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ABSTRACT

Aside from Social Security and, for some, employer-provided pensions, housing equity is the principle asset of a large fraction of older Americans. Many retired persons have essentially no financial assets to support retirement consumption. We use data from the Health and Retirement Study (HRS), the Asset and Health Dynamics Among the Oldest Old (AHEAD), and the Survey of Income and Program Participation (SIPP) to understand the extent to which families use housing equity to support general consumption in retirement. The initial analysis is based on self-assessed home values reported by survey respondents. Because the self-assessments exaggerate actual home equity, much of the subsequent analysis is based on the selling price of recently sold homes, together with the reported equity in recently purchased homes. Homeowners can change home equity by either discontinuing ownership or by purchasing another home of lesser or greater value. We find that in the absence of a precipitating shock--death of a spouse or entry of a family member into a nursing home- -families are unlikely to discontinue home ownership. And even when there is a precipitating shock, discontinuing ownership is the exception rather than the rule. On average, families that move and purchase a new home tend to increase home equity. We find, however, that income-poor and house-rich families are more likely to reduce equity when they move, while house-poor and income-rich households are more likely to increase housing equity. Overall, accounting for discontinuing ownership and moving to another home, housing equity increases with age until about age 75 and then declines slightly as households grow older. The overall decline among older households (surveyed in the AHEAD) is about 1.76 percent per year, and this decline is largely accounted for by a 7.84 percent decline among households who experience a precipitating shock. Families that remain intact reduce housing equity very little, about 0.11 percent per year for two-person households and 1.15 percent per year for one- person households. We conclude that, on average, home equity is not liquidated to support general non-housing consumption needs as households age.

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Except for Social Security and, for some, employer-provided pension assets, housing equity is the most important asset of a large fraction of older Americans. In principle, these assets might be used to support consumption after retirement. In this paper we take another look at the change in the home equity of older families as they age, beginning at ages just before retirement. We use data from the Health and Retirement Study (HRS), the Asset and Health Dynamics Among the Oldest Old (AHEAD) survey, as well as the Survey of Income and Program Participation (SIPP). We distinguish changes in housing equity that may might be thought of as part of a financial plan to use housing equity as a means of general support in retirement from changes in housing equity that are precipitated by family shocks--death or severe illness.

This paper extends the analysis in Venti and Wise [2001], in which we found that in the absence of changes in household structure, most elderly families are unlikely to move.[1] We also found that even among movers, those families that continue to own typically do not reduce home equity. However, precipitating shocks, like the death of a spouse or entry to a nursing home, sometimes lead to liquidation of home equity. Home equity is typically not liquidated to support *general* non-housing consumption needs. The analysis in the current paper is also based on both the HRS and AHEAD data, as well as data from eight panels of the SIPP. Again, the key question is whether housing wealth is typically used to support the general consumption of older persons as they

[1]The AHEAD initially surveyed persons age 70 and over in 1993 and resurveyed them in 1995 as part of the second wave of AHEAD and resurveyed them again in 1998 as part of the fourth wave of the HRS. For convenience we refer to these surveys as the first three waves of AHEAD.

age, although the analysis is based on more extensive data. The present analysis also presents a more formal accounting for the change in home equity when ownership is discontinued and the change in home equity when moving to another owned unit ("up-sizing" or "down-sizing"). In addition we give brief consideration to parallel changes in non-housing assets as persons age.

The change in housing equity as persons age has been considered in several earlier papers, using data that covered an earlier time period or data for persons at younger ages. In Venti and Wise [1989, 1990], we concluded that households "don't want to reduce housing equity" as they age. We found that large reductions in home equity were typically associated with the death of a spouse, retirement, or with other precipitating shocks. These analyses were based on the Retirement History Survey (RHS) and covered persons in the 58 to 73 age range. Merrill [1984], based on the Retirement History Survey (RHS), found that unless there was a change in family status there was little if any reduction in housing equity as families aged Feinstein and McFadden [1989], based on the Panel Survey of Income Dynamics (PSID), including households with heads over age 75, also concluded that in the absence of change in family status housing equity was typically not reduced. Megbolugbe, Sa-Aadu, and Shilling [1997] also used the PSID and found that the change in housing equity varied by age. The oldest households (age 75+) were as likely to trade up as to trade down when they moved. Sheiner and Weil (1993) found some decline in home equity at older ages, but these declines were primarily associated with shocks to family status and health. Hurd [1999], in a general analysis of wealth change based on the first two waves of the AHEAD, concluded that there was a modest decline in housing wealth and rates of home ownership for two-person households that survived the two year period intact, but larger declines for two-person households that lost a member between the waves. He also found that total wealth increased between the waves for all types of households and at all ages.

Whether the elderly perceive home equity as a source of funds for general consumption as they grow older is an important issue for at least two reasons. A concern of some is that older households have substantial wealth locked in illiquid housing and would like to release it. A proposed solution to this perceived “problem” is a reverse annuity mortgage that allows the household to draw down home equity while remaining in the home. To date, there has been little apparent interest in reverse mortgages. It is not clear whether the failure is due to unfavorable financial terms of reverse mortgages or simply to a lack of demand for a product that is intended to exhaust housing equity over the life of the occupant. Several studies, including Venti and Wise [1991], Mayer and Simons [1994], and Merrill, Finkel, and Kutty [1994], have shown that a significant segment of the population appears to be “income-poor and house-rich,” and might benefit from a reverse mortgage. We concluded in our earlier analyses, however, that the equity choices of older persons were inconsistent with substantial interest in such products. Nonetheless, knowing whether older households wish to withdraw assets from housing equity helps to evaluate the extent of the potential market for reverse mortgages, and we judge it important to revisit the issue.

A second reason to consider whether the elderly plan to, or will, use home equity to support general consumption is to understand the adequacy of saving for retirement. If housing equity is used just like financial assets to support consumption after retirement, then it might also be considered as a substitute for financial wealth and perhaps treated interchangeably with financial wealth in considering the well-being of the elderly. On the other hand, if households do not plan to draw down home equity as they age, it may be more realistic to assume that general consumption expenditures will come largely from accumulated financial wealth, including Social Security and other annuities. Analysts considering how well households are prepared for retirement have treated housing equity in various ways. Moore and Mitchell [2000] include housing wealth in the set of assets that can be used to finance retirement. The Congressional Budget Office [1993] also includes housing wealth with other wealth. On the other hand, Bernheim [1992] in considering “Is the Baby Boom Generation Preparing Adequately for Retirement” excluded housing wealth in making a determination. Engen and Gale [1999] include zero, 50 percent, and 100 percent of housing equity. Gustman and Steinmeier [1999] conduct analyses using zero and 100 percent of home equity.

In this paper we first consider the relationship between age and housing equity over the life cycle, based on data from the SIPP. This analysis is drawn largely from Venti and Wise [2001]. The results are based on cohort analysis and are presented graphically. Next, we present more detailed cohort analysis for older households, based on the HRS and the AHEAD data.

We then focus on within household changes in housing equity, giving particular attention to the effect of precipitating shocks. We find that on average there is no reduction in housing equity among persons who continue to own homes, even as they age through their eighties and even into their nineties. Indeed, persons who sell one house and buy another tend to increase housing equity, on average. Large reductions in housing equity are typically associated only with selling and discontinuing home ownership. Giving up ownership is most often associated with the death of a spouse or entry into a nursing home. In these cases, home equity may be used to pay medical expenses or indeed to support more general consumption of a surviving spouse, although we have not attempted here to document such expenditures. In general, however, we find that home equity is not systematically converted to liquid assets to support non-housing consumption.

Finally, our analysis draws attention to two limiting features of the HRS and AHEAD data. The first feature concerns the use of imputations in analysis of panel data. Our earlier analysis of the AHEAD data was based on preliminary releases of AHEAD wave 2 and HRS wave 4 (the third wave of AHEAD). In the current paper we use more recent releases of the second wave of AHEAD and the fourth wave of the HRS that include asset imputations–including home equity--provided by the HRS staff.[2] Tabulations from the new data sources are similar, to tabulations presented in Venti and Wise [2001] that did not use these imputations. We find, however, that in many instances the imputations appear to increase the "randomness" in the data. This is perhaps not surprising, given that imputed values are "hot-decked," based on contemporaneous cross-section data. In panel applications, the imputed values should be based on both family-specific longitudinal data, as well as cross-section data. In this paper, all analyses using the "selling price" data (section C.5 forward) drop imputed observations.

A second, related, concern is the large number of inconsistent responses in the *reported* data, particularly when comparing "move" and "stay" transitions to "own" and "rent" housing tenures. For example, many households are reported to own in one wave then rent in the next, and then return to ownership in the third wave, without reporting a move between either the first and second waves, or between the second and third waves. Many of these households begin and end with the same (or similar) home equity. Most of these anomalies are apparently reporting errors. Each such error results in two changes in housing equity that are of equal magnitude but opposite sign and thus may have a large effect on calculated changes in home equity. In some of our analyses we have dropped observations that reported a change in tenure but did not report a move. We also find many unrealistically large wave-to-wave swings in home equity among households that <u>stay</u> in the same home. These apparent errors are

[2] The newer data also use additional information on death and nursing home entry that has recently become available.

comparable in magnitude to the changes in home equity reported by movers.[3]

Much of the analysis in this paper is based on recent selling prices and on the reported equity in newly purchased homes. We believe these data are likely to be the most reliable data on home equity. We also have given considerable attention to evaluating the extent of bias in self-assessed home values. Thus on balance, while we believe that more attention can be given to improving the data, we are comfortable with our principle conclusions.

A. COHORT DESCRIPTION

1. SIPP Data on Home Ownership and Equity over the Life Course

The SIPP provides housing equity (obtained from home value and mortgage debt) data for seven years - 1984, 1985, 1987, 1988, 1991, 1993 and 1995.[4] From the random sample of cross-section data in each of these years we have created cohort data. For example, to trace the home equity of persons who were age 26 in 1984, we begin with the average home equity of persons age 26, based on the random sample of persons age 26 in 1984 survey. Next we obtain the average equity of persons age 27

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[3]The HRS is currently using "call-back" procedures to resolve these issues.

[4]The survey panels and wave that provide the data are as follows:

Panel	Wave	Dates in Field
1984	4	Sept-Dec 1984
1984	7	Sept-Dec 1985
1985	3	Sept-Dec 1985
1985	7	Jan-Apr 1987
1986	4	Jan-Apr 1987
1986	7	Jan-Apr 1988
1987	4	Feb-May 1988
1990	4	Feb-May 1991
1991	7	Feb-May 1993
1992	4	Feb-May 1993
1993	7	Feb-May 1995

from the 1985 survey, age 29 in the 1987 survey, and so forth. We identify cohorts by their age in the 1984 survey. We do this for 17 cohorts defined by the age of the cohort in the first year of the data. In fact, to obtain more precise estimates of housing equity, the data for a cohort, like age 26, is the average of data for a three-year age interval –25, 26, and 27. We do this for cohorts, age 26, 29, ...to age 71,74. All cohorts are followed until age 80 in the SIPP.[5]

Figure 1 shows the percent of two-person households who own a home, by cohort. These data can be affected by differential mortality. For example, suppose that home owners were less likely to die at any age than renters. In this case, the ownership rate would be increased with age simply because the owners lived and the renters died. To account for this possibility, we made a mortality correction to the data, which is explained in the appendix. The mortality-corrected data for two person households is shown in Figure 1. To make the figure easier to read, only selected cohorts are shown. The key message of the figure is that home ownership does not decline with age, through age 79. In addition, there appear to be no important cohort effects until about age 70. That is, there are no large jumps when the data for one cohort ends and the data for another cohort begins. At older ages, however, there do appear to be noticeable cohort effects. Home ownership is lower for the last two cohorts. But like the trends for the other cohorts, there is no evident decline in ownership as these cohorts age.

Home ownership data for one-person households are shown in Figure 2. Again there is no apparent decline in ownership with age, though age 79. Indeed, the data seem to show some increase in ownership at the oldest ages.

Cohort home equity data for two-person families are shown in Figure 3. These data in 1995 dollars and are corrected for mortality. The within-cohort data show no

[5] Data for households over age 80 are not used because age is top coded at 80.

decline in home equity as the cohort ages. The data may even show some increase in equity within cohorts for ages 65 to 79. There do appear to be some cohort effects in equity, as evidenced by the jumps when the data for one cohort ends and the data for another cohort begins.

In estimates reported in Venti and Wise [2001] we show rather systematic cohort effects. The estimates show that both older cohorts–those over age 70 in 1984--and younger cohorts–those younger than 36 in 1984--have lower home equity than the average, while the middle-aged cohorts have higher equity than the average. The cohort effects are likely determined in large part by differences in housing price changes over time.[6]

Figure 4 shows the cohort equity data for one-person households, corrected for mortality and inflation. As with the two-person households, there seems to be no decline in equity through age 79.

2. AT OLDER AGES: HRS and AHEAD

To understand trends in home equity at older ages, we use the AHEAD as well as the HRS. Both are panel studies. The HRS follows persons in households with heads age 51 to 61 in 1992. Members of these households were interviewed in 1992 and again in 1994, 1996, and 1998. In 1998, the heads were age 57 to 67. Thus this age range is included within the SIPP ages. The AHEAD study follows persons in households with heads age 70 and older in 1993. These households were interviewed

[6]For example, assume that homes are bought at age 35 on average, and consider the cohort that was age 50 in 1984 compared to the cohort that was age 38 in 1984. The older cohort bought homes in 1969 on average and would have gained from large home price increases in the 1970s. On the other hand, the younger cohort would have bought homes in 1981 on average and would have seen much lower increases in home equity during the 1980s and 1990s.

in 1993 and again in 1995 and in 1998 (as part of the fourth wave of the HRS.[7] The AHEAD age range overlaps the older SIPP ages. Thus both HRS and AHEAD allow comparison with components of the longer life cycle SIPP data. Details of the survey design are presented in Juster and Suzman [1995].

In this analysis, we follow households in both the AHEAD and HRS files. One complication is tracking households over time. A household may split through divorce or separation, members may die, or a family member may enter a nursing home. For the purposes of this analysis, we have adopted these conventions: In the first wave of each survey households are identified as either one-person or two-person households (institutionalized persons are excluded from the original sample). In subsequent survey waves we classify each household--according to the change since the prior wave--into one of the following six "states":

"1" Continuing one-person household

"2" Continuing two-person household

"D" One of the original members has died

"T" Both of the original members have died

"N" One or more members has entered a nursing home

"S" Household composition has changed for some other reason (most often a split through divorce or separation or the addition of a new adult member.)

"0" Household refused the interview or is missing for other reasons

The sequences observed in the HRS and AHEAD are presented in Tables 1. These sequences are used to distinguish households included in analyses below. In cohort analysis in the next section we restrict attention to continuing two-person or one-person households identified as "2222" or "1111" for the HRS and "222" or "111" for the AHEAD. In the following section we consider changes in housing equity and other

[7]Juster and Suzman [1995] provide details of the survey design.

assets between waves. For this analysis we use each two-period sequence (creating an "interval"), and we focus in particular on the within household relationship between home ownership and home equity on the one hand and change in household composition on the other hand. We consider cohort data on home ownership first. Then we consider cohort data on home equity, as well as non-housing net assets.

a. Home Ownership

To obtain cohort data comparable to the SIPP cohort data, we construct cohorts from the HRS and AHEAD data by grouping households in two-year age intervals. These constructed cohorts are the basis for the cohort data shown below.

The home ownership cohort data for two-person families are shown in Figure 5, which covers ages from 50 to 93. To make the individual cohort data easier to view, only selected–largely non-overlapping–cohorts are shown. The first three cohorts plotted in the figure are from the HRS; the last five are from the AHEAD. Overall, the within-cohort data show an increase in home ownership through age 70. Thereafter the cohort data suggest a small decline in ownership. A more detailed analysis of these data, presented below, shows that for the AHEAD sample the <u>within-cohort</u> decline in ownership for continuing two-person households is about 0.66 percent per year for cohorts age 70 to 78 in the initial year and 0.34 percent for cohorts age 80 or more in the initial year. A comparison of these data with the SIPP data in Figure 1 shows that for persons age 50 to 79 the SIPP and the HRS-AHEAD data are very similar. Both data sources show ownership rates of about 90 percent for families over age 60. The within-cohort SIPP data, however, show no decline in ownership through age 79.

The pattern of home ownership for continuing one-person households, shown in Figure 6, is quite different. Again, there are some cohort effects. The <u>within-cohort</u> data for one-person households show a distinct rise in ownership between ages 50 and 75 and a decline in ownership at older ages. For AHEAD households–age 70 and older–the within-cohort decline for the continuing one-person AHEAD households is a little over one percent per year. (The data used to produce Figures 5 and 6 differ in some respects from data used in similar calculations presented in subsequent sections of the paper. First, the figures are based on persons who were continuing one- or two-person households over all of the survey waves. Some of the subsequent calculations are based on continuing one- or two-person households between two consecutive survey waves. Second, the figures account for both own to rent (or other) and rent to own transitions. Rent to own transitions offset to some extent own to rent transitions. Some subsequent calculations are based only on the transitions of initial homeowners. Third, a noticeable number of reported changes in tenure are not associated with a move. We believe that most of these changes in tenure are reporting or coding errors, as discussed below in section C.1. For example, considering the AHEAD portion of Figure 6, the within-cohort decline in ownership for continuing one-person households is 1.29 percent per year, using the data as reported. If households that report changes in tenure without a move are not included in the calculations, the decline is only about 0.98 percent per year. Using the latter data, home ownership of continuing one-person households is 74.7 percent at age 70. At an annual decline of 0.98 percent per year, 61.28 percent of these one-person households would still be owners at age 90.)

b. Home Equity

Mean home equity cohort data for two-person households are shown in Figure 7.[8] These within cohort data show an increase in home equity through about age 70 or 75. At older ages, the randomness in within cohorts makes it hard to see clear trends,

[8]All dollar amounts for the SIPP and AHEAD have been converted to 1998 dollars using the CPI.

although there appears to be a within cohort decline in equity. In fact, data presented below show that the average mean decline is about $2,100 per year, which is largely accounted for by the reported decline the same-home equity of continuing owners.

