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ABSTRACT

This paper examines inequality in end-of-life wealth and the factors that contribute to individuals reaching this life stage with few financial resources. It analyzes repeated cross-sections of the Health and Retirement Study, as well as a small longitudinal sample of individuals observed both at age 65 and shortly before death. Most of those who die with little wealth had little wealth at retirement. There is strong persistence over time in the bottom tail of the wealth distribution, but the probability of having low wealth increases slowly with age after age 65. Those with low lifetime earnings are much more likely to report low wealth at retirement, and to die with little wealth, than their higher-earning contemporaries. The onset of a major medical condition and the loss of a spouse increase in the probability of falling into the low wealth category at advanced ages, although these factors appear to contribute to wealth decline for only a small fraction of those who had modest wealth at age 65 but low wealth at the time of death.

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The degree of wealth inequality at different ages has been a perennial topic of interest, in part because of the different forces that may contribute to the observed variation. Atkinson (1971) explores how lifecycle considerations and intergenerational transfers interact to determine the observed wealth distribution at different ages. Dispersion in the first few decades of adult life reflects variation in the receipt of *inter vivos* transfers as well as variation in earnings. Later in life, the rate of return on investments, the ability to continue working, receipt of a bequest, and the presence or absence of medical expenses contribute to the dispersion of wealth.

There is substantial inequality in late-life wealth, and a sizable lower tail of households with very low levels of both financial assets and net worth in their later years. For such households, Social Security benefits are the primary determinant of living standards. Poterba, Venti and Wise (2017a) consider how unexpected and costly expenditure shocks in retirement, such as out-of-pocket health outlays, and low pre-retirement saving, influence the distribution of wealth among retirees. Most of those with low late-life wealth had very little wealth at the time of retirement. Those findings, and results in the current paper, suggest that relatively few households that enter retirement with substantial wealth exhaust it before death.

Given the importance of low wealth at retirement in explaining low wealth late in life, this paper begins by exploring the factors that are associated with low saving before retirement. We pay particular attention to the links between education, health status, and wealth at age 65 and at the end of life. We examine the distribution of lifetime earnings, a key determinant of savings capacity, and calculate a “saving ratio,” the ratio of wealth at retirement to lifetime earnings. This ratio depends on a household’s saving

rate over the life course, as well as on the rate of return earned on this saving. We also present new evidence on how health and family status shocks affect the trajectory of wealth after retirement, and in particular how they affect the likelihood of reporting very low wealth at the end of life.

Our analysis builds on a large literature that relates health events, family disruption, and other changes in circumstances to the trajectory of wealth after retirement. Smith (2005) considers the effect of health shocks on the wave-to-wave change in wealth for respondents in the first five waves of the original Health and Retirement Study (HRS). For this cohort, which was between the ages of 51 to 61 in 1992, he finds a roughly \$40,000 (in year 2000 prices) decline in wealth following a major health event. Lee and Kim (2008) perform a similar analysis based on the older AHEAD cohort (age 70 and older in 1993), finding that new health events result in significant and relatively large asset depletion in the short term, but that the effects attenuate over time. They find larger effects of health shocks at older ages. Poterba, Venti, and Wise (2017b) find that HRS respondents in better health in 1994 accumulated substantially more wealth by 2010 than did those who had the same initial wealth, but poorer health, in 1994. Kelley, McGarry, Gorges and Skinner (2015) estimate the costs associated with different health conditions in the last five years of life, reporting mean out-of-pocket spending for those diagnosed with dementia of \$61,522 (\$2010), compared with \$35,294 for heart disease, \$28,818 for cancer, and \$36,073 for other conditions.

A number of related papers find a negative association between poor health and wealth in the HRS sample. These include Smith (1999, 2004), Levy (2002), Wu (2003),

Coile and Milligan (2009), Cook, Dranove and Sfekas (2010) and Wallace, and Haveman and Wolfe (2014). Himmelstein *et al.* (2005, 2009) report that health-related expenses are the primary cause of just over half of all personal bankruptcies. DiNardi, French and Jones (2015), using the older AHEAD cohort, find that the death of a spouse is associated with a \$30,000 to \$60,000 reduction in wealth (\$2005). Several other studies, including Sevak, Weir and Willis (2003), Johnson *et al.* (2005), Coile, and Milligan (2009) find that widowhood is associated with a large wealth decline. One of the contributions of this study is assessing the extent to which health shocks, and other life events, drive individuals into the lower tail of the wealth distribution.

This paper consists of five sections. The first summarizes the evidence from the HRS on wealth holdings late in life, considering both total wealth and financial assets. Section 2 explores wealth at retirement, while section 3 compares wealth at retirement and at death using both repeated cross sections and longitudinal data. Section 4 considers the factors affecting asset trajectories after retirement. There is a brief conclusion.

1. The Distribution of End of Life Wealth

Our analysis uses on data from the Health and Retirement Study (HRS), a longitudinal survey that resurveys respondents every two years. There are currently five HRS entry cohorts. The original HRS cohort surveyed respondents between the ages of 51 to 61 in 1992 and the Asset and Health Dynamics of the Older Old (AHEAD) cohort surveyed respondents aged 70 and older in 1993. Subsequent cohorts include the War Babies (WB) cohort, first surveyed in 1998 when respondents were between the ages of 51 and 56, the Children of Depression (CODA) cohort first surveyed in 1998

when respondents were between the ages of 68 and 74, and the Early Baby Boomers (EBB) cohort that includes respondents aged 51 to 56 in 2004. All cohorts were surveyed every second year through 2012.¹

Our primary data sample includes all HRS respondents, from all cohorts, who died during the survey and who were at least 65 years old in the last survey wave prior to their death. We exclude participants who were still alive when last interviewed in 2012 from the sample, along with non-respondents who were not deceased in 2012. Of the 33,316 individuals who were alive in the HRS at some point between 1996 and 2012, 9,215 died. For some purposes, we also analyze a much set of respondents who were observed at age 65 and who died both at age 65 and died during our 16-year sample period. HRS interviews are roughly two years apart, so the date of last interview may be as much as two years prior to the date of death. We measure end-of-life wealth using information from the last interview prior to death. Because expenditures associated with declining health are often substantial in the last six months of life, the balances we observe are likely to over-estimate wealth at the time of death.²

We define wealth as the sum of home equity, the net value of other real estate, business assets, and net financial assets. IRA, 401(k) and Keogh balances are included in financial assets.³ We convert asset balances to \$2012 using the CPI-U, and

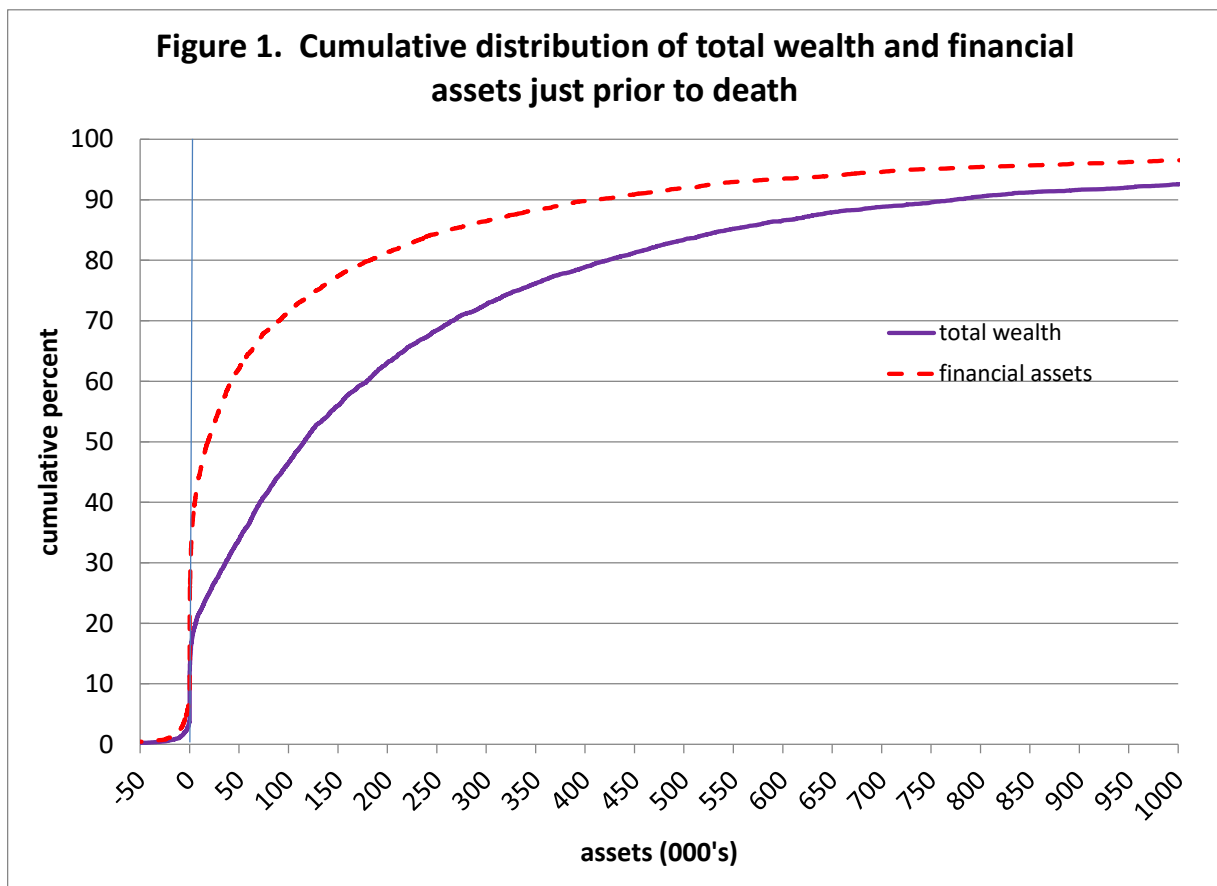
¹ We do not use data from the first two waves of the original HRS cohort (1992 and 1994) and the first wave of the AHEAD cohort (1993) because data on key health variables are incomplete.

