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Inequality in Comprehensive Wealth

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Abstract

We create an annualized measure of comprehensive household wealth using the 1998–2022 waves of the Health and Retirement Study and examine heterogeneity in retirement resources across households, cohorts, and time. We augment traditional net worth with the actuarial present values of expected future payment streams from labor-market earnings, Social Security, defined-benefit pensions, annuities, life insurance, and government transfers. We then calculate an annualized measure of that lump sum by converting it into an actuarially fair joint life annuity that we call annualized comprehensive wealth (ACW). We find that the median ACW increases throughout retirement, indicating that the median household is spending down its total resources more slowly than its joint life expectancy is shortening. In addition, we document considerable heterogeneity in the levels and trajectories of ACW across cohorts, education groups, and race. Notably, we find that the pattern of rising ACW is largely driven by college-educated and White households. Other groups show relatively flat or declining trajectories of ACW after retirement. We further explore the heterogeneity of ACW with the help of recentered influence function regressions. We show that inequality in ACW is associated with higher household-specific rates of return, higher education, and greater concentrations of single-headed and Black and Hispanic households.

Keywords: saving, wealth accumulation, cohort effects, retirement, inequality

JEL Classification: D14, J26, J11, D91, I24, J15, J14, E21

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1 Introduction

The past half century has seen a dramatic change in the way that households prepare for retirement. While earlier generations relied on a combination of Social Security, employer-based defined-benefit (DB) pensions, and personal saving, the rise of individual retirement accounts and 401(k)-type plans has made retirement security more dependent on household decisions about saving and asset allocation throughout their working lives, as well as movements in financial and housing markets. As a result, the Baby Boomers have arrived at retirement with a very different set of resources than their parents. In addition, the experiences of different households within these generations have varied systematically with education, earnings, and demographic characteristics. Moreover, as the composition of retirement wealth has changed, the trajectory of wealth after retirement has also evolved across and within cohorts.[1]

This paper uses a panel of households from the 1998–2022 waves of the Health and Retirement Study (HRS) to explore how these developments have affected households' ability to finance consumption after retirement.[2] We develop a broad measure of household wealth that includes the actuarial present values of expected future flows from labor-market earnings, Social Security, DB pensions, annuities, life insurance, and transfer payments. Following Love et al. (2009), we then convert these estimates of comprehensive wealth into annualized amounts by imagining that households were to purchase a fairly priced joint-life annuity with their total resources. This annualized measure, which we call annualized comprehensive wealth (ACW), is analogous to the classic measure of permanent income, and inherits the same connection to the life-cycle theory of consumption.

The most direct advantage of looking at annualized wealth, as opposed to total wealth, is that it allows us to more meaningfully compare the resources of households of different ages and sizes. Because we have a panel of households, our measure also provides a direct indicator of whether a household's ability to finance annual consumption is rising or falling as it ages. Conventional measures of net worth may decline as a household draws down resources in retirement, but this does not tell us whether the rate of drawdown is fast or slow relative to life expectancy. If our *annualized* measure is declining with age, however, it suggests that households are less able to

[1] Wolff (2025a) shows that these changes have led to a "seismic shift" in the age distribution of wealth. In particular, the Baby Boom generation experienced a rapid increase in wealth relative to other cohorts due to a combination of higher stock holding and home-ownership rates.

[2] The HRS is an ongoing biennial panel survey of U.S. households over age 50, sponsored by the National Institute on Aging (grant number NIA U01AG009740) and conducted by the University of Michigan. We provide more details on our use of the HRS below.

support the same level of consumption as they age. Conversely, if ACW is rising with age, it suggests that households are spending down resources more slowly than their life expectancies are shortening.

Our focus on differences across cohorts is made possible by the relatively long panel of household data in the HRS. Our panel includes retirement-age households from cohorts born from the start of the 20th century through the mid-1960s. The sample period also includes some tumultuous movements in financial and housing markets, including the dot-com crash in 2001, the Great Recession of 2008-2009, and the COVID pandemic starting in 2020. These rich data allow us to examine how the trajectory of retirement resources compares across and within generations, and to understand the differential impact of economic shocks on different cohorts and groups of households within cohorts.

Our paper makes three main contributions. First, relative to Love et al. (2009), which focused on the 1998–2006 waves of the HRS, we extend the length of the panel substantially, allowing us to trace the evolution of ACW across multiple cohorts and a time horizon that includes major economic events such as the Great Recession and the COVID pandemic. Second, we document several new facts about the level and the distribution of household resources in retirement. Like Love et al. (2009), we find that median ACW rises with age, indicating that the median household draws down wealth more slowly than its life expectancy is shortening, in contrast to what a simple life-cycle model would suggest.[3] We show that this pattern holds at the median for younger cohorts as well as older cohorts. However, we also show that the upward trajectories in ACW are driven by college-educated and White households, while other groups have flat or slightly declining trajectories of ACW with age. We also show that inequality in ACW increases as households age, which we attribute to differences in portfolio exposures and growing heterogeneity in bequest motives and out-of-pocket medical expenses. Looking across generations, we find that younger cohorts have arrived at retirement with greater average resources than their elders, especially in the form of financial wealth and expected labor earnings.

A third contribution is that we provide new evidence on the role of household-specific asset returns in shaping the distribution of resources in retirement. By estimating household-specific real rates of return on equities, fixed-income assets, and housing, we find that heterogeneity in returns is likely an important driver of cross-sectional inequality in ACW. Using recentered in-

[3]By "simple," we mean a life-cycle model without frictions in the housing market, precautionary motives in retirement, bequest motives, or uncertain longevity or medical expenses. A richer life-cycle model that includes these features can produce increasing annualized wealth profiles such as those we observe.

fluence function (RIF) regressions, we show that differences in household returns are strongly associated with increases in the Gini coefficient and the 90–10 ratio, and positively (though imprecisely) associated with other distributional measures, such as the top-10 percent share and the Theil index. We conclude that inequality in ACW is not only a function of differences in lifetime earnings, saving behavior, financial sophistication, life expectancy, and bequest motives, but also a function of how economy-wide fluctuations in asset returns differentially affect the portfolios of individual households.

In focusing on the inequality of retirement resources, we are building on a large body of research examining the determinants of wealth during the working life, as well as patterns of drawdown in retirement. For example, previous research has shown that life-cycle models that include transfer programs, health expenses, and precautionary motives have been successful at broadly matching the wealth distribution in the U.S. (Hubbard et al., 1994; Engen et al., 1999), while Scholz et al. (2006) showed that an augmented life cycle model can also predict wealth levels on a household-by-household basis.

Another strand of research has investigated the factors affecting the evolution of household resources after retirement, including bequest motives (Hurd, 1987; Dynan et al., 2002; Laitner, 2002) and the realization of key uncertain variables such as longevity, health, and out-of-pocket medical costs (Poterba et al., 2011; De Nardi et al., 2016; Palumbo, 1999; De Nardi et al., 2006; De Nardi et al., 2010a, 2025). Other key factors include the role of housing (Poterba et al., 2011, 2015) and the extent of annuitization (Inkmann et al., 2011; Lockwood, 2012; Peijnenburg et al., 2016). We find that these factors are also important for determining the level, trajectory, and heterogeneity of annualized comprehensive wealth after retirement.

Our focus on a more comprehensive measure of retirement wealth builds on a series of studies that have augmented traditional measures of net worth to include present values of Social Security and other annuitized streams of payments (Gustman et al., 1997; Gustman and Steinmeier, 1998; Weller and Wolff, 2005; Love et al., 2008, 2009; Poterba et al., 2011, 2015, 2018; Jacobs et al., 2020; Wolff, 2024; Llanes et al., 2025). These studies have documented the importance of Social Security to the wealth of most retired households, as well as the importance of the ongoing transition from traditional defined-benefit pensions to defined-contribution plans such as 401(k)s.

A related line of research studies the evolution of retirement wealth across cohorts and its distributional implications. Lusardi and Mitchell (2007) document the roles of planning and financial literacy for Baby Boomers' retirement security. Bosworth and Burke (2021) examine cohort-specific growth in retirement wealth using the HRS. And Kézdi et al. (2020), Sabelhaus and Volz (2022), and Bauluz and Meyer (2024) investigate the determinants of widening cohort inequality. Our paper contributes to this literature by analyzing cohort differences in annualized comprehensive wealth, both at the start of retirement and throughout the post-retirement period.