The home equity cohort data for one-person households are shown in Figure 8a. As with the two-person households, there is a clear within-cohort increase in home equity through age 70 or 75. At older ages a consistent within-cohort trend is not apparent. Data presented below show that the average decline is about $3,000 per year, again, largely accounted for by the reported decline the same-home equity of continuing owners. There appear to be substantial differences in home equity by cohort, although the randomness in the data makes it hard to distinguish cohort effects from within-cohort changes in home equity.

Median cohort data for two- and one-person households are shown in Figures 9 and 10 respectively. There is less randomness in the median data than in the mean data and thus within cohort trends are easier to discern in there figures. For example, for older two-person households the medians suggest modest within cohort decline in home equity beginning at about age 75, but cohort effects are not apparent. On the other hand, the median cohort data for older one-person households show little within-cohort decline in home equity but rather substantial cohort effects. Older cohorts seem to have successively less home equity. Below, we present quantitative estimates of the within-cohort changes in home equity.

c. Non-Home Equity

In considering the equity value of housing as these cohorts aged, it is informative to compare the value of housing with other assets. Cohort data on non-housing assets are shown in Figures 11 through 14. Like the home equity data, mean and median cohort data are shown for two- and one-person households. And separate figures are shown for the older AHEAD households. As with the home equity data, the trend in the non-home equity data for the HRS households is quite clear. But the extent of randomness in the data makes the cohort data for the AHEAD households much harder to interpret. Nonetheless, some trends are clear form the cohort data. (Below we show quantitative within-cohort changes in non-home assets, as well as home equity.)

First, it is clear for the HRS households that both home equity and housing increased with age, but the non-housing assets increased much more. For example, from Figure 7 it can be seen that the mean home equity of continuing two-person households increased from about $80,000 at age 50 to about $120,000 for households in their early 70s. There seem to be no apparent cohort effects. In Figure 11, it can be seen that non-housing assets of the HRS households increased from about $200,000 at age 50 to close to $400,000 at age 74, about five times as much as the increase in home equity. Again, cohort effects are not apparent in this age range. In future analysis we will try to determine which components of non-equity assets account for the large increase.

Second, for the older HRS households there are also large within-cohort increases in non-equity assets. For the older households, however, there are also large cohort effects, with successively older cohorts having lower non-housing assets. And, for the older cohorts there is some within-cohort decline in home equity.

It may be that there are in fact very large wave to wave changes in both home equity and non-housing assets. We believe, however, that the data is likely to reflect substantial reporting or recording errors. Thus further “verification” and “cleaning” of the data--including callbacks to correct retrospective information--might result in more consistent cohort patterns. These steps would have to be based on joint evaluation of all assets over all waves of the HRS and AHEAD surveys–looking perhaps at a X x Y matrix of data for each household.

C. FAMILY STATUS AND HOME EQUITY: HRS and AHEAD

We now turn to the relationship between changes in home equity and changes in family structure. Again we consider two- and one-person households separately and provide separate estimates for the HRS and the AHEAD families. Before considering within-cohort household transitions, cross-section summary data on household tenure (own, or rent or other combined) are shown by age and household structure (one-person or two-person) in Table 2. Home ownership of two-person families exceeds 90 percent between ages 54 and 74 and then declines to around 80 percent at ages 85 and older. For one-person families, home ownership increases to about 68 percent for age 70 to 74 households and then declines to about 50 percent for households age 85 and older. The home ownership rate for one-person households peaks in the 70-74 age range, declines modestly over the next decade, then falls sharply after age.

1. Within-Household Transitions

We focus on the events that precipitate changes in home ownership and the changes in home equity that are associated with the ownership changes. Table 3 shows ownership transitions between consecutive survey waves (an "interval"). The first two panels of the table pertain to households that owned a home at the beginning of the interval. The third and fourth panels pertain to households that did not own a home at the beginning of the interval. The table entries show the percent of households who make a transition between adjacent waves of each survey. For example, the transition labeled "22" identifies two-person household at the beginning of the interval (the first of the two waves) and at the end of the interval (in the subsequent wave). The HRS yields as many as three transitions (wave1 to wave 2, wave 2 to wave 3, and wave 3 to wave 4) and each represents a two year interval. The AHEAD yields two transitions. The first interval is two years and the second three years. All intervals in the HRS are combined to obtain the HRS results, and all intervals in the AHEAD are combined to obtain the AHEAD results.

Consider first the top panel of the table which pertains to the HRS households who were homeowners at the beginning of an interval. The first column shows the percent of households that own and the percent that rent (or have some other living arrangement) at the end of the interval. Of continuing two persons households, 98.3 percent still owned at the end of the interval; 1.7 percent no longer owned. The ownership of initial owners declined about 0.85 percent per year. Now consider continuing two-person HRS households who were non-owners at the beginning of the period shown in the third panel of the. Of these households 22.3 percent became owners during the interval, about 11.1 percent per year. On balance the number of homeowners increased: some initial owners became non-owners, but a larger number of initial non-owners became owners. This net addition to the homeowner group is shown graphically for the younger--HRS–cohorts in Figure 5. The figure, however, pertains to households who continued as two-person families through all four waves of the HRS. The data for continuing two-person households in the table, however, is based on all households that continued as two person families during any two adjacent survey waves.

Other rows of the first panel of Table 3 show that if a spouse dies (2D), the ownership rate remains high, at 95.6 percent. If a spouse enters a nursing home (2N) the ownership rate declines more, to 88.6 percent, although the sample of nursing home entrants is quite small for the younger HRS households.. For continuing one-person HRS households the ownership rate also remains high, at 95.2 percent. (There are only three single-person households in which the person entered a nursing home during the interval.)

The percent moving between adjacent waves is shown in the next column of

Table 3. Of two-person HRS households that own in both waves, 7.1 percent moved over the two-year interval. For two-person households that change from own to rent-or-other, the move rate is an unexpectedly low 65.7 percent. It is possible that ownership is transferred from parents to children, so the parents do not move, but also no longer own. However, this low move rate is more likely a reflection of reporting error. Inspection of some of these cases shows households owning a house of roughly constant value for three of the four waves. This evidence, combined with the absence of a move (which is verified by survey-takers), suggests errors in reporting or coding for one of the waves. Because there are a relatively small number of these households, a few errors can have a substantial effect on the move rate.

Similar results for the AHEAD sample are presented in the second and fourth panels. Initial homeowners in AHEAD were also likely to remain owners unless there was a change in family status. For example, 96.9 percent of continuing two-person households continued to own. But if one of the members died the ownership rate dropped to 88.8 percent. If one of the members entered a nursing home the rate dropped to 75 percent. For continuing one-person households, 91.3 percent remain owners. But if the single person enters a nursing home, the ownership rate drops to 39.9 percent. Thus, as with the younger HRS households, in the absence on precipitating shock, most AHEAD homeowners continue to own. But in the event of a shock, the decline in ownership is greater for older than for younger households. In addition, the decline is greater for one-person than for two-person households.

The move rate for the older AHEAD households that own in both waves is quite low, about 3.9 percent for two-person households and 4.5 percent of one-person households. Since the interval between waves is about 2 ½ years for the AHEAD, the annual move rates are 1.6 percent and 1.8 percent respectively. Again, the low move rates among households that report changing tenure suggest that some changes in tenure in the AHEAD may be incorrectly reported.

Overall, Table 3 suggests that homeowner households in the HRS age group are very likely to remain owners. And even if one of the household members dies or enters a nursing home, the rate of ownership remains high. Homeowners in the AHEAD age group are also likely to continue to own unless there is a change in family status, especially continuing two-person households. When a member of this older household dies or enters a nursing home, the decline in ownership is greater than for younger households. The greatest decline in ownership is for single-person AHEAD households who enter a nursing home. Even among this group almost 40 percent continue to own.

2. Change in Home Equity

We next consider changes in home equity that parallel the transitions shown in Table 3. Home equity changes are presented in two formats. The first format shows changes for all households– initial owners and initial renters-others. It shows changes for households who switch form owning to renting, as well as those switching from renting to owning. And it shows the net change in home equity for both groups combined. The second format is directed to the primary focus of our analysis, the change in home equity for initial homeowners. In this format we give particular attention to the change in the equity of movers who continue to own, compared to stayers, those who remain in the same house. Although we discuss changes based on changes in self-assessed home values here, we show below that the exaggeration of self-assessed home value impart large bias to the implied changes in home equity. Then we consider changes based on home selling prices compared to reported equity in newly purchased homes. We believe these latter data are the most reliable, as discussed below.

In addition, the mover-stayer comparison is complicated by the data inconsistencies discussed in the previous section. Some households report a change in tenure without moving. While such changes are possible, we believe most such cases reflect reporting or coding errors. The information on whether a household moved since the previous wave is likely to be accurate because the prior address is incorporated in the survey question on moving.[9] In all calculations reported below, we deleting all observations with apparent transitions involving a change in tenure without a reported move. Following this procedure, 1.1 percent of the HRS households and 3.4 percent of the AHEAD households are deleted.[10]

Change in home equity using the first format is presented in Table 4. The family status designations are the same as those used in Table 3. There are four tenure designations: OO, OR, RO, and RR where "O" indicates own and "R" indicates rent or other living arrangement. Large reductions in home equity are typically associated only with a home sale and subsequent rental. Those who move from renting to owning, of course, increase home equity. No matter what the change in family status, there is an increase in the average equity of HRS households (with the exception of the few 1N families). On the other hand, there is a decrease in the mean home equity of AHEAD families, no matter what the change in family status. The greatest decrease occurred when a family member entered a nursing home. For all continuing two-person households, the mean increase in housing equity was $6,192 in the HRS and -$5,241 in

[9]For example, in wave 4 of the HRS (also wave 3 of the AHEAD) noninstitutionalized respondents were asks "Are you still living, all of the year or part of the year, in the same apartment/house in <previous wave address and city>?" Respondents in nursing homes were asked: "Do you still have the same apartment/house in <previous wave address and city>?" If respondents in nursing homes answered affirmatively, they are may still be homeowners and they are not classified as movers.

[10]Deleting all respondents who change tenure without moving reduces the frequency of own to rent transitions. This affects the HRS and AHEAD cohort figures presented above. In particular, the cohort profiles for one-person AHEAD households (Figure 6) become flat.

the AHEAD. The median increase was close to zero for households in each of the surveys. In general, the median changes are smaller in absolute value than the mean changes, but the relative patterns by family status and change in tenure are similar.

Change in home equity of initial owners using the second format is shown in Table 5. The key question here is whether continuing homeowners who move and buy another house reduce home equity more than stayers, who can serve as the "control group" in this comparison. If movers typically wanted to use some of the wealth accumulated in home equity to support other non-housing consumption, the home equity of movers would be reduced relative to the change in the equity of stayers. The first two panels of Table 5 show the mean change in housing equity for the HRS and AHEAD; the next two panels show medians. The change in family status is shown on the left margin. Consider the first three rows of the upper panel of the table, which pertain to two-person households in the HRS. The ownership status (tenure) at the end of the interval is shown along the top margin. A household can continue to own or become a renter (or have some other living arrangement) at the end of the interval. The change in home equity is shown for continuing owners, for renters-others, and for both groups combined (all). The initial home value for each group is shown in the right column of the table. On average, the mean home equity of continuing two-person households increased by $3,305. For those who remained home owners, equity increased by $6,569. Initial homeowners whose transition was to the rent-other group reduced home equity by $54,155 on average. The average initial home value of continuing two-person households was $102,310. Thus home equity of the home sellers was only about half of the average equity of all continuing two-person households.

Some of those who continued to own stayed in the same house, others moved and bought a new house. The equity of those who stayed increased by $6,686. The equity of those who moved and bought a new house also increased, by $5,074. In somewhat more formal estimation below we use the change in the equity of the stayers as a measure of the increase the movers would have experienced had they not moved. In this case the decrease for movers was $1,612, about 1.7 percent of the initial home equity of this group. Thus these movers who bought a new home are not typically taking substantial home equity out of housing to support other consumption. By this measure, the greatest decline in home equity occurred in mover households in which a member died, although the sample sizes are small and the means are not precisely measured. For example, the home equity of the small number of two-person households who move but continue to own when one member dies declines by $21,935.

The average equity of continuing one-person HRS households declined by $697, a very small fraction of the average initial home equity of $95,555. Continuing one-person households who moved but continued to own reduced home equity by $3,739, and the stayers increased equity by $935. Using the stayers as a control, the movers reduced equity by 4.8 percent of the initial home equity of this group.

In summary: the average home equity of two-person HRS households increased over this period. This was true for continuing two-person households as well as those in which a member died or in which a member entered a nursing home. The equity of one-person households declined only slightly. Continuing owners who moved typically reduced home equity only marginally, when compared to stayers.. The only substantial reduction in the home equity of continuing owners was for households in which one member died.

For the older AHEAD households, changes in home equity also are typically associated with precipitating shocks. But for the older households the shocks are more frequent. Consider continuing two-person households first. The equity of continuing stayer owners (who do not move) declined by $4,103 and can serve as a base of comparison for other groups. This reduction, if taken at face value, apparently reflects a fall in the value of the homes of the older households as they continue to live in the homes, but not direct withdrawal of housing equity to support other consumption. (Estimates based on housing value rather than equity yields the same result.) This decline is only slightly less than the average reduction for all continuing two-person households, $5,367. Thus on average we conclude that little housing equity is taken from housing to support other consumption.

Continuing homeowners who move reduce home equity by $15,877, which is $11,322 more than the reduction in home equity of the stayers. We take this to represent funds taken from housing and that might be used to support other non-housing consumption. It represents, however, only about 10.5 percent of initial home equity for these households, and less than 4 percent of their initial non-housing wealth. Remember that the typical older household will only move once from one home to another. So if the reduction in housing equity can only be a one-time addition to funds available for other consumption. Below we show that even this small reduction is probably exaggerated and that in fact the average change is likely positive (an increase in housing equity).

For continuing owners in two-person households in which a member enters a nursing home, the reduction in the home equity of the movers is $5,821 greater than the reduction for the stayers. The reduction in the home equity of continuing one-person households is also small. In particular movers who continue to own reduce home equity by a small fraction of initial home equity.

In summary: among the older AHEAD households, the reduction in home equity of continuing owners is small relative to initial home equity, even among those who move to a different house. Large reductions in home equity are typically observed only for home owners who move and discontinue home ownership. The probability of such a move is larger in cases of precipitating shocks. But as seen in Tables 3 and 4, even in the event of shocks to family status, most households continue to own and thus do not withdraw equity from housing to support other needs. For all HRS groups, the initial home equity of the seller (rent-other) group was much lower than the equity of the continuing owners. For the older AHEAD households the initial home equity of sellers is also less than the initial home equity of continuing owners, although the difference is much smaller than for the HRS households.

Median changes in home equity are shown in bottom half of Table 5. The pattern of change is essentially the same as the pattern for mean changes. The changes, however, are typically smaller than the mean changes, in particular for the older AHEAD households. For example, for continuing two-person households in the HRS the median increase in home equity is $1,474. The increase for continuing owner-movers is only $2,105 greater than for stayers. For continuing one-person families the median increase is $222. And the reduction for continuing owner-movers is only $1,028 greater than for stayers. Among continuing two-person households in the AHEAD sample, movers reduce equity by $6,184. Continuing one-person households reduce equity by $695. Again, the conclusion is that for the most part housing equity is substantially reduced only after a precipitating shock. In the absence of a shock, the reductions in housing equity by movers represent a small fraction of initial housing equity.

3. Respondent Estimates of Home Values versus Sales Prices

Before turning to some simple estimation, we emphasize that respondent assessment of home equity likely overestimates home value by a substantial margin. Thus reliance on reported home values yields exaggerated reductions in housing equity when homeowners move. Substantial evidence shows that homeowners overestimate the value of their homes. Kiel and Zabel [1999]) surveyed the literature and concluded that self-reported home values exceed actual sale prices or appraisal values by -2 to 16 percent. Their analysis showed that homeowners on average overvalue their home by 8 percent, and that owners with long tenure overvalue their houses even more. In other words, when a family moves the realized sale price is typically less than the family's prior estimate of the home value. This creates a bias in our estimate of the *change* in housing equity among movers. The pre-move estimate is inflated. The post-move price is presumably "accurate" because the purchase transaction was recently completed.

The estimates in Tables 4 and 5 on the change in housing equity between waves are based on HRS and AHEAD respondent self-assessment of home values and are affected by such overvaluation. The tendency to overvalue homes confounds mover-stayer comparisons. Recent movers are likely to know the market value of their homes. Stayers, on the other hand, are likely to overvalue their houses.[11] As a result, the change in home equity is more likely show a larger price decrease for movers than for stayers. Thus in the previous tables movers, relative to stayers, appear to be taking more equity out of their homes than is actually the case.

