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ABSTRACT

We consider assets when individuals were last observed prior to death in the Health and Retirement Study (HRS) and trace assets backwards to the age when these individuals were first observed. For most individuals, assets in the last year observed (LYO) were very similar to assets in the first year observed (FYO). In particular, most of those who were last observed with very low asset levels also had low assets when first observed. We also estimate the relationship between an individual's asset change between the first and last date of observation, that individual's education and health status when first observed, and that individual's within-sample changes in health and family composition. We obtain estimates for HRS respondents who were 51 to 61 in 1992 and for AHEAD respondents who were age 70 and over in 1993.

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Many individuals reach the end of life with limited financial assets. This paper explores the determinants of asset balances at death by following respondents in the Health and Retirement Study (HRS) "backward" from the last wave prior to their death to the first wave in which they were observed. We first document the relationship between the assets in an individual's last year observed (LYO) before death and assets in the first year observed (FYO). We then estimate the effect of individual attributes, in particular health status and education, and changes in these attributes, on the relationship between assets when first and last observed.

There is particular interest in the factors that lead some individuals to have very low wealth levels near the end of life. There are several pathways that can lead to this outcome. One is for an individual or household to enter retirement with modest or substantial assets, and then to experience unanticipated events that drain financial resources. For some individuals, the death of a spouse or divorce may result in a decline in wealth. For others, the costs associated with a health event such as a stroke or the onset of a chronic illness may lead to substantial reductions in assets. For still others, a decline in wealth may accompany a general decline in health, a pattern that is documented in Poterba, Venti and Wise (2010) and a number of other studies.

A second pathway to low assets at death is to enter retirement with some accumulated assets, but to "outlive" them without extraordinary expenditures at any point during retirement. This explanation is most likely to apply to those in households in which one or both individuals lived longer than they expected to.

A third pathway to low assets at death is beginning the retirement period with low assets, the result of low or no saving before retirement. Individuals in households that enter retirement with very limited wealth are unlikely to have substantial wealth when they are last observed. For these individuals, low wealth at the end of life is not a manifestation of economic choices or events during retirement, but rather of events in the pre-retirement period.

Our aim is to assess these three alternative pathways in light of data on observed asset trajectories late in life. We motivate our analysis with a series of figures that follow the path of assets between the year when an individual is first, and the year when she is last, observed. These figures summarize the widely-varying data on

household balance sheets by presenting median assets. They are shown for individuals aged 51 to 61 in 1992 (the original HRS cohort) and those aged 70 and older in 1993 (the original AHEAD cohort). We show separate figures to disaggregate the sample by education level and by family status. The figures generally show little difference between median assets when first and when last observed for those in the younger cohort, and only a modest decline in assets for those in the older cohort.

We then estimate regression models relating the change in assets between the first and last year when an individual is observed and various individual attributes, some fixed and some time-varying. Simulations based on these estimates show relatively flat asset trajectories by age for those who do not experience a change in family composition or in health status. However, many individuals exhibit substantial asset declines in connection with important medical events or disruptions in family composition. The rate at which assets decline between the years when an individual is first and last observed is negatively related to the individual's education level.

This analysis is closely related to the findings we report Poterba, Venti, and Wise (2012), which summarizes individuals' asset holdings in the last survey wave preceding their death. Banerjee (2015) presents similar findings. Rather than tracking all HRS respondents who die before 2012, as we do, he focuses on the HRS respondents who die between 2010 and 2012. His results confirm the prevalence of low levels of assets in the years prior to death. Our findings in this paper are also related to a much broader literature, surveyed by DeNardi, French, and Jones (2015), that seeks to identify factors affecting wealth accumulation and decumulation in retirement. Numerous studies have used the HRS to consider the effect of health and family disruptions on wealth. Coile and Milligan (2009), French, DiNardi, Jones, Baker, and Doctor (2006), Lee and Kim (2007), Smith (1999, 2004, 2005), and Wu (2003), among others, estimate the effect of new health events on wealth or on other measures of socio-economic status. These studies find that health events are an important source of variation in wealth. In related work, Sevak, Weir and Willis (2003/2004), Johnson et al. (2006) and Coile and Milligan (2009) show that widowhood is associated with large reductions in wealth.

This paper is divided into four sections. Section one describes the data used in the analysis. Section 2 shows how asset balances in the LYO compare to balances in

the FYO. Section 3 presents the regression results that explore the individual attributes that are associated with changes in assets between the FYO and LYO. Section 4 summarizes our results and discusses future directions for research.

1. Data Description

Our analysis is based on two cohorts from the HRS – the original HRS cohort whose members were first surveyed in 1992 when they were between the ages of 51 and 61 and the original Asset and Health Dynamics among the Oldest Old (AHEAD) cohort whose members were over the age of 70 when first surveyed in 1993. In both cohorts, we drop "age ineligible" spouses (not age 51 to 61 in the HRS and not age 70+ in the AHEAD). We also drop respondents who leave the sample for reasons other than death and we drop the 1992 wave of the HRS because of incomplete data for some variables. With one exception, respondents are surveyed biennially so we are able to use data for 10 waves: 1994, 1996, 1998, 2000, 2002, 2004, 2006, 2008, 2010 and 2012 for the HRS cohort and 1993, 1995, 1998, 2000, 2002, 2004, 2006, 2008, 2010 and 2012 for the AHEAD cohort. We choose to use the 1993 AHEAD wave, despite concerns about understatement of wealth in that wave that have been raised by Rohwedder, Haider, and Hurd (2006), to maximize the sample size of our subsequent cohorts. In the figures we present below, the 1993 observations for the AHEAD sample do not seem substantially different from the 1995 values, which supports for including this sample wave.

For each respondent, there is a last year observed (LYO). If an individual is last observed prior to 2012, then the data for the LYO pertain to the last year observed prior to death. If the LYO is 2012, then the data are for a respondent who was alive when last observed. Respondents are surveyed approximately every two years, so for those who die within our sample period, the date at which assets are measured in the LYO may be as much as two years prior to the date of death. On average it will be about one year prior to death. Because medical expenditures are often substantial in the last six months of life, asset balances observed in the last wave before death may over-estimate assets at the time of death.

In principle, we could obtain more precise estimates of assets at the time of death from "exit interviews" administered to a surviving spouse, child or other knowledgeable person after the death of a respondent. These exit interviews obtain information on the finances of the deceased in the period between the last core interview and the time of death. We have not used these data because exit interviews were not obtained for approximately 20 percent of deceased persons and key components of wealth are missing for many of the remaining 80 percent. Marshall, McGarry and Skinner (2011), who study late-life medical expenses, use the exit interviews, imputing medical expenditures when necessary but also relying on the core interviews to obtain components of wealth. Since much of our analysis is based on a relatively small subsample of deceased persons, retaining as many of these observations as possible is a high priority. While in principle we could impute components of wealth for the missing and incomplete exit interviews, this approach could be unreliable given the small samples we are studying and the fact that mortality is correlated with individual attributes, making selection a substantial concern.

We define "assets" inclusive of home equity and the net value of other real estate, business assets, and financial assets. IRA and Keogh balances are included in financial assets, but assets in 401(k) plans are not included--401(k) assets were not collected for the AHEAD cohort and the data are incomplete in some years (in particular 1994 to 1998) for the HRS cohort. This is not an important concern for members of the older AHEAD cohort because they were unlikely to have participated in 401(k) plans. These plans were first authorized in 1982 and did not become widespread until the late 1980s and early 1990's. They were largely unavailable to members of the AHEAD cohort who were age 70 or older in 1993. Members of the HRS cohort were more likely to work for an employer offering a 401(k) plan. Many 401(k) balances are rolled over into IRA accounts, especially when employees change employers. The portion of 401(k) balances not rolled over into an IRA at retirement is excluded from our measure of assets. So is the capitalized value of annuity income from Social Security and defined benefit (DB) pensions. The income from both Social Security and DB pensions is included in our definition of household income. All income streams and asset balances have been converted to 2012 dollars using the CPI-U.

Our unit of observation is the person, but the asset balance associated with each person is drawn from the household asset balance. Some results are presented separately by family status pattern, distinguishing those who were continuously single, continuously married, or married to single. More details on how family status groups are defined as well as on other aspects of the data are presented below.

2. Background and Descriptive Information

We begin by summarizing the distributions of assets when respondents are last observed and when they are first observed. As noted above, the interval between the first and last observation for a person can be as short as two years or as long as nineteen years. The tables below only consider the distribution of assets for deceased persons for whom the number of years between the LYO and the FYO is eight or more. Each table, and each associated figure, presents results separately for the HRS and AHEAD cohorts. To provide further insight on the financial circumstances of those with very low asset levels, we also report the joint distribution of assets in the LYO and annuity income in the LYO. To facilitate the comparison of assets at different ages, all assets are converted to 2012 dollars using the Consumer Price Index.

After summarizing the distributions, we provide additional detail on the prevalence of zero and negative asset balances when individuals are last observed and we present figures that provide more detail on asset trajectories by age, family status and level of education. The tables focus exclusively on individuals who died within our sample period, but the figures include those who were still alive when last observed.

2.1 Summary Tabulations

Tables 2-1a and 2-1b show assets in the first year observed conditional on assets in the last year observed for all individuals who died during the sample period. We exclude all persons for whom the interval between the FYO and the LYO is fewer than eight years; for very short periods between FYO and LYO, a high correlation between the two is almost mechanical. Each table includes three panels. The top panel shows total non-annuity assets (defined to include housing wealth, financial assets, other real estate and business assets), the middle panel shows housing equity (including the net value of other real estate) and the bottom panel shows net financial

assets (all non-housing wealth). Table 2-1a considers all persons between the ages of 51 and 61 in 1992 (the HRS cohort) and the Table 2-1b considers all persons over the age of 70 in 1993 (the AHEAD cohort).

