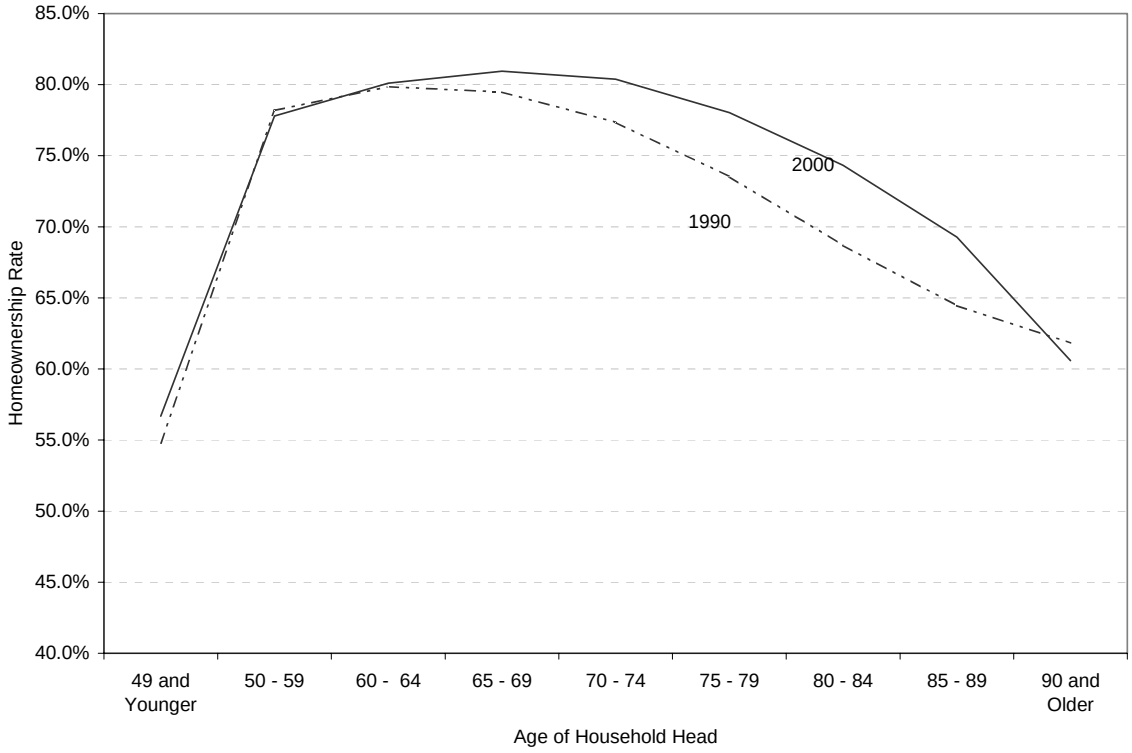


Exhibit E-3: Homeownership Rates by Age Category for Race/Ethnicity Subgroups in 2000