Finally, our analysis connects to an emerging literature on the role of household-specific asset returns in shaping inequality. Fagereng et al. (2019) find that heterogeneity in asset returns is large and persistent across households, and Kuhn et al. (2020) link differences in equity exposure to the rise of U.S. wealth inequality over a long sample period. Relatedly, Wolff (2025b) finds that wealthier households earn systematically higher returns on housing and other real estate, suggesting that returns may differ both because of different portfolio weights and because of different realized returns.[4] Methodologically, we draw on the recentered influence function (RIF) framework of Firpo et al. (2009), which has been used to study wage inequality (Lemieux, 2008; Dube, 2019), behavioral aspects of wealth inequality (Cobb-Clark et al., 2016), and, most recently, the impact of the COVID pandemic on income inequality (Angelov and Waldenström, 2023). We use the RIF approach to estimate the impact of household-level returns on several standard measures of inequality, including the Gini coefficient, the 90-10 ratio, the top 10-percent share, and the Theil index.

Taken as a whole, our results provide new evidence of the extent and determinants of inequality in retirement resources among U.S. households. We find stark differences in ACW by cohort, education group, and race, and find that these differences become more pronounced with age in retirement.

In the remainder of the paper, we describe in more detail our measure of annualized comprehensive wealth, investigate the age trajectories of annualized comprehensive wealth across demographic groups, and explore how various measures of inequality are related to household-level heterogeneity in asset returns.

2 Annualized comprehensive wealth in the HRS

We construct our measure of annualized comprehensive wealth using data from the 1998–2022 waves of the Health and Retirement Study (HRS). The HRS began in 1992 as a panel survey of about 12,500 households aged 51–61. In 1998, the HRS expanded to about 21,000 households, rep-

[4] Our analysis does not allow for differences on realized returns, conditional on portfolio shares, but this would be an interesting line of future research.

resenting all non-institutionalized U.S. households aged 51 and older. Since then, the HRS has re-interviewed these households every two years, and has refreshed the panel with new households aged 51–56 every six years (adding new households in 1998, 2004, 2010, 2016, and 2022).

For much of the analysis, we use the RAND HRS longitudinal file, which has consistent variable names across surveys and imputations for some income and wealth variables.[5] We supplement this with the RAND FAT files, which provide more information on pension plans, annuities, Social Security, and life insurance. We convert all dollar values into year-2022 dollars using the CPI-U.

Our unit of analysis is the household, which consists of a survey respondent and often a spouse or partner.[6] In some cases, respondents report that they do not know the exact value of some financial variables, such as account balances in 401(k)-type plans. In these cases, the HRS provides a series of unfolding bracket questions that allows the respondent to report that a balance is within a specified range. Where possible, we use the unfolding bracket structure to impute values.[7]

2.1 Comprehensive Wealth

We construct a measure we call *comprehensive wealth* (CW) as a broad measure of household resources. Comprehensive wealth starts with a conventional measure of net worth, which is the value of all financial assets (including defined-contribution pension plans) and nonfinancial assets such as housing and vehicles, less any debt. To make our measure more comprehensive, we then add in the actuarial present values of expected future payment streams from labor earnings, Social Security benefits, defined-benefit pensions, annuities, life insurance, and government transfer programs such as Supplemental Security Income and veterans benefits.[8]

[5]Specifically, we use the RAND HRS longitudinal file for some measures of assets, income, demographics, and expectations (including financial assets like stocks and bonds and non-financial assets like houses, vehicles, and businesses), government transfers, and wages, as well as household characteristic variables.

[6]The HRS interviews each person in the household, regardless of which individual was selected for the survey. Typically, one respondent is designated as the financial respondent, and we use their responses for household-level financial questions. For respondent-level financial questions, we use both respondents' answers, and then sum to the household level.

[7]Specifically, we use the unfolding brackets to impute missing values from the RAND FAT files, since variables from the longitudinal file have already been imputed as needed by RAND. To impute using the unfolding brackets, we draw randomly from the values within the range specified by the respondent. If the respondent specifies a range with no maximum value, we draw randomly from the distribution of non-missing values within the range specified by the respondent. We use regressions to impute values for expected Social Security in 1998 and 2000, because unfolding bracket questions were not asked in those years.

[8]This approach follows previous studies that have included in wealth the expected present values of future payments, including Gustman et al. (1997), Gustman and Steinmeier (1998), Gustman and Steinmeier (2000), Gustman et al. (2010), Jacobs et al. (2020), Llanes et al. (2025), Love et al. (2008), Love et al. (2009), Poterba et al. (2011), Weller and Wolff (2005), and Wolff (2024).

To do this in a standardized way, we make a number of assumptions. For households with a working respondent or spouse under age 65, we include the present value of their current self-reported labor earnings, projected through age 65.[9] For households reporting current or expected Social Security benefits, we use the self-reported benefit amount, top-coded at the maximum amount reported by the Social Security Administration.[10] For households reporting life insurance policies that list the spouse as a beneficiary, we include the actuarial expected value of such policies. For households reporting one or more DB pension plan, we include the present value of all payments from such plans.[11]

The details of the computation of actuarial present values depend on the structure of each payment (e.g., when it begins, how long it lasts, whether it is contingent on states of the world, whether it includes spousal benefits or cost-of-living adjustments). But in general, the calculation is a function of the amount of each payment, the household members' survival probabilities, and discount rates.

As an illustration, consider the calculation for a two-person household with a respondent aged a_h and a spouse aged a_s. For the purposes of the calculation, we assume no one will survive beyond age 119.[12] Then the maximum number of periods of receipt of a flow of future payments to the household will be $T \equiv 119 - \min\{a_h, a_s\}$. We use $p_{h,t}$ to denote the probability that the respondent (or head) is alive at age a_h+t, conditional on being alive at a_h, and $p_{s,t}$ to denote the probability that the spouse is alive at age a_s+t, conditional on being alive at a_s.[13]

For a future date t years ahead, the household can be in one of three states: both members are alive (which we denote as state B), only the head is alive (state H), or only the spouse is alive (state S). We use $X_{B,t}, X_{H,t}$, and $X_{S,t}$ to denote the payment to the household at time t in each

[9] Of course, retirement ages are endogenously determined by households, but this method provides a standardized way to compare the human capital of different working households.

[10] To do this, we use the "Benefit Examples For Workers With Maximum-Taxable Earnings" available at www.ssa.gov/oact/cola/examplemax.html.

[11] Prior to 2012, the HRS asked about DB and DC pension plans separately. Beginning in 2012, the HRS asked about all of a respondent's pension plans together. While the HRS did ask respondents to classify each plan as DB or DC, we use the values reported for specific questions to indicate the plan type. In particular, we categorize as DC plans any plan for which the respondent provides a plausible numerical value in response to the question "How much is in the plan account now?". We categorize as a DB plan any plan for which the respondent provides a plausible value for "How much are the payments per month or year?." If respondents report plausible values for both questions, we use the self-reported plan type and the survey's internal plan-consistency variable to classify the plan. Because we could substantially over-estimate wealth if we misclassified a DC plan as DB, we err on the side of caution by only classifying a plan as DB if the type and consistency questions are in agreement that a plan is DB; otherwise we classify it as DC.

[12] As described below, we will apply survival probabilities from the Social Security life tables, so we are not assuming that everyone will live to age 119, only that no one could live longer than that.

[13] We construct these survival probabilities based on the Social Security 2013 period actuarial life table, as reported in the 2016 Trustees Report.

state. (These payments can depend on the state, for example, through spousal benefits.) Given a constant discount rate r (nominal or real, depending on the nature of the payment),[14] we compute the actuarial present value as:

$$PV = \sum_{t=0}^{T} \frac{X_{B,t}\, p_{h,t} p_{s,t} + X_{H,t}\, p_{h,t}(1-p_{s,t}) + X_{S,t}\, p_{s,t}(1-p_{h,t})}{(1+r)^t}. \tag{1}$$

The present value formula in (1) can accommodate different types of payments. For Social Security, as an example, when both members are alive, benefits $X_{B,t}$ are the sum of the two benefits, including any spousal benefits (individuals can receive the maximum of their own benefits and 50% of their spouse's benefit). After the death of a spouse, the survivor receives the maximum of their two individual benefits. As another example, consider a DB pension benefit amount B that includes a survivor benefit equal to κB. In this case, $X_{B,t} = B$, $X_{H,t} = B$, $X_{S,t} = \kappa B$. As a final example, we can compute the present value of remaining wage income for a household in which one member is working and under 65 and the other is not. In this case, for example, $X_{B,t} = X_{H,t} = w(1+g)^{t-1}$ until retirement, and $X_{S,t} = 0$, where w is the current labor income amount, and g is the assumed real growth rate in wages.[15]

We use this method to compute the present values of all future payments expected for each household.[16] For each household, we define comprehensive wealth as the sum of the present values of all expected future payment streams and the values of conventional financial and non-financial assets.

Table 1 presents summary statistics characterizing comprehensive wealth for our full sample (about 168,000 observations, pooling all panel years 1998–2022), with the components ranked in descending order by their contribution to average comprehensive wealth. The first column reports the share of households with non-zero values of each component (for example, 93% of household report current or expected Social Security benefits,[17] while only 16% report current transfer payments such as Supplemental Security Income).