We first consider the results for total assets in the top panel of each table. The last column of each of these panels shows that a large fraction of persons die with minimal non-annuity assets. Among persons age 51 to 61 in 1992, 14.9 percent had non-annuity asset balances that were zero (or negative) just prior to death. Another 23 percent had positive asset balances of less than $50,000. Of persons age 70 and older in 1993, 13.3 percent had zero or negative non-annuity assets just prior to death and another 25.4 percent had positive balances below $50,000. The cell entries in each table show that for a large proportion of persons, non-annuity assets at death are similar in magnitude to the comparable assets when first observed. For example, for persons in the HRS cohort, 48.2 percent of those with zero or negative wealth when last observed had zero or negative wealth when first observed in 1994. A larger subset of this group, 79 percent, had less than $50,000 when first observed. Of those with greater than $500,000 when last observed, 52.1 percent had $500,000 or more when first observed and 82.3 percent had greater than $250,000 when first observed. Similar patterns can be seen in Table 2-1b for persons aged 70 and older in 1993. These tables suggest that for most individuals, non-annuity assets at death are not so different from non-annuity assets when first observed. This is true both for those who were between 51 and 61 in 1992 and those who were age 70 or older in 1993. A large fraction of persons with meager assets at death also had limited assets when first observed. Most of those with substantial assets at death also had substantial assets when first observed.

These comparisons are more striking if estimates along the diagonal (in bold) are combined with the estimates to the left and to the right of the diagonal element. For example, of HRS persons with assets in the $1-$50,000 interval in the LYO, 42.8 percent were in the same interval in the FYO, but 81 (= 21.4 + 42.8 + 16.8) percent are in this interval or in the intervals to the left and right of this interval, that is, 81 percent had had assets of less than $100,000 in the FYO. Thus of persons who had positive assets of less than $50,000 in the LYO, only 19 percent had assets more than $100,000

in the FYO. A similar calculation reveals than of the persons who had zero (or negative) assets when last observed, only 16.5 percent had more than $100,000 in assets when first observed.

The bottom two panels of each table show the distributions of housing and financial assets respectively. For both the HRS and the AHEAD cohorts, the relationship between housing equity in the LYO and the FYO are very similar to the relationship for total assets. The same is true for financial assets. Persons with low housing wealth in the LYO also tend to have low housing wealth when first observed. For example, of those in the HRS cohort who had housing assets in the $1-$50,000 interval in the LYO, 88.5 percent had housing wealth less than $100,000 when first observed. For the AHEAD cohort, the comparable statistic is 74.5 percent. The corresponding values for persons with positive financial wealth of less than $50,000 in the LYO are 87.2 percent for the HRS cohort, and 86.4 percent for the AHEAD cohort. The factors that lead some individuals with less than $100,000 in financial assets when first observed to report significantly higher assets when last observed warrants further exploration.

The row percentages in Tables 2-1a and 2-1b show the probability of being in a given asset interval in the FYO given the level of assets in the LYO. Tables 2-2a and 2-2b present the same underlying data in a different way, by reporting the probability of being in a given asset interval in the last year observed conditional on the level of assets in the first year observed. As in the previous tables, results are only shown for those for whom the interval between the FYO and the LYO is eight or more years. The results once again suggest a great deal of persistence: those who have substantial assets when first observed also tend to have substantial assets when last observed prior to death. For both age groups, over 55 percent of those with zero or negative total assets in the FYO also have zero or negative total assets in the LYO. For the younger age cohort, 73.8 percent of persons in the top total asset interval (> $500,000) in the FYO are also in the top total asset interval in the LYO. In the older cohort, persistence in the top total asset interval is somewhat lower: only 57.3 percent of those in this interval when first observed were also there when last observed.

The relationships between assets when first and last observed are similar for housing wealth and for financial wealth. In the HRS cohort, 76.2 percent of persons with zero or negative housing wealth in the FYO had zero or negative housing wealth in the LYO. For the AHEAD cohort, this statistic is 90.7 percent. For persons in the $250-500,000 housing wealth interval in the FYO, only 24.1 percent of the HRS sample, and 30.9 percent of the AHEAD sample, had housing wealth in this interval when last observed, and most had less.

Financial assets also tend to decline between the first and last years observed. In the HRS cohort, 61.5 percent of persons with zero or negative financial assets in the FYO also had zero or negative assets in the LYO. Only 29.3 percent of persons with assets in the $250-500,000 interval had assets in this interval in the LYO; 34.1 percent had more and 36.7 percent less. For the AHEAD cohort, 45.9 percent of those with zero or negative financial assets in the FYO also has zero or negative assets in the LYO, and only 20.7 percent of those with assets in $250-500,000 interval in the FYO had assets in this interval in the LYO. For this group, 28.3 percent had more, and 51.0 percent less, financial assets in the LYO. The data suggest a general tendency for both housing wealth and financial wealth to decline modestly between the FYO and the LYO for both the HRS and the AHEAD cohorts.

To provide a simple way to visualize the mobility patterns across the asset intervals in Tables 2-2a and 2-2b, Figures 2-1a and 2-1b show the percentage of individuals who are in each FYO interval who moved to a higher interval, dropped to a lower interval, or stayed in the same interval when they were last observed. For both the lowest and the highest interval the chart is of limited interest, but for individuals whose asset holdings place them one of the four middle categories, the graph shows the pattern of mobility. The contrast between the two figures illustrates the greater likelihood of individuals in the AHEAD sample, who are older than those in the HRS sample, moving to a lower asset interval when last observed than when first observed. Both figures illustrate that for those in the lowest asset category when first observed, the probability of being observed at a similarly low level of assets when last observed is very high.

Table 2-1a. Percentage of persons in each asset interval when first observed by asset interval in last wave prior to death, persons age 51 to 61 in 1992 (row percents)

Total Assets

total asset interval in LYO	total asset interval in first year observed (1994) ≤ $0	$1-$50,000	$50,001-$100,000	$100,001-$250,000	$250,001-500,000	> $500,001	Percent in each LYO interval
≤ $0	**48.2**	30.8	7.5	7.5	3.8	2.3	14.9
$1-$50,000	21.4	**42.8**	16.8	16.1	2.4	0.5	23.0
$50,001-$100,000	2.0	20.8	**36.5**	34.7	4.0	2.1	9.4
$100,001-$250,000	1.5	9.5	20.8	**43.0**	20.3	4.9	20.9
$250,001-500,000	0.4	1.5	7.8	31.3	**43.8**	15.2	12.5
> $501,000	0.5	1.5	2.3	13.3	30.2	**52.1**	19.3
Percent in each FYO interval	12.8	18.9	14.2	23.6	17.0	13.6	

Housing Equity

housing equity interval in LYO	housing equity interval in first year observed (1994) ≤ $0	$1-$50,000	$50,001-$100,000	$100,001-$250,000	$250,001-500,000	> $500,001	Percent in each LYO interval
≤ $0	**56.6**	16.6	10.3	12.8	2.7	1.0	28.4
$1-$50,000	18.9	**47.9**	21.7	8.0	2.3	1.2	14.6
$50,001-$100,000	3.2	20.3	**49.0**	23.1	4.4	0.0	15.0
$100,001-$250,000	5.1	9.5	24.5	**50.4**	8.3	2.3	25.4
$250,001-500,000	1.2	5.4	9.1	55.7	**20.3**	8.4	9.5
> $501,000	5.2	0.6	5.4	28.3	30.3	**30.2**	7.2
Percent in each FYO interval	21.1	17.7	20.9	28.3	8.0	4.0	

Financial Assets

financial asset interval in LYO	financial asset interval in first year observed (1994) ≤ $0	$1-$50,000	$50,001-$100,000	$100,001-$250,000	$250,001-500,000	> $500,001	Percent in each LYO interval
≤ $0	**54.7**	34.6	4.8	3.3	1.7	0.7	27.7
$1-$50,000	24.8	**50.5**	11.9	9.4	2.3	1.1	36.4
$50,001-$100,000	4.8	46.1	**20.0**	18.2	8.0	2.9	6.8
$100,001-$250,000	1.4	20.7	17.1	**40.6**	13.2	7.1	11.1
$250,001-500,000	0.0	13.5	8.2	33.7	**35.3**	9.3	7.5
> $501,000	0.0	3.0	4.3	20.1	29.7	**42.9**	10.4
Percent in each FYO interval	24.7	34.8	10.0	14.7	9.1	6.8	

Note: Calculations exclude persons alive when last observed and persons for whom fewer that 8 years elapsed between FYO and LYO.

Table 2-1b. Percentage of persons in each asset interval when first observed by asset interval in last wave prior to death, persons age 70 or older in 1993 (row percents)

Total Assets

total asset interval in LYO	total asset interval in first year observed (1993) ≤ $0	$1-$50,000	$50,001-$100,000	$100,001-$250,000	$250,001-500,000	> $500,001	Percent in each LYO interval
≤ $0	**28.7**	28.4	13.5	20.9	6.8	1.7	13.3
$1-$50,000	10.0	**39.0**	17.9	22.4	6.4	4.4	25.4
$50,001-$100,000	2.6	15.4	**30.7**	36.9	9.7	4.7	10.8
$100,001-$250,000	1.2	5.9	13.1	**49.2**	23.2	7.5	18.0
$250,001-500,000	0.5	2.5	2.9	31.8	**40.4**	21.9	15.6
> $501,000	0.0	1.2	1.2	15.3	30.6	**51.8**	17.1
Percent in each FYO interval	6.9	17.0	12.7	28.8	19.3	15.4	

Housing Equity

housing equity interval in LYO	housing equity interval in first year observed (1993) ≤ $0	$1-$50,000	$50,001-$100,000	$100,001-$250,000	$250,001-500,000	> $500,001	Percent in each LYO interval
≤ $0	**37.6**	11.7	16.0	25.0	6.7	3.0	47.4
$1-$50,000	6.7	**39.9**	27.9	17.7	6.4	1.4	8.1
$50,001-$100,000	4.4	14.4	**45.1**	30.6	4.4	1.1	12.4
$100,001-$250,000	2.2	2.9	14.8	**65.7**	11.3	3.2	19.4
$250,001-500,000	3.8	0.6	3.6	41.6	**39.5**	10.9	8.6
> $501,000	0.0	0.0	1.4	16.9	27.6	**54.2**	4.1
Percent in each FYO interval	19.6	11.2	18.7	34.1	10.9	5.5	

Financial Assets

financial asset interval in LYO	financial asset interval in first year observed (1993) ≤ $0	$1-$50,000	$50,001-$100,000	$100,001-$250,000	$250,001-500,000	> $500,001	Percent in each LYO interval
≤ $0	**42.2**	42.4	6.9	5.5	1.9	1.1	19.1
$1-$50,000	19.0	**55.3**	12.1	9.0	3.1	1.5	38.8
$50,001-$100,000	4.7	33.7	**21.6**	23.6	10.3	6.0	9.0
$100,001-$250,000	6.6	32.5	15.3	**28.1**	13.0	4.5	13.5
$250,001-500,000	2.9	26.2	9.7	29.6	**18.9**	12.7	9.1
> $501,000	5.2	13.8	11.8	18.4	22.5	**28.3**	10.5
Percent in each FYO interval	17.6	40.8	12.2	15.1	8.3	6.1	

Note: Calculations exclude persons alive when last observed and persons for whom fewer that 8 years elapsed between FYO and LYO.