	Non Hispanic White[2]			Non Hispanic Black			Other Non Hispanic			Mexican Hispanic			Other Hispanic		
Race & Ethnicity	**N**	**Distrib**	**Rate**	**N**	**Distrib**	**Rate**	**N**	**Distrib**	**Rate**	**N**	**Distrib**	**Rate**	**N**	**Distrib**	**Rate**
Total	79.08	100.0%	72.5%	12.13	100.0%	46.3%	5.08	100.0%	53.3%	5.01	100.0%	48.4%	4.18	100.0%	42.3%
Age in 2000[1]															
49 and Younger	40.94	51.8%	63.9%	7.51	61.9%	36.9%	3.37	66.3%	45.8%	3.78	75.4%	41.8%	2.86	68.4%	37.1%
50 - 59	13.90	17.6%	82.6%	1.96	16.1%	58.9%	0.85	16.7%	69.3%	0.61	12.2%	66.1%	0.60	14.5%	52.6%
60 - 64	5.11	6.5%	84.4%	0.70	5.8%	62.2%	0.26	5.1%	70.7%	0.18	3.7%	69.7%	0.21	4.9%	54.5%
65 - 69	4.81	6.1%	84.8%	0.62	5.1%	63.9%	0.20	4.0%	67.0%	0.15	3.0%	73.9%	0.17	4.1%	56.5%
70 - 74	4.72	6.0%	83.6%	0.52	4.3%	65.2%	0.16	3.2%	65.6%	0.13	2.5%	72.0%	0.15	3.5%	55.8%
75 - 79	4.21	5.3%	80.5%	0.40	3.3%	63.6%	0.12	2.3%	64.5%	0.09	1.7%	71.5%	0.09	2.3%	54.4%
80 - 84	3.08	3.9%	75.8%	0.25	2.0%	64.5%	0.07	1.4%	63.2%	0.05	0.9%	73.6%	0.06	1.4%	51.0%
85 - 89	1.68	2.1%	70.4%	0.13	1.1%	63.9%	0.04	0.8%	56.0%	0.02	0.4%	66.6%	0.03	0.7%	45.4%
90 and Older	0.61	0.8%	60.9%	0.05	0.5%	60.8%	0.01	0.3%	54.9%	0.01	0.2%	65.7%	0.01	0.2%	41.7%

Notes:

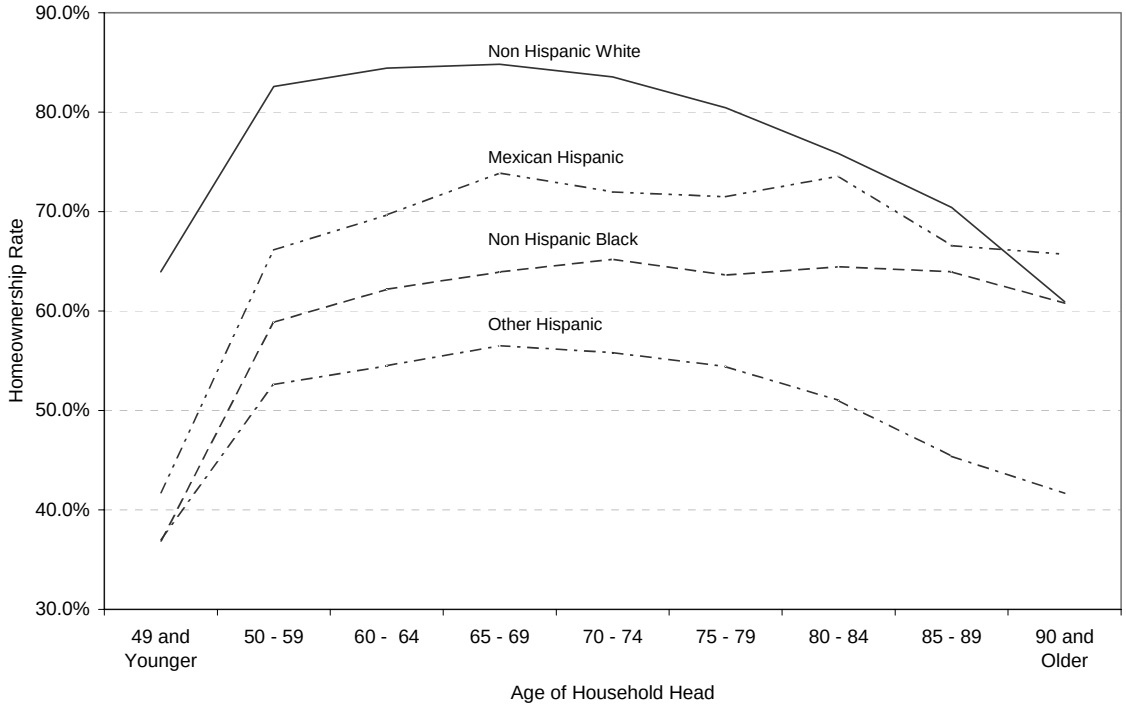
Source: 1990 and 2000 IPUMS

Sample sizes are in millions of households and homeownership rates are percentages of sample size. Sample size, distribution and homeownership rates are weighted by the household weight provided by IPUMS.