Information obtained in both the HRS and the AHEAD allows us to gauge the extent of this bias. For households that have recently moved, the surveys inquired about the "selling price" of the house. The sale price can be compared to the reported value of the house in the previous wave. The survey also asks for the month and year of the sale; the month and year of the self-assessed value is the interview date. We index the pre-move assessed value of movers and the post-move price of movers to obtain measures in 1998 dollars.[12] From these values we obtain estimates of the

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[11]We suspect this is most likely to be the case when house prices are not rising rapidly. Another factor that may lead to overestimates by stayers is that most homeowners know the "asking" price of similar homes in their neighborhood, but may be unaware of the actual selling price.

[12]Some movers are missing data for the sale price. The HRS and AHEAD provide no imputations for missing values of the sale price. A bracketing technique is used to obtain ranges for persons unable to provide a sale price, but we have made no attempt here to convert the bracketed amounts to values. The analysis is restricted to

overvaluation bias.

Mean and median differences between assessed values and sale prices are shown in the Table 6. The results suggest that both the HRS and the AHEAD respondents overestimated their home values by 15 to 20 percent, based on a comparison of mean values. Based on medians, home values are overestimated by 6 to 7 percent. The mean dollar differences are $20,000 to $30,000, and median dollar differences are $6,000 to $8,000. This suggests that our calculated reductions in the home equity of continuing owner-movers may be due entirely to valuation bias. For example the mean reduction of $15,887 (or $11,322 using the stayers as a control) in the home equity of two-person AHEAD families who move and continue to own would be more than accounted for by such bias.

4. More Formal Estimates of Change in Home Equity

Here we consider more formally the change in home equity of movers and stayers. As mentioned above, one way to think about this is to treat movers as the treatment group and stayers as the "control" group. The home equity of stayers and movers at the beginning and at the end of the interval can be represented by:

	Beginning	End
Stayers	"	" + t
Movers	"	" + t + m

In this case, a difference-in-difference estimate yields m, the "treatment" effect. We can estimate this for all households combined, or for any subgroup, by

(1) $$\Delta E = t + mM$$

where t is a constant term--and represents a time (inflation) effect--and m is the

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observations that specify a sale price.

additional effect for movers, with M a dummy variable identifying movers.

Estimates of this equation, by change in household status, are shown in Table 7. This table presents estimates for households who owned at both the beginning and at the end of the interval. Data are presented by the subsequent–at the end of the interval–status of the initial homeowners. OLS estimates are shown in the left portion of the table. Median regression estimates are shown in the right portion of the table. The median regression estimates should be less affected than the OLS estimates by reporting errors or other outliers in the data.

The key mover effect estimate, m, measures the difference between the change in the equity of stayers and the change for movers. The OLS estimates show negative mover effects in each comparison, but only the mover effects for the HRS 2D and AHEAD 11 groups are significantly different from zero at the 5 percent significance level. And, with the possible exception of the estimated mover effect for the 2 to D HRS households, the estimated effect is much lower than the bias suggested in Table 6. For example, the estimated mover effect for continuing two-person households is -$1,612. Referring back to Table 6, however, we see that the bias estimate for HRS households is between $20,000 and $33,000. Thus, since most families are continuing two person families, a reasonable judgment from these data is that the equity of the continuing two-person households in fact <u>increased</u> by about $25,000. Coincidentally, this increase matches the estimated increased for such households based on selling prices, which is discussed below. For each of the other groups, with the exception of the 2 to D HRS families, the estimated mover effect is much less than the bias estimates shown in Table 6, suggesting rather large increases in home equity.

For the HRS households, the median regression mover effect estimates are also small and typically not significantly different from zero. And, the estimates are less then the median bias estimates Table 6. Thus, based on the estimated mover effects in conjunction with the bias estimates, we conclude that home equity likely increases substantially when families move and buy another home.

The median estimates for the AHEAD households are larger than the median HRS estimates and are more precisely measured. For the 2D and 2N groups, the estimates are greater than the bias estimates in Table 6, in particular for the 2N group. Thus these data suggest that for households in which a member dies, and for households in which a member enters a nursing home, home equity is reduced when these households move and buy again. The analysis below based on selling prices, however, suggests an increase in the median home equity of these groups as well.

5. Estimates Based on Selling Price

Each home owner re-interviewed in the HRS and AHEAD is asked whether the home was sold since the previous interview. For many of these households, the selling price is reported.[13] In this section, we estimate the change in the home equity of families who sell and buy another home, and the change in equity of those who sell and then choose another tenure. Table 8 shows summary data on home equity for adjacent waves of HRS and AHEAD. The first column shows reported home equity from the first of the two waves. The second column shows the reported selling price (obtained from the second wave interview) minus the mortgage reported in the initial wave. The sale occurred sometime between the two waves, but the mortgage pertains to the data of the last interview prior to the sale. The third column shows home equity reported in the second of the two waves. For households who purchased another home (the first and

[13] There is more missing sale price data than home equity data, used in earlier sections of the paper. Home equity (home value and mortgage balance) is obtained from the Housing module. Information on the sale price is obtained from a module on Capital Gains that has more incomplete responses. There are no imputations for missing or incomplete (bracketed) sale price data. Partly for this reason, we do not use the weights when analyzing the sale price data.

third panels of the table), this is the equity in the newly purchase home. For households that did not purchase another home (the second and fourth panels), this column is zero.

Like the data in Table 6 on reported home values versus selling prices, these data show that households who sell and buy another home substantially overestimate their pre-sale housing equity. For those who sell and do not purchase another home, the over-estimation is not so apparent. For several of these groups the reported equity seems to underestimate realized equity, based on selling price minus the mortgage. We believe that the reported selling price is likely to be close to the actual selling price, unlike the pre-sale assessment of home equity. The last column shows reported home equity at the end of the interval. In principle, home equity right after a purchase should also be accurately reported. For each of the intervals, the reported new home equity at the end of the period is substantially greater than gain in home equity from the sale of the prior home, suggesting that equity in the new home is greater than equity in the prior home.

Based on the same data, Table 9 shows the estimated change in home equity for households that have sold a home and purchased another, by change in family status. These estimates are obtained from simple OLS and median regression estimates of the form

(3) $$\Delta E = m + \varepsilon$$

where)E is equity in the new home at the end of the period minus equity from the sale of the prior home. Here, m is the estimated increase in home equity. This specification is estimated for several years separately and for several family status change groups. For all but two groups, there is a substantial increase in home equity. Many of the estimates are for small groups, however, and are not significantly different form zero.

We now consider whether the change in home equity depends on the relationship between income and housing wealth. It might be expected that persons with relatively low income and relatively high housing equity would be more likely to withdraw housing equity. And those with low equity and high income would be more likely to add to housing equity. We begin with estimates of the probability of moving and buying another home, and the probability of moving and discontinuing home ownership, thus withdrawing all housing equity. These outcomes will depend, in particular, on the level of home equity and the level of income in the initial period. Then we show estimates of the relationship between the change in equity, given a move, on the one hand, and initial income and home equity levels on the other hand.

Households that own in the initial period can either stay in the same house, move to another house, or discontinue home ownership by moving to a rental apartment or some other arrangement. The probabilities of the latter two transitions may be specified as:

$$\Pr\left[OmO\right] = c(\ 2D\ or\ 2N\ or\ 1N\ ) + a11 + b22 + \alpha Y + \beta E + \gamma Y \cdot E + \varepsilon$$

(4)

$$\Pr\left[OR\right] = c(\ 2D\ or\ 2N\ or\ 1N\ ) + a11 + b22 + \alpha Y + \beta E + \gamma Y \cdot E + \varepsilon$$

where OmO identifies families who sell a home, then move and buy another home (own to move to own) and OR identifies families who discontinue ownership (own to rent or other). The parameter “a” is the effect of a continuing one persons household and “b” the effect of a continuing two-person household. (The estimated parameters are of course not constrained to be the same for the OmO and OR groups.) The omitted categories, captured in the constant tern c(2D, 2N, and 1N), are the 2D, 2N, and 1N households. Initial period income is denoted by Y and initial home equity is denoted by E. . Here, (indicates whether the effect of Y depends on E (or, equivalently, whether the effect of E depends on Y).

Given the decision to move to another home or to discontinue ownership, we then estimate the conditional change in home equity for the two groups, given that a move occurs. The change in equity equations are in the same format, given by

$$\Delta E(OmO) = c(\ 2D\ or\ 2N\ or\ 1N\ ) + a11 + b22 + \alpha Y + \beta E + \gamma Y \cdot E + \varepsilon$$

(5) $$\Delta E(OR) = c(\ 2D\ or\ 2N\ or\ 1N\ ) + a11 + b22 + \alpha Y + \beta E + \gamma Y \cdot E + \varepsilon$$

Given the estimated probabilities and conditional changes in housing equity, we can simulate the expected change in equity for homeowners as

(6) $$\begin{aligned} \Delta E &= \Delta E(OmO) + \Delta E(OR) = \\ & \Pr[OmO] * E(\Delta E | OmO) + \\ & \Pr[OR] * E(\Delta E | OR) \end{aligned}$$

where the expected change in decomposed into it's component parts. We present below the simulation for selected quantiles on income and home equity.

Simulated probabilities of moving between the waves are shown in Table 10. The estimated probit parameter estimates and selected quantiles of home equity and income used to produce this table are shown in Appendix table 1. The top three panels of Table 10 pertain to HRS households and the bottom three panels pertain to AHEAD households. Simulated probabilities of moving and buying another home are shown on the left side of each panel and probabilities of moving and discontinuing ownership are shown on the right. The simulations show that initial income and home equity have little effect on the probabilities of moving, although in some instances the estimated parameters are statistically different from zero. For both HRS and AHEAD households the difference between the probabilities for "house-poor and income-rich" households and for "house-rich and income-poor" households is only a few percentage points.

Consistent with the findings reported above, the probability of moving is highest among households that have experienced a disruption in household structure. For example, among AHEAD households, the probability of moving and discontinuing ownership is 1.5 percent (evaluated at median income and home equity) for continuing two-person households, 4.4 percent for continuing one-person households, and 21.2 percent for households in which a member has either died or entered a nursing home between the waves.

The simulated change (between the survey waves) in home equity for families who move and buy another home is shown in Table 11. The associated parameter estimates in Appendix Table 2 show that initial income and home equity have substantial and statistically significant effects on the change. Both OLS and median regression estimates are shown. The greater the level of initial home equity (based on selling price minus the mortgage), the smaller the increase in equity when the family moves. And the larger initial income, the greater the increase in home equity for households that move. The equity-income interaction, however, is imprecisely measured. The estimated difference in the change in home equity for the 11 or for the 22 groups compared to the 2D-2N-1N groups combined is not statistically significant. These estimates are based on the sample of respondents that report a sale price for the former home and report both the home value and mortgage debt for their current home.[14]

Evaluated at the median (50th quantile) of income and home equity, the simulated change in equity shown in Table 11 is positive for all family status groups, with the exception of the simulation for the 11 AHEAD households, based on median regression

[14] Both the sale price of the old home and the value of and mortgage on the new home are reported in the same wave. The survey does not inquire about the mortgage obligation discharged on the old home. To obtain home equity for the old home we use the mortgage reported in the prior wave.

estimates. For all family status groups the greatest simulated reduction in home equity is at the 80th equity quartile and 20th income quantile. The greatest simulated increase in home equity at the 80th income quartile and the 20th equity quantile. Thus relatively house-rich and income-poor families reduce equity and relative house-poor and income-rich households add to home equity when they move and buy another home. For example, based on the OLS estimates for the 22 HRS households, at the high-equity-low-income quantiles home equity is reduced by -$15,422; at the low-equity-high-income quantiles home equity is increased by +$54,778. The pattern of the simulated changes based on the median regression estimates is similar to the pattern based on OLS estimates.

The change (decrease) in the home equity of the families who discontinue home ownership is shown in Table 12 and the associated parameter estimates are shown in Appendix Table 3. In this case, the decline in equity is simply the sale price minus the mortgage. Thus we cannot use the initial home equity to predict the change in equity, as in Table 11 for those who sell and buy again. Thus estimates of the reduction in equity are based on income only. Essentially the simulated changes show how home equity is related to income. For this selected group of households who sell and do not buy another home, home equity is negatively related to income. The greatest equity reductions occur in families where a household member dies or in which a household member enters a nursing home.

As a summary, the move probabilities and change in home equity results reported in Tables 10-12 are combined to calculate expected change in housing equity. These results are reported on an annual basis in Table 13.[15] The top part of the table shows results for movers who sell and buy another house. The bottom part shows

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[15]Waves of the HRS were two years apart. In the AHEAD there were two years between wave 1 and wave 2, and three years between wave 2 and wave 3.

results for movers who sell and discontinue ownership. The table shows results by equity-income quantile, as in several of the tables above. But in this table, the expected change in equity is decomposed into its component parts: the probability of a move, and the change in equity given a move. For example, consider the HRS 22 households. Evaluated at the median of home equity and income, the expected increase in equity through home "upgrading" is $815. Only 3.3 percent of families upgrade each year, but those that do add $12,531 to home equity. Averaged over all HRS households, home equity is increased by $823 through selling and buying a new home. Evaluated at the median of home equity and income, about 1.5 percent of AHEAD 22 households move and buy another home each year. Those that do add $7,426 to home equity. The expected increase in home equity, averaged across all AHEAD household types, is $399. Viewed in this way, the expected changes in the equity of HRS and AHEAD households are not very different at the median: +$823 for the HRS group and +$399 for the AHEAD group.

For HRS 22 households with high initial housing equity and low income (the 80-20 column), the expected annual reduction in equity is -$486: 3.2 percent move and, given a move, the reduction in home equity is -$7,711. Averaged over all HRS households in this high-equity-low-income group, the expected reduction in home equity through selling and buying another home is -$528. The AHEAD households reveal a similar pattern, although again they are less likely to move than the younger HRS households.

The estimates for persons who sell and discontinue ownership are shown in the bottom half of the table. Again consider 22 HRS families evaluated at the median of equity and income. Only 0.7 percent of households discontinue ownership each year. Those that do reduce equity by -$29,162 on average. Averaged over all HRS 22 families, equity is reduced by -$379 through divesting of homes. This reduction can be compared to the +$815 average increase through upgrading. Overall, the average equity of all HRS households is reduced by -$610 in this way, compared to an increase of +$823 through upgrading. For all AHEAD households average equity is reduced by -$1,918 by sellers who discontinue ownership between survey waves, compared to an increase of +$399 through movers who upgrade.

Table 14 presents a succinct accounting of the expected annual change in the home equity of all HRS initial homeowners combined and of all AHEAD initial homeowners combined. The first column shows the expected change in home equity for households who move and purchase another home. (Recall that the expected change is the probability of a move times the average change in home equity given a move.) Both HRS and AHEAD families that move to a new home increase home equity on average. The second column is the expected reduction in the home equity of households that discontinue ownership. The reduction is largest among households experiencing precipitating shocks. The third column--the sum of the first two columns--is the net annual change in home equity. (Like Table 13, Table 14 considers only initial home owners; it does not account for the increase in the home equity that occurs when initial renters buy a home.)

On average, HRS households increase home equity by $214 per year. AHEAD households, on average, reduce home equity by $1,519 annually, which represents an overall decline of about 1.76 percent of initial home equity. The percentages in the last column can be used to illustrate the significance of disruptions to family status among AHEAD households: For example, there is almost no decline (-0.11 percent) in the home equity of continuing two-person households. On average, the initial home equity of these households is $94,257. Suppose that this is the average home equity of two-person households at age 70. At an annual decline of 0.11 percent, the $94,257 would be reduced by only $2,052--to $92,205--by age 90. The reduction of continuing one-person households is somewhat larger. If the average home equity of one-person households is $78,496 at age 70, and the annual reduction for one-person households is 1.15 percent, the home equity of continuing one-person households would be reduced by $16,211-- to $62,285--by age 90. Most of the overall reduction of 1.76 percent is accounted for by households who experience precipitating shocks - the "other" group (2N, 2D, or 1N). For these households, home equity falls by 7.84 percent on an annual basis. If each year, the equity of households in this group fell at this rate, average equity of $87,777 at age 70 would be reduced to $17,149 by age 90. But, only about 12 percent of households are in this group. Thus the reduction for all households is much less than this. Even among households in this group - those experiencing precipitating shocks - only 8.8 percent move in the survey interval in which the shock occurs, as shown in Table 13. This suggests the decline in housing equity among continuing one-person households may in part be the delayed consequence of a prior transition from a two-person household to a one-person household.

Thus, as suggested by the results in prior sections of the paper, the summary results in Table 14 show that in the absence of precipitating shocks there is little systematic reduction in home equity as families age. Families who move to a new home increase home equity on average. Reductions in equity come from families who sell and discontinue home ownership. And most of these moves are associated with precipitating shocks to family status. We find no systematic withdrawal of home equity to support non-housing consumption.

D. CONCLUSIONS

Home equity is the principle asset of a large fraction of elderly Americans. In this paper we have used HRS and AHEAD panel data, as well as SIPP data, to understand the change in the home equity of households as they age. We give particular attention to the relationship between changes in home equity and changes in household structure. There are two ways for households to change home equity: by discontinuing home ownership or by selling and moving to another home. W e find that, overall, households are unlikely to discontinue home ownership. Ownership terminations are most likely to occur following the death of a spouse or entry of a family member into a nursing home. But even in these circumstances, selling the home is the exception and not the rule. In the absence of a precipitating shock, it is much more likely that a family will sell and buy a new home than discontinue ownership. And, households who sell and buy again tend to increase rather than reduce home equity. That is, assets are transferred to housing.