Table 2-2a. Percentage of persons in each asset interval in last wave prior to death by total asset interval when first observed, persons age 51 to 61 in 1992 (column percents)

Total Assets

total asset interval in LYO	total asset interval in first year observed (1994) ≤ $0	$1-$50,000	$50,001-$100,000	$100,001-$250,000	$250,001-500,000	> $500,001	Percent in each LYO interval
≤ $0	**56.3**	24.3	7.9	4.8	3.3	2.5	14.9
$1-$50,000	38.7	**52.3**	27.3	15.7	3.3	0.8	23.0
$50,001-$100,000	1.5	10.4	**24.1**	13.8	2.2	1.5	9.4
$100,001-$250,000	2.5	10.6	30.7	**38.2**	24.9	7.6	20.9
$250,001-500,000	0.4	1.0	6.9	16.6	**32.2**	13.9	12.5
> $501,000	0.7	1.6	3.1	10.9	34.2	**73.8**	19.3
Percent in each FYO interval	12.8	18.9	14.2	23.6	17.0	13.6	

Housing Equity

housing equity interval in LYO	housing equity interval in first year observed (1994) ≤ $0	$1-$50,000	$50,001-$100,000	$100,001-$250,000	$250,001-500,000	> $500,001	Percent in each LYO interval
≤ $0	**76.2**	26.6	14.0	12.8	9.6	7.1	28.4
$1-$50,000	13.1	**39.5**	15.2	4.1	4.3	4.5	14.6
$50,001-$100,000	2.3	17.2	**35.1**	12.2	8.3	0.0	15.0
$100,001-$250,000	6.1	13.6	29.7	**45.1**	26.5	14.7	25.4
$250,001-500,000	0.5	2.9	4.1	18.6	**24.1**	19.8	9.5
> $501,000	1.8	0.2	1.9	7.2	27.2	**54.0**	7.2
Percent in each FYO interval	21.1	17.7	20.9	28.3	8.0	4.0	

Financial Assets

financial asset interval in LYO	financial asset interval in first year observed (1994) ≤ $0	$1-$50,000	$50,001-$100,000	$100,001-$250,000	$250,001-500,000	> $500,001	Percent in each LYO interval
≤ $0	**61.5**	27.6	13.4	6.3	5.3	3.1	27.7
$1-$50,000	36.6	**52.9**	43.3	23.3	9.3	5.8	36.4
$50,001-$100,000	1.3	9.0	**13.6**	8.4	6.0	2.9	6.8
$100,001-$250,000	0.6	6.6	19.0	**30.6**	16.1	11.7	11.1
$250,001-500,000	0.0	2.9	6.2	17.2	**29.3**	10.4	7.5
> $501,000	0.0	0.9	4.5	14.2	34.1	**66.2**	10.4
Percent in each FYO interval	24.7	34.8	10.0	14.7	9.1	6.8	

Note: Calculations exclude persons alive when last observed and persons for whom fewer that 8 years elapsed between FYO and LYO.

Table 2-2b. Percentage of persons in each asset interval in last wave prior to death by total asset interval when first observed, persons age 70 or older in 1993 (column percents)

Total Assets

total asset interval in LYO	total asset interval in first year observed (1993) ≤ $0	$1-$50,000	$50,001-$100,000	$100,001-$250,000	$250,001-500,000	> $500,001	Percent in each LYO interval
≤ $0	**55.2**	22.2	14.2	9.7	4.7	1.4	13.3
$1-$50,000	36.7	**58.3**	36.0	19.7	8.5	7.2	25.4
$50,001-$100,000	4.0	9.8	**26.1**	13.8	5.4	3.3	10.8
$100,001-$250,000	3.1	6.3	18.6	**30.7**	21.6	8.7	18.0
$250,001-500,000	1.1	2.3	3.6	17.2	**32.7**	22.2	15.6
> $501,000	0.0	1.2	1.6	9.0	27.1	**57.3**	17.1
Percent in each FYO interval	6.9	17.0	12.7	28.8	19.3	15.4	

Housing Equity

housing equity interval in LYO	housing equity interval in first year observed (1993) ≤ $0	$1-$50,000	$50,001-$100,000	$100,001-$250,000	$250,001-500,000	> $500,001	Percent in each LYO interval
≤ $0	**90.7**	49.7	40.6	34.8	29.0	26.3	
$1-$50,000	2.8	**29.0**	12.2	4.2	4.8	2.1	8.1
$50,001-$100,000	2.8	15.9	**29.9**	11.1	5.0	2.6	12.4
$100,001-$250,000	2.2	5.0	15.4	**37.4**	20.0	11.2	19.4
$250,001-500,000	1.6	0.5	1.7	10.4	**30.9**	17.0	8.6
> $501,000	0.0	0.0	0.3	2.1	10.4	**40.9**	4.1
Percent in each FYO interval	19.6	11.2	18.7	34.1	10.9	5.5	

Financial Assets

financial asset interval in LYO	financial asset interval in first year observed (1993) ≤ $0	$1-$50,000	$50,001-$100,000	$100,001-$250,000	$250,001-500,000	> $500,001	Percent in each LYO interval
≤ $0	**45.9**	19.8	10.9	7.0	4.4	3.5	19.1
$1-$50,000	42.0	**52.7**	38.6	23.1	14.4	9.7	38.8
$50,001-$100,000	2.4	7.4	**16.0**	14.1	11.1	8.9	9.0
$100,001-$250,000	5.1	10.7	17.0	**25.1**	21.1	9.9	13.5
$250,001-500,000	1.5	5.9	7.3	17.9	**20.7**	19.1	9.1
> $501,000	3.1	3.5	10.2	12.8	28.3	**48.9**	10.5
Percent in each FYO interval	17.6	40.8	12.2	15.1	8.3	6.1	

Note: Calculations exclude persons alive when last observed and persons for whom fewer that 8 years elapsed between FYO and LYO.

Figure 2-1a. Percentage of persons with assets in LYO that were more/same/less than assets in FYO, by asset interval in FYO, persons age 51 to 61 in 1992

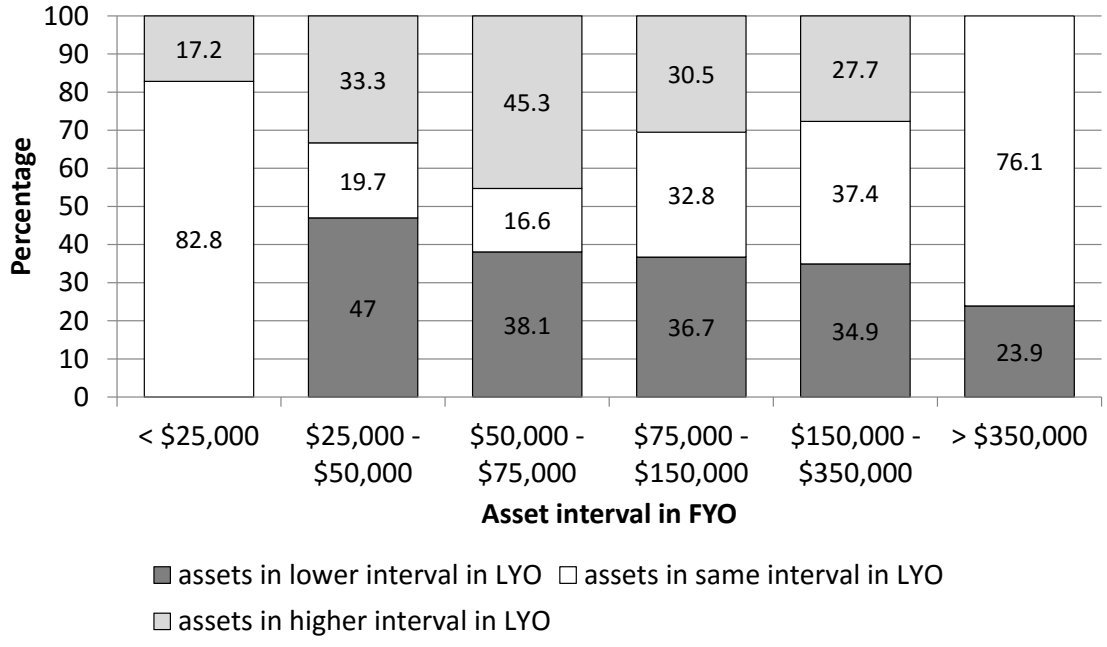
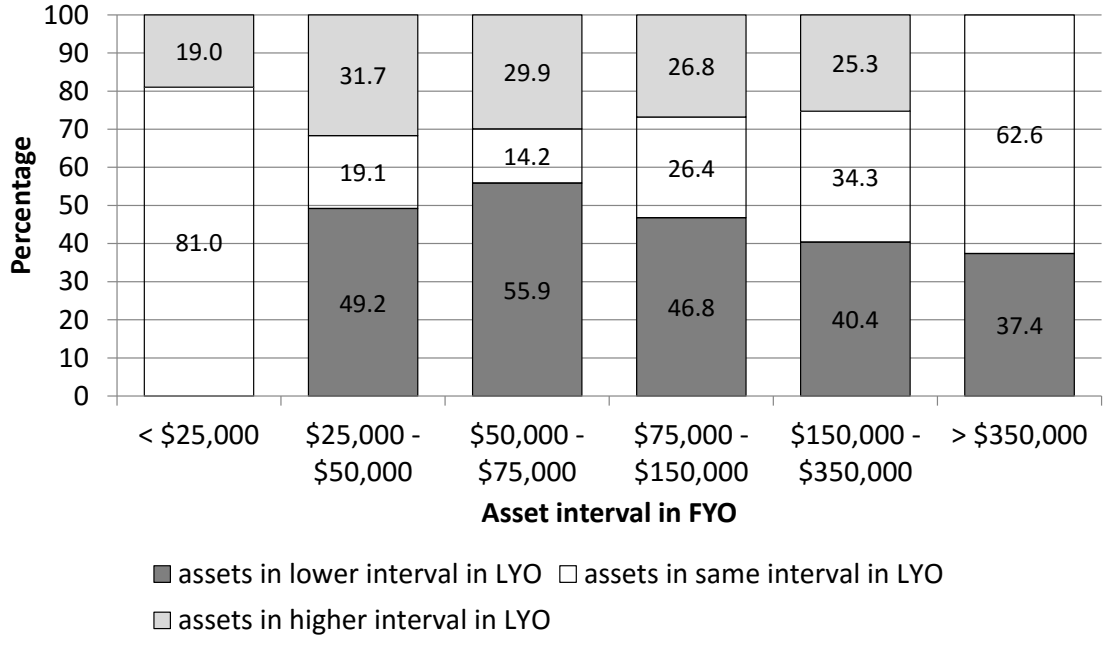