Pooling across all panel years, we find an average comprehensive wealth of about $1.65 million (in 2022 dollars). The largest components are non-financial wealth (e.g., housing), making up 23

[14] We set inflation to be 2 percent each year, and we set the nominal interest rate to be 4.5 percent each year.

[15] We assume a real wage growth rate of 1%, which is broadly consistent with long-run estimates of real earnings growth. Using BLS data on average hourly earnings and the CPI-U, we find that real wages grew at about 0.7% per year over 1998–2022.

[16] We base the expectation on each household's current state; e.g., we project forward earnings and transfer payments for households currently receiving those, but we do not model the probability of a household beginning to receive such payments if they do not currently do so.

[17] Typically the households not expecting Social Security benefits are state and local government employees.

Table 1: Components of Comprehensive Wealth

Component	% positive	Average (thous 2022 $)	% of Avg	Avg at ptiles of CW 25th	50th	75th
				(thous 2022 $)		
Non-financial	90	382	23	94	225	403
PV Social Security	93	344	21	217	343	466
PV Earnings	49	296	18	48	148	420
Retirement accounts	56	233	14	15	91	293
Financial	71	185	11	21	80	192
PV DB pensions	36	150	9	23	83	218
PV Annuities & life insurance	34	46	3	4	21	53
PV Transfer payments	16	22	1	17	26	28
Comprehensive wealth	100	1658	100	439	1018	2072
Observations						162,003

Notes: The table reports summary statistics for the components of comprehensive wealth, using the HRS household weights. Data come from the 1998–2022 waves of the HRS. The final three columns of the table report the means of each component for households within two percentage points of the 25th, 50th, and 75th percentiles of comprehensive wealth.

percent of average comprehensive wealth, the value of future Social Security benefits, making up 21 percent, and the value of future earnings through age 65, making up 18 percent.

To show how comprehensive wealth and its components vary across the distribution, we report the components of average comprehensive wealth within two-percentage-point bands around the 25th, 50th, and 75th percentiles of comprehensive wealth.[18] We find substantial heterogeneity, with a median comprehensive wealth of about $1 million, significantly less than the average of $1.65 million. We also find that the 75th percentile of comprehensive wealth ($2.1 million) is 4.7 times larger than the 25th percentile ($436,000). At the 25th percentile, Social Security is by far the dominant component of comprehensive wealth, making up about half of the total. At the 75th percentile, by contrast, Social Security makes up less than a quarter of the total, though it is still the largest single component. These results illustrate how important Social Security is to most US households, and especially those lower in the wealth distribution. They also indicate how much Social Security helps to reduce wealth inequality—without it, the ratio of comprehensive wealth at the 75th percentile to its value at the 25th percentile would rise from 4.7 to 7.3.[19]

The results also underscore the contribution to inequality of the transition from traditional DB pensions to retirement accounts. The 75-25 ratio of the average retirement account is about 19.5,

[18] We use this approach to take advantage of the fact that the average of the components will add up to the average of the total within each band.

[19] This is just an illustrative calculation, not taking into account the general-equilibrium effects of removing Social Security on household savings behavior.

while for DB pension wealth the ratio is 9.8. While these ratios reflect variation along both the intensive margin (account balances or benefit levels) and the extensive margin (participation), the results suggest that the shift from DB plans to retirement accounts is associated with increasing wealth inequality over time.

2.2 Annualized Comprehensive Wealth

To facilitate the comparison of comprehensive wealth across households of different ages and sizes, we convert the values of comprehensive wealth into an expected lifetime-annual equivalent by imagining that a household were to use the entire value of CW to purchase an actuarially fair joint-life annuity with survivor's benefits. This measure, which we call *annualized comprehensive wealth* (ACW), illustrates how much consumption could be financed annually for the rest of the household's expected lifetime.

For this calculation, we assume that the price of such an annuity is given by:

$$P = \sum_{t=0}^{T} \frac{\phi\, p_{h,t} p_{s,t} + p_{h,t}(1 - p_{s,t}) + p_{s,t}(1 - p_{h,t})}{(1+r)^t}, \tag{2}$$

where $p_{h,t}$ and $p_{s,t}$ are defined as before as the age-dependent t-period-ahead survival probabilities of the head and spouse, r is the real interest rate, and ϕ is a household economy of scale parameter.[20] Intuitively, the price of the annuity can be thought of as the actuarial present value of receiving the equivalent of 1 unit of resources per household member for the rest of life. With a price of P for each unit of the annuity, we can convert comprehensive wealth into an annualized equivalent by dividing by the annuity price:

$$ACW = \frac{CW}{P}. \tag{3}$$

The main advantage of looking at annualized comprehensive wealth, as opposed to comprehensive wealth or conventional measures of net worth, is that it expresses total household resources in a way that accounts for differences in household composition and expected longevity. In the same way that permanent income provides a measure of sustainable consumption, annualized comprehensive wealth offers a way to think about the sustainable annual use of total available household resources during retirement (e.g., for consumption or bequests).

[20] In practice, we set $\phi = 1.67$, which is consistent with typical values of household equivalence scales (see Buhmann et al. (1988) and Deaton and Paxson (1998)).

A caveat about the measure is that, if taken literally, it implicitly assumes that all sources of wealth are fungible and liquid. Households with a large share of their wealth held in housing, for example, may not be able to convert that wealth into regular annual consumption, given imperfections in reverse mortgage markets that limit the ability to extract home equity at actuarially fair prices. Similarly, households are generally unable to borrow against the future values of Social Security benefits, annuities, or transfer payments. Nevertheless, annualized comprehensive wealth provides a useful conceptual basis for comparing the level of retirement resources across cohorts and demographic groups, and for examining how these resources evolve over time.

Table 2 presents summary statistics of annualized comprehensive wealth for our full sample (pooling all panel years), with the components ranked by their contribution to average ACW.

Table 2: Components of Annualized Comprehensive Wealth

Component	% positive	Average (thous 2022 $)	% of Avg	Avg at ptiles of ACW 25th (thous 2022 $)	50th	75th
Non-financial	90	25	26	6	14	26
PV Social Security	93	19	20	17	21	23
PV Earnings	49	13	14	4	11	19
Retirement accounts	56	13	14	1	5	17
Financial	71	14	14	1	4	12
PV DB pensions	36	9	9	1	5	14
PV Annuities & life insurance	34	3	3	0	1	2
PV Transfer payments	16	1	1	1	2	1
Annualized Comp. Wealth (ACW)	100	97	100	32	62	114
Observations						162,003

Notes: The table reports summary statistics for the components of annualized comprehensive wealth, using the HRS household weights. Data come from the 1998–2022 waves of the HRS. The final three columns of the table report the means of each component for households within two percentage points of the 25th, 50th, and 75th percentiles of annualized comprehensive wealth.

Pooling across panel years, we find an average ACW of about $96,000 (in 2022 dollars), meaning that on average, households in the sample have the resources to finance about that much consumption per year for the rest of their lives. The median value of ACW is significantly less, at about $62,000, and the 25th percentile is about $32,000, with more than half of that coming from Social Security. Notably, at the median ACW, Social Security contributes about a third of the total, while retirement accounts contribute about 8 percent, indicating that, in this sample, retirement accounts do not account for a major portion of retirement resources for the median household.[21]

[21] The two are a little closer at the 75th percentile of ACW, with Social Security accounting for about 20 percent and retirement accounts accounting for about 15 percent.

3 The trajectory of annualized comprehensive wealth

A key advantage of a panel such as the HRS is that we can use the data to study how household wealth evolves as households age through retirement, which we call the trajectory of household wealth. The length of the panel, spanning 1998 to 2022, allows us to distinguish cohort effects and age effects by, for example, comparing wealth across different cohorts when they are at the same age.

3.1 ACW by age and cohort

We begin by looking at cohort differences in average ACW and its components around the start of retirement. Figure 1 shows the level and composition of average ACW for households aged 61–70 across three different cohorts: the Silent and Older generation (born 1945 and earlier), the early Baby Boomers (born 1946–1954), and the late Baby Boomers (born 1955–1964).[22] For this figure, we select households aged 61-70 to illustrate resources available relatively early in retirement, and for now we focus on the mean (rather than median) to show how the components add up to the total.