² The HRS conducts “exit interviews” with surviving relatives of deceased HRS participants. These interviews contain some information on medical expenditure and asset drawdown in the interval between the last survey interview and death. Because they are incomplete and would limit the sample size, we do not use the exit interview data.

³The AHEAD survey did not collect 401(k) balances. These respondents were unlikely to have participated in 401(k) plans. These plans, first authorized in 1982, did not become widespread until the

measure them net of outstanding liabilities; both wealth and net financial assets can be negative. Our unit of observation is the individual, but for those who are married, we associate household wealth with each member of the couple. It is difficult to assign ownership of assets, such as housing or jointly held financial assets, to specific household members.

Figure 1 shows the cumulative distribution of total wealth (\$000s) from the last survey wave prior to death. To facilitate exposition, we only show the range of



late 1980s and early 1990's. They were unavailable to most members of the AHEAD cohort who were age 70 or older in 1993.

wealth for individuals with balances between -\$50,000 and \$1,000,000. Half of those who died had wealth of less than \$115,000 (2012 dollars) when last surveyed. Four percent had negative net worth, and another 7 percent reported net worth of zero. The figure also shows financial assets (including 401(k) and IRA balances) in the last survey wave preceding death. About 8 percent of individuals were in households with negative financial asset balances and 22 percent reported a zero or negative balance. The median financial asset balance was \$18,500. Thus, the majority of individuals were in households with relatively limited financial assets. Poterba, Venti, and Wise (2017a) provide a deeper analysis of late-life asset balances for the HRS and AHEAD cohorts.

The low level of wealth for many elderly households in the U.S. makes their standard of living highly dependent on their annual income from Social Security and from a defined benefit pension if they have one. Data from other nations often show a similar pattern. Atkinson and Sutherland (1993), for example, pointed out that in the U.K., a substantial fraction of elderly households had little private retirement support and were therefore reliant on public support.

2. The Distribution of Wealth at Retirement

Because previous work suggests that low wealth at the end of life is highly correlated with low wealth at retirement, we begin by considering some of the factors that are associated with low retirement-age wealth.⁴ We examine the distribution of household lifetime earnings at age 65; these earnings are related to a household's capacity to save for retirement.⁵ Our sample includes all persons who were 65 or 66

⁴ There is also a substantial literature documenting low levels of wealth at retirement. Recent examples include Poterba, Venti and Wise (2011), Poterba (2014), and the U.S. General Accountability Office (2015).

⁵ We calculate lifetime earnings using linked Social Security earnings records for the years 1951 through 1991. These linked earnings records are available for about two-thirds of the HRS respondents. Earnings data for 1992

years old in any of the HRS cohorts. We obtain wealth data for each individual from the first survey wave they completed after turning 65.

Since HRS interviews occur at approximately two-year intervals, some respondents may be age 65 when surveyed and others may be age 66. We combine data for the years 1996 through 2012. The calculation of lifetime earnings excludes any earnings after age 65.⁶ We report results by quintiles of the distribution of household lifetime earnings.⁷ Reporting issues suggest some caution in interpreting the findings for the top and bottom quintiles. Some of those in the lowest quintile have low recorded earnings not because they did not have labor income, but because their earnings were not reported to the Social Security Administration (SSA). Whitman, Reznik and Shoffner (2011) report that 55.1 percent of those whose earnings were not reported to the SSA were immigrants who did not meet the 40 quarters of required work history coverage, 34.7 percent were infrequent workers, and 4.7 percent were government employees not covered by the Social Security system.⁸ We have tried to exclude individuals with unrecorded earnings by those whose primary job was in the public sector and by excluding widows. Nonetheless, many with low or zero earnings records remain and some of the respondents with such records are likely to have earnings not reported to the SSA. Lifetime earnings in the top quintile are also under-reported because of the SSA annual earnings cap (\$110,100 in 2012).

through 2012 are available bi-annually in the HRS. We imputed earnings for the years between the HRS waves by taking the average of adjacent years. Lifetime earnings are in 2012 dollars.

⁶ We have recalculated each table using earnings through age 70 and found no appreciable difference from the results reported here.

⁷ Quintiles of the distribution of household lifetime earnings are calculated separately for married and single persons.

⁸ In addition, if a respondent's spouse died before the HRS began, the spousal Social Security earnings records is not linked to the respondent's HRS record, and we are unable to compute household lifetime income.

2.1 Descriptive Information

Table 1 shows lifetime earnings at age 65, in \$2012, by earnings quintile and level of education. The top panel shows results for married persons (N=2,911), the bottom, for singles (N=635). For singles, some sample sizes, especially for off-diagonal cells, are sparse. The last column shows that household lifetime earnings in the top quintile are over six times greater than earnings in the lowest quintile for married persons and approximately twenty times as large for singles. This suggests substantial dispersion in the capacity to save. Lifetime earnings within an earnings quintile do not differ much by level of education, but overall, they co-vary positively with the level of education. Married persons with at least a college degree are members of households that about 90 percent more over their lifetimes than the households of married persons with no more than a high school degree. Single persons with a college degree earn approximately 150 percent more than singles without a high school degree.

Table 1. Mean lifetime earnings for persons age 65, by lifetime earnings quintile, level of education and marital status					
Lifetime earnings quintile	Less than HS	GED or HS graduate	Some college	College or more	All
Married Persons					
1	586,583	633,490	649,707	507,011	599,558
2	1,557,916	1,615,394	1,613,330	1,609,975	1,598,650
3	2,226,462	2,241,800	2,236,227	2,249,011	2,239,516
4	2,807,231	2,781,094	2,814,180	2,809,179	2,799,051
5	3,506,715	3,583,398	3,818,181	4,077,691	3,853,760
all	1,425,349	2,157,601	2,423,717	2,690,347	2,217,282
Single Persons					
1	78,554	142,057	149,258	126,421	106,303
2	508,583	491,725	533,873	565,474	518,257
3	899,743	967,038	925,970	949,509	940,659
4	1,409,853	1,421,081	1,475,079	1,485,667	1,450,321
5	2,353,625	2,198,283	2,450,154	2,330,687	2,304,768
all	534,472	1,156,617	1,223,701	1,359,094	1,060,747

Note: all amounts are reported in 2012 dollars.

To explore the link between lifetime earnings and lifetime health events, we compare the lifetime earnings of those who did, and did not, experience at least one of four major health conditions -- heart disease, lung disease, cancer or stroke -- before age 65. The first two columns of Table 2 show household lifetime earnings stratified by whether any member of the respondent's household experienced a major health condition. The earnings of those who did, and those who did not, experience a major health event differ very little. It is possible that, because the prevalence of health conditions rises sharply with age, our health measure confounds frequent health events close to retirement, which may have a small effect on lifetime earnings, with infrequent but high-impact early-career health events.

Table 2. Mean and percentage distribution of lifetime earnings by lifetime earnings quintile and by whether person ever experienced a major health condition and by marital status, persons age 65

Lifetime earnings quintile	Ever experience a major health condition?		Never experienced a major health condition
	No	Yes	
Married Persons			
	<i>Mean Lifetime Earnings</i>		<i>Percent</i>
1	589,760	615,188	61.5
2	1,609,679	1,578,412	64.7
3	2,238,400	2,241,281	61.3
4	2,795,865	2,804,487	63.1
5	3,880,461	3,812,074	61.0
all	2,215,764	2,219,789	62.3
Single Persons			
	<i>Mean Lifetime Earnings</i>		<i>Percent</i>
1	112,197	99,788	52.5
2	511,148	526,102	52.5
3	928,002	964,422	65.3
4	1,444,985	1,457,636	57.8
5	2,245,965	2,447,220	70.8
all	1,120,151	972,719	59.7

Note: mean lifetime earnings are reported in 2012 dollars.