Figure 2-1b. Percentage of persons with assets in LYO that were more/same/less than assets in FYO, by asset interval in FYO, persons age 70 or older in 1993



To highlight those individuals who reach the end of life with very few assets, Table 2-3 provides further information on asset trajectories for those who have positive, zero and negative asset balances in the LYO before death. Negative asset balances just prior to death are common, particularly for those in the younger cohort. The primary source of negative wealth is consumer debt, which typically consists of credit card debt, medical debt, or life insurance policy loans. A substantial fraction of the individuals who died with negative assets died before the Great Recession, and the house price decline 2008 and 2009 may have increased the number of older individuals with negative asset positions.

Table 2-3 shows that the members of the older cohort are much less likely than those in the younger cohort to have negative asset balances in the LYO—1.8 percent vs 7.0 percent. A substantial proportion in both cohorts, 7.9 percent for HRS and 11.5 percent for AHEAD, also have zero balances. The table also reports mean assets for those with negative, and with positive, net assets. For the 7 percent of the HRS sample that appears to have negative net assets when last observed, the average net assets, -$25,661, is substantially lower than the median (-$6,375). For the older AHEAD sample, only 1.8 percent of sample shows negative net assets when last observed, and the mean and median are much closer to zero.

Table 2-3. Summary of asset balances in the LYO, noting zero and negative assets balances, for the HRS and AHEAD cohorts.

Assets in Last Year Observed	Percent of persons	Mean Assets in LYO	Median Assets in LYO	Percent with Negative Consumer Debt	Percent with Negative Housing Debt	Percent with Zero Home Equity
Persons age 51 to 61 in 1992						
<$0	7.0	-$25,661	-$6,375	95.3	8.7	82.9
$0	7.9	$0	$0	0.0	0.0	100.0
>$0	85.1	$474,840	$153,770	26.3	0.3	17.2
Persons age 70 or older in 1993						
<$0	1.8	-$8,615	-$2,310	97.0	3.0	97.0
$0	11.5	$0	$0	0.0	0.0	100.0
>$0	86.7	$357,845	$145,900	6.3	0.2	41.6

Note: a small number of persons hold negative positions in financial assets. Calculations exclude persons alive when last observed and persons for whom fewer that 8 years elapsed between FYO and LYO.

For individuals who report very low levels of non-annuity assets, their economic well-being depends critically on their annuity income and their access to insurance that can provide support in the event of medical or other emergencies. We provide some information on the income profile for these individuals by cross-tabulating their annuity income in the last year observed by their total non-annuity assets in the same year. Both assets and income are in 2012 dollars.

The results suggest that among individuals with zero or negative total assets in the year last observed, 36.8 percent have less than $10,000 of annuity income and 85.1 percent have less than $20,000 of annuity income. By comparison, only 6.9 percent of those with more than $500,000 in total assets have annuity income of less than $10,000, and 25.6 percent have an annual annuity income of more than $40,000.

Table 2-4. Percentage of persons in each annuity income interval in last wave prior to death by total asset interval in last wave prior to death, persons age 70 or older in 1993 (row percents sum to 100)

	annuity income interval in LYO					
total asset interval in LYO	< $10,000	$10,000-$20,000	$20,000-$30,000	$30,000-$40,000	> $40,000	Percent in LYO interval
≤ $0	36.8	48.3	9.4	3.3	2.1	13.3
$1-$50,000	23.5	48.1	18.4	5.7	4.2	25.4
$50,001-$100,000	16.5	46.6	22.5	9.3	5.1	10.8
$100,001-	9.8	41.2	24.3	16.0	8.6	18.0
$250,001-500,000	6.2	30.6	31.8	14.1	17.3	15.6
> $501,000	6.9	27.4	23.2	16.9	25.6	17.1

Note: Calculations exclude persons alive when last observed and persons for whom fewer that 8 years elapsed between FYO and LYO.

2.2 Asset Trajectories

To provide more information on the evolution of assets between the year first observed and the year last observed, we present figures with the median non-annuity assets in each survey wave for respondents stratified by their last year observed. The LYO for each profile is easily identified by the most recent year for which assets are graphed. Thus the top profile in each panel shows median assets in 2012 and all prior years for all persons whose LYO is 2012. Another profile shows assets in 2010 and all

prior years for all persons whose LYO is 2010, and so forth. Our analysis is "backward-looking" in the sense that we classify respondents by the last time we observe them, and then examine their survey responses in earlier years.

The top two panels in Figure 2-2 show the assets in each year by the LYO for persons who were age 51 to 55 and age 56 to 61 in 1992. We draw attention to several features of the data. First, for persons last observed before 2012 (these persons were all deceased after the LYO) the median asset profiles indicate little change in median assets between 1994 and the LYO. Second, for persons last observed before 2012, there appears to be no relationship between assets and mortality, as indicated by the absence of vertical gaps between the profiles. The median assets for those who died earlier are comparable to the median assets for those who died later. While a "mortality gradient," with lower mortality rates for those with higher income and wealth, has been widely documented, our focus on medians by LYO group may confound this relationship. Moreover, a strong relationship between assets and mortality emerges if the group still living in 2012 (the uppermost profile) is considered. Persons who die after 2012 have much more wealth, both when first observed in 1994 and when last observed in 2012, than persons who died prior to 2012. For the group still living in 2012, there is some evidence of asset decline over the sample period, but it is difficult to disentangle age-related drawdown of assets from year-related changes in asset values as contributory factors for this pattern. In both figures the decline in assets coincides with the Great Recession of 2007-2008.

The bottom two panels of Figure 2-2 show median asset profiles for two older age groups from the AHEAD cohort. Relative to the groups from the HRS cohort, these profiles show stronger evidence of asset decline approaching end of life, but again the decline coincides with the Great Recession. There is also some evidence of a positive asset-mortality relationship for both older groups. There is, however, one notable exception to this pattern: for those aged 76 and older, the group still living in 2012 does not appear to be wealthier than several of the groups that predeceased them.