The figure illustrates a number of findings about our measure of ACW. First, for all three cohorts, the average household can finance between $75,000 and $100,000 of consumption per year (in 2022 dollars) over their expected lifetimes.[23] Looking across cohorts, we see that younger cohorts are arriving at retirement with more resources, on average, than their elders. And looking at the components of wealth for the youngest vs. oldest cohorts, we see a shift from annuitized wealth to financial wealth, likely reflecting in part the shift from defined-benefit to defined-contribution pension plans. We also see a growing share of wealth from earnings, likely indicating a higher labor-market attachment for younger cohorts.[24]

While Figure 1 focuses on early retirees (aged 61-70), Figure 2 expands the analysis to include all of our observed age ranges. For all three cohorts, we see that average ACW generally rises with age throughout retirement, a pattern consistent with Love et al. (2009). Looking at the components, we see that expected earnings make up a substantial share of ACW among the youngest

[22] These cohort definitions are based on those used by the Pew Research Center (2019). Given their relative sizes, for this analysis we combine the Silent Generation (1928–1945) and the Greatest Generation (before 1928), and we split the Baby Boom generation (born 1946–1964) into two groups.

[23] As shown in Table 2, average ACW across the full sample is $96,000, with the median significantly less at $62,000.

[24] Recall that this measure includes expected future earnings up to age 65 for households with current earnings, and is set to zero for respondents under age 65 without earnings and for all respondents over age 65.

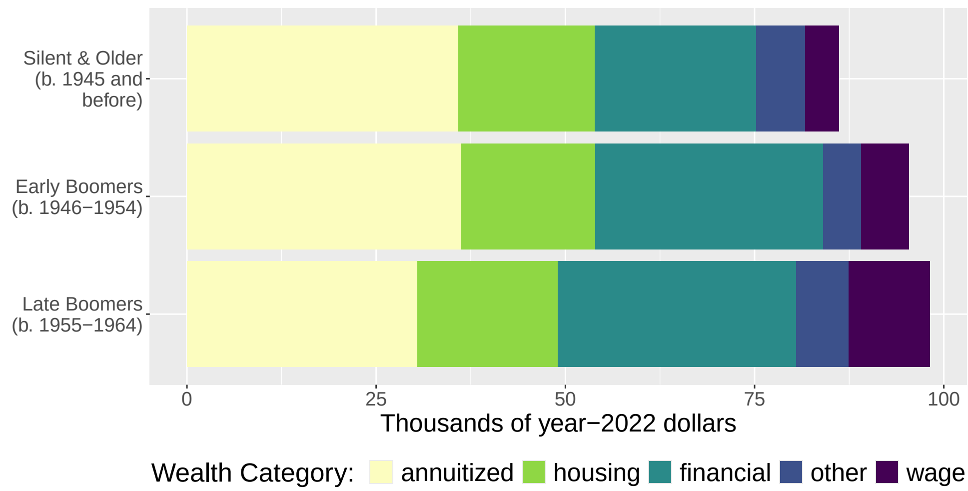

Figure 1: Average annualized comprehensive wealth (ACW) at age 61-70, by cohort

Notes: Annuitized wealth includes DB pensions, Social Security, annuities, and transfers. Retirement accounts are included in financial wealth. ”Other” includes life insurance, vehicles, and businesses. ”Wage” is the PV of expected earnings through age 65. Data come from the 1998–2022 waves of the HRS.

age ranges, falling off sharply (by construction) after age 65. But as the earnings component declines rapidly, overall ACW continues to increase due to the growth of the housing and financial wealth components. This pattern of rising ACW with age indicates that, on average, households are spending down their resources more slowly than their life expectancy is shortening. From the perspective of a life-cycle model, this would be most consistent with a model accounting for precautionary behavior in the context of uncertain lifetimes or medical expenses (Palumbo, 1999; Poterba et al., 2011; De Nardi et al., 2016), or bequest motives (Dynan et al., 2002; Laitner, 2002).

3.2 ACW by education and race

Figure 3 shows how ACW for households in early retirement (age 61–70) varies by education and race/ethnicity. For each race/ethnicity group (Hispanic, Non-Hispanic, Black, and White), the panels show the components of average ACW for three mutually exclusive education groups: those without a high school degree, high school graduates, and college graduates.[25] There is a very steep ACW gradient by education, across all the race and ethnicity groups. Households with less than a high school degree have less than a third as much ACW as college graduates, and high school graduates have about half as much. This illustrates the very important role of

[25]The race and ethnicity groups are defined by the self-reported race and ethnicity of the household head. The ”Hispanic” and ”Not Hispanic” categories can include households of any race. Thus, the four race/ethnicity categories shown in Figure 3 are not mutually exclusive.

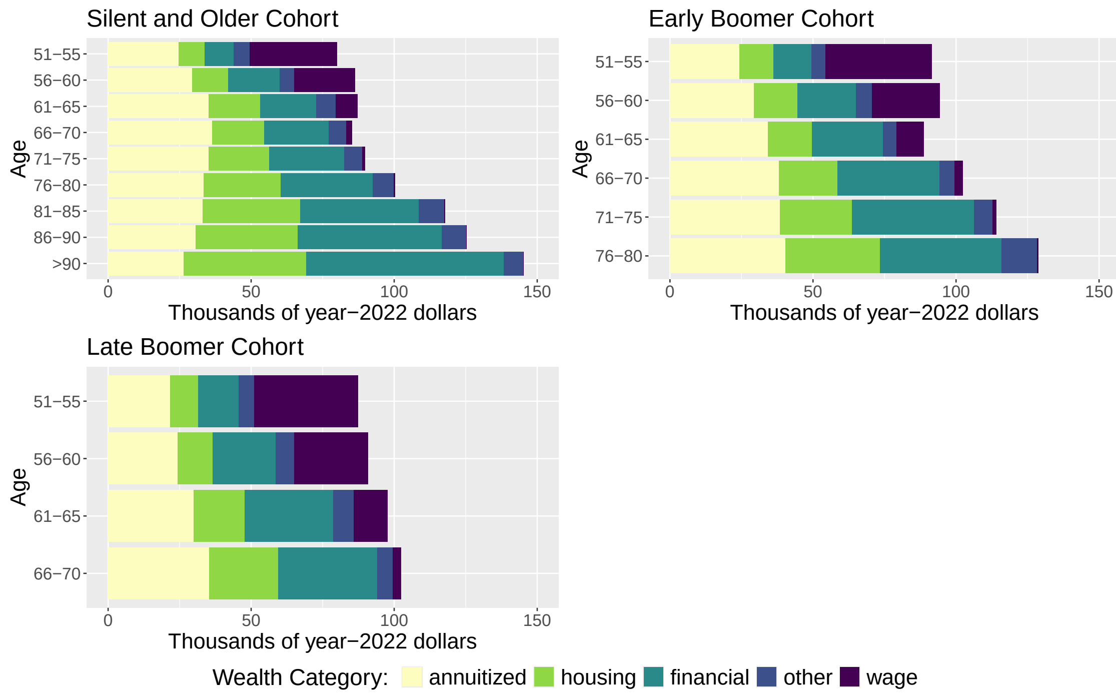

Figure 2: Average annualized comprehensive wealth (ACW) by age and cohort

Notes: Annuitized wealth includes DB pensions, Social Security, annuities, and transfers. Retirement accounts are included in financial wealth. "Other" includes life insurance, vehicles, and businesses. "Wage" is the PV of expected earnings through age 65. Data come from the 1998–2022 waves of the HRS.

education in determining lifetime earnings, as well as financial literacy, survival expectations, and intergenerational transfers via bequests. Looking at the components, we see that annuitized wealth (which includes Social Security) makes up the bulk of ACW for households without a high-school degree, while housing and financial wealth make up the bulk of ACW for college-educated households.

The differences across race and ethnicity groups are also stark. Households with heads identifying as Black or Hispanic hold between half and three-quarters the annual resources of those headed by heads identifying as White or non-Hispanic. For example, college-educated Black households have average ACW of around $80,000 per year, while college-educated White households have over $150,000. These differences in the average levels of ACW by race and ethnicity reflect different earnings experiences, homeownership rates, retirement plan participation, and intergenerational wealth transfers (Bhutta et al., 2020). Looking at the components, we see that White households have substantially higher financial wealth than Black households. Regardless of the cause, the ACW levels in the figure indicate that retirement preparation varies greatly by