Overall--combining the effects of discontinuing ownership and moving to another home--we find that housing equity of HRS households increases with age, and the equity of AHEAD households declines somewhat. The overall decline in the housing equity of the older AHEAD households is about 1.76 percent per year, which is accounted for primarily by a 7.84 percent decline among households experiencing precipitating shocks to family status. Families that remain intact reduce housing equity very little, only 0.11 percent per year for two-person households and 1.15 percent per year for one-person households.

We use two approaches to determine whether households wish to reduce home equity as they age. One approach is to compare the change in the home equity of movers to the change for stayers. If households withdraw equity when they sell and move to a new home, the reduction in the equity of the movers will typically be greater than the change for stayers. These comparisons, however, are confounded by the tendency of the self-assessed home values to exceed actual values, as measured by selling prices. A comparison of the selling prices of homes with the prior self-assessment of home values shows that home values reported prior to a sale far exceed realized sales prices. Comparing the change in the home equity of movers and stayers, but accounting for this bias, we conclude that families who sell and buy a new home increase home equity on average.

The second approach is based on the comparison of the selling price of the old home (minus the mortgage on the home) with the reported equity value in the newly purchased home. We believe that these are the most reliable data on the change in home equity when families move from one home to another. Based on these "sale price" data, we find that on average households increase home equity when they move to a new house. We also find, however, that equity-rich and income-poor families tend to reduce home values when they sell and buy a new house, while equity-poor and income-rich families tend to increase home equity. For continuing two-person HRS households, for example, we estimate that the between-wave reduction for those at the 80^{th} equity quantile and at the 20^{th} income quantile is -\$15,422. On the other hand, we estimate that households at the 20^{th} equity quantile and the 80^{th} income quantile, increase equity by +\$54,778.

These results suggest that in considering whether families have saved enough to maintain their pre-retirement standard of living after retirement, housing equity should not, in general, be counted on to support non-housing consumption. Families apparently do not intend to finance general retirement consumption by saving through investment in housing, as they might through a 401(k) plan or through some other financial form of saving. Rather we believe the findings here, as well as our earlier findings, suggest that families purchase homes to provide an environment in which to live, even as they age through retirement years. In this case, the typical aging household is unlikely to seek a reverse annuity mortgage to withdraw assets from home equity. It may be appropriate, however, to think of housing as a reserve or buffer that can be used in catastrophic circumstances that result in a change in household structure. In this case, having used the home equity along the way–through a reverse mortgage for example–would defeat the purpose of saving home equity for a "rainy day."

Although these results are based largely on new HRS and AHEAD data files, and are based on different methods of analysis, the findings correspond closely to the conclusions we reached in our earlier papers, based on different data sources. These conclusions also correspond closely to the findings of a recent survey of older households sponsored by the American Association of Retired Persons (AARP), showing that the preponderance of older families agree with the statement that: "What I'd really like to do is stay in my current residence as long as possible'."[16] Like our findings, the results of the AARP survey also imply that most households do not intend to liquidate housing equity to support general non-housing retirement consumption as they age.

[16] More detail is presented in Venti and Wise [2001].

APPENDIX: MORTALITY CORRECTION

The analyses using the SIPP data are based on cohorts constructed from cross-section surveys. For example, the home ownership (or home equity) profile for a cohort is constructed by combining data for all households age A in the first survey year with data for households age A+T from a survey T years later. If the likelihood of survival from A to A+T is related to wealth, then these cohort profiles can be affected by differential mortality. We correct for this problem by reweighting the sample. Households are assigned an adjusted weight that is inversely related to the probability of survival from age A to age A+T.

Baseline estimates of these survival probabilities for one and two person households are obtained from waves 1 and 2 of AHEAD. A one-person household "survives" if the person is present in waves 1 and 2. A two-person household "survives" if both members are present in the second wave. Survival probabilities are estimated from the AHEAD for five year age intervals and for housing equity quartiles. Households that are older and households that have lower levels of housing wealth are less likely to survive. Since the AHEAD only includes households age 70 and over, published survival rates by age (from the NCHS) were used to extrapolate the AHEAD survival probabilities back to age 50.

The final step is to reweight the data . For each household observation of age A and housing equity quartile Q, the SIPP frequency weight is multiplied by the inverse of the cumulative survival probability. The survival probabilities are assumed to be one for households less than age 50. Thus households that are unlikely to survive are given higher weights. For each observation the probability of surviving to age A given equity quartile Q is

$$S(A,Q) = \prod_{a=50}^{A} s(a,a+1:Q)$$

where s(a,a+1;Q) is the one-year survival rate for a household in equity quartile Q.
For each household in each year the SIPP frequency weight is multiplied by the inverse of S(A,Q).

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Table 1. Household status sequences in the HRS and in the AHEAD/HRS

Sequences in the HRS				Sequences in the AHEAD/HRS			
Sequence	N	All %	Group %	Sequence	N	All %	Group %
2222	3311	43.75	68.39%	222	1203	19.93	55.75%
2220	225	2.97	4.65%	22D	293	4.86	13.58%
222D	156	2.06	3.22%	220	133	2.2	6.16%
222S	42	0.55	0.87%	22N	33	0.55	1.53%
222N	10	0.13	0.21%	22T	27	0.45	1.25%
2200	307	4.06	6.34%	2DD	234	3.88	10.84%
22DD	131	1.73	2.71%	200	112	1.86	5.19%
22SS	47	0.62	0.97%	2DT	47	0.78	2.18%
22D0	10	0.13	0.21%	2ND	26	0.43	1.20%
2000	377	4.98	7.79%	2TT	20	0.33	0.93%
2DDD	116	1.53	2.40%	2D0	19	0.31	0.88%
2SSS	94	1.24	1.94%	2NN	11	0.18	0.51%
2D00	15	0.2	0.31%	Subtotal	2158		100.00%
Subtotal	4841		100.00%				
1111	1832	24.21	68.61%	111	2217	36.74	57.70%
1110	119	1.57	4.46%	11D	405	6.71	10.54%
111D	52	0.69	1.95%	11N	186	3.08	4.84%
111S	12	0.16	0.45%	110	142	2.35	3.70%
111N	10	0.13	0.37%	1DD	462	7.66	12.02%
1100	179	2.37	6.70%	100	266	4.41	6.92%
11DD	69	0.91	2.58%	1ND	98	1.62	2.55%
11SS	10	0.13	0.37%	1NN	66	1.09	1.72%
1000	323	4.27	12.10%	Subtotal	3842		100.00%
1DDD	64	0.85	2.40%				
Subtotal	2670		100.00%	Other	35	0.6	
				All	6035	100.02	
Other	57	0.74					
All	7568	99.98					

Table 2. Percent Own, Rent, and Other By Age, from Wave 1 of the HRS and Wave 1 of the AHEAD

	One-Person Households			Two-Person Households		
age	own	rent	other	own	rent	other
51-53	58.3	34.0	7.7	87.7	10.8	1.5
54-56	54.5	37.0	8.4	90.9	7.7	1.4
57-61	62.5	29.5	8.0	90.5	7.1	2.4
70-74	67.5	22.8	9.8	91.1	7.0	1.9
75-79	64.0	25.6	10.3	87.8	8.6	3.7
80-84	60.3	25.3	14.4	81.1	12.8	6.0
85+	48.4	31.8	19.9	78.7	15.1	6.2

Table 3. Tenure transitions, by initial tenure and by change in household status, for HRS and AHEAD households, in percent.

Initial Homeowners in the HRS

Change in Household Status	Tenure	Subsequent Period Status (%)	% Move	N
22	own	98.3	7.1	9173
	rent or other	1.7	65.7	165
2D	own	95.6	8.4	316
	rent or other	4.4	55.6	13
2N	own	88.6	18.9	12
	rent or other	11.4	0	1
11	own	95.2	6.1	3150
	rent or other	4.8	54.5	169
1N	own	100	0	3
	rent or other	0		0

Initial Homeowners in the AHEAD

Change in Household Status	Tenure	Subsequent Period Status (%)	% Move	N
22	own	96.9	3.9	2332
	rent or other	3.1	38.5	75
2D	own	88.8	9.4	358
	rent or other	11.2	76.1	51
2N	own	75	6.4	35
	rent or other	25	79.9	14
11	own	91.3	4.5	2841
	rent or other	8.7	47.2	269
1N	own	39.9	0	57
	rent or other	60.1	92.6	79

Initial Renters in the HRS

Change in Household Status	Tenure	Subsequent Period Status (%)	% Move	N
22	own	22.3	51.3	220
	rent or other	77.7	21.1	822
2D	own	12.4	46.8	8
	rent or other	87.6	40.2	64
2N	own	0		0
	rent or other	100	47.5	5
11	own	11.4	46.5	239
	rent or other	88.6	22.2	2002
1N	own	0		0
	rent or other	100	43.6	3

Initial Renters in the AHEAD

Change in Household Status	Tenure	Subsequent Period Status (%)	% Move	N
22	own	11.9	8.8	31
	rent or other	88.1	10.4	253
2D	own	14.5	49.5	11
	rent or other	85.5	22.1	77
2N	own	5	0	1
	rent or other	95	34.3	17
11	own	7.4	12.6	128
	rent or other	92.6	14.4	1744
1N	own	3.4	0	7
	rent or other	96.6	89.1	204

Note: Based on authors' estimates from the HRS and AHEAD. All percentages are based on weighted samples. However, the sample sizes presented in the table are unweighted. Initial renters in the last two panels include households with "other" living arrangements.

Table 4. Change in the housing equity of initial owners and initial renters, by change in family status.

Family Status	Change in Tenure	Means: Change in Housing Equity	Means: Initial Housing Equity	Medians: Change in Housing Equity	Medians: Initial Housing Equity	Number
HRS						
22						
	OO	6565	102893	1695	81326	8919
	OR	-61073	61073	-50905	50905	164
	RO	64117	0	35000	0	215
	RR	0	0	0	0	822
	All	6192	92472	0	72721	10120
2D						
	OO	6223	84329	1734	72721	296
	OR	-75575	75575	-52281	52281	12
	RO	45707	0	6000	0	8
	RR	0	0	0	0	64
	All	3345	69176	0	56928	380
2N						
	OO	4203	83650	2450	79994	12
	OR	0	0	0	0	1
	RO					0
	RR	0	0	0	0	5
	All	2850	56727	0	34854	18
11	OO	642	96874	621	62333	2961
	OR	-50716	50716	-40663	40663	161
	RO	51883	0	36361	0	228
	RR	0	0	0	0	2002
	All	1126	57784	0	20897	5352
1N						
	OO	-44095	77747	-3971	33971	2
	OR					0
	RO					0
	RR	0	0	0	0	3
	All	-25501	44964	-3971	33971	5

AHEAD

22						
	OO	-4555	116475	-2217	90242	2309
	OR	-80472	80472	-67682	67682	74
	RO	79697	0	45000	0	31
	RR	0	0	0	0	253
	All	-5241	103938	-207	80217	2667
2D						
	OO	-7182	107705	-2631	80217	354
	OR	-80749	80749	-73322	73322	50
	RO	70915	0	58825	0	11
	RR	0	0	0	0	77
	All	-10956	86415	0	62042	492
2N						
	OO	-18869	122320	-9941	95882	35
	OR	-97003	97003	-84602	84602	14
	RO	13369	0	13369	0	1
	RR	0	0	0	0	17
	All	-29941	90771	-9782	62042	67
11	OO	-4675	103232	-1739	74869	2801
	OR	-81412	81412	-67682	67682	266
	RO	73623	0	50269	0	128
	RR	0	0	0	0	1744
	All	-5265	64540	0	37434	4939
1N						
	OO	-13013	82910	-6040	69521	57
	OR	-72546	72546	-56401	56401	79
	RO	57386	0	65000	0	7
	RR	0	0	0	0	204
	All	-18043	30229	0	0	347

Table 5. Mean Change in Housing Equity of Initial Owners, by change in family status and by subsequent tenure, for movers and stayers, means and medians.

Mean Changes

Change in Status		Tenure in Subsequent Period own	rent or other	all	Number of Observations own	rent or other	all	Initial Home Equity
HRS								
22	all	6569	-54155	5855	8918	106	9024	102310
	stayer	6686		6686	8295	0	8295	102852
	mover	5074	-54155	-3305	623	106	729	96335
2D	all	6288	-28079	5547	294	7	301	83212
	stayer	8997		8997	266	0	266	83939
	mover	-21935	-28079	-23169	28	7	35	77158
2N	all	4203		4203	12	0	12	83650
	stayer	4750		4750	9	0	9	88372
	mover	1863		1863	3	0	3	63426
11	all	642	-48476	-697	2961	86	3047	95555
	stayer	935		935	2779	0	2779	96012
	mover	-3739	-48476	-17549	182	86	268	90829
1N	all	-44095		-44095	2	0	0	77747
	stayer	-44095		-44095	2	0	2	77747
	mover				0	0	0	0
AHEAD								
22	all	-4555	-73974	-5367	2309	30	2339	115978
	stayer	-4103		-4103	2213	0	2213	115103
	mover	-15877	-73974	-29557	96	30	126	132706
2D	all	-7182	-81900	-13805	354	39	393	105418
	stayer	-5777		-5777	322	0	322	102228
	mover	-20432	-81900	-51390	32	39	71	120352
2N	all	-18869	-105730	-37168	35	12	47	118825
	stayer	-18498		-18498	33	0	33	123456
	mover	-24319	-105730	-90020	2	12	14	105715
11	all	-4675	-92350	-8446	2801	126	2927	102764
	stayer	-4011		-4011	2671	0	2671	102209
	mover	-18500	-92350	-55077	130	126	256	108598
1N	all	-13013	-73671	-48315	57	72	129	77533
	stayer	-13013		-13013	57	0	57	82910
	mover		-73671	-73671	0	72	72	73671

Medians

Change in Status		Tenure in Subsequent Period own	rent or other	all	Number of Observations own	rent or other	all	Initial Home Equity
HRS								
22	all	693	-50905	1474	8918	106	9024	81033
	stayer	1745		1745	8295	0	8295	81326
	mover	-360	-50905	-4946	623	106	729	72721
2D	all	-1632	-32530	1474	294	7	301	71491
	stayer	2217		2217	266	0	266	73193
	mover	-5481	-32530	-10999	28	7	35	42594
2N	all	6794		2450	12	0	12	79994
	stayer	-2311		-2311	9	0	9	79994
	mover	15899		15899	3	0	3	87989
11	all	125	-40633	222	2961	86	3047	60493
	stayer	639		639	2779	0	2779	62333
	mover	-389	-40633	-8854	182	86	268	49376
1N	all	-3971		-3971	2	0	0	33971
	stayer	-3971		-3971	2	0	2	33971
	mover				0	0	0	
AHEAD								
22	all	-5179	-64173	-2348	2309	30	2339	90242
	stayer	-2087		-2087	2213	0	2213	89114
	mover	-8271	-64173	-16869	96	30	126	101608
2D	all	-10008	-73322	-4869	354	39	393	80090
	stayer	-2303		-2303	322	0	322	76706
	mover	-17712	-73322	-50761	32	39	71	80217
2N	all	-26230	-90242	-13978	35	12	47	90242
	stayer	-9941		-9941	33	0	33	95882
	mover	-42520	-90242	-54145	2	12	14	90242
11	all	-2087	-73322	-2434	2801	126	2927	73799
	stayer	-1739		-1739	2671	0	2671	73322
	mover	-2434	-73322	-37434	130	126	256	74869
1N	all	-6040	-64173	-39921	57	72	129	64173
	stayer	-6040		-6040	57	0	57	69521
	mover		-64173	-64173	0	72	72	64173

Table 6. Comparison of Estimated Home Values and Sale Prices

Survey	Interval and Sample Size	Estimate of Home Value in Initial Year	Reported Sale Price in Next Year	Mean Difference	Percent Difference
			Means		
HRS	1992-1994 N=250	135,607	115,665	19,942	14.7
	1994-1996 N=233	157,068	123,883	33,186	21.1
	1996-1998 N=236	162,264	138,206	24,048	14.8
AHEAD	1993-1995 N=163	101,568	81,625	19,943	19.6
	1995-1998 N=179	131,382	109,447	21,935	16.7
			Medians		
HRS	1992-1994 N=250	106,151	96,208	7,117	6.7
	1994-1996 N=233	109,838	98,347	8,083	7.4
	1996-1998 N=236	140,159	122,276	8,290	5.9
AHEAD	1993-1995 N=163	83,848	69,094	5,888	7
	1995-1998 N=179	89,445	77,081	6,546	7.3

Source: Authors' calculations from the AHEAD and HRS. All figures are in 1998 dollars are use household weights.

Table 7. Estimates of the mover equity effect using stayers as the “control” group, for <u>initial homeowners</u>, for two- and one-person households, for the HRS and the AHEAD households, by estimation method.

	OLS Estimates				Median Regression Estimates			
Change in household status	time effect (t)	t statistic	mover effect (m)	t statistic	time effect (t)	t statistic	mover effect (m)	t statistic
HRS								
2 to 2	6686	2.26	-1612	0.15	1745	6.98	-2104	2.24
2 to D	8997	2.62	-30931	2.67	2216	1.66	-7698	1.76
2 to N	4750	0.26	-2887	0.07	-2311	0.2	18210	1.16
1 to 1	935	0.45	-4674	0.57	639	1.8	-1028	0.73
1 to N								
AHEAD								
2 to 2	-4103	2.46	-11774	1.38	-2087	4.05	-6185	2.46
2 to D	-5777	1.5	-14656	1.18	-2303	1.51	-15409	3.16
2 to N	-18498	2.61	-5821	0.21	-9941	3.77	-32579	4.49
1 to 1	-4011	2.57	-14489	1.99	-1739	5.28	-696	0.47
1 to N								

Note: Too few observations to estimate 1 to N transitions

Table 8. Comparison of initial reported home equity, selling price minus mortgage, and home equity at the end of the interval.