Figure 2-2. Median assets (in 000's) in each year by last year observed

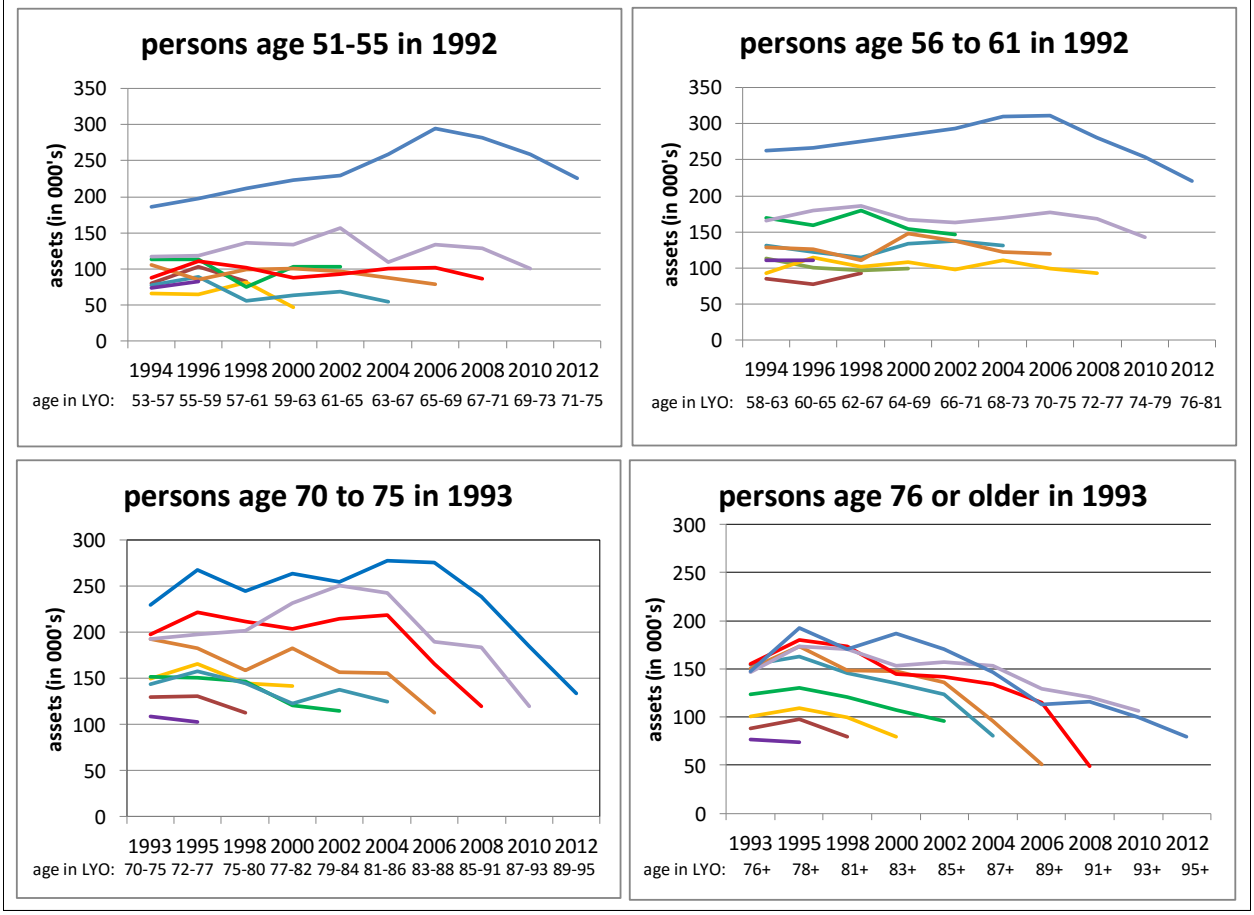
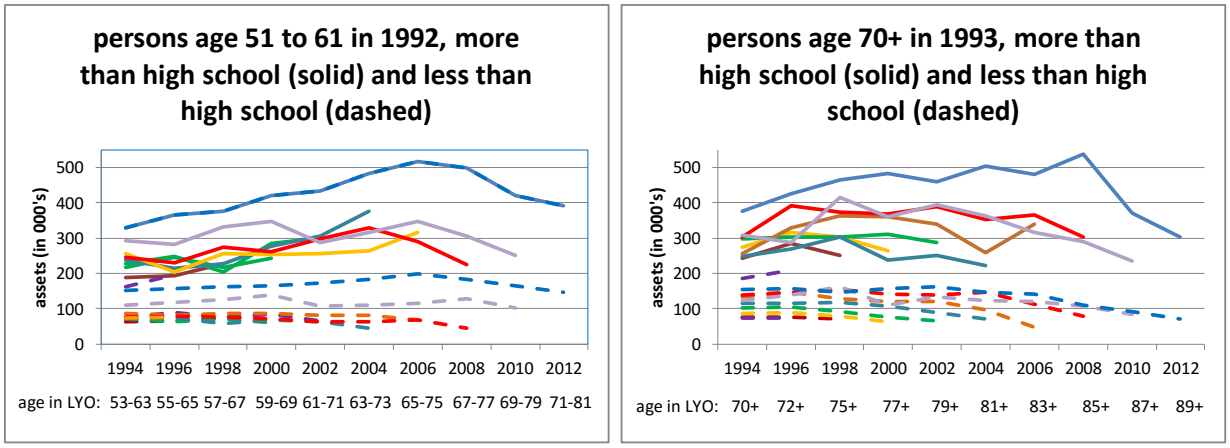


Figure 2-3 is based on the same data as Figure 2-2, but it combines all persons in the top two panels of Figure 2-2, and all persons in the bottom two panels of Figure 2-2, and then distinguishes persons by level of education. The solid lines pertain to persons with more than a high school education and the dashed lines are for those with less than a high school education. There is a very substantial difference in the initial non-annuity wealth of the two education groups. Among those 51-61 in 1992 with less than a high school degree, those who are still living in 2012 clearly have more wealth than those who died before 2012, but among those who died before 2012 there appears to be little relationship between age of death and wealth in 1994. For this group, wealth at death is approximately the same as wealth in 1994. For those with more than a high school education, the pattern is similar: those who were alive in 2012 had substantially more wealth in 1994 than those who died before 2012, but there is little relationship between wealth in 1994 and the age of death.

Figure 2-3. Median assets (in 000's) in each year by last year observed and level of education

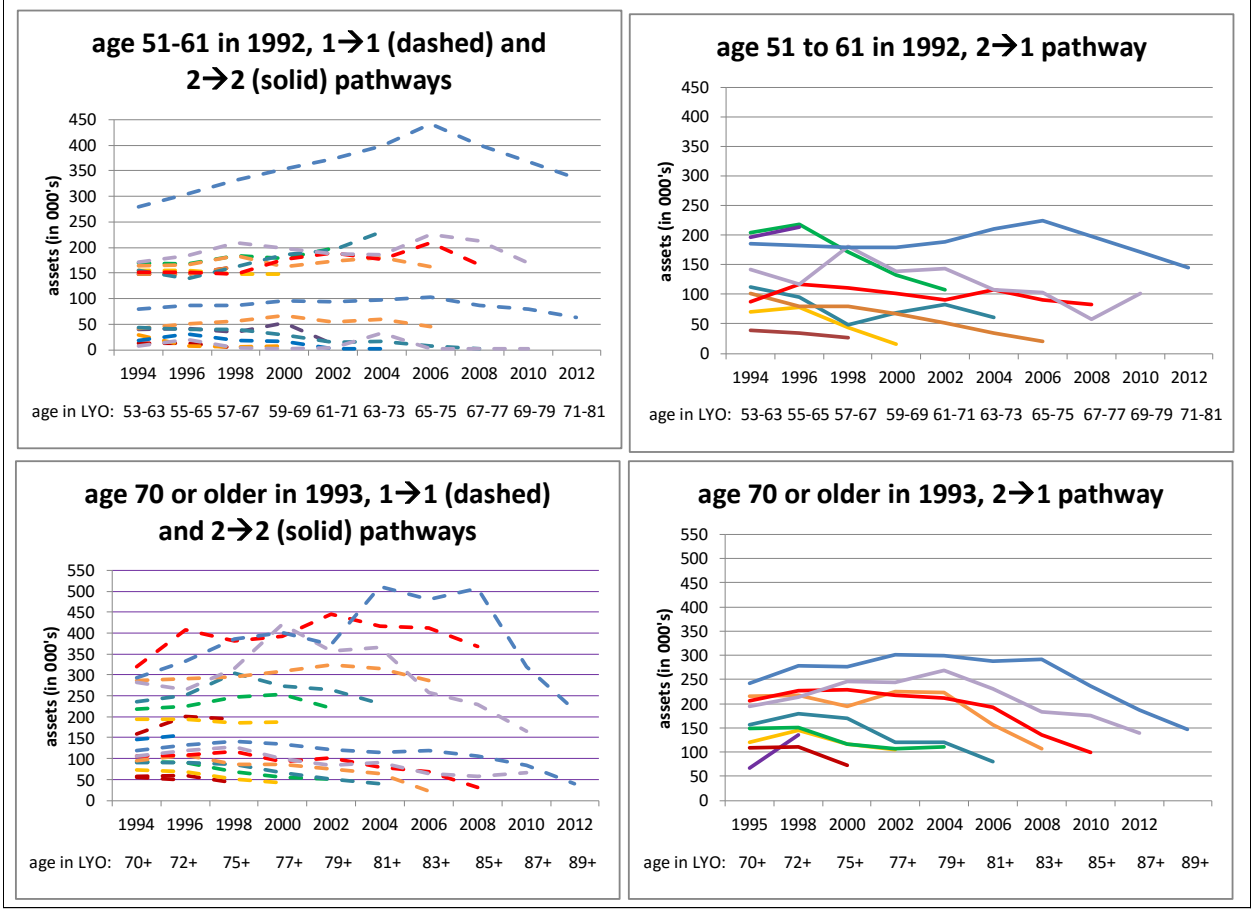


Figures 2-2 and 2-3 do not distinguish married from single persons, even though wealth profiles may differ by marital status and may be strongly affected by changes in this status. Figure 2-4 shows separate asset profiles for persons that experienced different family status transitions over the observation period. We distinguish persons who were single when first observed in the HRS or AHEAD and single when last observed (1→1), persons who were in a two-person household when first observed but single when last observed (2→1), and persons who were in a two-person household when first observed and in a two-person household when last observed (2→2). A fourth group – persons single when first observed and in a two-person household when last observed– was too small for meaningful analysis. The top two panels show data for persons aged 51-61 in 1992; the left panel shows data for the 1→1 and the 2→2 groups and the right panel shows data for persons in the 2→1 group. The 1→1 group has the lowest level of assets and for this group there is little difference between assets in 1994 and assets when last observed. The 2→2 group has the highest level of assets and for this group assets in the LYO tend to be larger than assets in 1994. The assets of the 2→1 group are the most dispersed in the LYO and in most but not all cases the level of assets in the LYO tends to be similar to that when first observed.

Profiles for the persons who were over the age of 70 in 1993 are shown in the bottom two panels of Figure 2-4. The left panel shows profiles for the 1→1 group, for which assets tend to decline with age. The data show a pronounced relationship

between wealth and mortality, with those with more wealth in 1993 living longer. The 2→2 group also shows a substantial wealth-mortality relationship. The profiles show that for persons who remain married until their death, median assets in the year last observed are similar to median assets in 1993 for those with an LYO of 2006 or earlier. For those with an LYO of 2008, 2010, or 2012, the profiles for the 2→2 group show a substantial increase in wealth until about six years before the LYO and then a decline. The median asset profiles for the 2→1 group exhibit a strong wealth-mortality relationship, and for all LYO groups, assets when last observed are lower than assets in 1993.