1. In 2000, age was topcoded at 89 and higher values were expressed as the state mean of all values of 89, maximum of which was 94.

2. In 2000, Census respondents could multiple race categories. For this tabulation, respondents picking black as one of their races are counted as black and non-black respondents picking other races than white are counted as other race. Respondents picking only white as their race is counted as white.

Exhibit E-4: Census 2000 Homeownership Rates by Race and Ethnicity



The percent of the population that is elderly varies by state, as does the elderly homeownership rate. Summing the distribution shares for people 75 years old or more, the average for USA is 10.5 percent of all households and Florida stands out with the largest share of 14.2 percent of all households headed by people age 75 or over. Pennsylvania is the next highest with 13.1 percent, but a very different situation. Florida has a high share of elderly as a Sunbelt destination state for retirees, whereas Pennsylvania is a Rustbelt state from which younger households leave for employment elsewhere. Housing costs are generally low in Pennsylvania, particularly in the non-metro areas of the state, so the ownership rates are relatively high. The other states chosen for the comparison, Maryland and California, have relatively high housing costs as working families move there for jobs. Exhibit E-5 presents the homeownership distributions for each of these states along with the national benchmark. A graphical version in Exhibit E-6 shows how much Florida surpasses other states in terms of high homeownership rates for elders. California, as a high cost market, falls below other states but eventually joins the pack in the mid-70s age category.

Exhibit E-5: Homeownership Rates by Age Category for Four States

	Florida			Pennsylvania			Maryland			California			USA		
Age	**N**	**Distrib**	**Rate**	**N**	**Distrib**	**Rate**	**N**	**Distrib**	**Rate**	**N**	**Distrib**	**Rate**	**N**	**Distrib**	**Rate**
All Households	6.34	100.0%	70.1%	1.98	100.0%	71.3%	1.98	100.0%	67.7%	11.51	100.0%	56.9%	105.50	100.0%	66.2%
Age in 2000[1]															
49 and Younger	3.10	49.0%	57.6%	2.42	50.7%	63.4%	1.11	56.1%	59.5%	6.67	58.0%	45.4%	58.45	55.4%	56.7%
50 - 59	1.02	16.1%	78.2%	0.80	16.8%	81.4%	0.36	18.4%	80.0%	1.96	17.0%	70.6%	17.92	17.0%	77.8%
60 - 64	0.42	6.7%	83.4%	0.31	6.4%	82.2%	0.12	6.2%	79.3%	0.66	5.7%	73.8%	6.46	6.1%	80.1%
65 - 69	0.44	7.0%	86.1%	0.30	6.4%	82.7%	0.10	5.2%	79.8%	0.59	5.1%	75.1%	5.96	5.7%	80.9%
70 - 74	0.45	7.1%	86.5%	0.32	6.7%	80.6%	0.10	5.1%	80.6%	0.55	4.8%	76.5%	5.68	5.4%	80.4%
75 - 79	0.39	6.2%	85.4%	0.28	6.0%	76.8%	0.08	4.2%	74.8%	0.48	4.1%	76.5%	4.91	4.7%	78.0%
80 - 84	0.29	4.6%	81.8%	0.20	4.3%	73.0%	0.06	3.1%	70.9%	0.35	3.0%	72.8%	3.51	3.3%	74.3%
85 - 89	0.16	2.5%	78.3%	0.10	2.1%	68.4%	0.03	1.3%	68.9%	0.19	1.6%	69.5%	1.89	1.8%	69.3%
90 and Older	0.06	0.9%	67.2%	0.03	0.7%	60.2%	0.01	0.5%	58.6%	0.07	0.6%	61.1%	0.70	0.7%	60.6%
75 and Older	0.90	14.2%	81.8%	0.62	13.0%	73.3%	0.18	9.1%	71.7%	1.08	9.4%	73.1%	11.00	10.4%	74.3%