Interval	Initial reported equity prior to home sale	Selling price minus mortgage	Reported equity at end of interval	Sample size
Mean for Households that Purchased Another House				
HRS				
1992-1994	76518	64940	89317	181
1994-1996	112382	86599	126228	174
1996-1998	108412	89038	120990	166
AHEAD				
1993-1995	108821	89284	110690	71
1995-1998	154104	114388	123737	61
Mean for Households that Did Not Purchase Another House				
HRS				
1992-1994	61851	55697	0	55
1994-1996	52308	57226	0	48
1996-1998	72408	86769	0	38
AHEAD				
1993-1995	75857	61543	0	44
1995-1998	78005	72313	0	51
Median for Households that Purchased Another House				
HRS				
1992-1994	57679	49806	65903	181
1994-1996	74941	69045	88852	174
1996-1998	82636	72082	110964	166
AHEAD				
1993-1995	78258	67826	79590	71
1995-1998	95013	70606	96000	61
Median Households that Did Not Purchase Another House				
HRS				
1992-1994	55137	39649	0	55
1994-1996	32819	42664	0	48
1996-1998	69561	85949	0	38
AHEAD				
1993-1995	72668	65244	0	44
1995-1998	79590	73213	0	51

Notes:
1. No imputed variables are used.
2. All values are in 1998 dollars.
3. The data are not weighted.

Table 9. Estimates of the change in home equity for movers who bought another home, by method of estimations, for HRS and AHEAD intervals, in 1998 dollars.

Interval	Estimated Change in Home Equity	t statistic	Sample size
	OLS Estimates		
HRS			
1992-1994	24377	3.54	181
1994-1996	39629	2.86	174
1996-1998	31952	4.55	166
AHEAD			
1993-1995	21406	1.37	71
1995-1998	9349	0.59	61
HRS (pooled waves)			
2 to 2	31345	6.39	373
1 to 1	40014	1.73	96
other	20742	1.5	52
AHEAD (pooled waves)			
2 to 2	13887	0.91	63
1 to 1	9052	0.45	52
other	43794	2.01	17
	Median Regression Estimates		
HRS			
1992-1994	6303	1.86	181
1994-1996	15455	2.35	174
1996-1998	19803	3.42	166
AHEAD			
1993-1995	1066	0.24	71
1995-1998	9818	1.12	61
HRS (pooled waves)			
2 to 2	17153	4.01	373
1 to 1	-294	0.04	86
other	8856	1.11	52
AHEAD (pooled waves)			
2 to 2	3438	0.37	63
1 to 1	0	0	52
other	10111	0.55	17

Table 10. Simulated move probabilities at selected income and home equity quartiles, for HRS and AHEAD households

	Buy Another Home				Discontinue Ownership		
HRS 2 to 2 Households							
		equity				**equity**	
income	**20th**	**50th**	**80th**	**income**	**20th**	**50th**	**80th**
20th	0.063		0.063	**20th**	0.015		0.013
50th		0.065		**50th**		0.013	
80th	0.069		0.070	**80th**	0.011		0.009
HRS 1 to 1 Households							
20th	0.055		0.056	**20th**	0.031		0.027
50th		0.058		**50th**		0.026	
80th	0.061		0.062	**80th**	0.023		0.020
HRS Other Households (2D, 2N, 1N)							
20th	0.090		0.091	**20th**	0.031		0.027
50th		0.094		**50th**		0.027	
80th	0.099		0.099	**80th**	0.024		0.021
AHEAD 2 to 2 Households							
20th	0.034		0.041	**20th**	0.017		0.015
50th		0.037		**50th**		0.015	
80th	0.037		0.043	**80th**	0.014		0.011
AHEAD 1 to 1 Households							
20th	0.039		0.047	**20th**	0.049		0.044
50th		0.043		**50th**		0.044	
80th	0.042		0.049	**80th**	0.041		0.035
AHEAD Other Households (2D, 2N, 1N)							
20th	0.049		0.059	**20th**	0.228		0.211
50th		0.054		**50th**		0.212	
80th	0.053		0.062	**80th**	0.204		0.182

Table 11. Simulated changes in housing equity at selected income and home equity quartilies for households purchasing another home, for HRS and AHEAD households

	OLS				Median Regression		
		equity				**equity**	
income	**20th**	**50th**	**80th**	**income**	**20th**	**50th**	**80th**
HRS 2 to 2 Households							
20th	38176		-15422	**20th**	24353		-23870
50th		25061		**50th**		11929	
80th	54778		1854	**80th**	37510		-9537
HRS 1 to 1 Households							
20th	36090		-17508	**20th**	13825		-34397
50th		22975		**50th**		1402	
80th	52692		-232	**80th**	26982		-20065
HRS Other Households (2D, 2N, 1N)							
20th	36041		-17557	**20th**	14588		-33635
50th		22926		**50th**		2164	
80th	52644		-280	**80th**	27744		-19303
AHEAD 2 to 2 Households							
20th	34548		-28386	**20th**	29758		-46091
50th		17970		**50th**		5337	
80th	52781		-9021	**80th**	38129		-33449
AHEAD 1 to 1 Households							
20th	27834		-35099	**20th**	8974		-66874
50th		11256		**50th**		-15447	
80th	46067		-15735	**80th**	17345		-54233
AHEAD Other Households (2D, 2N, 1N)							
20th	43547		-19386	**20th**	29526		-46323
50th		26970		**50th**		5105	
80th	61781		-22	**80th**	37897		-33681

Table 12. Simulated changes in housing equity at selected income and home equity quartilies for households not purchasing another home, for HRS and AHEAD households

	OLS			Median Regression			
HRS 2 to 2 Households							
		equity				equity	
income	20th	50th	80th	income	20th	50th	80th
20th	-53822		-53822	20th	-37994		-37994
50th		-58323		50th		-43176	
80th	-65153		-65153	80th	-51040		-51040
HRS 1 to 1 Households							
20th	-59492		-59492	20th	-46077		-46077
50th		-63993		50th		-51258	
80th	-70823		-70823	80th	-59122		-59122
HRS Other Households (2D, 2N, 1N)							
20th	-72577		-72577	20th	-56630		-56630
50th		-77077		50th		-61811	
80th	-83907		-83907	80th	-69675		-69675
AHEAD 2 to 2 Households							
20th	-54127		-54127	20th	-43203		-43203
50th		-60653		50th		-50522	
80th	-72544		-72544	80th	-63859		-63859
AHEAD 1 to 1 Households							
20th	-54039		-54039	20th	-51688		-51688
50th		-60565		50th		-59007	
80th	-72455		-72455	80th	-72344		-72344
AHEAD Other Households (2D, 2N, 1N)							
20th	-78865		-78865	20th	-78698		-78698
50th		-85391		50th		-86017	
80th	-97281		-97281	80th	-99354		-99354

Table 13. Summary of annual change in home equity of initial home owners, decomposed into probability of a move times the change in equity given the move, by family status, for selected equity and income quantiles. Based on probit move probability estimates and OLS equity change estimates.

			Equity-Income Quantile				
			50-50	80-20	20-80	80-80	20-20
		For movers who sell and buy a new home					
HRS	22	Prob OmO	.033	.032	.035	.035	.032
		Change|OmO	12531	-7711	27389	927	19088
		Expected Change	815	-486	1890	65	1203
	11	Prob OmO	.029	.028	.031	.031	.028
		Change|OmO	11488	-8754	26346	-116	18045
		Expected Change	667	-490	1607	-7	993
	Other	Prob OmO	.047	.046	.050	.050	.045
		Change|OmO	11463	-8779	26322	-140	18021
		Expected Change	1078	-799	2606	-14	1622
	All	Expected Change	823	-528	1935	42	1221
AHEAD	22	Prob OmO	.015	.017	.015	.018	.014
		Change|OmO	7426	-11730	21810	-3728	14276
		Expected Change	275	-481	807	-160	486
	11	Prob OmO	.018	.019	.017	.020	.016
		Change|OmO	4651	-14504	19036	-6502	11502
		Expected Change	200	-682	800	-319	449
	Other	Prob OmO	.022	.024	.022	.026	.020
		Change|OmO	11145	-8011	25529	-9	17995
		Expected Change	602	-473	1353	0	882
	All	Expected Change	399	-528	1045	-130	650

For movers who sell and discontinue ownership

			Equity-Income Quantile				
			50-50	80-20	20-80	80-80	20-20
HRS	22	Prob OmR	.007	.007	.006	.005	.008
		Change|OmR	-29162	-26911	-32577	-32577	-26911
		Expected Change	-379	-350	-359	-293	-404
	11	Prob OmR	.013	.014	.012	.010	.016
		Change|OmR	-31997	-29746	-35412	-35412	-29746
		Expected Change	-832	-803	-815	-708	-922
	Other	Prob OmR	.014	.014	.012	.011	.016
		Change|OmR	-38539	-36289	-41954	-41954	-36289
		Expected Change	-1041	-980	-1007	-881	-1125
	All	Expected Change	-610	-576	-588	-502	-662
AHEAD	22	Prob OmR	.006	.006	.006	.005	.007
		Change|OmR	-25063	-22367	-29977	-29977	-22367
		Expected Change	-376	-336	-420	-330	-380
	11	Prob OmR	.018	.018	.017	.014	.020
		Change|OmR	-25027	-22330	-29940	-29940	-22330
		Expected Change	-1101	-983	-1228	-1048	-1094
	Other	Prob OmR	.088	.087	.084	.075	.094
		Change|OmR	-35286	-32589	-40199	-40199	-32589
		Expected Change	-7481	-6876	-8200	-7316	-7430
	All	Expected Change	-1918	-1743	-2116	-1849	-1907

Table 14. Accounting for the overall change in home equity of initial homeowners in the HRS and the AHEAD

Survey and household structure	Expected Annual Change in Home Equity: Move and purchase new home	Discontinue home ownership	All	Initial home equity	% of initial equity
HRS					
22	815	-379	436	75128	0.58
11	667	-832	-166	81105	-0.20
Other	1078	-1041	37	79858	0.05
All	823	-610	214	76952	0.28
AHEAD					
22	275	-376	-101	94257	-0.11
11	200	-1101	-901	78496	-1.15
Other	602	-7481	-6879	87777	-7.84
All	399	-1918	-1519	86445	-1.76

column1: Pr(OmO)* E(ΔHE|OmO)
column 2: Pr(OmR)* E(ΔHE|OmR)
column 3: E(ΔHE|O)
column 4: Initial home equity of sellers

Appendix Table 1. Probit Estimates of Move Probabilities and Quantiles Used to Simulate Move Probabilities

HRS Households

Variable	Buy Another Home Estimate	Buy Another Home t-stat	Discontinue Ownership Estimate	Discontinue Ownership t-stat
1 to 1	-0.256	-3.24	-0.007	0.06
2 to 2	-0.194	-2.64	-0.303	2.71
Equity	0.001	0.37	-0.006	3.22
Income	0.008	4.09	-0.020	2.66
Equity*Income	-0.000	-1.59	0.000	0.37
Constant	-1.354	-18.92	-1.808	16.81

Selected Quantiles of Income and Initial Reported Home Equity

	Income	Equity
20th	17871	30796
50th	42986	68192
80th	81105	131984

AHEAD Households

	Buy Another Home Estimate	Buy Another Home t-stat	Discontinue Ownership Estimate	Discontinue Ownership t-stat
1 to 1	-0.113	1.34	-0.907	13.57
2 to 2	-0.175	1.99	-1.367	15.47
Equity	0.009	3.24	-0.004	0.74
Income	0.014	1.87	-0.024	1.09
Equity*Income	-0.000	2.27	-0.001	0.61
Constant	-1.699	20.83	-0.701	8.89

Selected Quantiles of Income and Initial Reported Home Equity

	Income	Equity
20th	10909	37434
50th	21433	74869
80th	40609	139042

Appendix Table 2. OLS and Median Regression Estimates of the Change in Home Equity and Quantiles Used to Simulate Changes in Home Equity for Households Purchasing Another Home

HRS Households

	OLS		Median Regression	
Variable	**Estimate**	**t-stat**	**Estimate**	**t-stat**
1 to 1	48.4	0.00	-762.6	0.08
2 to 2	2134.4	0.16	9765.2	1.04
Equity	-5315.7	10.91	-4798.4	8.53
Income	2593.1	4.40	2024.1	2.33
Equity*Income	10.5	1.20	18.4	0.57
Constant	47719.4	3.64	25646.6	2.60

Selected Quantiles of Income and Initial Reported Home Equity

	Income	Equity
20th	17871	30796
50th	42986	68192
80th	81105	131984

AHEAD Households

	OLS		Median Regression	
	Estimate	**t-stat**	**Estimate**	**t-stat**
1 to 1	-15713.5	0.49	-20551.8	0.80
2 to 2	-8999.6	0.29	231.9	0.01
Equity	-6234.6	5.21	-7619.1	4.56
Income	5998.9	1.83	2289.0	0.60
Equity*Income	37.5	0.36	141.5	0.64
Constant	60189.0	1.82	54972.1	1.77

Selected Quantiles of Income and Initial Reported Home Equity

	Income	Equity
20th	10909	37434
50th	21433	74869
80th	40609	139042

Appendix Table 3. OLS and Median Regression Estimates of the Change in Home Equity and Quantiles Used to Simulate Changes in Home Equity for Households Not Purchasing Another Home

HRS Households

	OLS		Median Regression	
Variable	**Estimate**	**t-stat**	**Estimate**	**t-stat**
1 to 1	13084.3	0.86	10552.8	0.48
2 to 2	18754.4	1.37	18635.4	0.85
Equity	0.0	0.00	0.0	0.00
Income	-1791.8	2.40	-2063.0	1.46
Equity*Income	0.0	0.00	0.0	0.00
Constant	-69374.6	5.16	-51943.1	2.63

Selected Quantiles of Income and Initial Reported Home Equity

	Income	Equity
20th	17871	30796
50th	42986	68192
80th	81105	131984

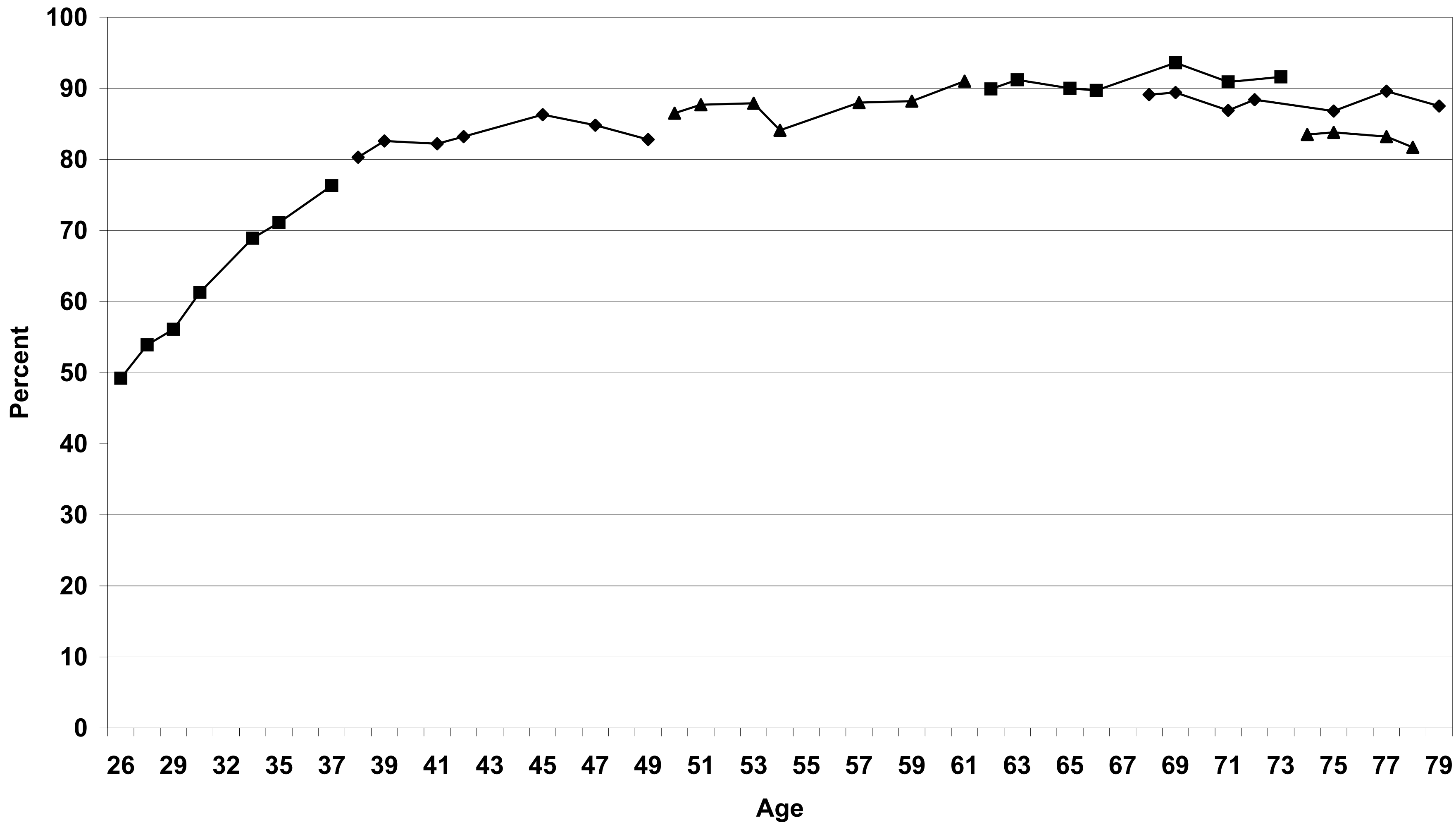
AHEAD Households

	OLS		Median Regression	
	Estimate	**t-stat**	**Estimate**	**t-stat**
1 to 1	24825.9	1.81	27010.7	2.30
2 to 2	24737.6	1.66	35495.2	2.47
Equity	0.0	0.00	0.0	0.00
Income	-6200.7	2.47	-6954.9	1.43
Equity*Income	0.0	0.00	0.0	0.00
Constant	-72100.7	4.79	-71111.1	6.05