Table 2 also presents information on the fraction of individuals in each earnings quintile who have experienced a major health condition. For married persons, there is a weak positive relationship between lifetime earnings by age 65 and health. For singles, those in lower earnings quintiles are more likely to have experienced a major health condition, with only 29 percent of those in the highest earnings quintile reporting a condition compared with 48 percent of those in the lowest quintile.

Table 3 shows the relationship between wealth at age 65 and education and lifetime earnings.⁹ Averaging over all levels of education, married (single) persons in the top earnings quintile had wealth nearly three (five) times greater than married (single) persons in the lowest quintile do. Averaging over all earnings quintiles, married (single) persons with at least a college degree had wealth more than five (seven) times greater than married (single) persons with less than a college degree do. A comparison of the bottom rows of Tables 1 and 3 suggests that education-related differences in wealth are much greater than education-related differences in lifetime earnings.

Table 3 also reports the distribution of educational attainment for individuals in each lifetime earnings quintile, and confirms the strong education-earnings link. Among married persons, over 40 percent of those in the top earnings quintile have college degrees, compared with 16 percent of those in the lowest earnings quintile. Over one third of those in the lowest quintile have less than a high school degree, compared with only 2 percent of those in the top earnings quintile.

⁹ We exclude individuals with more than \$10,000,000 of total assets from the analysis to minimize the effects of reporting errors.

Table 3. Mean total wealth for persons age 65 and by lifetime earnings quintile and by marital status

Lifetime earnings quintile	Less than HS	GED or HS graduate	Some college	College or more	All
Married Persons					
<i>Mean total wealth</i>					
1	113,564	362,004	362,894	936,341	362,292
2	298,975	317,579	631,908	1,060,029	498,316
3	335,652	427,927	611,002	1,097,711	579,283
4	316,931	486,387	692,189	1,337,271	755,220
5	330,913	677,983	943,894	1,439,321	1,062,196
all	231,320	445,794	679,821	1,244,873	651,382
<i>% of persons in each quintile</i>					
1	36.1	31.6	16.7	15.6	100.0
2	27.0	36.5	19.8	16.6	100.0
3	14.8	43.2	24.0	18.1	100.0
4	7.9	40.5	24.3	27.3	100.0
5	2.1	27.8	28.8	41.4	100.0
all	17.6	35.9	22.7	23.8	100.0
Single Persons					
<i>Mean total wealth</i>					
1	49,518	26,985	128,528	351,123	79,162
2	61,567	124,956	73,597	308,928	116,784
3	31,446	166,783	172,975	302,340	166,717
4	62,084	186,897	409,070	649,056	339,614
5	444,199	225,537	429,757	600,164	396,723
all	67,046	158,059	264,912	481,569	219,353
<i>% of persons in each quintile</i>					
1	55.8	23.6	12.1	8.4	100.0
2	29.2	33.2	25.1	12.6	100.0
3	21.3	37.3	21.1	20.3	100.0
4	9.6	38.2	32.0	20.3	100.0
5	5.2	41.6	23.2	30.0	100.0
all	24.3	34.8	22.7	18.3	100.0
Notes: Wealth is reported in 2012 dollars. Estimates in bold indicate the difference between the first (less than HS) and fourth (college or more) columns is statistically different from zero at the 5% level.					

To focus more directly on those with low wealth, and to minimize the effect of reporting errors, Table 4a presents the fraction of individuals in households with wealth

below either \$25,000 or \$100,000. Among married 65-year olds, 9.3 (22.4) percent have household wealth less than \$25,000 (\$100,000). The fractions of single persons below each threshold are greater, 39 percent and 57.5 percent respectively. For each wealth threshold, the range across levels of education is similar to the range across lifetime earnings quintiles. For example, using the \$25,000 threshold for married persons, about 23 percent of those in the lowest education group and 3 percent of those in the highest have low wealth. About 23 percent of those in the lowest lifetime earnings quintile and 3 percent of those in the highest lifetime earnings quintile have low wealth. The same pattern is also evident for single persons.

Table 4b presents tabulations comparable to those in Table 4a, but for financial assets rather than total wealth. The table shows that 28.8 (56.7) percent of married (single) persons have household financial assets less than \$10,000 at age 65 and 44.5 (68.2) percent have less than \$50,000. The estimated percentage of persons with low financial assets varies dramatically by lifetime earnings quintile and by level of education. Using the \$10,000 threshold, married persons in the lowest education group are 7.5 times more likely to have low financial assets than those in the highest education group. Married individuals in the lowest lifetime earnings quintile are 5.7 times more likely to have low financial assets than those in the highest quintile, and those in the lowest education and earnings quintiles are 16.1 times more likely to have low financial assets than those with high education and earnings. The table shows considerable variation in financial preparedness for retirement by level of education, even controlling for lifetime earnings.

Table 4a. Percent with wealth less than \$25,000 and \$100,000 for persons age 65, by lifetime earnings quintile, level of education, whether person ever experienced a major health condition, and marital status

Lifetime earnings quintile	Less than HS	GED or HS graduate	Some college	College or more	Ever experience a major health condition?		All
					No	Yes	
Married Persons							
<i>% with wealth less than \$25,000</i>							
1	36.6	16.3	16.6	9.9	19.5	27.7	22.7
2	13.8	12.8	14.8	7.0	9.6	17.7	12.5
3	12.7	5.3	2.8	2.6	4.9	5.9	5.3
4	6.0	3.2	2.0	1.4	1.5	4.6	2.6
5	33.2	3.2	4.0	1.0	2.4	4.3	3.1
all	22.8	8.0	7.1	3.3	7.6	12.0	9.3
<i>% with wealth less than \$100,000</i>							
1	67.0	40.3	35.4	14.0	39.6	53.5	45.0
2	48.2	37.1	28.0	10.7	28.2	44.3	33.9
3	37.1	18.1	13.0	6.7	15.8	20.6	17.6
4	14.8	11.0	8.3	4.0	6.7	12.3	8.7
5	41.2	9.8	7.2	3.2	4.4	11.0	7.0
all	50.9	23.0	16.4	6.4	19.0	28.2	22.4
Single Persons							
<i>% with wealth less than \$25,000</i>							
1	78.4	62.5	45.3	33.3	59.1	75.5	66.8
2	65.0	53.5	53.8	14.3	50.6	53.6	52.0
3	71.8	28.5	27.5	11.7	23.1	54.7	34.1
4	33.9	26.1	36.0	13.2	22.3	34.2	27.4
5	6.0	29.6	5.3	1.8	16.6	9.1	14.4
all	67.4	37.6	33.1	11.2	32.8	48.3	39.0
<i>% with wealth less than \$100,000</i>							
1	90.1	88.8	77.5	33.3	77.2	90.6	83.5
2	89.9	67.9	75.8	34.0	65.7	79.4	72.0
3	88.3	60.3	55.8	27.9	46.0	82.6	58.7
4	88.0	53.3	41.6	24.9	40.7	55.7	47.1
5	20.4	41.2	21.5	8.4	24.7	28.0	25.7
all	86.6	59.6	51.6	22.3	49.1	70.1	57.5

Note: Wealth thresholds are in 2012 dollars. For results by level of education, estimates in bold indicate the difference between the first (less than HS) and fourth (college or more) columns is statistically different from zero at the 5% level. For results by health condition, estimates in bold indicate that the difference between the "No" and "Yes" columns is statistically different from zero at the 5% level.

Table 4b. Percent with financial assets less than \$10,000 and \$50,000 for persons age 65, by lifetime earnings quintile, level of education, whether person ever experienced a major health condition, and marital status

Lifetime earnings quintile	Less than HS	GED or HS graduate	Some college	College or more	Ever experience a major health condition?		All
					No	Yes	
Married Persons							
<i>% with financial assets less than \$10,000</i>							
1	83.9	42.9	48.2	17.3	48.6	64.0	54.6
2	63.0	43.5	35.7	17.6	38.6	50.7	42.9
3	50.5	22.0	21.1	6.2	20.8	26.8	23.1
4	24.6	16.5	14.8	5.1	10.6	18.7	13.6
5	32.1	14.3	9.8	5.2	6.6	14.4	9.6
all	65.3	27.6	23.4	8.7	25.1	34.8	28.8
<i>% with financial assets less than \$50,000</i>							
1	92.9	67.9	61.0	31.2	63.6	80.3	70.0
2	80.6	63.9	62.9	34.7	57.3	74.4	63.4
3	65.6	45.9	35.8	19.7	39.1	45.5	41.6
4	47.2	34.3	33.3	14.2	27.4	33.3	29.6
5	48.8	24.6	17.4	12.3	13.7	24.6	17.9
all	79.4	47.5	39.0	19.5	40.3	51.4	44.5
Single Persons							
<i>% with financial assets less than \$10,000</i>							
1	93.8	93.4	72.3	36.2	77.6	96.0	86.3
2	91.8	75.4	71.3	19.5	66.5	78.7	72.1
3	72.4	54.4	55.6	27.2	41.4	74.8	53.0
4	84.1	59.0	39.1	23.7	39.7	58.8	47.9
5	14.2	41.0	17.5	5.9	24.0	22.7	23.6
all	85.4	61.6	48.5	19.3	48.0	69.7	56.7
<i>% with financial assets less than \$50,000</i>							
1	95.0	97.3	83.3	36.2	81.7	97.6	89.2
2	100.0	87.9	86.2	31.0	79.3	89.1	83.8
3	97.7	81.4	67.9	32.2	64.1	86.9	72.0
4	92.3	75.5	44.7	33.4	51.5	68.4	58.7
5	56.8	52.0	31.9	16.6	36.6	37.7	37.0
all	94.8	76.5	59.8	27.6	61.2	78.8	68.2

Note: Financial asset thresholds are in 2012 dollars. For results by level of education, estimates in bold indicate the difference between the first (less than HS) and fourth (college or more) columns is statistically different from zero at the 5% level. For results by health condition, estimates in bold indicate that the difference between the "No" and "Yes" columns is statistically different from zero at the 5% level.