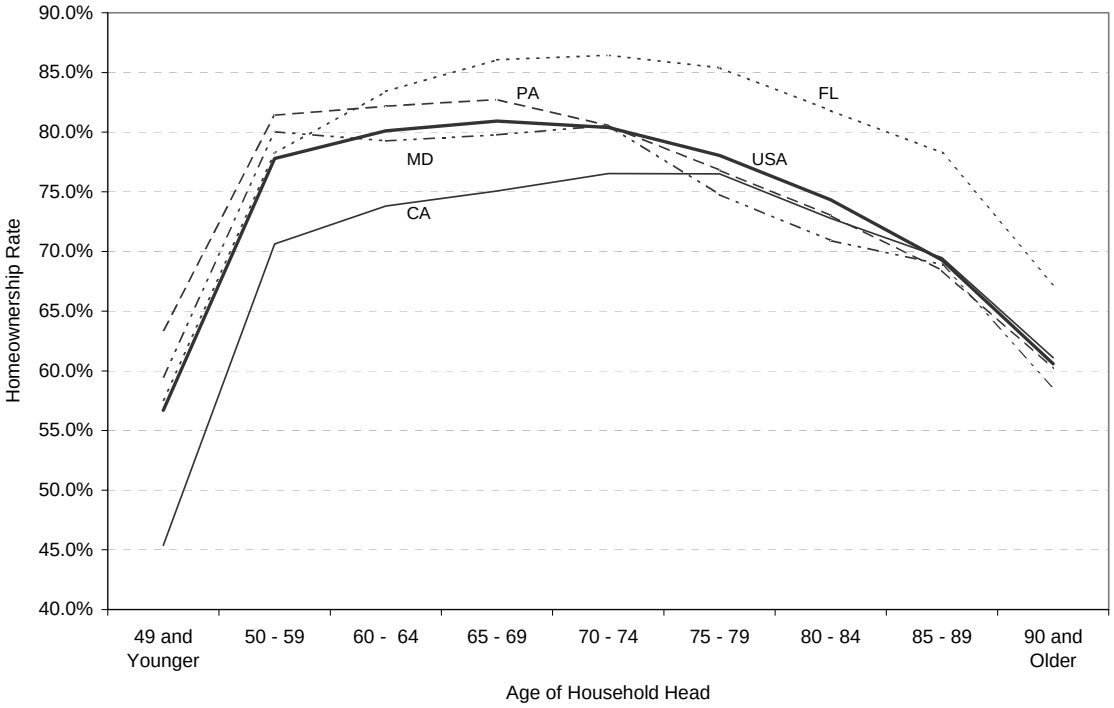
Notes:

Source: 1990 and 2000 IPUMS

Sample sizes are in millions of households and homeownership rates are percentages of sample size. Sample size, distribution and homeownership rates are weighted by the household weight provided by IPUMS.