Figure 2-4. Median assets (in 000's) in each year by last year observed and family status pathway



3. Regression Estimates

To complement the tabular and graphical analysis of asset profiles, we estimate regression models that describe the relationship between assets when first and last

observed. We do this using data on individuals in both the HRS and AHEAD samples. To motivate our estimating equation, Figures 3-1a and 3-1b plot the relationship between assets in the first and last year observed for persons between the ages of 51 and 61 in 1992. There are many outliers in the data; many are probably reporting errors. In Figure 3-1a, asset balances are truncated at $4,000,000. In Figure 3-1b, the truncation is at $200,000. The figures show that there are many negative asset balances in both the FYO and in the LYO.

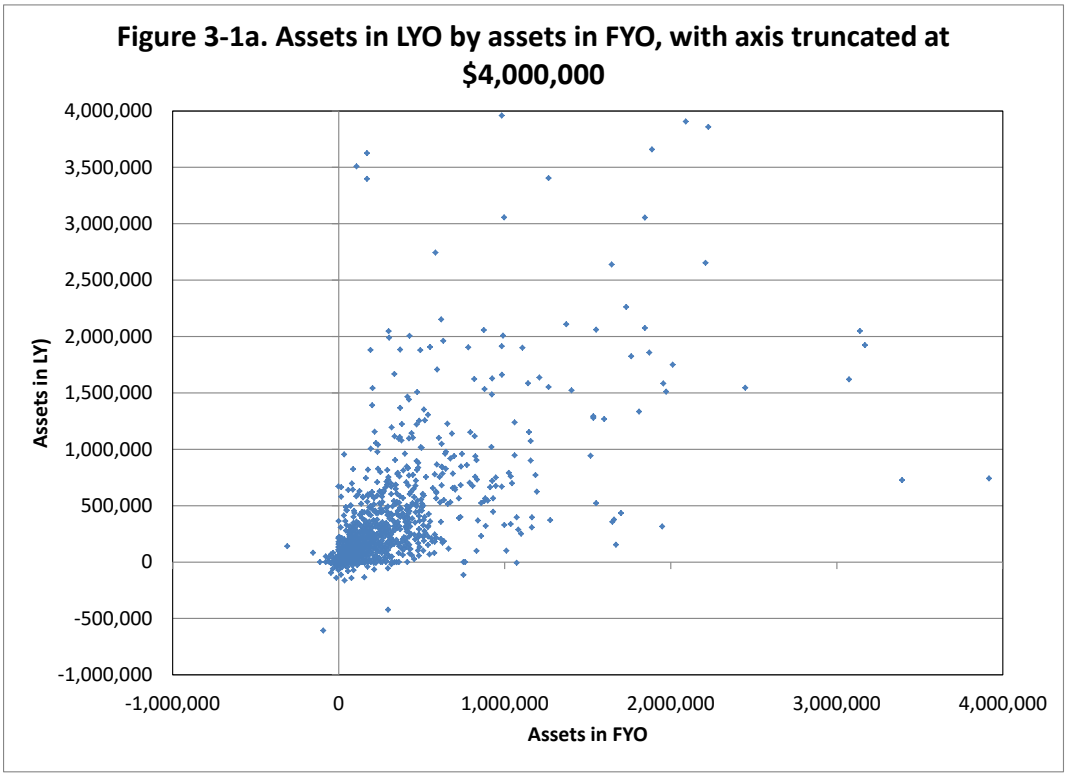
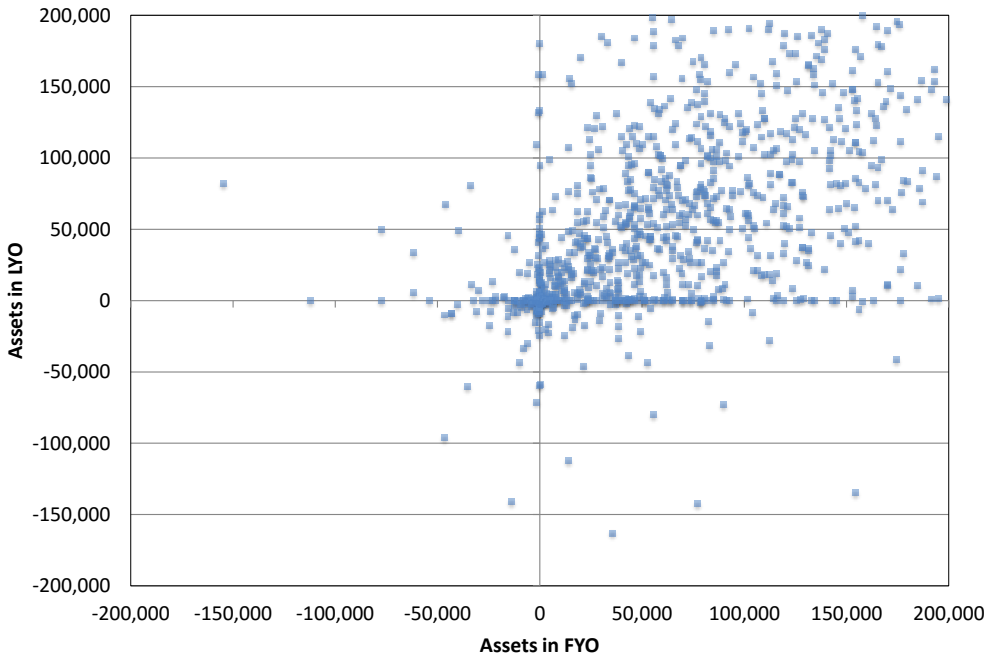


Figure 3-1b. Assets in LYO by assets in FYO, with axis truncated at $200,000



To minimize the effect of outliers, we estimate regression models in which the dependent variable is the natural logarithm of net worth. The presence of zero and negative asset balances poses an obvious problem for such a specification. We experimented with various transformations of the data that would enable us to use the negative values but ultimately settled on carrying out our estimation using only the observations with positive values of assets in both the FYO and the LYO. These are the observations in the upper right quadrants of both figures. For the sample aged 51 to 61 in 1992, this restriction limits us to 77 percent of the individuals who have data on assets holdings in both the first and last year observed. For the older AHEAD sample, it limits us to 81 percent of the sample. It is difficult to assess the effect of these exclusions on our results. One simple test is to estimate models based on asset *levels* and to compare results for the full sample to results from the sub-sample that conditions on positive values of assets in both the FYO and the LYO.

Table 3-1 shows the results of estimating a bivariate regression specification relating assets in the last year observed to assets in the first year observed, using a

trimmed data sample.

$$Assets_{LYO} = \alpha + \beta Assets_{FYO} + \varepsilon$$

In Table 3-1 and in all subsequent tables we first estimate the regression model for the full sample, and we order the residuals. Then, we delete the observations corresponding to the top and bottom three percent of the residuals, and we re-estimate the equation. The resulting estimates are presented in the table.

Table 3-1. Estimates of the relationship between the level of assets in the LYO and the level of assets in the FYO for the full and restricted samples, for persons age 51 to 61 in 1992, persons aged 70 and over in 1993

	β	t-statistic	α	t-statistic
Persons 51 to 61 in 1992				
Full sample	1.085	85.2	11,677	2.3
Positive asset subsample	1.097	69.1	21,601	3.0
persons 70 and older in 1993				
Full sample	0.964	92.0	18,714	5.4
Positive asset subsample	0.956	73.7	35,293	7.4

The estimate of the coefficient on assets when first observed (β) changes very little when the negative and zero asset values are excluded. The intercept term for the level of assets, not surprisingly, is affected by this sample limitation. This finding gives us some confidence that a model specified in logs may not be appreciably affected by the exclusion of observations with zero or negative asset balances.

To estimate the effect of personal attributes, in particular health, family status and education, on assets when last observed, conditional on assets when first observed, we postulate a simple log-log model linking assets in the LYO and the FYO, and allow for log-linear relationships between assets in the LYO and the other covariates. The log-log specification for assets in the FYO implies that a one percent change in assets in the FYO will lead to a constant percentage change in assets in the LYO. The log-linear specification implies that a unit change in each of the covariates leads to a constant percentage change in assets in the LYO. The specification is:

$$Ln(\text{Assets}_{LYO}) = \alpha + \beta Ln(\text{Assets}_{FYO}) + d_1(\text{Years Since FYO}) + d_2(\text{Age in FYO}) +$$
$$h_1(\text{Cancer}) + h_2(\text{Heart Problems}) + h_3(\text{Stroke}) + h_4(\text{Lung Disease}) +$$
$$h_5(\text{Psychological Problems}) + h_6(\text{Diabetes}) +$$
$$e_1(\text{High School}) + e_2(\text{Some College}) + e_3(\text{College or More}) +$$
$$p_1(\text{Path: 2 to 2}) + p_2(\text{Path: 1 to 1}) + \mu$$

We describe the covariates included in this equation in more detail when we discuss the estimates below. Note that this regression framework is focused on the conditional mean of the natural log of assets when last observed, in contrast with the figures in the last section, which emphasized conditional medians.

Estimates of this equation are shown in Table 3-2 for persons aged 51 to 61 in 1992 and persons aged 70+ in 1993. For each age group, we present three specifications. The first includes only the log of assets in the FYO, the second also includes other covariates, and the third includes the other covariates and year effects. The year effects are included to absorb changes in wealth that may result from economy-wide shocks, such as the financial crisis and associated drop in house and stock prices in 2008.

The estimates are based only on individuals who are known to be deceased by the end of the sample. Those who are still alive when last observed in the 2012 wave of the HRS, and those who left the sample but are not known to be deceased, are excluded. In the specification with no covariates, the estimates of α indicate the log of assets in the LYO if a person had one dollar of assets in the FYO. The estimates of β indicate the fraction of the log of assets in the FYO that are carried over to the LYO. In the specifications without covariates, the coefficient on assets in the FYO (β) is lower for the 70+ group than for the 51-61 group, a finding that is consistent with the patterns observed in Figures 2-1 to 2-3.