Tables 4a and 4b also explore the relationship between the onset of a major health condition during the working years and the likelihood of reaching retirement age with low wealth. Table 4a shows the percentage of individuals in each earnings quintile, with and without major health conditions, who report wealth of less than \$25,000 and \$100,000. For married persons, the probability of reporting low wealth is higher for those who experienced a major health condition. For example, using the \$25,000 threshold (top panel), 7.6 percent of those who did not experience a major health condition had low wealth, compared with 12 percent of those who did. For singles, the percentage below the \$25,000 threshold is 32.8 percent for those who did not experience a major health event and 48.3 percent for those who did. For both singles and marrieds, the pattern is similar using the \$100,000 threshold. There are similar differences within lifetime earnings quintiles, suggesting that the effect of poor health on wealth is not just attributable to the effect of poor health on earnings, but may also operate through health-related spending.

Recent retrospective survey evidence supports the role of health shocks in reducing retirement wealth. Borsch-Supan, Hurd, and Rohwedder (2017), for example, in a survey of individuals over the age of 60, found that 13 percent reported large non-health expenses at some point, and that over three quarters of those with such expenses regretted not saving more for retirement.

Table 4b repeats the tabulation for financial assets, using thresholds of \$10,000 and \$50,000. The patterns are similar for both definitions of “low assets.” Major health conditions are associated with lower levels of financial preparedness and these health-related differences are evident even after controlling for lifetime earnings. The results in

Tables 4a and 4b suggest that pre-retirement health shocks contribute to disparities in wealth at retirement, and thus to late-life wealth inequality.

2.2 The Savings Ratio

To investigate the role of lifetime earnings in contributing to low retirement saving, we calculate the ratio of household wealth to lifetime earnings. While many factors, including bequests and gifts received and the rate of return on investments, affect retirement wealth, for many households the saving ratio is likely to depend primarily on the history of annual saving rates.

Table 5 shows the ratio of mean wealth at age 65 to mean lifetime earnings at age 65 (a ratio of means, not mean of ratios) by lifetime earnings quintile and by level of education. Within each earnings quintile, the savings ratio rises with the level of education. The ratio of wealth to lifetime earnings for married persons is 0.16, 0.21, 0.28 and 0.46 for those with less than a high school degree, those with a high school degree, those with some college, and those with college or more, respectively. Savings ratios for single persons are lower than for married persons, but also strongly increase with the level of education. Within each earnings quintile, the wealth-to-earnings ratio is higher for groups with more education is associated with higher levels of wealth accumulation.¹⁰ This could reflect underlying differences in time preference – those with greater capacity to defer consumption invest in acquiring more education, and also choose to save more – or could be due to the effect of education on desired saving

¹⁰ Some of the saving ratios in the first quintile are quite high, probably because some persons in this decile have earnings that are not reported to the Social Security Administration and the reported lifetime earnings (the denominator in the saving ratio) is an underestimate of actual earnings.

levels. The effect does not simply reflect an association between earnings and educational attainment.

Table 5. Ratio of mean wealth to mean lifetime earnings for persons age 65, by lifetime earnings quintile and by level of education					
Lifetime earnings quintile	Less than HS	GED or HS graduate	Some college	College or more	All
Married Persons					
1	0.19	0.57	0.56	1.85	0.60
2	0.19	0.20	0.39	0.66	0.31
3	0.15	0.19	0.27	0.49	0.26
4	0.11	0.18	0.25	0.48	0.27
5	0.09	0.19	0.25	0.35	0.28
all	0.16	0.21	0.28	0.46	0.29
Single Persons					
1	0.63	0.19	0.86	2.63	0.74
2	0.12	0.25	0.14	0.56	0.23
3	0.03	0.17	0.18	0.32	0.18
4	0.04	0.13	0.28	0.44	0.23
5	0.19	0.10	0.18	0.26	0.17
all	0.13	0.14	0.22	0.35	0.21

The foregoing analysis suggests that low educational attainment and low lifetime earnings are both associated with low levels of retirement wealth. Many of those in the bottom tail of the retirement wealth distribution are also in the bottom tail of the lifetime earnings distribution. Education and wealth are related even after controlling for lifetime earnings. Individuals who experienced a major health event prior to age 65 are more likely to have low wealth than those who did not, even after controlling for differences in lifetime earnings.

3. Comparing Wealth at Age 65 and Wealth at End of Life

Shocks such as adverse health events or the death of a spouse can affect a household's trajectory of wealth from retirement until end of life. We explore this trajectory in two ways. First, we compare wealth at 65 with wealth at end of life in repeated cross sections of HRS respondents. Then, for the small subset of respondents for whom we observe both wealth at 65 and wealth at death, we construct longitudinal wealth trajectories and explore the factors that affect them.

3.1 Repeated Cross-Section Evidence

Table 6 reports the fraction of individuals in each lifetime earnings quintile who have low total wealth (< \$100,000) and low financial assets (<\$50,000) at retirement and at the end of life. Unreported results using a \$25,000 threshold for total wealth and a \$10,000 threshold for financial assets yield similar results. The low-wealth tail of the wealth distribution grows thicker as individuals age.¹¹ For married persons, 22.4 percent reported less than \$100,000 of total wealth at retirement, but 30.7 percent report less than \$100,000 of total wealth in the last year observed before death. The comparable statistics using the \$50,000 threshold for financial assets are 44.5 percent (retirement) and 52.4 percent (end of life). The bold highlighting in the table indicates that we can reject the null hypothesis of no difference between the values at retirement age and at death at the 95 percent confidence interval. The percentage increase in the

¹¹ The estimates in both panels of this table use the same cut-points, defined in 2012 dollars, to define lifetime earnings quintiles. We estimate the quintile cut-points for persons aged 65 or 66 to produce the results in the left panel. We use the same cut-points to assign lifetime earnings quintiles to persons in the right panel. Since a person's indexed lifetime earnings does not change as the person ages, our method assigns each person in the right panel the earnings quintile that person would have been in when they were 65. Together the two panels allow us to compare assets at age 65 (or 66) and assets in the last year before death for persons in the same earnings quintile at age 65.

share of married persons with low financial assets is also about 8 percent; this increase is statistically significantly different from zero. The same pattern is evident for singles, but the increase is smaller: 5 to 6 percentage points. For some earnings quintiles the

Table 6. Percent of persons in each lifetime earnings quintile having low wealth, for persons age 65 and persons in the last year observed before death

Lifetime earnings quintile	Total wealth less than \$100,000		Financial assets less than \$50,000	
	At age 65	In last year observed	At age 65	In last year observed
Married Persons				
1	45.0	45.1	70.0	65.6
2	33.9	30.4	63.4	54.0
3	17.6	20.7	41.6	41.7
4	8.7	14.3	29.6	35.2
5	7.0	7.5	17.9	28.1
all	22.4	30.7	44.5	52.4
N	2,911	2,309	2,911	2,309
Single Persons				
1	83.5	78.9	89.2	86.5
2	72.0	77.2	83.8	87.4
3	58.8	70.7	72.0	76.0
4	47.1	41.1	58.7	56.6
5	25.7	13.0	37.0	28.4
all	57.5	63.2	68.2	73.1
N	635	532	635	532

Note: Results for the last year observed before death are for persons at least age 65 at death. Bold indicates that the difference between the percent at age 65 and the percent in the last year observed is statistically different from zero at the 5% level.

prevalence of low wealth, or low financial assets, is lower at death than at retirement, although we cannot reject the null hypothesis of no change since retirement for most of these groups. A drop in the percentage reporting low financial assets could coincide

with an increase in the percentage with low wealth if there are balance sheet transfers. For example, selling a home to pay off bills associated with a health shock can lead to a drop in wealth, but could lead to a rise in financial assets if some of the proceeds are held in a bank account.