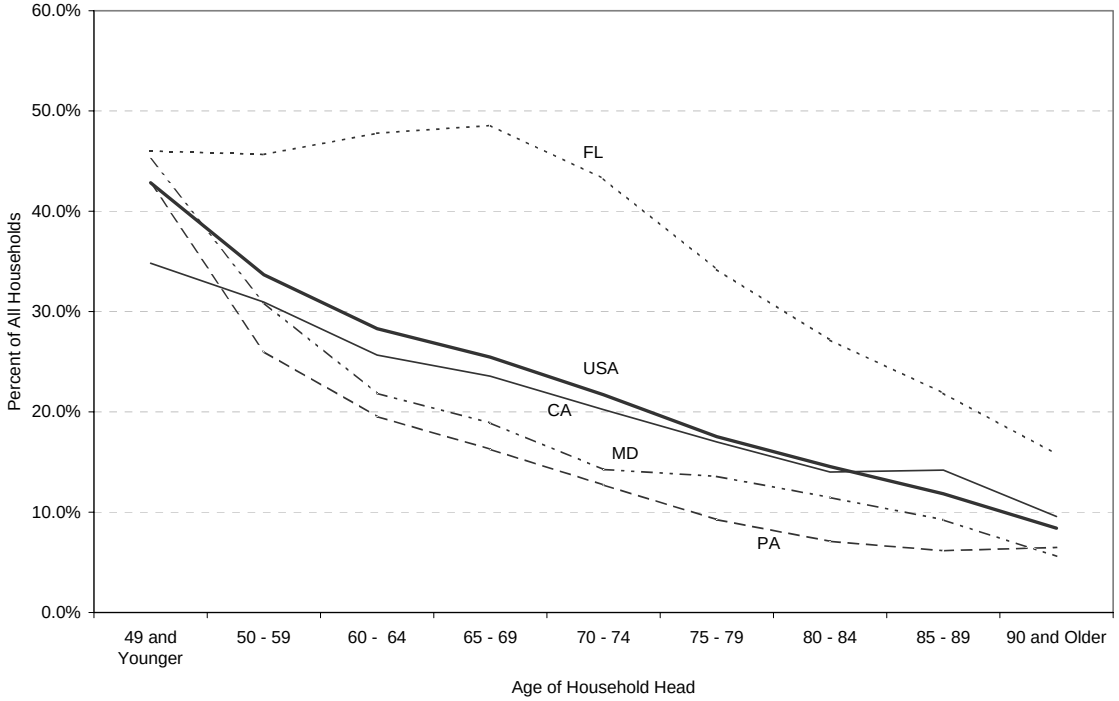
1. In 2000, age was topcoded at 89 and higher values were expressed as the state mean of all values of 89, maximum of which was 94.

Exhibit E-6: Census 2000 Homeownership Rates of Households in Four States



Florida and Pennsylvania both have a disproportionate share of elderly households, but their mobility characteristics are very different, as shown in Exhibit E-7. Movers are defined as households who have lived in their house less than 11 years. Stayers have length of tenure 11 years or more. The percent of mover-owners starts at about the same level for households under 50, but then diverges to a wide spread by the late 60s age category. At that age, mobility rates in Florida are twice as high as in Pennsylvania. California follows the national pattern of declining shares of movers as households age. Maryland has relatively low mover shares.

Exhibit E-7: Mover Owner Households in 2000 by Age



Another way to compare the states is to subdivide the movers by ownership shares. In Exhibit E-8, households in each state are divided between movers and stayers, then further subdivided between owners and renters. The stayer-renter category is small and relatively stable, so it has been left out of the table. The mover-renters start with a high share for households below 50, but then drop to a share of 10 to 20 percent until the last age category above 90 years old. The main action comes from the declining shares of mover-owners as they age and shift into stayer-owners until becoming renters at the end of their lives. The shift happens relatively early in Pennsylvania and late in Florida. The other states are closer to the national average.

Given the long periods of ownership for stayers, it is typical for older owners to live in older houses. Exhibit E-9 shows that, in fact, stayers' ages are more correlated with building age (0.15) than movers (-0.07), and stayer-owner ages are more highly correlated (0.19) than stayer-renters (-0.05). The correlations between owner age and building age are even higher in PA (0.21) and MD (0.26). This correlation is potentially important in the regression models with inadequate controls for building age. The effect of old buildings on house value may be transmitted through the owner age coefficient if the building age variable is omitted (as it is in the HRS models due to lack of data).