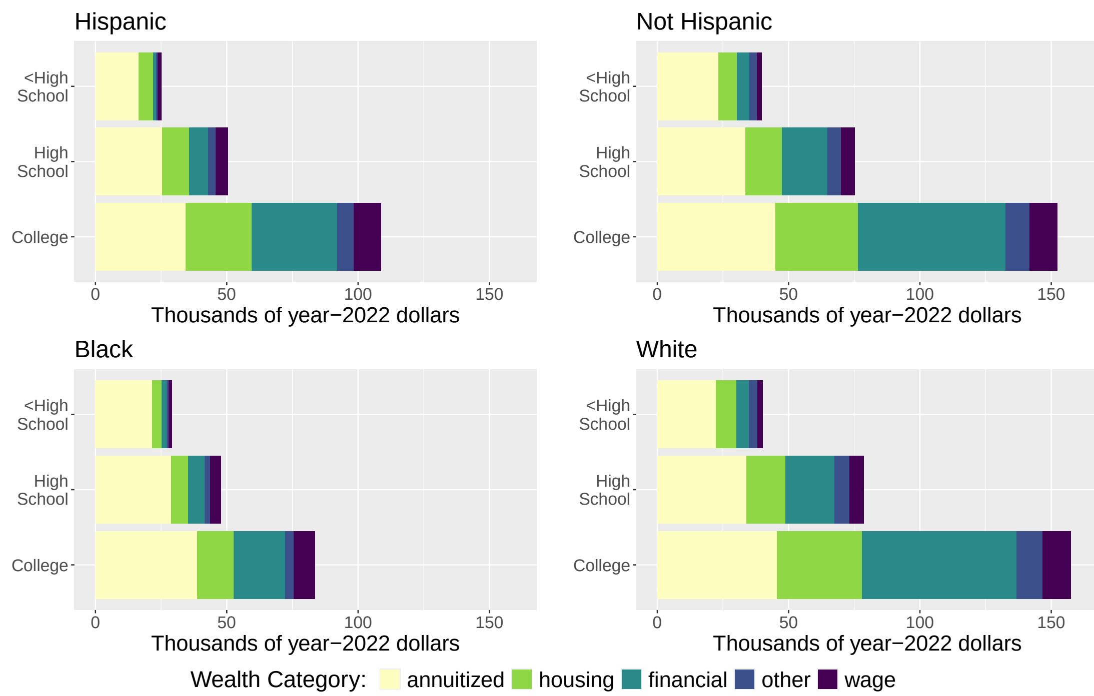

Figure 3: Average annualized comprehensive wealth (ACW) by education and race/ethnicity

Notes: Race/ethnicity groups are not mutually exclusive. Annuitized wealth includes DB pensions, Social Security, annuities, and transfers. Retirement accounts are included in financial wealth. "Other" includes life insurance, vehicles, and businesses. "Wage" is the PV of expected earnings through age 65. Data come from the 1998–2022 waves of the HRS.

both education and race/ethnicity.[26]

3.3 The Trajectory of Median ACW

We have focused on average levels of ACW in order to examine how the components add to the total. But as noted, average values are significantly larger than median values, due to skewness in both the lifetime earnings distribution and the wealth distribution. Thus the typical household experience may be better captured by comparing the median levels of ACW.

Figure 4 illustrates the trajectories of median ACW by age for the three different cohorts. All three cohorts show declining median ACW at younger ages, followed by rising ACW at higher ages. But note that while the chart controls for cohort effects by showing three separate lines, each line is still a combination of age effects and year effects. In other words, these patterns are driven by both the dynamics of household aging ("age effects") and other time-varying effects such as changing returns to housing and equity markets ("year effects"). This is particularly important in this sample due to the financial crisis and economic downturn after 2008 that significantly reduced the market values of housing and equity, mechanically reducing ACW at whatever age a household is when those market corrections occurred.

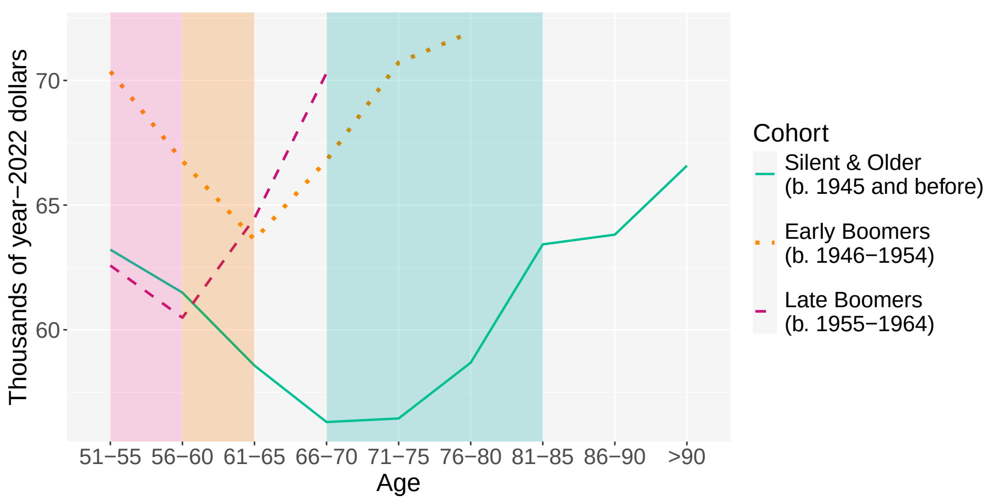

Figure 4: Median annualized comprehensive wealth (ACW) by age and cohort

Notes: The figure shows median ACW by five-year age bucket for the Silent and older generation, Early Boomers, and Late Boomers. The recession bands indicate the age buckets covering the 25th to 75th percentiles of age for each cohort during the years 2008-2012. Data come from the 1998–2022 waves of the HRS.

[26]Note that our present-value calculations and annualizing factors use Social Security life tables that do not account for differential mortality by education or race. Accounting for higher mortality rates among less educated groups, Blacks, and Hispanics (Brown, 2000) would affect the differences shown in this figure.

We will control for these effects more formally later in the paper, but for the purposes of this figure, we simply indicate the approximate age range each cohort was in during the Great Recession. To do this, we highlight color-coded recession bands indicating, for each cohort, which age ranges were covered by the years 2008–2012.[27] We see that the younger two cohorts experience falling ACW concurrently with the Great Recession, which is not surprising. But we also see that the oldest cohort experiences falling ACW from ages 51–70 even before the Great Recession, and that ACW rises for this cohort during the Great Recession, likely due to less exposure to housing and financial markets.

To explore this further, we also examine the trajectories of ACW by year, shown in Figure 5. This figure shows the differences across cohorts in how each experienced the Great Recession. The Silent and Older generation was aged 63 and above during the years 2008–2012, while the Early Boomers were 54–66 and the Late Boomers were 51–57. We see that the two younger cohorts experienced fairly substantial drops in ACW during the Great Recession years, with the Early Boomers subsequently recovering much of the loss and the Late Boomers only partially recovering. The Silent and Older generation, in contrast, experienced a quite modest drop in ACW during the recession years, followed by a steep increase, consistent with the fairly rapid rise in ACW shown at later ages in Figure 2.

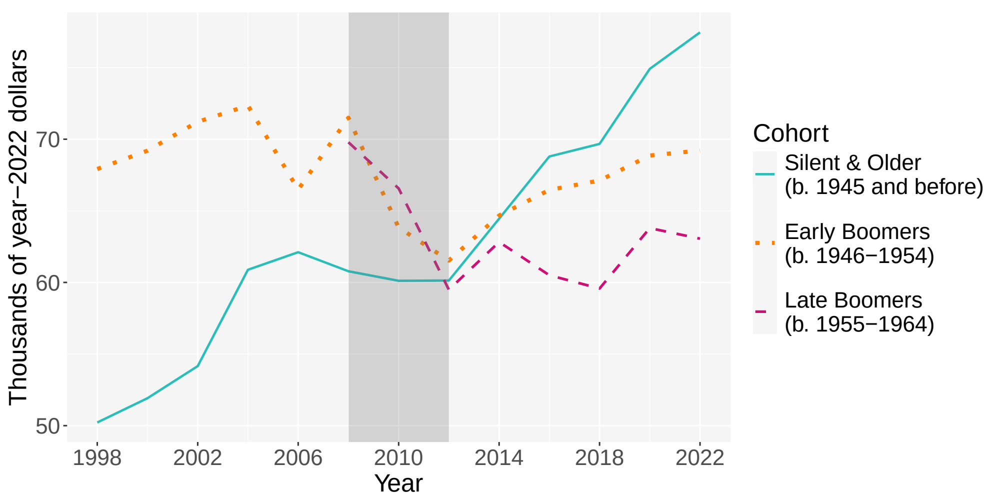

Figure 5: Median annualized comprehensive wealth (ACW) by age and cohort

Notes: The figure shows median ACW by year for the Silent and older generation, Early Boomers, and Late Boomers. The recession band indicates the years 2008-2012. Data come from the 1998–2022 waves of the HRS.

The trajectory of ACW also varies by wealth. Figure 6 displays the median levels of ACW

[27] Because there is a distribution of ages for each year, each recession band covers the 25th to 75th percentile of ages.

for three wealth brackets: the top 10% of the distribution, the middle 40%, and the bottom 10%. Median ACW rises dramatically with age for the top wealth bracket, particularly at the oldest ages, indicating that comprehensive wealth for this group becomes increasingly large relative to remaining life expectancy. The age profile for the middle 40% is much flatter but still upward sloping at the oldest ages, while the profile for the bottom 10% of ACW is essentially flat at a low level. We do not see much difference across cohorts.