Selected Quantiles of Income and Initial Reported Home Equity

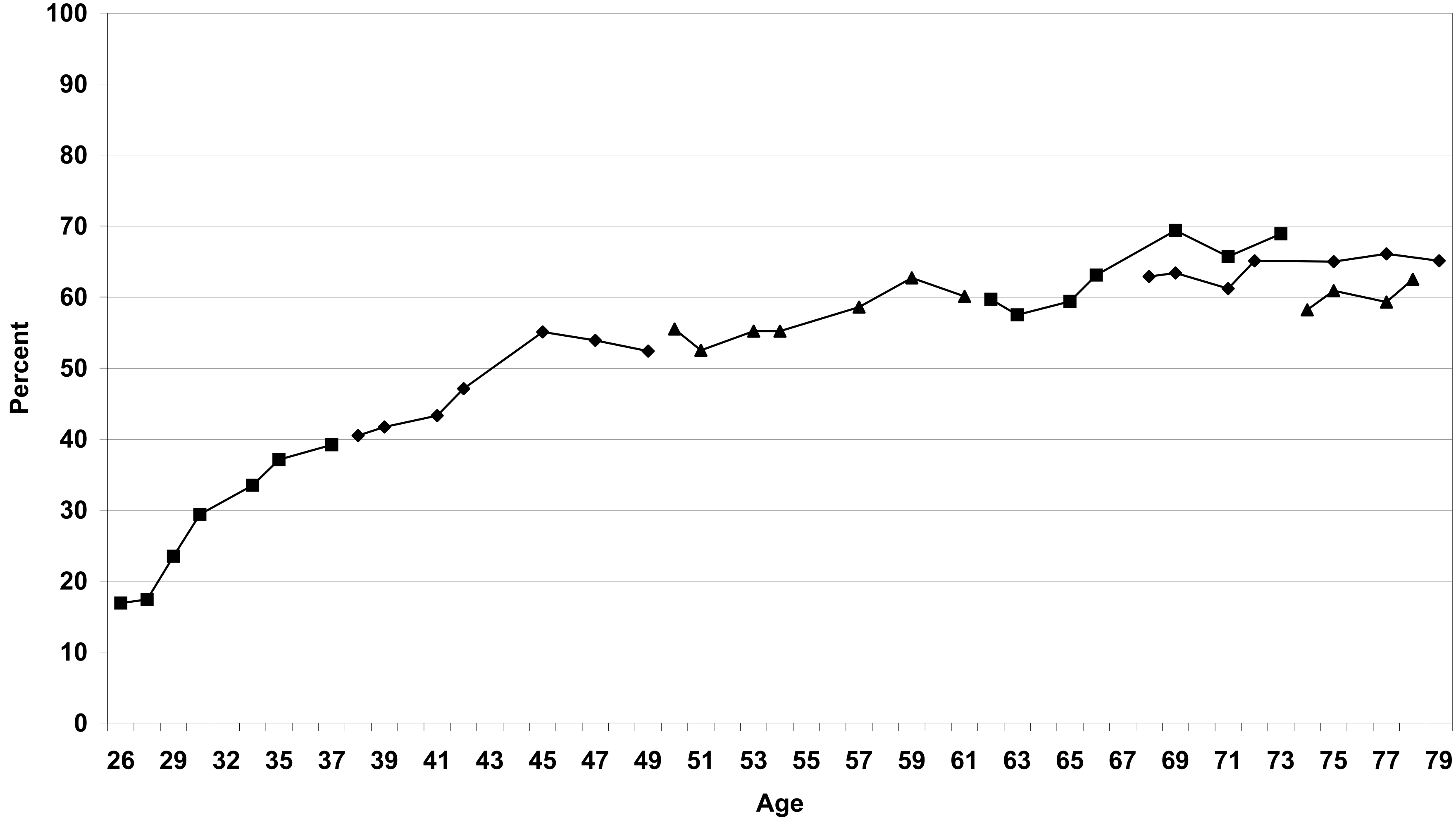
	Income	Equity
20th	10909	37434
50th	21433	74869
80th	40609	139042

Figure 1. Percent Owning for Two-Person Households
Mortality Adjusted Data from SIPP



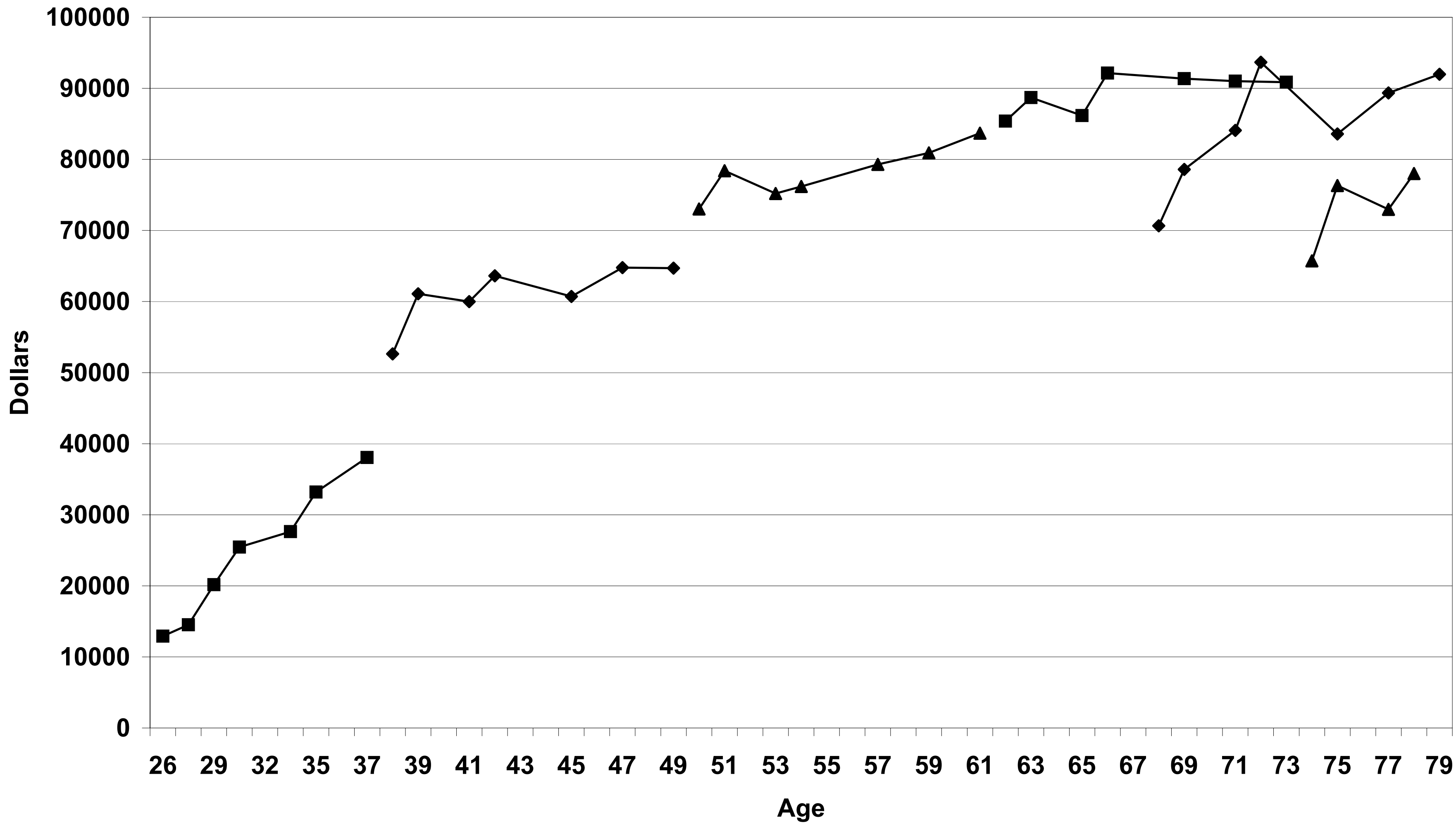
Source: Authors' calculations, SIPP data.

Figure 2. Percent Owning for One-Person Households
Mortality Adjusted Data from SIPP



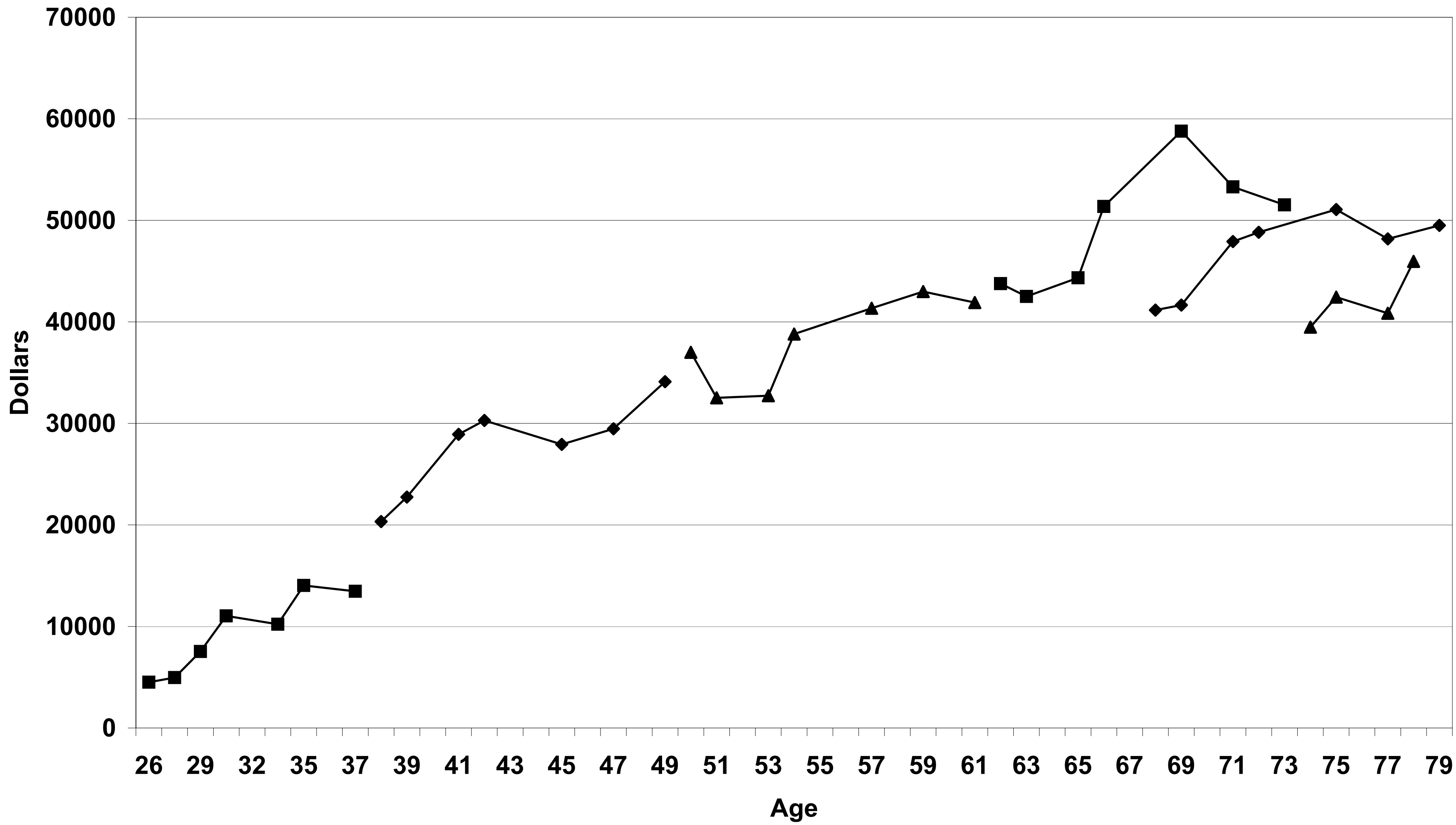
Source: Authors' calculations, SIPP data.

Figure 3. Home Equity for Two-Person Households
Mortality and CPI Adjusted Data from SIPP



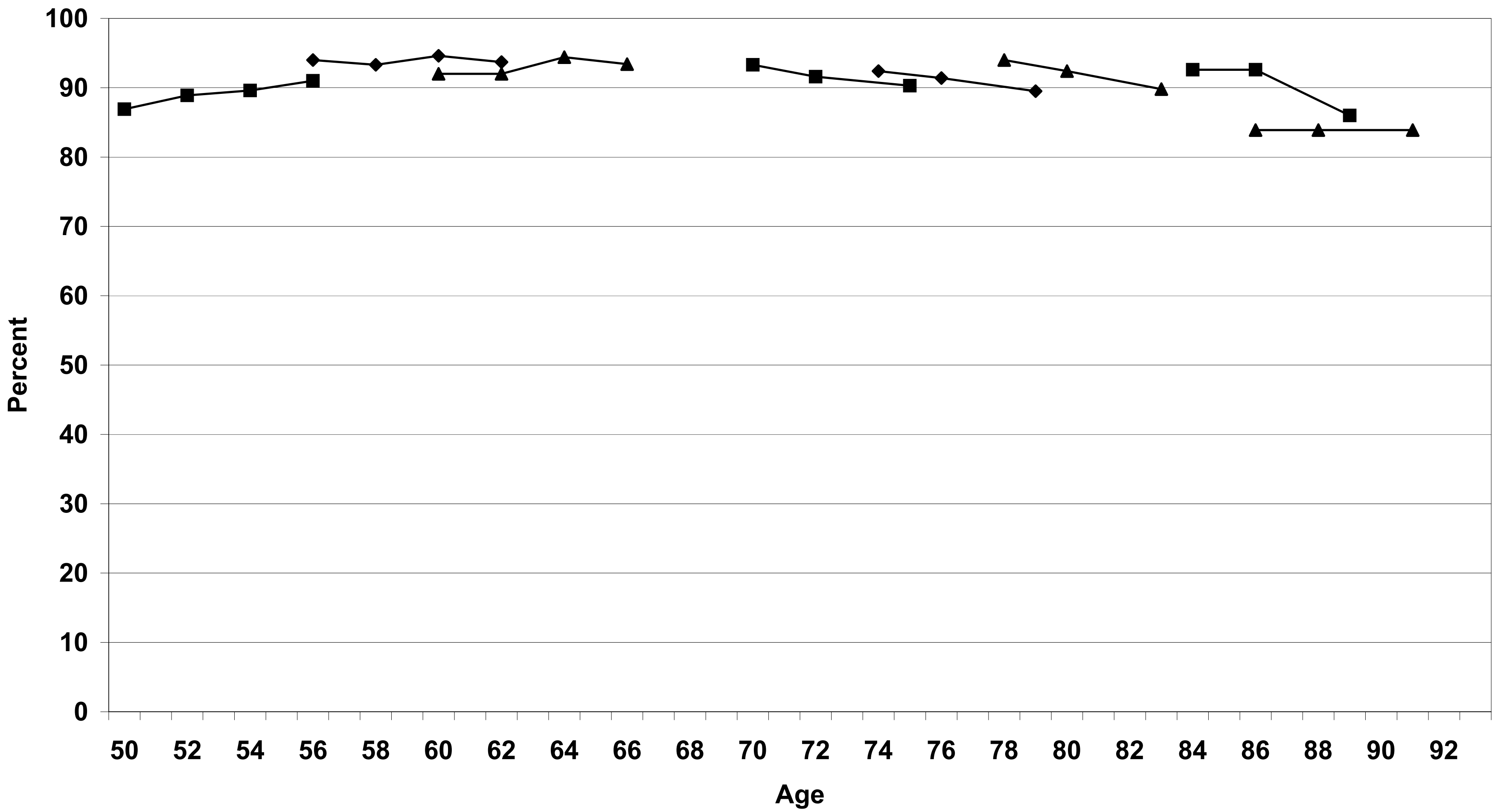
Source: Authors' calculations, SIPP data.