Exhibit E-8: Tenure Choice for Movers versus Stayers by Age Category

	Florida			Pennsylvania			Maryland			California			USA		
	Mover [2]		Stayer	Mover		Stayer	Mover		Stayer	Mover		Stayer	Mover		Stayer
Age	**Owners**	**Renters**	**Owners**	**Owners**	**Renters**	**Owners**	**Owners**	**Renters**	**Owners**	**Owners**	**Renters**	**Owners**	**Owners**	**Renters**	**Owners**
Age in 2000[1]															
49 and Younger	46.0%	41.0%	11.5%	42.8%	34.1%	20.6%	45.2%	38.1%	14.3%	34.8%	51.7%	10.6%	42.9%	40.8%	13.8%
50 - 59	45.7%	19.6%	32.6%	26.0%	14.3%	55.4%	30.9%	15.8%	49.2%	30.9%	23.8%	39.7%	33.7%	17.6%	44.1%
60 - 64	47.8%	13.8%	35.6%	19.5%	12.0%	62.6%	21.9%	15.6%	57.4%	25.7%	19.8%	48.1%	28.3%	14.5%	51.8%
65 - 69	48.6%	11.4%	37.5%	16.3%	11.4%	66.5%	18.9%	13.6%	60.9%	23.6%	18.0%	51.5%	25.5%	13.4%	55.5%
70 - 74	43.3%	10.6%	43.2%	12.7%	12.3%	67.8%	14.3%	12.6%	66.3%	20.2%	16.2%	56.3%	21.7%	13.0%	58.7%
75 - 79	34.2%	10.9%	51.2%	9.3%	13.9%	67.6%	13.6%	14.4%	61.2%	17.0%	15.6%	59.5%	17.5%	13.7%	60.5%
80 - 84	27.2%	12.7%	54.6%	7.1%	14.2%	65.9%	11.5%	17.8%	59.5%	14.0%	16.9%	58.8%	14.5%	15.2%	59.8%
85 - 89	21.9%	15.4%	56.4%	6.2%	16.1%	62.3%	9.3%	16.7%	59.7%	14.2%	17.7%	55.3%	11.9%	17.9%	57.4%
90 and Older	15.8%	23.0%	51.5%	6.5%	20.7%	53.7%	5.6%	23.4%	53.0%	9.6%	22.5%	51.5%	8.4%	22.8%	52.2%

Notes:

Source: 1990 and 2000 IPUMS

Shares in each age category is calculated using weights provided by IPUMS.

1. In 2000, age was topcoded at 89 and higher values were expressed as the state mean of all values of 89, maximum of which was 94.

2. Stayers are households with household heads living at the current address in 2000 for longer than 10 years. Movers have only been at the current address in 2000 for 10 or fewer years. Stayer renters has been excluded from this table and comprises a small but stable group in each age category.

Exhibit E-9: Correlations Between Household Head Age and Building Age

	Florida			Pennsylvania			Maryland			California			USA		
Types of Housholds [1]	**N**	**Distrib**	**Corr**	**N**	**Distrib**	**Corr**	**N**	**Distrib**	**Corr**	**N**	**Distrib**	**Corr**	**N**	**Distrib**	**Corr**
Stayers	1.83	28.9%	0.06	2.19	45.8%	0.17	0.73	36.8%	0.22	3.58	31.1%	0.12	36.97	35.1%	0.15
Owners	1.68	26.5%	0.07	1.96	41.1%	0.21	0.65	32.6%	0.26	3.04	26.4%	0.16	32.50	30.8%	0.19
Renters	0.15	2.4%	0.01	0.23	4.8%	-0.15	0.08	4.2%	-0.05	0.54	4.7%	-0.05	4.48	4.2%	-0.05
Movers	4.51	71.1%	-0.06	2.59	54.2%	-0.12	1.25	63.2%	-0.04	7.93	68.9%	-0.06	68.51	65.0%	-0.07
Owners	2.76	43.6%	-0.06	1.44	30.3%	-0.10	0.70	35.2%	-0.01	3.51	30.5%	-0.06	37.31	35.4%	-0.06
Renters	1.75	27.5%	0.06	1.14	23.9%	-0.12	0.55	28.1%	-0.03	4.42	38.4%	-0.01	31.19	29.6%	-0.01

Notes:

Source: 1990 and 2000 IPUMS

Sample sizes are in millions of households and homeownership rates are percentages of sample size. Sample size, distribution and correlations are weighted by the household weight provided by IPUMS.

1. Stayers are households with household heads living at the current address in 2000 for longer than 10 years. Movers have only been at the current address in 2000 for 10 or fewer years.