Table 3-2. Personal attributes associated with the change in assets between first and last year observed (dependent variable is log of assets in last year observed)

Variable	Coeffi-cient	t-stat	Coeffi-cient	t-stat	Coeffi-cient	t-stat	Coeffi-cient	t-stat	Coeffi-cient	t-stat	Coeffi-cient	t-stat
	Age 51 to 61 in 1992						**Age 70+ in 1993**					
Log(assets in FYO)	0.947	54.98	0.873	46.24	0.873	46.71	0.912	73.89	0.856	64.14	0.855	64.15
Years since FYO			0.006	0.93					-0.032	-6.00		
Age in FYO			0.006	0.73	0.007	0.84			-0.008	-2.07	-0.008	-2.06
Health in FYO			0.003	2.70	0.003	2.85			0.002	2.73	0.002	2.34
Cancer			-0.023	-0.39	-0.031	-0.52			0.052	0.93	0.064	1.14
Heart problems			-0.050	-0.81	-0.041	-0.67			0.092	1.89	0.063	1.29
Stroke			-0.284	-3.85	-0.270	-3.65			-0.069	-1.34	-0.072	-1.41
Lung disease			-0.224	-3.17	-0.212	-3.02			-0.002	-0.02	-0.006	-0.10
Psychological problems			-0.253	-3.49	-0.266	-3.68			-0.214	-3.77	-0.240	-4.23
Diabetes			0.008	0.12	0.014	0.21			-0.176	-2.53	-0.134	-1.91
High school degree			0.196	3.01	0.191	2.95			0.127	2.69	0.134	2.82
Some college			0.252	3.25	0.241	3.11			0.289	4.98	0.262	4.53
College or more			0.413	4.80	0.396	4.60			0.406	6.20	0.397	6.08
2→2 Pathway			0.298	3.59	-0.042	-0.44			0.394	6.71	0.056	0.98
1→1 Pathway			-0.048	-0.50	0.285	3.45			0.058	1.02	0.386	6.58
1998					0.025	0.23					-0.065	-1.00
2000					-0.159	-1.48					-0.062	-0.93
2002					0.139	1.22					-0.048	-0.66
2004					0.096	0.86					-0.204	-2.64
2006					0.150	1.35					-0.533	-6.47
2008					0.049	0.46					-0.301	-3.59
2010					0.007	0.07					-0.350	-3.47
Constant	0.594	2.87	1.014	4.34	1.035	4.36	0.842	5.73	1.415	8.43	1.364	8.10
R^2	0.7019		0.7201		0.7215		0.606		0.6232		0.6245	
N	1,286		1,285		1,285		3,549		3,550		3,548	

Notes: Sample excludes all persons who were alive when last observed. The variable "age in LYO" is the number of years over the age of 53 in the LYO for the age 51 to 61 group and the number of years over the age of 70 for the age 70 or older group.

In the specifications with covariates, the variable *Years since FYO* is the number of years elapsed between the FYO and the LYO. The variable *Age in FYO* is the number of years over the age of 53 in the FYO for the 51 to 61 age group and the number of years over the age of 70 for the age 70 or older group. The next seven variables are intended to capture the effect of health on the change in assets between the FYO and the LYO. The first variable, *Health in FYO* is the value of a percentile health index in the FYO. This index, described in Poterba, Venti, and Wise (2013), is constructed from 27 health-related questions in the HRS and is scaled to range from 1 (lowest) to 100 (highest). The next six variables are indicator variables for the onset of particular health conditions between the FYO and the LYO. For married persons, these variables are set to one if the health condition is reported for either partner. There are

three indicator variables for level of education (less than a high school degree is the excluded category) and two indicator variables for family status pathway (the 2→1 category is excluded).

The estimates of the coefficients on the health-related variables suggest important links between health shocks and the late-life evolution of assets. For both age groups, the overall level of health in the FYO has a statistically significant effect on assets when last observed. For the younger group, the coefficient of 0.003 implies that an improvement in health that moves an individual up by ten percentiles in the FYO is associated with an increase of approximately three percent in assets in the LYO. For the younger group, a stroke, the onset of lung disease and the onset of psychological problems are all associated with substantial reductions (approximately 25 percent) in assets in the LYO. For the older group, the onset of psychological problems and of diabetes are both associated with declines in assets in the last year observed. The relationship between education and assets in the LYO is strong, even conditional on assets in the FYO. The education estimates for the younger and older groups are similar, with the effect of having received a college degree larger than the effect of having attended some college, which in turn is larger than the estimated effect of a high school degree. On average, persons in the 2→2 family status pathway group have assets in LYO that are 30 to 40 percent higher than those of persons in other pathways.

The final set of estimates for each age group adds year effects for the last year observed (1996 is the excluded year). The variable “years since FYO” is deleted from this specification to allow estimation of the full set of age effects. The estimates of the coefficients on the covariates are essentially unchanged when the year effects are added. This suggests that the covariate estimates are not picking up macro shocks associated with the financial crisis. For the younger group, for most years we cannot reject the null hypothesis that the coefficient on the year effect is zero. For the older group, the estimates for 2004 through 2010 are all negative and we can reject the null hypothesis of zero coefficients. The magnitudes are large: older persons last observed in these years held between 20 to 50 percent less assets than individuals with similar characteristics who were last observed in 1996.

Table 3-3 shows separate estimates of the regression model by family status pathway for persons 51 to 61 in 1992 and Table 3-4 shows estimates by family status pathway for persons 70 and older in 1993. Both tables show results with and without covariates, excluding year effects. The sample size for the 2→1 pathway group for the HRS (51 to 61) group is quite small and many of the estimates are not significantly different from zero. For the 2→2 group the indicator variables for the onset of lung disease, psychological problems, and stroke have the greatest negative effect on assets in LYO given assets in FYO. For the 1→1 group the most consequential conditions for assets in the LYO are psychological problems, heart problems, and stroke. The general health index level when first observed is associated with higher LYO assets in both the 1→1 and the 2→1 groups, but not for the 2→2 group. This may be because married couples are more financially resilient in the face of health challenges, because one spouse can take actions, such as providing care at older ages or increasing labor supply at younger ages, to offset the adverse financial effects of a health shock. For the 2→2 and the 1→1 groups the education estimates are large; for the 2→2 group they are also precisely measured.

Table 3-3. Personal attributes associated with the change in assets between first and last year observed, persons age 51 to 61 in 1992 (dependent variable is log of assets in last year observed)

Variable	Coeffi-cient	t-stat	Coeffi-cient	t-stat	Coeffi-cient	t-stat	Coeffi-cient	t-stat	Coeffi-cient	t-stat	Coeffi-cient	t-stat
	2-person to 2-person				**1-person to 1-person**				**2-person to 1-person**			
Log(assets in FYO)	0.849	40.44	0.804	35.92	0.970	23.98	0.872	20.22	1.060	11.59	0.965	10.20
Years since FYO			0.007	1.17			-0.001	-0.04			-0.002	-0.05
Age in FYO			-0.004	-0.47			0.073	2.68			0.074	1.84
Health in FYO			0.001	0.58			0.006	2.14			0.016	3.45
Cancer			0.027	0.47			-0.120	-0.54			-0.010	-0.03
Heart problems			-0.019	-0.31			-0.545	-2.62			0.320	0.97
Stroke			-0.188	-2.65			-0.506	-1.83			-0.507	-1.24
Lung disease			-0.318	-4.49			-0.105	-0.45			0.475	1.37
Psychological problems			-0.202	-2.74			-0.825	-3.30			-0.540	-1.70
Diabetes			-0.059	-0.94			0.143	0.60			0.884	2.40
High school degree			0.225	3.39			0.224	1.04			-0.229	-0.79
Some college			0.369	4.66			0.219	0.89			0.175	0.48
College or more			0.438	5.07			0.541	2.03			0.186	0.36
Constant	1.917	7.48	2.267	8.54	0.062	0.14	0.544	1.14	-1.212	-1.11	-1.262	-1.12
R^2	0.656		0.681		0.69		0.723		0.45		0.525	
N	858		858		261		260		166		166	

Notes: Sample excludes all persons who were alive when last observed. The variable "age in LYO" is the number of years over the age of 53 in the LYO.

Table 3-4. Personal attributes associated with the change in assets between first and last year observed, persons age 70 or older in 1993 (dependent variable is log of assets in last year observed)

Variable	Coeffi-cient	t-stat	Coeffi-cient	t-stat	Coeffi-cient	t-stat	Coeffi-cient	t-stat	Coeffi-cient	t-stat	Coeffi-cient	t-stat
	2-person to 2-person				**1-person to 1-person**				**2-person to 1-person**			
Log(assets in FYO)	0.894	57.25	0.868	50.11	0.841	42.94	0.820	40.41	0.910	22.71	0.870	20.00
Years since FYO			-0.014	-2.34			-0.044	-4.58			-0.045	-2.95
Age in FYO			-0.003	-0.77			-0.008	-1.25			-0.011	-0.88
Health in FYO			0.000	-0.39			0.003	1.83			0.006	2.32
Cancer			0.002	0.03			0.101	0.89			-0.009	-0.05
Heart problems			0.108	2.12			0.190	2.13			-0.081	-0.56
Stroke			0.051	0.96			-0.252	-2.67			-0.167	-1.11
Lung disease			-0.040	-0.61			-0.107	-0.83			0.243	1.20
Psychological problems			-0.148	-2.51			-0.421	-3.90			-0.260	-1.65
Diabetes			-0.069	-1.06			-0.110	-0.76			-0.253	-1.08
High school degree			0.083	1.64			0.281	3.36			0.160	1.13
Some college			0.252	3.95			0.279	2.73			0.297	1.76
College or more			0.190	2.80			0.674	5.29			0.586	3.12
Constant	1.299	6.77	1.657	8.04	1.520	6.80	1.899	7.75	0.606	1.25	1.273	2.47
R^2	0.71		0.709		0.544		0.567		0.44		0.465	
N	1338		1338		1548		1546		659		660	

Notes: Sample excludes all persons who were alive when last observed. The variable "age in LYO" is the number of years over the age of 70 in the LYO.