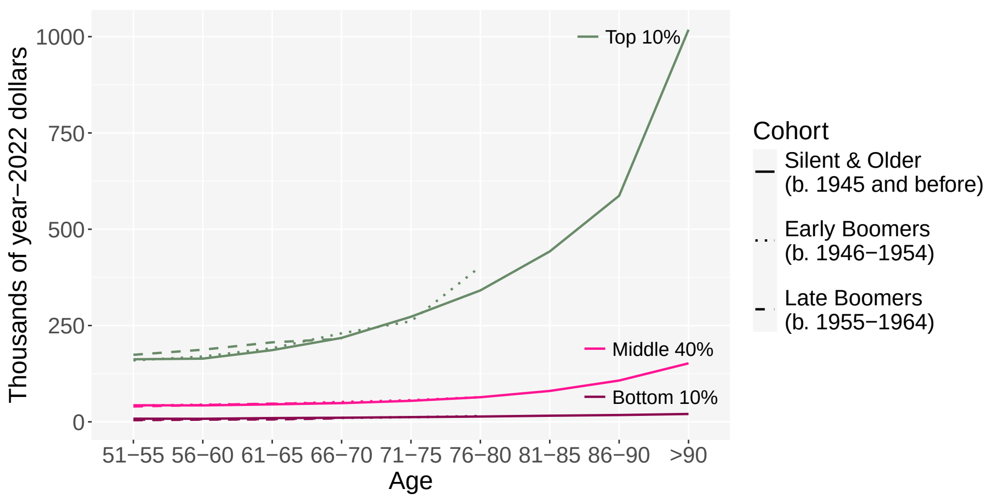

Figure 6: Median ACW by cohort and wealth bracket.

Notes: The figure plots median ACW by age for the Silent & Older generation, Early Boomers, and Late Boomers, disaggregated by wealth bracket. Data come from the 1998–2022 waves of the HRS.

Next we look at how the age trajectories of median ACW vary by education and cohort. Figure 7 shows that there are large differences in the levels of median ACW by education group across all cohorts. Median ACW for households with a college degree is over $100,000 and generally rises with age in retirement. By contrast, it is about $60,000 for households with a high-school degree and $25,000 for those without a high-school degree, with both of these groups showing less of an upward trajectory with age.

Looking across cohorts, we see that the trajectories of median ACW are largely similar, except that college graduates in the Early Boomer cohort (born 1946–1954) saw their ACW begin to rise at a younger age than the Silent and Older generation (born before 1946). While there could be a variety of explanations for the gap, it may be partially due to the rise in the college wage premium after 1980 (Goldin and Katz, 2007), which would have increased the lifetime earnings of the more recent generations of college graduates, as well as generally favorable returns in equity and housing markets for this cohort.

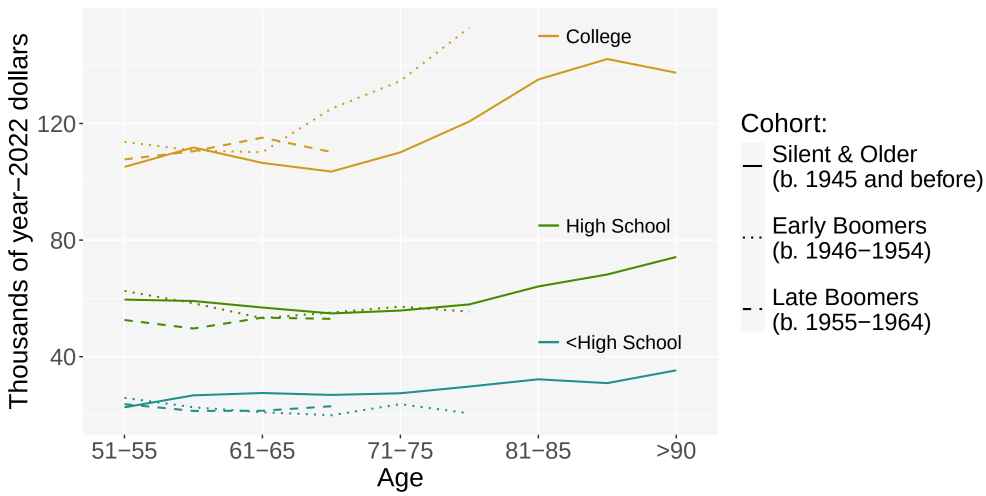

Figure 7: Median ACW by cohort and education

Notes: The figure plots median ACW by five-year age bucket for the Silent & Older generation, Early Boomers, and Late Boomers, disaggregated by education group.

Figure 8 shows how these age trajectories vary by cohort across race and ethnicity groups. Again we see that the level differences in ACW are substantial, with Black households holding significantly less ACW than White households across retirement ages. Further, these gaps do not diminish with more recent cohorts; if anything, they appear to be larger for younger cohorts, with White and non-Hispanic households showing a much faster rise in ACW. In addition, the age trajectories of median ACW also differ by race and ethnicity, particularly at older ages. While median ACW for White households increases after age 70, it falls notably for Black and Hispanic members of the Silent and Older generation (though not for the Early Boomers). This shows that the rising trajectory of annual retirement resources that we observed at the median is not shared across all groups. Again, however, note that these profiles reflect both cohort and age effects. The oldest households in our sample accumulated wealth in a different environment than members of younger generations. As a result, these age trajectories reflect both the accumulation patterns of aging households within a given cohort, as well as differences across cohorts.

3.4 Returns

The levels and trajectories of annualized comprehensive wealth reflect both active saving/spending decisions and household-specific realizations of returns on financial wealth and housing. Households that hold greater concentrations of housing and financial assets tend to show larger growth in wealth over time, though of course they are also more exposed to market corrections. And

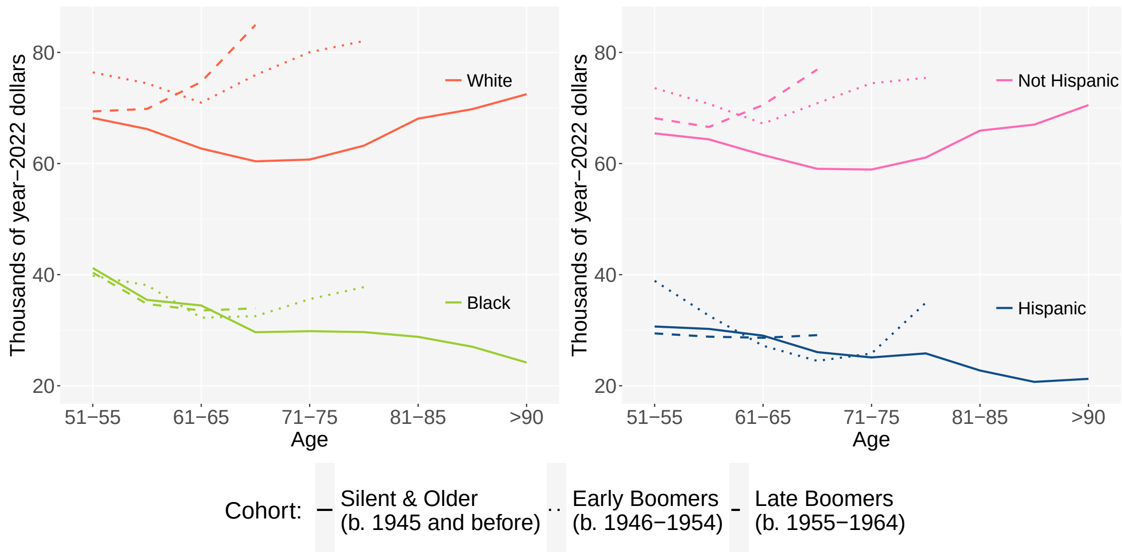

Figure 8: Median ACW by cohort and race and ethnicity

Notes: The figure plots median ACW by age bucket for the Silent & Older generation, Early Boomers, and Late Boomers, disaggregated by race and ethnicity (Black and White; Hispanic and Not Hispanic). Data come from the 1998–2022 waves of the HRS.

importantly, households who participate less in financial markets, or who hold relatively little housing wealth, will not see large changes in annualized wealth in response to either increases or decreases in asset prices.

In order to examine the role of asset returns in shaping patterns of annualized wealth, we construct household-specific estimates of real rates of return on assets. For simplicity, we focus on equities, fixed-income assets, and housing wealth. Let $\alpha^i_{j,t}$ denote household i's share of asset j as a fraction of comprehensive wealth (equivalently, annualized comprehensive wealth) in period t. Letting $r_{j,t}$ denote the real return on asset j in period t, we can write the household-specific return, r^i_t as:

$$r^i_t = \sum_{j=1}^{n} \alpha^i_{j,t} r_{j,t}. \tag{4}$$

That is, the household-specific rate of return is a weighted sum of the returns on the household's assets, where the weights correspond to the portfolio shares.