Figure 4. Home Equity for One-Person Households
Mortality and CPI Adjusted Data from SIPP



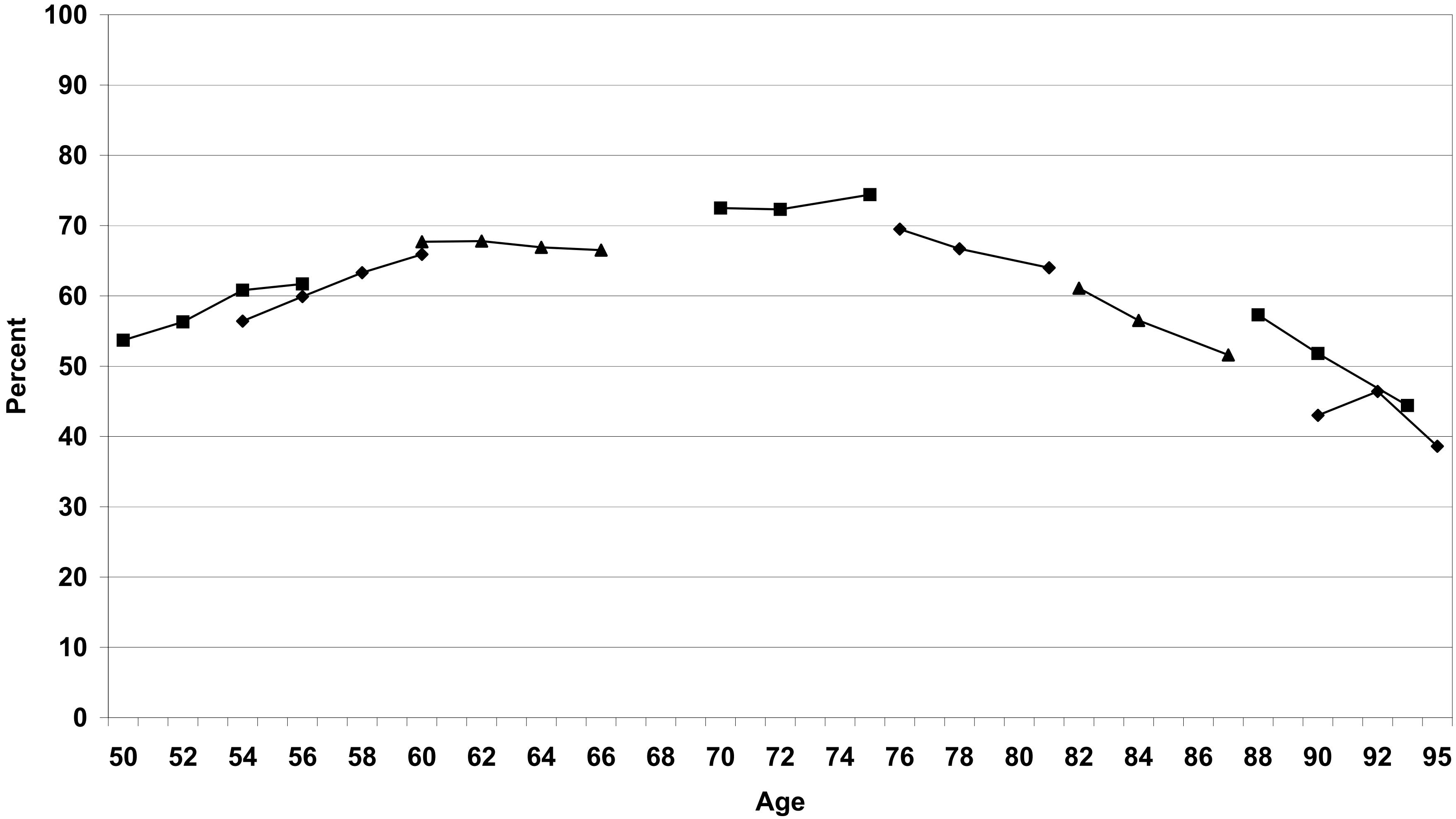
Source: Authors' calculations, SIPP data.

Figure 5. Percent Owning for Two-Person Households
Data from HRS and AHEAD



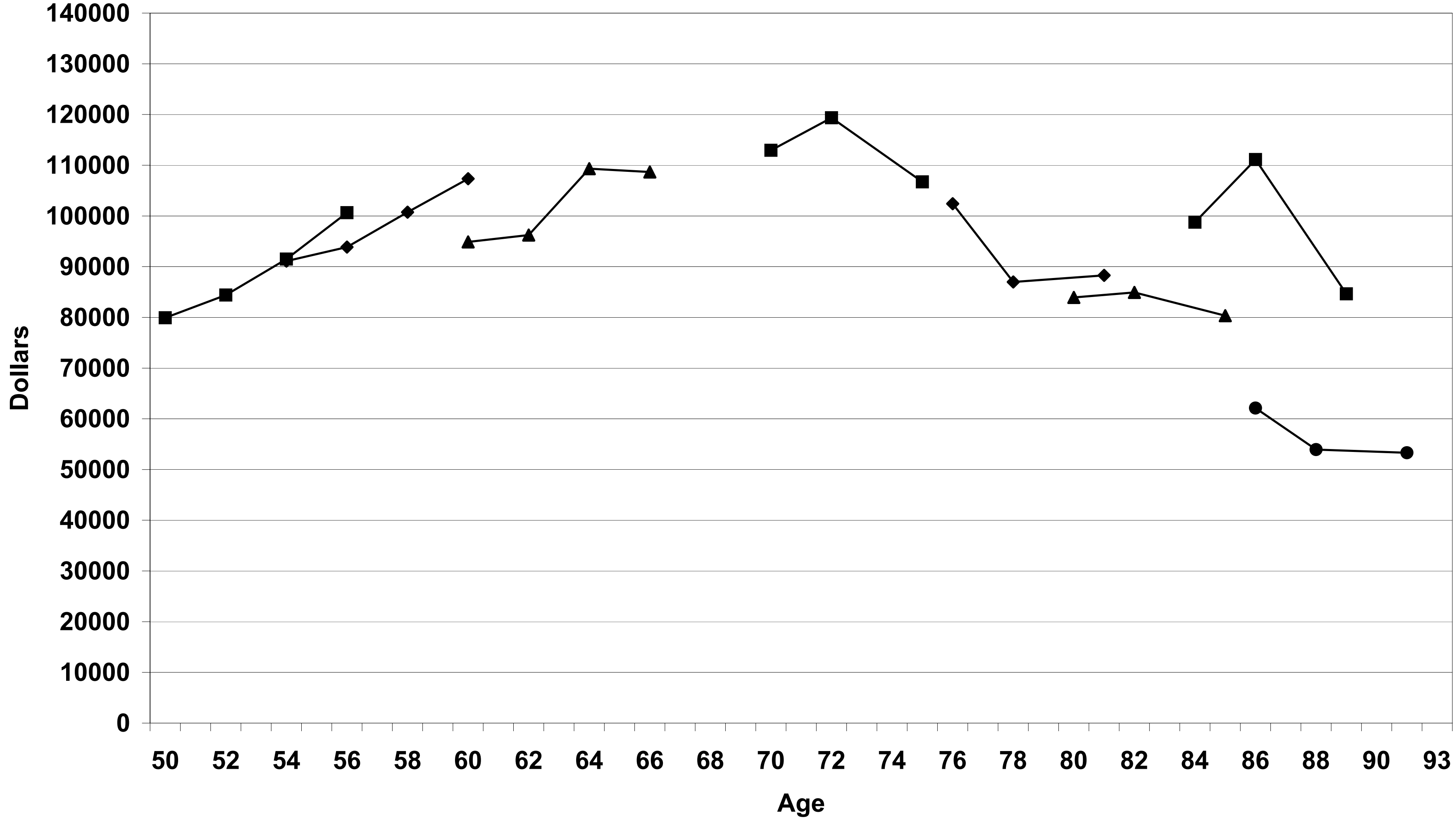
Source: Authors' calculations, HRS and AHEAD data.

Figure 6. Percent Owning for One-Person Households
Data from HRS and AHEAD



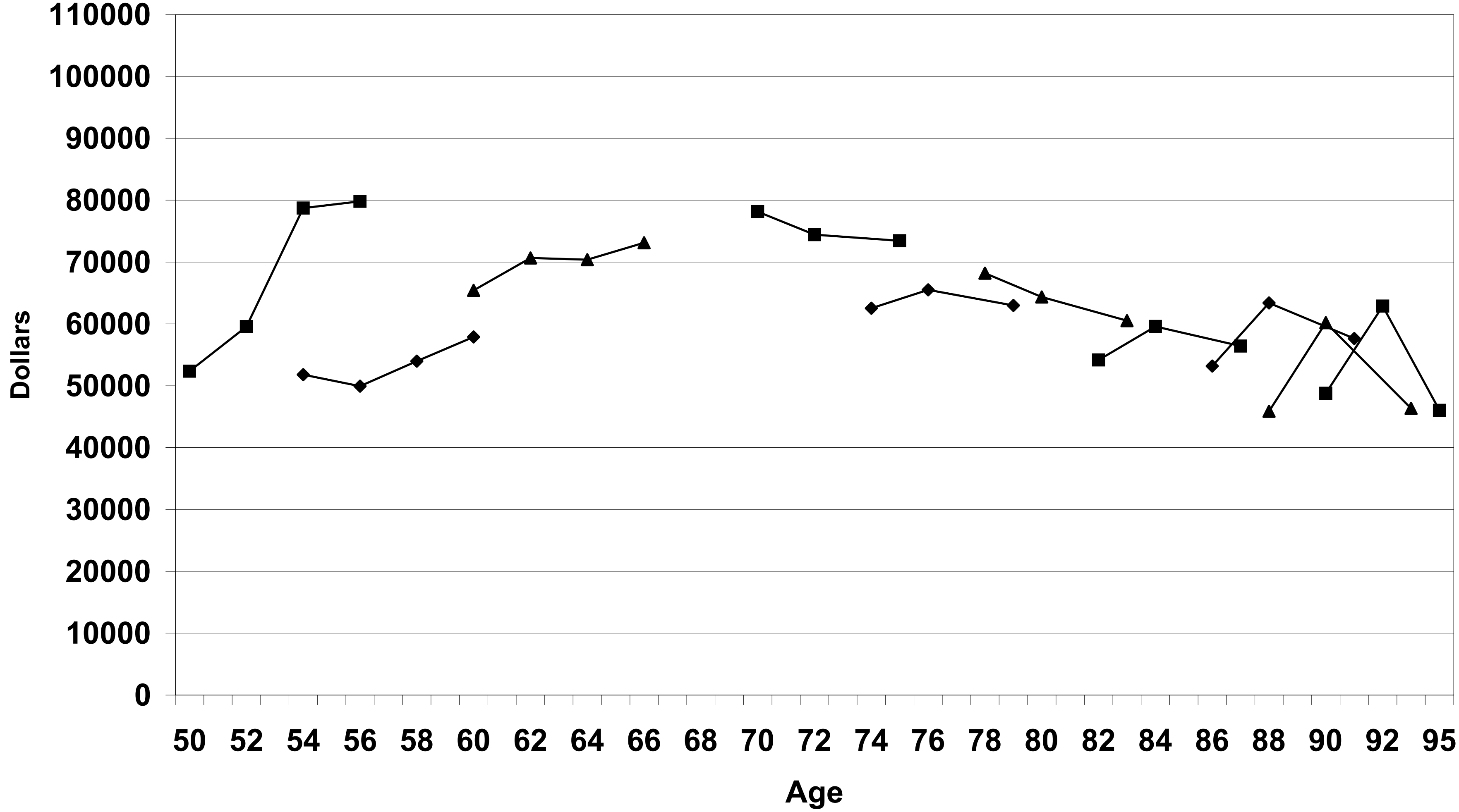
Source: Authors' calculations, HRS and AHEAD data.

Figure 7. Mean Home Equity for Two-Person Households
Data from HRS and AHEAD



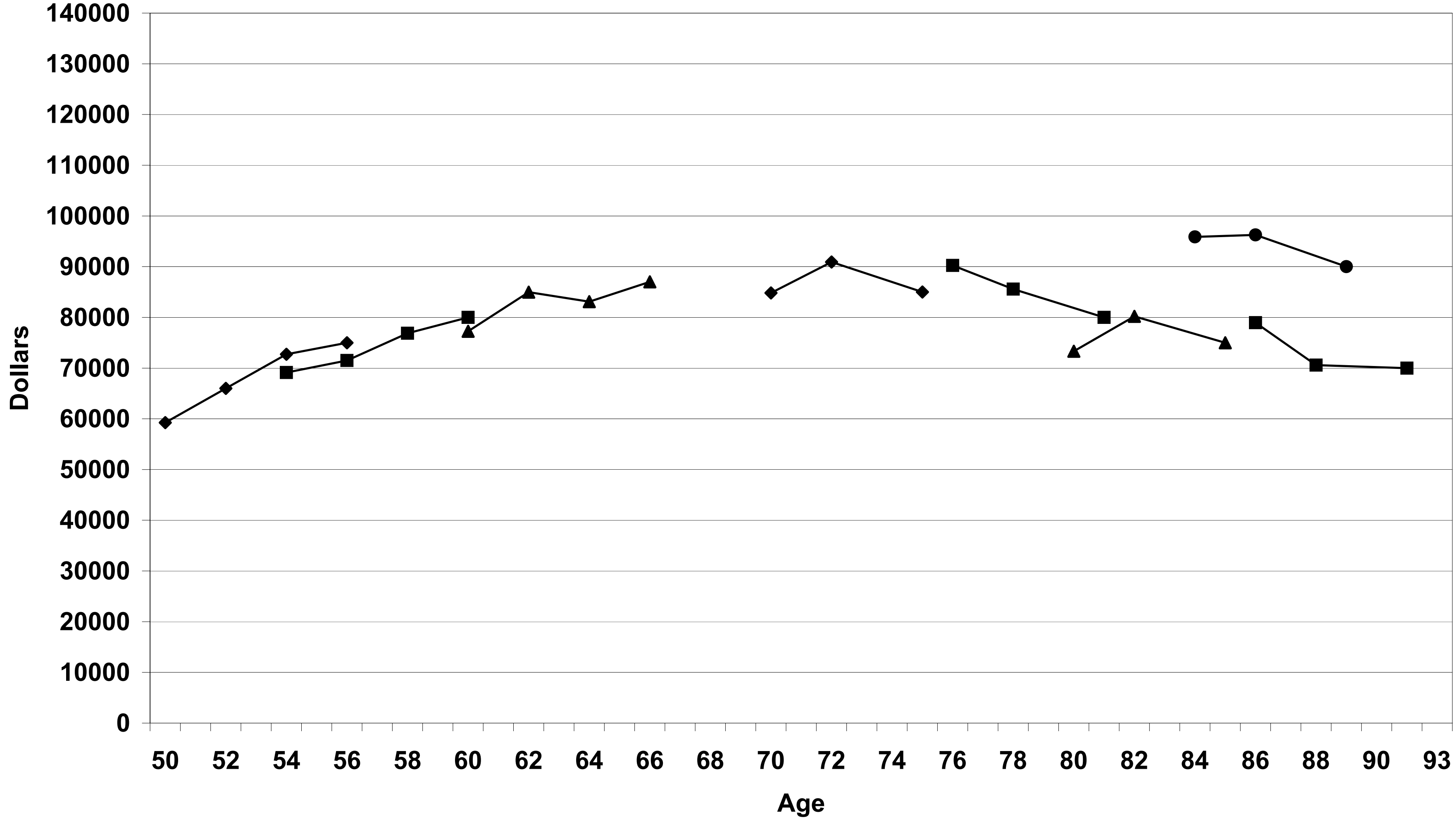
Source: Authors' calculations, HRS and AHEAD data.

Figure 8. Mean Home Equity for One-Person Households
Data from HRS and AHEAD



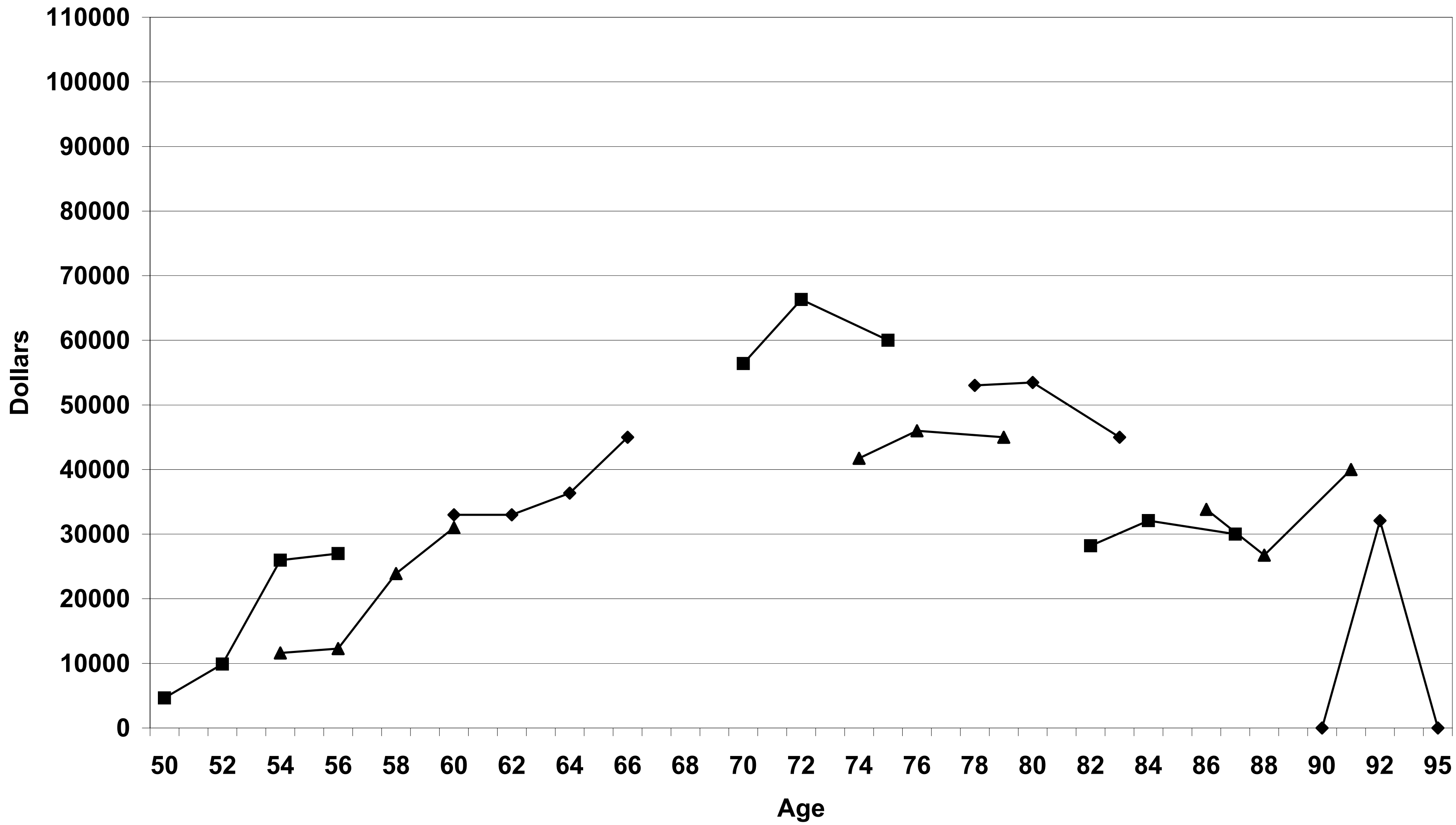
Source: Authors' calculations, HRS and AHEAD data.