We also investigated the likelihood that individuals who report low late-life wealth were low lifetime earners. Nearly half -- 47.8 percent -- of the married individuals with wealth of less than \$100,000 in the last survey before death were in the lowest quintile of lifetime earnings, and 40.1 percent of those with less than \$100,000 at age 65 were in this earnings quintile. The pattern is similar for financial assets: 40.7 percent of those with less than \$50,000 in financial assets at death were in the lowest lifetime earnings quintile, while 31.5 percent of those with this level of financial assets at retirement were in the lowest earnings quintile. Thus a higher share of those with low wealth at death, than of those with low wealth at retirement, were low lifetime earners.

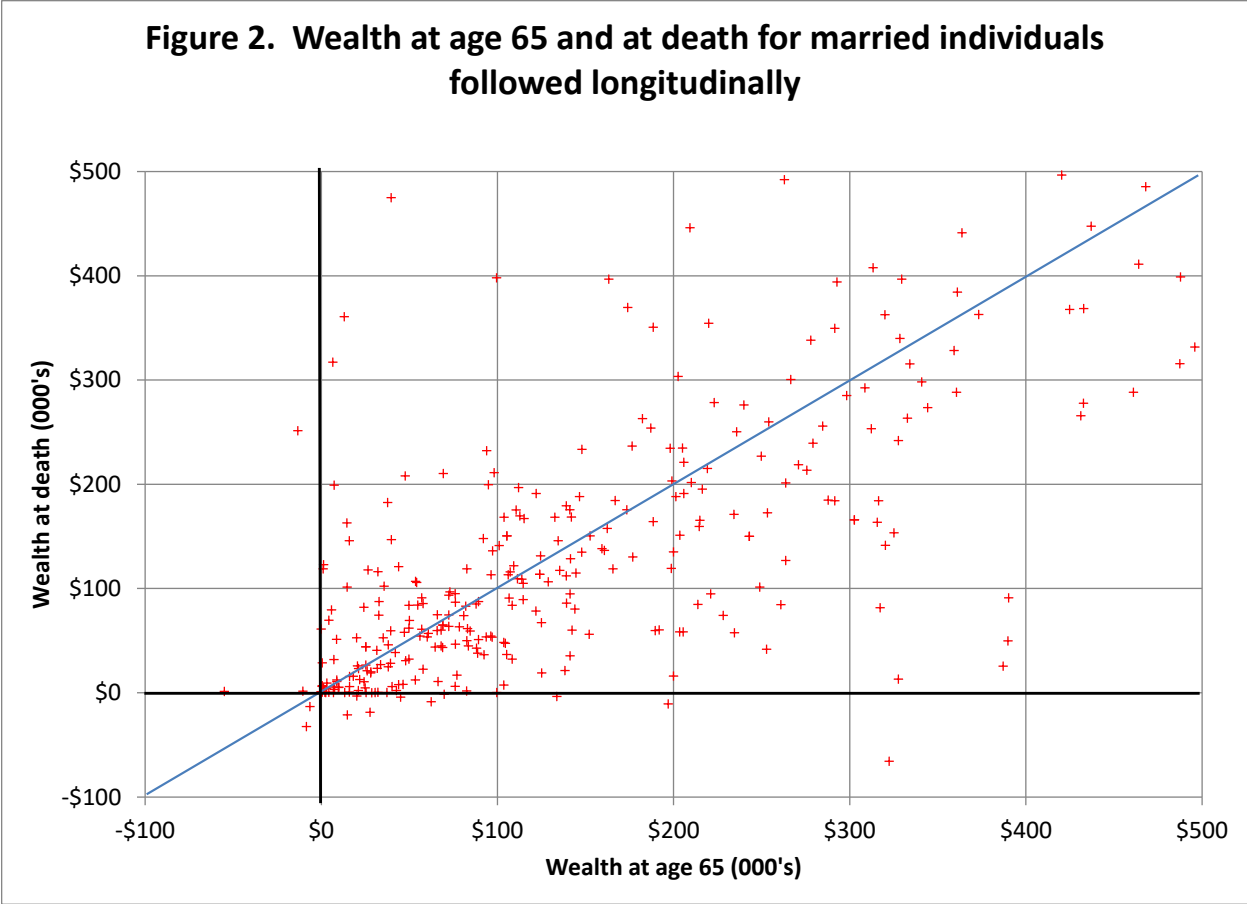
3.2 Evidence from HRS Cohorts, Retirement through Death

The results in Table 6 suggest that some individuals experience a drawdown of wealth during retirement, but it is difficult to track these changes because the table compares different cross-sections of retirees and those at the end of life. The sample used to make the left panel in Table 6 includes all respondents who attained age 65 in any wave of the HRS between 1996 and 2012. The right panel includes all respondents over the age of 65 who died between 1996 and 2012. There is very little overlap between these two samples. The HRS does contain some respondents -- 455 married individuals and 113 singles -- for whom the longitudinal dimension of the data is long

enough to track the complete asset trajectory from retirement through death.¹² In what follows, we focus on married individuals who were observed at age 65 and who died within our sample, so we also observe them in the wave before death.

Figure 2 graphs total wealth at age 65 and total wealth at death for the longitudinal sample of 455 individuals – each indicated by a marker - observed at both age 65 and at death. To facilitate the exposition, the figure only shows individuals with total wealth less than \$500,000 at each date, which further limits our sample to 325 individuals. Those with flat trajectories of wealth in retirement will graph close to the 45-degree line. The figure shows many individuals above (higher wealth at death than at age 65) and below (higher wealth at age 65 than at death) the 45-degree line, but a relatively small number (69 of 325, or 21.2 percent) for whom the difference is greater than \$100,000. At low levels of wealth, many individuals are close to the 45-degree line, suggesting that for them, wealth neither increased nor decreased markedly between age 65 and when last observed before death.

¹² We omit results for singles because of the small sample size. There are significantly fewer single persons than married persons in our sample, and the number is further diminished by the exclusion of widows and widowers in all analyses that involve lifetime earnings because of the absence of lifetime household earnings information for persons whose deceased spouses were never HRS respondents. For the longitudinal sample, the response at age 65 defines marital status. There are two noticeable differences between the longitudinal sample and the sample used in Tables 6a and 6b. First, the longitudinal sample is less wealthy (and presumably less healthy) at age 65 because it only includes individuals who die before age 79 (individuals age 65 in 1996 will be age 79 in 2010 when last observed before death). Second, the age at death is younger in the longitudinal sample, again because the sample is limited to individuals who were observed at age 65 and who died before 2012.



Of the 455 individuals in our longitudinal sample, wealth declined for 56.9 percent, was recorded as zero in both surveys for 1.1 percent, and increased for 42 percent. One shortcoming of the longitudinal sample is that it only includes individuals who are both present in the HRS at age 65 in any year after 1996 and are known to have died by 2012. As a consequence, the maximum number of years between age 65 and the last wave before death is about 14 years (for a person observed at age 65 in 1996, first reported as deceased in 2012, and last observed alive in 2010). It is likely that if we had longitudinal data for an even longer period, we would observe larger differences between wealth at age 65 and at death.

Table 7 shows additional detail on the persistence of total wealth and financial assets between age 65 and the last survey before death in the longitudinal sample.

The prevalence of “low wealth” changes little (from 37.4 percent to 39.8 percent) between age 65 and death. The probability of reporting low wealth rises for four of the five levels of lifetime earnings, but we cannot reject the null hypothesis of equality for any of the five intervals. Overall, the prevalence of “low financial assets” increases between age 65 and the last survey prior to death, from 58.9 percent to 62.4 percent. The likelihood of low financial assets again increases for four of the five levels of lifetime earnings, but we cannot reject the null hypothesis of equality for any of the five intervals.

Table 7. Percent of married persons in each lifetime earnings quintile having low wealth and low financial assets, for persons observed at age 65 and who die during the sample period

Lifetime earnings quintile	Total wealth less than \$100,000		Financial assets less than \$50,000	
	At age 65	In last year observed	At age 65	In last year observed
1	63.0	63.8	85.8	84.3
2	40.3	42.7	68.5	71.8
3	29.7	30.7	47.5	50.5
4	11.1	19.4	27.8	37.5
5	6.5	6.5	19.4	32.3
all	37.4	39.8	58.9	62.4

Note: Results for the last year observed before death are for persons at least age 65 at death. Bold indicates that the difference between the percent at age 65 and the percent in the last year observed is statistically different from zero at the 5% level.

To explore the transitions between wealth at age 65 and when last observed before death in more detail, Tables 8 and 9 present additional summary data. The top panel of Table 8 shows the percentage of those in various total wealth intervals at age 65 who were in various intervals when last observed. There is substantial variation between wealth at these two points of the life cycle. For example, 32.8 percent of the

respondents who reported between \$10,000 and \$50,000 of total wealth at age 65 were in this wealth category at death. There is greater persistence in the top and bottom categories: 68 percent of those who reported less than \$10,000 in wealth at age 65 were in this wealth interval in the survey before death; 77.5 percent of those with more than \$250,000 in assets at age 65 were similarly categorized when last surveyed.