To compute household-level estimates of rates of return, we apply data on real returns on equities (using the S&P 500), corporate bonds (Moody's Baa corporate bond yield), Treasuries (10-year), and housing (Case-Shiller) to each HRS household's portfolio.[28] We calculate two-year real

[28]We use the estimates available on Aswath Damodaran's website: `https://pages.stern.nyu.edu/~adamodar/New_Home_Page/home.htm`.

returns for each asset type, then construct the household-specific returns according to the equation above. To implement this with the data available in the HRS, we compute the equity share for a household as the sum of directly held equities, equities held in mutual funds, and equities held in retirement accounts, divided by comprehensive wealth.[29] For fixed-income assets, we sum directly held bonds and fixed-income assets held in retirement accounts, and divide by comprehensive wealth.[30] Finally, we define the housing share of wealth as home equity (the market value of the home less mortgage debt), divided by comprehensive wealth.

Figure 9 shows how the average household rates of return differ across the distribution of annualized comprehensive wealth in our sample. In general, we see that market movements lead to different average rates of return across households, reflecting differences in portfolio composition.[31] Households with higher ACW tend to hold more financial wealth, increasing the importance of financial market fluctuations (including the dot-com bust in 2000, the Global Financial Crisis in 2008, and the Covid pandemic). Households with lower ACW were less exposed to financial markets, though they still experienced declines during the financial crisis due to the relative importance of housing in their portfolios. Overall, the fluctuations in average returns both across groups, and within groups over time, suggest that household-level asset returns play an important role in shaping the evolution of inequality in ACW.

Figure 10 shows how household-specific returns differ by the education of the household head. Prior to the Global Financial Crisis, the average returns across education groups moved fairly closely together (though with higher volatility for college educated households, due to more financial wealth). Following the Financial Crisis, there is a much wider gap in household-level returns by education group, with higher education groups earning substantially higher returns from 2010 to 2020. The divergence reflects the higher exposure to equity markets within higher education groups, which translated into large differences in average returns in the wake of the long run-up in equities following the Financial Crisis.

We also look at differences in average household returns by race and ethnicity. Returns across race and ethnicity groups move fairly closely together before 2008, after which the household returns for White households begin to outpace those for the other groups. This again reflects

[29] While the HRS asks about the percent of IRAs held in stocks, it does not include questions about the equity share of DC plans. For this calculation, we assume that 65% of retirement account balances are invested in U.S. equities. According to EBRI Brief No. 606, about 71% of 401(k) assets are invested in equities (Copeland and Bass, 2024). Since the equity allocation in IRAs is closer to 55% (Investment Company Institute, 2024), we choose the intermediate value of 65% of retirement assets for this calculation.

[30] For this calculation, we assume that bonds are composed of 50% 10-year Treasuries and 50% Baa corporate bonds.

[31] Appendix figure 18 shows the ACW portfolio compositions by wealth bracket, education, and race/ethnicity.

Figure 9: Household returns by ACW group

Notes: The figure depicts the average real household return for each survey year in the 1998–2022 waves of the HRS for the bottom 10 percent of households, the middle 40–60 percent, the top 10 percent, and the sample as a whole.

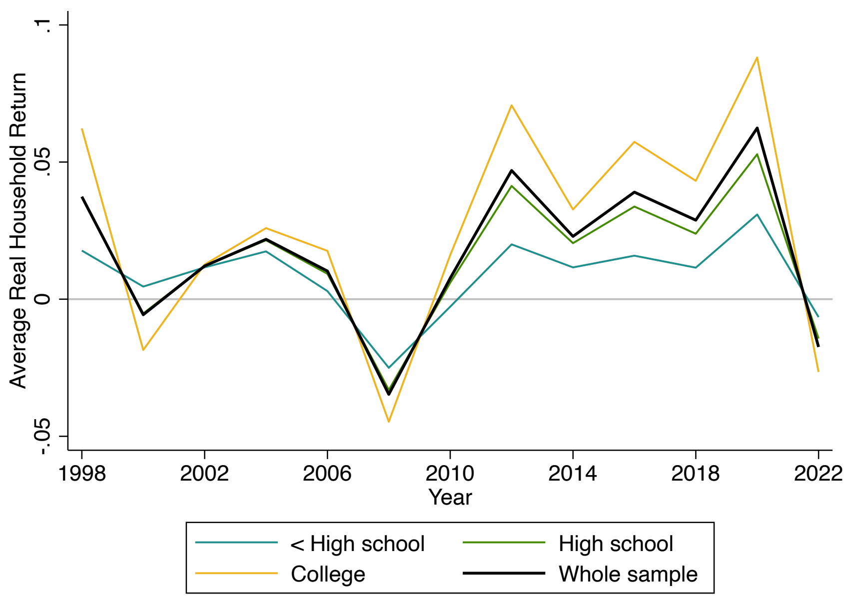

Figure 10: Household returns by education

Notes: The figure depicts the average real household return for each survey year in the 1998–2022 waves of the HRS for households whose heads had less than a high school degree, a high school degree, a college degree, and for the sample as a whole.

differences in equity exposure by race and ethnicity. In the wake of the Global Financial Crisis, non-White and less well-educated households disproportionately exited the stock market (Zhou, 2020), which meant that these households missed the historic increase in asset prices in the following decade.

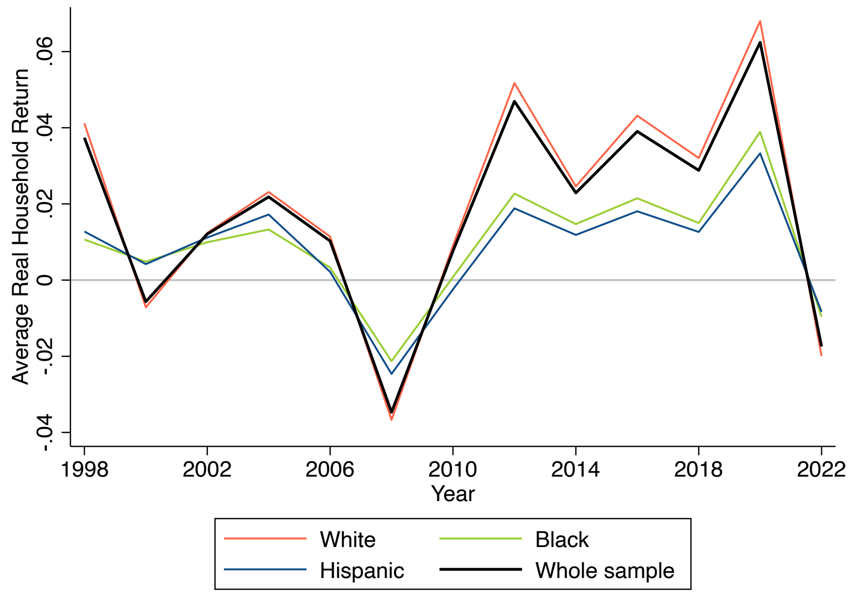

Figure 11: Household returns by race

Notes: The figure depicts the average real household return for each survey year in the 1998–2022 waves of the HRS for households with White, Hispanic, and Black household heads.

3.5 Regression-based ACW profiles

As described above, for the sample as a whole, ACW appears to increase with age throughout retirement, indicating that the median household is spending down its total wealth more slowly than its life expectancy would suggest. The life cycle model provides a number of reasons why we might expect such a trajectory. Bequest motives (De Nardi, 2004; Hurd, 1989) and uncertain longevity, combined with imperfect annuity markets, provide an incentive to self-insure against the risk of outliving one's resources (Davidoff et al., 2005; Yaari, 1965). In addition, imperfect reverse mortgage markets mean that some families will hold on to their homes until they either need to move into assisted living facilities or downsize (Nakajima and Telyukova, 2020; Venti and Wise, 2004). Finally, uncertain out-of-pocket medical expenses, which tend to rise with age, may cause households to build up a precautionary buffer of resources (Palumbo, 1999; De Nardi et al., 2010b). These considerations naturally raise the question of how much of the observed age pattern in ACW reflects differences in observable life-cycle characteristics.

We explore this question using two complementary approaches. First, we estimate quantile fixed-effects regressions that allow us to construct age profiles of median ACW, conditioning on household fixed effects and time-varying household characteristics. We then turn to a sequence of OLS fixed-effects regressions with layered blocks of controls, which show how the estimated age profiles change as we control for life-cycle variables such as portfolio composition, expectations, and household composition.