Table 3-4 shows estimates by family status pathway for the age 70 and older group. The sample sizes are much larger than the sample sizes for the 51 to 61 group. The general level of health is statistically significant in only one of the three family status pathways, although the magnitude of the estimated effect is quite large: a 10 percent increase in the index is associated with a 6 percent increase in assets in the LYO. Among the health variables, the indicator variable for psychological problems has a strong negative effect in two of the three pathways, and a stroke has a negative effect for persons who are single throughout our sample. Surprisingly, the onset of heart problems is estimated to have a positive effect on assets in the last year observed for two of the three pathways.

Education is very strongly related to assets in the LYO for both the 1→1 and the 2→1 groups. For example for the 1→1 group, an individual with a college degree is estimated to have a 67 percent increase in assets in the LYO relative to an individual with less than a high school degree. For the 1→2 group the comparable increase in 59 percent. For the 2→2 group the education effects are much smaller. Somewhat paradoxically, the coefficient on the indicator variable for having attained at least a

college degree, 0.190, is smaller than the coefficient for some college, 0.252, although the hypothesis of equal effects could not be rejected at standard significance levels.

An indicator variable for psychological problems (emotional, nervous or psychiatric problems) has the most robust negative effect on assets in the LYO, looking across all persons age 51 to 61 in 1992 and 70+ in 1993 and across the three family status pathways. In addition, health in the first year observed is associated with greater assets in the LYO for all groups except the 2→2 group.

We illustrate the relative magnitudes of the effects reported in Table 3-2 by simulating asset balances for various covariate combinations using the specification without year effects. Table 3-5 presents simulated asset balances based on the estimates for ages 51 to 61 in 1992 and Table 3-6 present simulations for those over 70 in 1993. The first two rows of each table show the simulated assets in the LYO for a baseline person who has $100,000 of assets in the FYO, for each of the four levels of education, and the weighted average across all education groups. The first row reports assets in the LYO when all covariates except assets in the FYO and education are set to their sample means. The first entry in the first row of Table 3-5 shows that assets fall by about $16,000 (from $100,000 to $84,139) for persons without a high school degree. The remaining entries in this row show terminal assets for persons with other levels of education. The differences by level of education are substantial, especially since we condition assets in the FYO both in the estimation and in the simulation. The last entry in the row shows that average assets remain almost constant between the FYO and LYO. The second row shows the results of the same simulation, except that all of the health condition variables are set to zero rather than to their means. The last entry in this row shows that, on average, persons who do not experience any health events increase asset balances between the FYO and the LYO.

The remaining rows of Table 3-5 show the simulated level of assets in the LYO when selected attributes are set at specified values and the other covariates are set to their means. For example, averaging over all education groups (the last column), an increase in health in the FYO from the 25th percentile to the 75th percentile is associated with an increase in assets in the LYO from $96,001 to $108,966. Overall, the relationship between health in the FYO and assets in the LYO is modest, although

statistically significant. However, both changes in family status and changes in health conditions have substantial effects on assets in the LYO. For example, using the coefficients in the "all" column, persons who are continuously married are predicted to have approximately $29,000 more in assets in the LYO, $83,821 versus $112,920, than persons who went from a two-person household to a one-person household. The two most important health conditions, stroke and psychological problems, are each associated, on average, with a $25,000 to $30,000 reduction in assets.

Table 3-6 presents comparable results for persons age 70 and older in 1993. The last entry of the first row of simulations suggests that, on average, the assets of this group declined modestly between the FYO and the LYO. The second row shows that assets would have been only marginally higher if the baseline person had experienced no health conditions. A comparison with the previous table suggests that the effect of health conditions is much greater for the younger than for the older cohort. This may be because an adverse health shock at a younger age reduces earnings and potential pension and Social Security accruals, in addition to creating expenditure needs. The effects of most of the other covariates are of similar orders of magnitude for the two age cohorts.

Table 3-5. Simulated assets in LYO for baseline person with $100,000 of assets in FYO, based on estimates for persons age 51 to 61 in 1992

Baseline assets and attribute change	Level of Education				
	Less than high school	High school degree	Some college	College or more	All
Baseline assets in LYO					
Mean attributes	$84,139	$102,309	$108,296	$127,120	$101,921
No health conditions	$95,785	$116,470	$123,286	$144,714	$116,028
Change in attribute					
Health in FYO					
25th percentile	$79,253	$96,937	$102,006	$154,114	$96,001
75th percentile	$89,955	$109,382	$115,782	$174,927	$108,966
Family status					
1→2	$69,198	$84,142	$89,065	$104,546	$83,821
2→2	$93,220	$113,351	$119,984	$181,274	$112,920
Health conditions					
None	$95,785	$116,470	$123,286	$144,714	$116,028
Stroke	$72,126	$87,702	$92,834	$108,970	$87,369
Psychological problems	$64,347	$90,403	$95,693	$112,325	$90,059

Table 3-6. Simulated assets in LYO for baseline person with $100,000 of assets in FYO, based on estimates for persons age 70 or older in 1993

Baseline assets and attribute change	Level of Education				
	Less than high school	High school degree	Some college	College or more	All
Baseline assets in LYO					
Mean attributes	$74,487	$84,559	$99,432	$111,752	$86,024
No health conditions	$76,396	$86,225	$101,980	$114,615	$88,227
Change in attribute					
Health in FYO					
25th percentile	$72,284	$82,057	$96,490	$108,445	$83,478
75th percentile	$80,874	$91,809	$107,957	$121,333	$93,399
Family status					
1→2	$62,062	$70,453	$82,845	$93,109	$71,673
2→2	$92,008	$104,448	$122,820	$138,037	$106,257
Health conditions					
None	$76,396	$86,725	$101,980	$114,615	$88,227
Stroke	$71,336	$80,981	$95,225	$107,023	$82,384
Psychological problems	$61,663	$70,000	$82,313	$92,511	$71,213

4. Summary

We have considered the determinants of assets as individuals approach the end of life, comparing asset balances when individuals in the Health and Retirement Study (HRS) were last observed prior to death with comparable data measures in the first year the individual was included in the survey. We have data through 2012 for members of two HRS cohorts--respondents aged 51 to 61 who were first observed in 1992, and respondents aged 70 and above who were first observed in 1993. Thus we are able to study the evolution of assets for as many as 19 years.

We first document levels of total assets, housing assets, and financial assets near the end of life for each of the HRS cohorts. Asset balances are quite persistent in the later stages of life. For the younger cohort, 70 percent of those with less than $50,000 in total assets when last surveyed before death also had fewer than $50,000 in assets when first surveyed. For the older cohort, 52 percent of those with less than $50,000 in assets when last surveyed before death also had fewer than $50,000 in assets when first surveyed. Low levels of both housing and financial assets are also persistent. Those who had substantial assets at the end of life also had substantial

asset balances when first observed. The persistence of wealth is confirmed in a series of figures showing median total assets in each survey wave between the wave first observed and the last wave observed before death. For the younger cohort the path of assets is essentially flat. For older cohorts there is some evidence of a modest decline. These findings suggest that the low level of retirement wealth of many households at the time of retirement, documented in many studies including Poterba (2014) and the U.S. Government Accountability Office (2015), is a key contributor to low levels of wealth for individuals near the end of life.

We relate the change in assets between the first and last year observed to individual attributes and to changes in these attributes. We obtain estimates for each subgroup, those in the HRS who were 51-61 in 1992 and those in the AHEAD who were 70 or older in 1993, and for persons in each family status pathway. This includes those who were in two person households in both the FYO and the LYO, those who were in one-person households in both the FYO and the LYO years, and those who were in a one-person household in the LYO but a two-person household in the FYO.

We pay particular attention to how the onset of chronic conditions, an individual's level of education, and changes in family composition, such as death of a spouse, are associated with changes in assets. Simulation results based on our regression estimates suggest that on average, assets remain roughly constant between the FYO and the LYO for the younger cohort and decline modestly for the older cohort. For those who do not experience a health event or family disruption, the asset profile slopes upward for the younger cohort and slightly downward for the older cohort. However, for individuals who experience adverse health events, such as a stroke or the onset of psychological problems, the decline in assets can be quite large. Similarly, individuals who experience a change in household composition, to one-person from two-person, on average also experience substantial declines in wealth.

Taken as a whole, these results suggest that the level of assets of individuals approaching the end of life is determined primarily by the assets these individuals held many years earlier. Most of those with limited assets at death also had limited assets earlier in life. They did not run out of assets in retirement; they never had many assets to begin with. However, there are also some individuals who entered retirement with

modest or even large asset balances and experienced health shocks or family disruption that resulted in significant declines in assets. For the cohort age 51 to 61 in 1992, we find little evidence of asset decline among persons who did not experience health shocks or family disruption. For these individuals, there is no evidence that asset balances are being depleted by normal consumption expenditure in retirement. For older persons, it is also the case that assets at death are determined primarily by asset balances earlier in retirement. However, for those in our sample who were over the age of 70 in 1993, and who were therefore mostly over 90 by 2012, there is some evidence that assets decline modestly prior to death, even in the absence of health or family shocks. The onset of health conditions can have large negative consequences for asset balances of the older cohort as well, but on the whole the effects of health conditions are smaller than for the younger cohort.

A natural extension of this project would ask what individuals might have done earlier in life to avoid reaching late life with few resources. We will pursue this issue in future analysis. For those who are observed with lower assets in the LYO than in the FYO, purchasing an annuity earlier in life might have improved well-being in later years. To assess this possibility we plan to calculate the potential annuity income that each individual could have obtained by purchasing an annuity in the first year observed. We also plan to estimate the number of individuals who saved very little while working.

One explanation of low saving, which is difficult to evaluate, is that some households do not earn enough to both meet their spending requirements, and save, while working. Analyzing the dispersion of accumulated financial assets for those who are in the bottom quartile or half of the lifetime earning distribution could shed light on this hypothesis. Previous research, including Venti and Wise (1998, 1999), Hendricks (2007), Yang (2009) and Bozio, Emmerson and Tetlow (2011), has shown that at each level of (lifetime) earnings, there are both high and low savers. This suggests that “low earnings” can only provide a partial explanation for low assets in late-life, but this possibility warrants further investigation.

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