Table 8. Percentage of persons in each asset interval in last wave prior to death by asset interval at age 65 (row percents)

Total Wealth		wealth interval in last year observed					Percent in each row
wealth interval at age 65	<\$10,000	\$10,000-\$50,000	\$50,000-\$100,000	\$100,000-\$250,000	> \$250,000		
<\$10,000	68.2	11.4	9.1	6.8	4.6	9.7	
\$10,000-\$50,000	29.7	32.8	14.1	15.6	7.8	14.1	
\$50,000-\$100,000	11.3	21.0	48.4	16.1	3.2	13.6	
\$100,000-\$250,000	3.7	7.5	16.8	56.1	15.9	23.5	
> \$250,000	1.7	2.8	2.8	15.2	77.5	39.1	
Percent in each column	13.9	11.4	14.5	24.2	36.0		

Financial Assets		financial asset interval in last year observed					Percent in each row
financial asset interval at age 65	<\$10,000	\$10,000-\$50,000	\$50,000-\$100,000	\$100,000-\$250,000	> \$250,000		
<\$10,000	89.3	7.0	1.6	1.1	1.1	40.9	
\$10,000-\$50,000	48.8	30.5	9.8	8.5	2.4	18.0	
\$50,000-\$100,000	16.2	35.1	21.6	16.2	10.8	8.1	
\$100,000-\$250,000	8.2	13.1	29.5	26.2	23.0	13.4	
> \$250,000	5.6	3.4	5.6	27.0	58.4	19.6	
Percent in each column	48.8	13.6	9.2	12.1	16.3		

Table 9. Percentage of persons in each asset interval at age 65 by asset interval in last wave prior to death (column percents)

Total Wealth						
wealth interval at age 65	wealth interval in last year observed					Percent in each row
	<\$10,000	\$10,000-\$50,000	\$50,000-\$100,000	\$100,000-\$250,000	> \$250,000	
<\$10,000	47.6	9.6	6.1	2.7	1.2	9.7
\$10,000-\$50,000	30.2	40.4	13.6	9.1	3.1	14.1
\$50,000-\$100,000	11.1	25.0	45.5	9.1	1.2	13.6
\$100,000-\$250,000	6.4	15.4	27.3	54.6	10.4	23.5
> \$250,000	4.8	9.6	7.6	24.6	84.2	39.1
Percent in each column	13.9	11.4	14.5	24.2	36.0	

Financial Assets						
financial asset interval at age 65	financial asset interval in last year observed					Percent in each row
	<\$10,000	\$10,000-\$50,000	\$50,000-\$100,000	\$100,000-\$250,000	> \$250,000	
<\$10,000	74.8	21.0	7.1	3.6	2.7	40.9
\$10,000-\$50,000	18.0	40.3	19.1	12.7	2.7	18.0
\$50,000-\$100,000	2.7	21.0	19.1	10.9	5.4	8.1
\$100,000-\$250,000	2.3	12.9	42.9	29.1	18.9	13.4
> \$250,000	2.3	4.8	11.9	43.6	70.3	19.6
Percent in each column	48.8	13.6	9.2	12.1	16.3	

Some individuals make significant transitions in wealth holdings. We find that 7.3 percent of those who reported more than \$250,000 at age 65 had less than \$100,000 when last surveyed. While we would like to explore what happened to the respondents in this group, the sample sizes of households with large declines are small.

Financial assets are more persistent, particularly for individuals with very low initial financial asset balances. The proportion of individuals with less than \$10,000 of financial assets at age 65 who also had less than \$10,000 of financial assets when last

observed before death is 89.3 percent. However, the fraction of individuals having very high financial assets at both age 65 and at death is lower than the fraction of individuals maintaining very high total wealth between age 65 and death.

The top panel of Table 9 stratifies married individuals in various total wealth intervals in the last year observed by their reported wealth at age 65. It shows column percentages rather than the row percentages shown in Table 8. For example, 47.6 percent of those last observed with less than \$10,000 of total wealth also had less than \$10,000 of total wealth at age 65. Persistence is particularly strong for persons dying with substantial wealth: 84.2 percent of those who have more than \$250,000 when last observed also had more than \$250,000 at age 65. At low wealth levels, of those with less than \$10,000 of total wealth at death, 11.2 percent had more than \$100,000 entering retirement, while nearly 50 percent of those with between \$10,000 and \$50,000 of wealth when last observed had wealth of more than \$50,000 at age 65. This suggests some “downward mobility” between age 65 and death among those who had accumulated substantial assets at retirement. The bottom panel of Table 9 suggests similar patterns for financial asset mobility.

Tables 8 and 9 categorize wealth and financial assets into finer categories than our earlier discussion of “low wealth” or “low financial assets.” We can nevertheless combine the sub-categories and compute retirement-to-last observation transition probabilities corresponding to our broader categories. Among those with less than \$100,000 (\$50,000) in wealth at age 65, 82.1 (69.4) percent were also in this wealth category when last observed before death. For low financial assets, there is much greater persistence: 91 percent of those with less than \$50,000 in financial assets at

age 65 are also in this “low financial assets” group when last observed before death. Reversing the conditioning – asking what share of those with low financial assets at death had low financial assets at 65 – yields a similar result: 85.9 percent. For total wealth, 76.2 (65.2) percent of those with less than \$100,000 (\$50,000) at death were similarly situated at age 65. These results suggest that between one quarter and one third of those who are observed with low wealth at death entered this state between age 65 and death. While Figure 2 and the tables above suggest that large movements in wealth or financial assets between age 65 and death are relatively uncommon for those who die before the age of 80, they also demonstrate that some households draw down their assets and are poorer at death than at they were at retirement age. Most of the incidence of low wealth at death, however, is due to low wealth at the time of retirement.

4. Wealth Trajectories after Retirement

We conclude our analysis by exploring two factors that are often identified as potential contributors to a decline in wealth and financial assets: adverse health shocks and loss of a spouse.

4.1 Adverse Health Events

Figure 3 shows the age-specific probability of respondents reporting that they have experienced a major health condition -- cancer, heart disease, lung disease, or stroke – prior to the survey. This probability increases with age, rising from about 25 percent at age 60 to more than 50 percent after age 75. Figure 4 shows the age of first experiencing a major health condition; this increases until about age 70 and then plateaus at older ages at a rate of between 6 and 7 percent per year.¹³

¹³ The HRS surveys respondents approximately every two years. Thus this figure shows the probability that a respondent first experiences each health condition in the two-year interval since the previous survey wave.

Figure 3. Percent of persons having experienced at least one major health condition by age

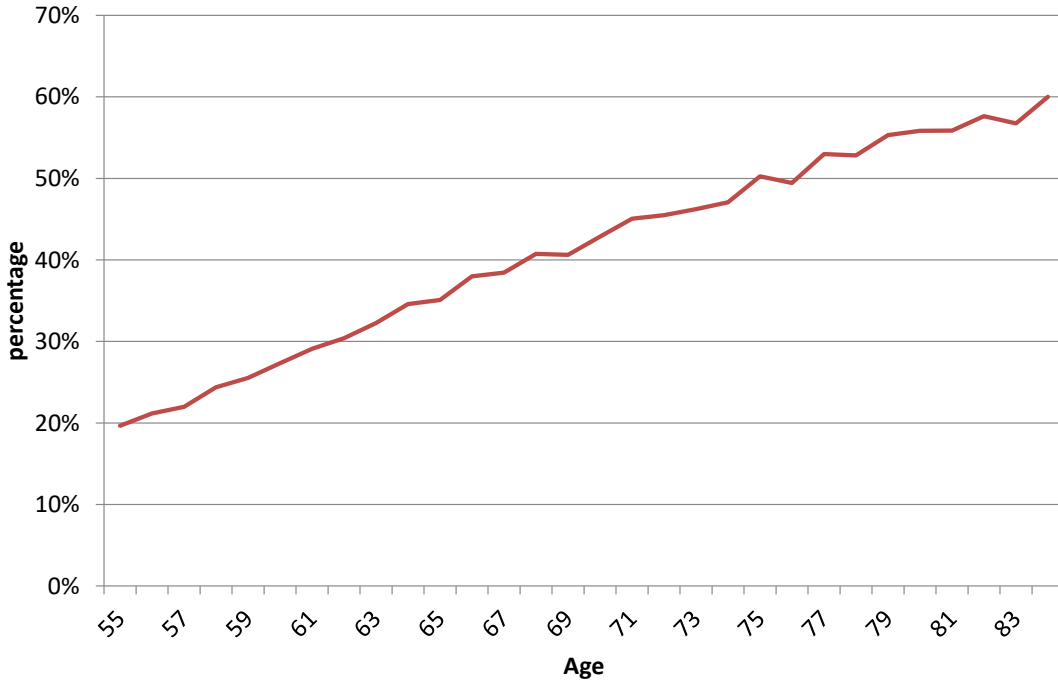
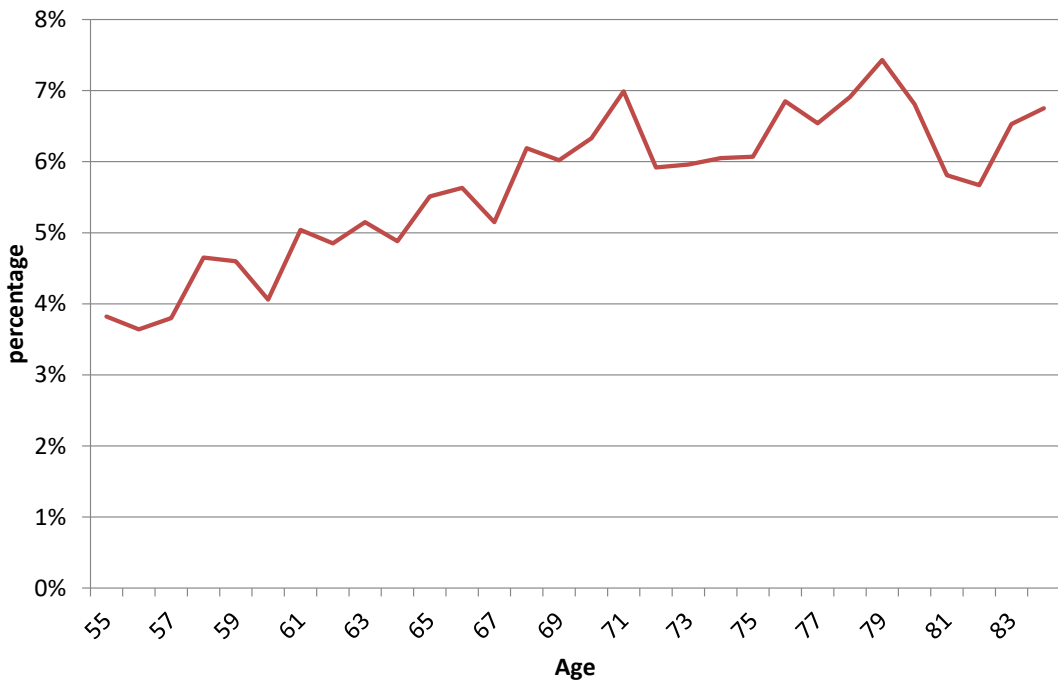