Figure 9. Median Home Equity for Two-Person Households
Data from HRS and AHEAD



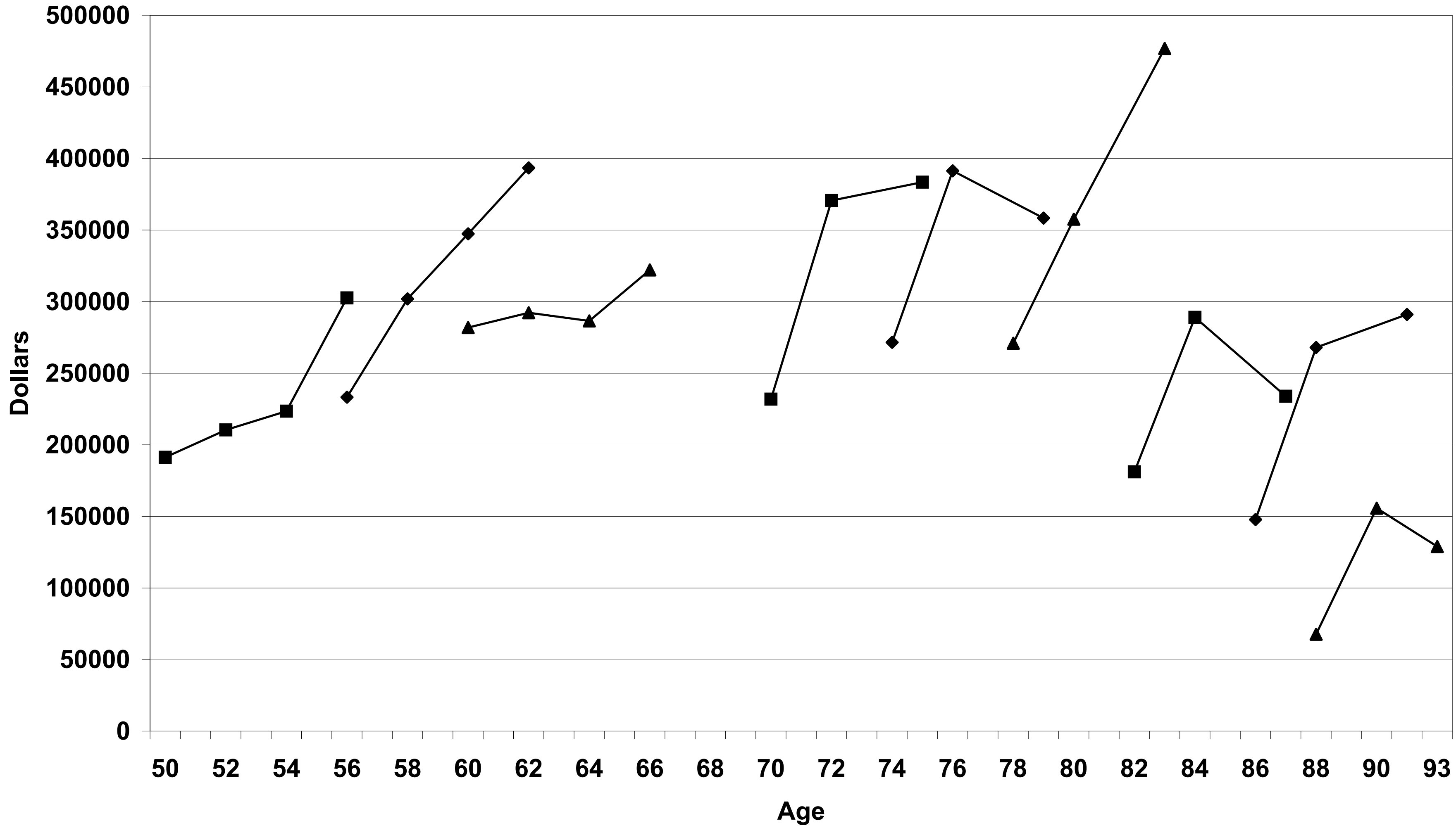
Source: Authors' calculations, HRS and AHEAD data.

Figure 10. Median Home Equity for One-Person Households
Data from HRS and AHEAD



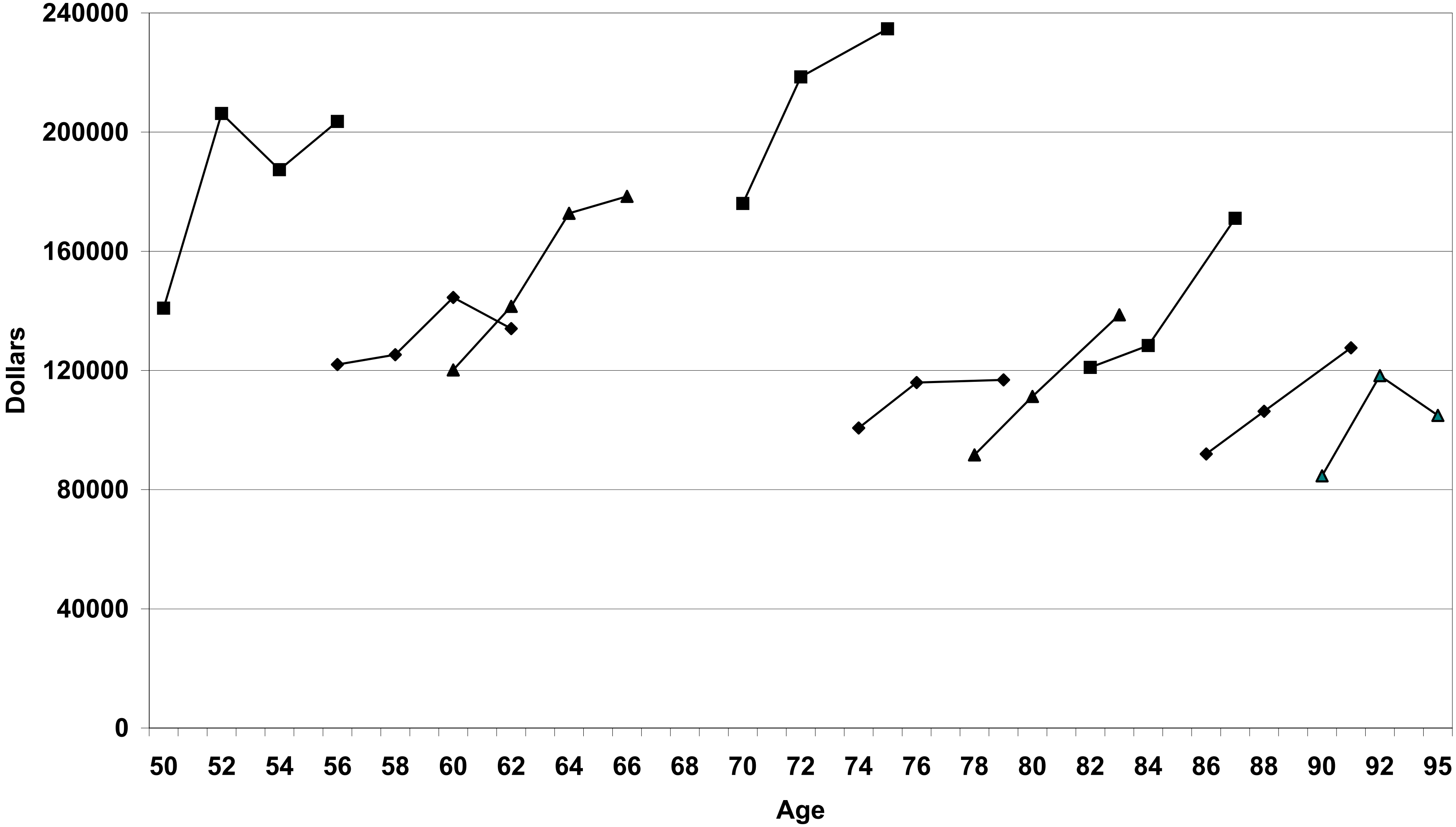
Source: Authors' calculations, HRS and AHEAD data.

Figure 11. Mean Non-Housing Equity for Two-Person Households
Data from HRS and AHEAD



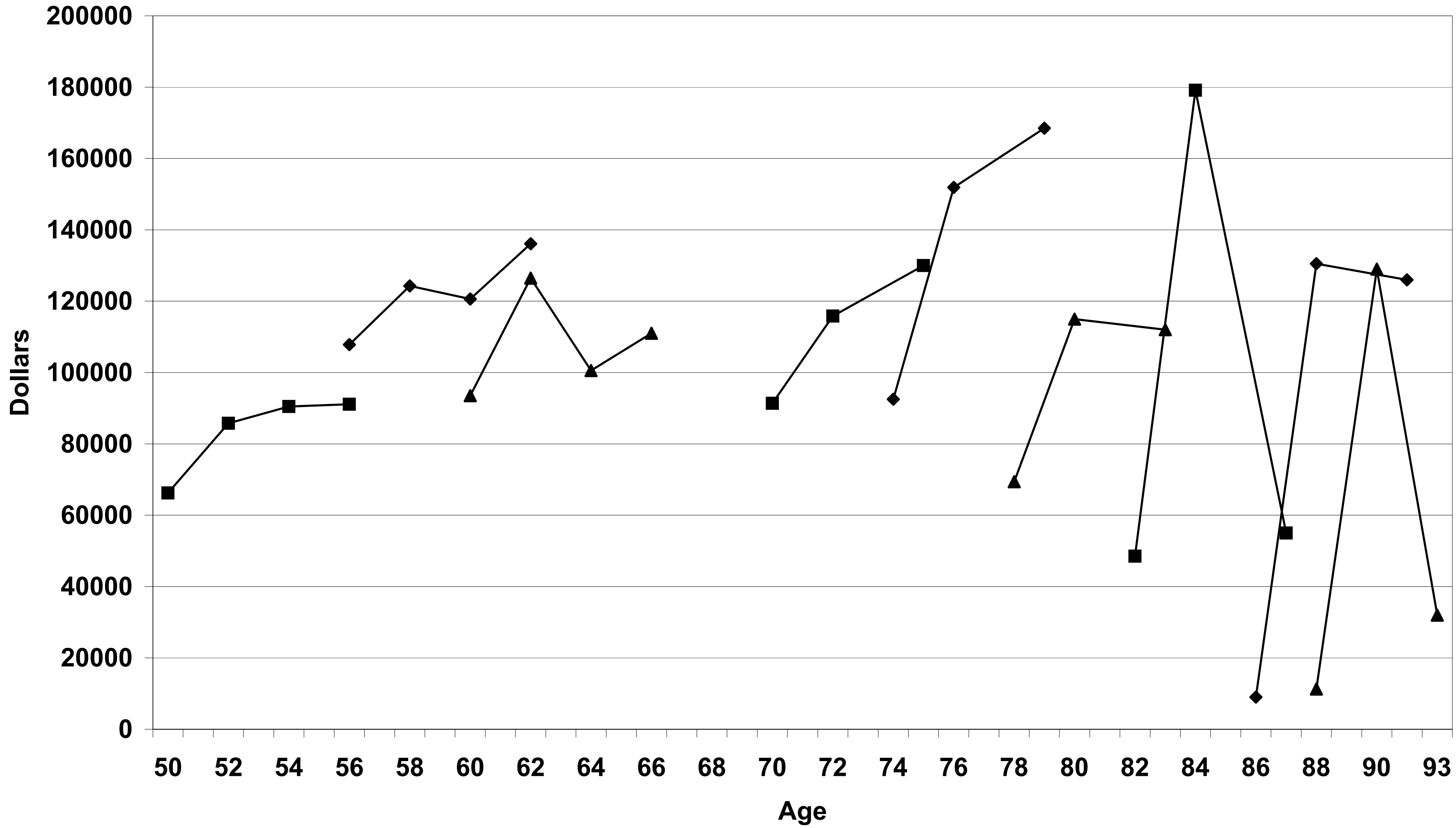
Source: Authors' calculations, HRS and AHEAD data.

Figure 12. Mean Non-Housing Equity for One-Person Households Data from HRS and AHEAD



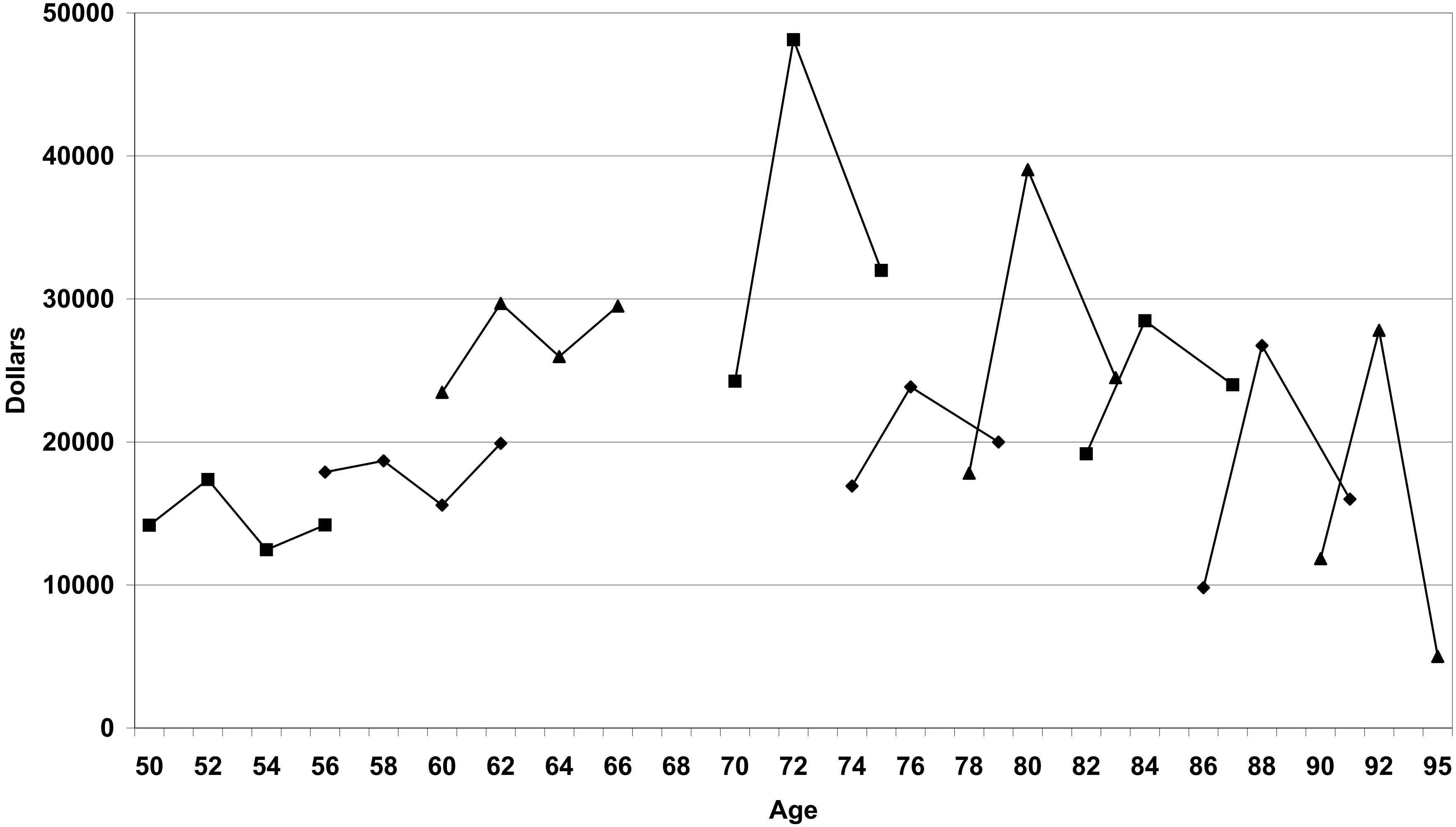
Source: Authors' calculations, HRS and AHEAD data.

Figure 13. Median Non-Housing Equity for Two-Person Households
Data from HRS and AHEAD



Source: Authors' calculations, HRS and AHEAD data.

Figure 14. Median Non-Housing Equity for One-Person Households
Data from HRS and AHEAD



Source: Authors' calculations, HRS and AHEAD data.