Figure 4. Percent of persons reporting their first major health condition by age



In Table 10, we explore the association between the onset of a major health condition and low wealth at age 65 and older. We construct the entries by identifying the survey wave in which the onset of each health condition is first reported. The first column (“before”) shows the percentage of respondents with low wealth in the wave prior to the onset; the second column (“after”) shows the percent with low wealth in the wave after the onset. Since survey waves in the HRS are approximately two years apart, on average the first column shows the percentage of persons with low wealth one year prior to the onset of the condition, and the second column shows the percentage with low wealth one year after onset. The difference between the waves, shown in the third column, is the short-run association between the onset of a health condition and low wealth.¹⁴ Our analysis differs from the many previous studies that focus on the change in wealth at the time of a new health condition in that we focus on the likelihood of reporting low wealth, a tail outcome in the wealth distribution.¹⁵

The results in top panel (married persons) of Table 10 suggest that the onset of a major medical condition is associated with an increase of about 0.8 percentage points in the chance that total wealth is below \$25,000 and an increase of about 1.3 percentage points in the chance that wealth is below \$100,000. The 1.3 percentage point difference is the difference between the 2.5 percentage point increase in the probability of having wealth below \$100,000 for those who faced the onset of a new medical condition, and

¹⁴ Because lifetime earnings are not necessary for the calculations for Table 10, the sample is larger than in earlier tables. We also include widows; they were also excluded from tabulations using lifetime earnings.

¹⁵ We also examined the effect of the onset of a health condition on wealth accumulation over several years; the resulting standard errors on asset changes were very large.

Table 10. Percent with low wealth and low financial assets in the wave before and in the wave after first experiencing a major health condition, persons age 65 or older*

Condition	Before	After	Difference	p-value**
Married Persons				
<i>% with wealth less than \$25,000</i>				
Any major condition	8.2	9.9	1.7	0.026
No major health conditions	6.9	7.8	0.9	
<i>% with wealth less than \$100,000</i>				
Any major condition	21.3	23.8	2.5	0.024
No major health conditions	16.9	18.1	1.2	
<i>% with financial assets less than \$10,000</i>				
Any major condition	27.3	29.2	1.9	0.367
No major health conditions	23.3	24.6	1.3	
<i>% with financial assets less than \$50,000</i>				
Any major condition	43.4	44.2	0.8	0.642
No major health conditions	36.7	37.8	1.1	
Single Persons				
<i>% with wealth less than \$25,000</i>				
Any major condition	29.5	32.7	3.2	0.031
No major health conditions	25.4	27.0	1.6	
<i>% with wealth less than \$100,000</i>				
Any major condition	48.3	51.4	3.1	0.139
No major health conditions	44.0	45.8	1.8	
<i>% with financial assets less than \$10,000</i>				
Any major condition	48.7	50.6	1.9	0.721
No major health conditions	43.4	45.6	2.2	
<i>% with financial assets less than \$50,000</i>				
Any major condition	64.7	66.0	1.3	0.419
No major health conditions	60.2	62.2	2.0	
* Major health conditions are cancer, heart disease, lung disease and a stroke.				
* p-value for difference from no major health conditions				

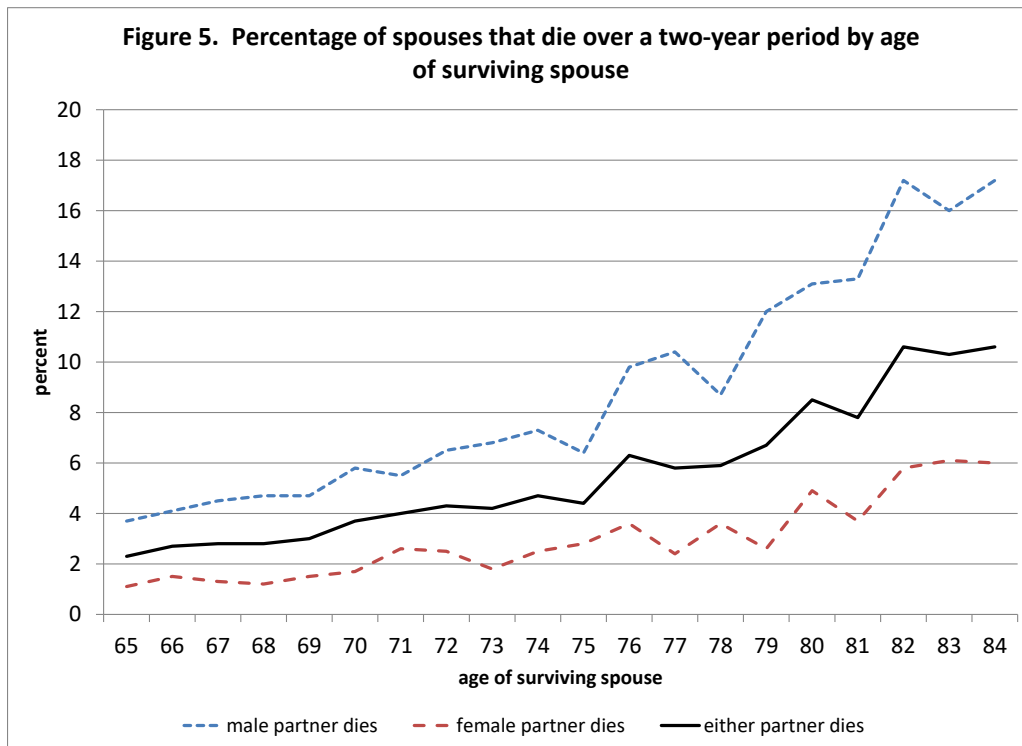
the 1.2 percentage point increase for those who did not. The last column shows the p-value for this difference. For total wealth, the onset of a major condition is associated with an increase in the likelihood that married persons report low wealth.

The next two rows in Table 10 show that the association between the onset of health conditions and the proportion of persons with low financial assets is smaller and less consistent than the association observed for total assets. For the \$10,000

threshold, the association between the onset of a major health condition and the percent with low financial assets is positive, but not statistically significant. For the \$50,000 threshold, the difference is negative but again is not statistically significantly different from zero. The results for single persons in the bottom panel again suggest that the onset of a major health condition increases the likelihood of low total assets, but has no effect on the likelihood of low financial assets. This could reflect transfers across the household balance sheet that raise financial assets while lowering wealth, such as sale of a home.

4.2 Death of a Spouse

Figure 5 reports the percent of married persons in the HRS over the age of 65 in each wave whose spouse died before the next wave. The horizontal axis is the age of



the surviving spouse at the beginning of the two-year interval. Women tend to have older spouses and men tend to have younger spouses, so the age at which one partner becomes a widow/widower (on the horizontal axis) may be an imperfect indicator of the age of the partner at their death. The probability that a partner will die in a two-year interval increases from about 2 percent at age 65 to a little over 3 percent at age 70 and to almost 9 percent by age 80.

Table 11 reports the probability of reporting low total wealth and low financial assets before and after the death of a spouse, along with the percent with low wealth for those who remain married to the same spouse in adjacent waves. The first column (“wave before death”) shows the percent with low wealth, on average, one year prior to the death of a spouse, and the second column (“wave after death”) shows the percent with low wealth, on average, one year after the death of a spouse. The probability of reporting low wealth rises. The increase ranges from 1.6 percentage points to 3.3 percentage points and is statistically significant different from the increase for continuously married women, who account for 68 percent of the surviving spouses, but not for men.

The bottom two panels of Table 11 report similar tabulations for low financial assets. The death of a spouse is associated with an increase in the likelihood of reporting less than \$10,000 in financial assets, but the effects are statistically indistinguishable from zero. However, the point estimates suggest reduction in the percentage of individuals with financial assets below \$50,000 after the death of a

Table 11. Percent with low wealth and low financial assets for newly widowed persons and for continuously married persons

Family Status	Gender of Survivor	Wave before death	Wave after death	Difference	p-value*
<i>Percentage with wealth less than \$25,000</i>					
Spouse Died	men	14.2	15.8	1.6	0.358
	women	9.6	12.7	3.1	0.000
	all	11.0	13.7	2.7	0.000
Continuously Married		6.8	7.7	0.9	
<i>Percentage with wealth less than \$100,000</i>					
Spouse Died	men	29.5	31.6	2.1	0.509
	women	27.2	30.5	3.3	0.014
	all	27.9	30.9	3.0	0.000
Continuously Married		17.7	19.1	1.4	
<i>Percentage with financial assets less than \$10,000</i>					
Spouse Died	men	31.9	33.5	1.6	0.883
	women	30.7	32.2	1.5	0.986
	all	31.1	32.6	1.5	0.947
Continuously Married		23.2	24.7	1.5	
<i>Percentage with financial assets less than \$50,000</i>					
Spouse Died	men	50.4	49.6	-0.8	0.167
	women	49.4	48.7	-0.7	0.067
	all	49.7	49.0	-0.7	0.024
Continuously Married		38.0	39.1	1.1	

* p-value for test against continuously married

spouse. This could indicate that death-related payouts, such as life insurance benefits, are of some importance for this group. This does not appear to be the explanation; surviving spouses of those who had life insurance display a larger decrease in the probability of reporting low financial assets than the surviving spouses of those without insurances. Even for those with uninsured spouses, there is some decline in the probability of being in the low financial assets category. This may reflect a transfer of

some non-financial assets, such as home equity, into financial assets after the death of a spouse. Selling a home to cover medical expenses incurred by the first-to-die spouse could result in an increase in financial assets even though total assets were declining.

We also explore the relationship between changes in wealth between age 65 and death, and new health conditions or the death of a spouse, using the longitudinal sample of 455 married persons who were observed both at age 65 and just before death. We find that 60.7 percent of those who experience major new health condition between age 65 and death reported a decline in wealth, compared with 55.7 percent of those who did not report a new condition but died within the sample. For financial assets, the difference is smaller: 61.7 percent and 60.6 percent respectively. Among those who lost a spouse and also died within the sample, 69.2 percent reported a decline in wealth. By comparison, 56.6 percent of those who died but did not report losing a spouse also reported a wealth decline.

If we condition on the observed change in wealth or financial assets, among those who experienced a decline in wealth (financial assets) between age 65 and death, 25.1 percent (23.8 percent) were diagnosed with a new health condition. This corresponds to 21.4 percent (23.0 percent) for those whose assets increased. Those whose wealth declined were also more likely (3.5 vs. 2.0 percent) to have lost a spouse. The results, while not statistically significant, suggest some association between both health and family status shocks and declines in wealth. While the small sample size prevents us from drawing any broad conclusions, but the data point toward the advent of one of the four major health conditions that we consider, and spousal deaths, raising the likelihood of falling into the low wealth category. At least in our longitudinal sample,

which is limited to elderly individuals who died relatively young, these shocks do not appear to account for a large share of the transitions into low wealth status between retirement and death.

5. Conclusions

Low lifetime wealth accumulation is the most important reason why some individuals in the U.S. have low wealth in late life. In a sample of HRS respondents who are observed both at age 65 and on average one year before death, more than two thirds of those who report net worth of less than \$50,000 at death, and three quarters of those with less than \$100,000, had similarly low levels of wealth at age 65.

There is a very strong association between lifetime earnings and educational attainment and wealth at age 65. Education is strongly correlated with wealth even after controlling for lifetime earnings. Forty-five percent of married persons in the lowest quintile of the distribution of lifetime earnings have net worth of less than \$100,000 at age 65, compared with only 7 percent of married persons in the highest quintile. Among married individuals without a high school degree, 50.9 percent have low wealth, compared with only 6.4 percent of those with a college degree. Pre-retirement health is also strongly associated with wealth at retirement. Nineteen percent of married persons who never experienced a major health condition had wealth of less than \$100,000 at retirement, as did 28.2 percent of those who reported a major health condition. The patterns are similar for singles.

Relatively few households fall from modest or substantial wealth to low wealth during retirement. In the longitudinal sample of HRS households, 37.4 percent of married persons had wealth of less than \$100,000 at age 65, compared with 39.8

percent just prior to their death. The difference is greater when we compare synthetic cohorts: 22.4 percent (age 65) and 30.7 percent (last observed before death). This may reflect the later average age of death in the synthetic cohort group, and the correspondingly longer length of the retirement period. For financial assets, 58.9 percent had less than \$50,000 at retirement, compared with 62.4 percent just prior to death. The change in the fraction with low wealth, which reflects the rate at which assets are depleted between retirement and death, does not seem related to the level of education or to lifetime earnings.

Although large movements in wealth or financial assets between age 65 and death are relatively uncommon for those who die before the age of 80, there are some households that draw down their assets and are poorer at death than they were at retirement age. About one third of the households in the longitudinal sample report lower wealth at death than at retirement; for some, a decline in health or the death of a spouse is associated with wealth depletion. For example, the onset of a major health condition is associated with an increase in the fraction of persons with wealth below \$100,000 from 21.3 to 23.8 percent. The loss of a spouse is associated with an increase in the likelihood of low wealth from 29.5 to 31.6 percent for (surviving) men and from 27.2 to 30.5 percent for (surviving) women. These findings are suggestive but do not identify the causal mechanisms that underlie these associations. These events may involve medical, funeral, and other direct expenditures that lead to asset spend-down. Barcellos and Jacobson (2015) demonstrate that Medicare is a key source of insurance and reduces out-of-pocket health expenses for those over 65 relative to those approaching 65, but there are still uncovered expenses. In addition, for couples, these

adverse events may result in the loss of spousal earnings or spousal pension benefits, thus forcing the healthy or surviving spouse to deplete assets to replace lost income from other sources.

A key challenge in studying wealth changes associated with health shocks is that households might change their spending patterns, and hence their wealth trajectories, for reasons other than unavoidable out-of-pocket medical expenses. Adverse health events may cause individuals to reduce their estimate of their longevity, which could increase their consumption spending and the rate at which they draw down wealth. Because the change in wealth reflects the return on wealth, plus other income, less consumption and health expenditures, any effects of health shocks on income, or consumption, or health expenditures, will manifest themselves in the evolution of wealth. Determining which of these mechanisms is responsible for the estimated health-wealth association is a topic for future work.

One very important limitation of our results is that, because of the nature of our sample, those who we can track from retirement through death died relatively young – before age 80. It is possible that adverse health shocks at later ages are more costly than similar shocks experienced by individuals in their 60s and 70s; Lee and Kim (2008) present some evidence in support of this view. As longer longitudinal samples become available with the HRS, our results that track married couples over time may need to be modified. Continued focus on the out-of-pocket medical costs of those near the end of life, and on the other non-medical costs associated with health events, even when it is not possible to measure financial circumstances at earlier ages, is also warranted.

Our findings on the link between health shocks, spousal deaths, and the probability of reporting low wealth suggest that some elderly households are not fully insured against health care needs. This is consistent with the body of prior research that suggests an adverse health shock are associated with lower wealth; our findings suggest that for some households, these shocks contribute to their reaching the end of life with very limited wealth. Our results also call attention to the financial risks confronting surviving spouses in married couples. Wives outlive their husbands more often than not, and the chance that the wife's assets will fall to low levels rises after the death of her husband. Sevak, Weir, and Willis (2003) use data from the early waves of the HRS to describe various ways in which a husband's death can raise financial challenges for his survivor; exploring these channels with more recent data would provide further insight on the late-life wealth trajectory. Similarly, understanding the consequences of low wealth late in life, and in particular whether the absence of a financial reserve affects an individual's consumption patterns, is an important issue for future work.

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