Summary statistics for our regression sample are reported in Table 3. Life-cycle variables of interest that could affect saving incentives and thus ACW include the household's subjective probabilities of leaving bequests of more than \$10,000, \$100,000, and \$500,000, the subjective probability of needing to move to a nursing home in the next five years, the household's out-of-pocket medical expenses, household composition, and the household's survival expectations relative to the life table.[32] In addition, we also include controls for portfolio composition and household-specific asset returns.

In constructing the regression-based age profiles, we estimate median regressions of log ACW with household fixed effects and year effects. Specifically, we estimate regressions of the form

$$\ln(\text{ACW}_{it}) = \alpha_i + \sum_{a,g} \beta_{ag} \mathbb{1}\{\text{AgeBin}_{it} = a\} \times \mathbb{1}\{G_i = g\} + \mathbf{X}_{it}'\gamma + \delta_t, \tag{5}$$

where ACW_{it} denotes annualized comprehensive wealth for household i in year t, and α_i is the household-specific fixed effect. The summation term allows each group G_i to have its own age profile. Depending on the specification, G_i represents education (less than high school, high school, college), race (White, Black, Other), or ethnicity (Hispanic, non-Hispanic). The vector $\mathbf{X}_{it}$ includes controls for characteristics observable in the HRS data that are related to the life-cycle considerations mentioned above, including bequest expectations, inheritance expectations, subjective life expectancy (relative to actuarial expectations), and out-of-pocket medical expenditures. The δ_t are year dummies included to capture aggregate time effects, such as economy-wide changes in asset returns. These regressions are estimated at the median, so that the coefficient estimates describe

[32] The HRS asks each respondent about their subjective odds of surviving to age A, where A is determined by their current age: 85 if they are under 65, and then a sliding scale (80 if they are 65-69, 85 if they are 70-74, 90 if they are 75-79, 95 if they are 80-84, and 100 if they are 85-89). The subjective odds are then expressed as a ratio to the implied probability from a life table based on the respondent's age and sex.

Table 3: **Summary Statistics**

	Mean	Std Dev	Min	Max
ln(ACW)	10.85	1.01	-1.94	17.19
Age	68.11	10.98	26	109
Black	0.19	0.39	0	1
Hispanic	0.11	0.32	0	1
White	0.73	0.44	0	1
Less than High School	0.22	0.42	0	1
High school	0.54	0.50	0	1
College	0.24	0.42	0	1
P(Bequest > $10K)	0.61	0.41	0	1
P(Bequest > $100K)	0.39	0.41	0	1
P(Bequest > $500K)	0.14	0.28	0	1
P(nursing home)	0.08	0.17	0	1
Life expectancy ratio	1.25	1.82	0	49.63
ln(medical expenses)	6.95	2.93	0	14.69
Household asset return	0.02	0.05	-0.22	0.49
Financial ACW share	0.15	0.21	0	1
Nonfinancial ACW share	0.21	0.22	0	1
Household size	2.16	1.27	1	19
Married	0.45	0.50	0	1
Pre-Boomer	0.66	0.48	0	1
Boomer	0.26	0.44	0	1
Post-Boomer	0.08	0.28	0	1
Observations	162,003			

Notes: The table reports (weighted) summary statistics for the variables used in the regressions. "P(Bequest < $10k", "P(Bequest < $100k", and "P(Bequest < $500k" are self reported probabilities of leaving bequests of those amounts. "P(nursing home)" is the self-reported probability of entering a nursing home in the next 5 years. "ln(medical expenses)" is the natural log of out-of-pocket medical expenses plus 1. "Household asset return" reflects household-specific portfolio weights of stocks, bonds, and housing, along with their respective aggregate returns. "Pre-Boomer" indicates households with a head born before 1948, "Boomers" indicate those with a head born 1948–1965, and "Post-Boomers" are those with a head born after 1965. Data come from the 1998–2022 waves of the HRS.

effects on the conditional median of ln(ACW).[33]

Using the estimated coefficients on the age dummies, we construct median age profiles of ACW, conditional on the household fixed effect, year effects, and observable characteristics for different groups. Figure 12 shows the predicted trajectory of median ACW for the full sample. We find a a slight decrease in ACW around the start of retirement, followed by a steepening rise at older ages. Median ACW increases by around 17% from age 61–65 to age 81–90. The increasing growth rate toward the end of life is notable, suggesting that the typical household does not draw down its resources in tandem with the decline in life expectancies.

[33] The models are estimated using the fixed-effects quantile regression estimator of Machado and Santos Silva (2019) and implemented using Stata's `xtqreg` command. In constructing the figures below, the predicted values from each model are re-centered so that the fitted median log(ACW) values for each group equal the observed medians at ages 51–60.

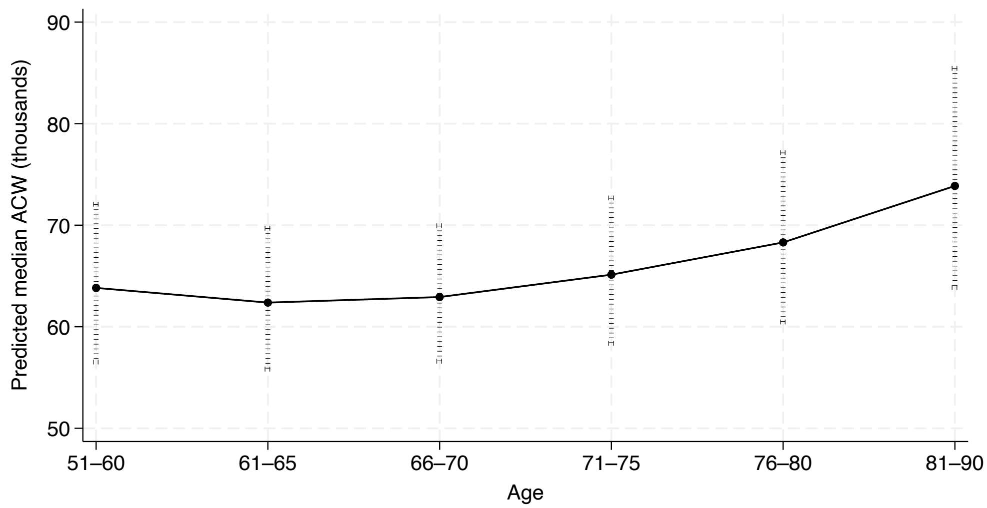

Figure 12: Predicted trajectory of median ACW

Notes: The figure plots the age trajectory of ACW using the marginal estimates of a set of age dummies from a quantile fixed effects regression that includes controls for bequest expectations, inheritance expectations, subjective life expectancy (relative to actuarial expectations), out-of-pocket medical expenditures, household fixed effects, and year effects. Data come from the 1998–2022 waves of the HRS.

Next we look at how these trajectories vary by education, race, and ethnicity. Figure 13 shows the predicted trajectories of ACW by our three education groups. In addition to the substantial differences in the levels of ACW across groups, we also see notable differences in the trajectories. In particular, households with a college degree see a steeper rise in ACW than those with high school degrees, and those without a high school degree stay flat at a relatively low level.

There are similar differences in the trajectories by race and ethnicity. Figure 14 shows the predicted median ACW trajectories for households with White and Black heads, respectively. While median ACW rises steadily throughout retirement for White households, the median trajectory is essentially flat for Black households, suggesting widening inequality by race as households age. As can be seen in Figure 15, Hispanic households accumulate annual resources more slowly with age compared to non-Hispanic households, but both groups generally rise throughout retirement.

In comparing the median age profiles of ACW by race and ethnicity, the most notable difference is in the overall level of annual resources. What factors help explain the gap in ACW by race and ethnicity? While it is difficult to identify causal factors, we can attempt to explain the differences by looking at the roles of differences in observables vs. differences in returns on those observables, similar to the traditional Oaxaca-Blinder decomposition. In particular, we implement a median Oaxaca–Blinder decomposition based on recentered influence function (RIF) regressions, using the method of Firpo et al. (2018).[34]

Table 4 reports the results, showing the decomposition of differences in median ACW by race and ethnicity. At the median, log ACW is 0.76 log points lower for Black than for White households and 0.98 log points lower for Hispanic than for White households. These gaps imply that White median ACW is roughly twice that of Black households ($\exp(0.76) = 2.14$) and about 2.7 times that of Hispanic households ($\exp(0.976) = 2.65$). In both comparisons, the majority of the gap is accounted for by differences in observable characteristics, rather than differences in coefficients.

The most important characteristics in explaining the gaps have also been highlighted in previous life-cycle studies of saving. Education serves as a (noisy) proxy for lifetime earnings. Bequest expectations provide both a motive for wealth accumulation and help identify households with higher-than-average total wealth. Household returns account for 10–12% of the explained portion of the gap, suggesting that a substantial portion of the difference in annualized wealth comes from differences in portfolio composition (which determine returns). For both comparisons, out-of-pocket costs explain a similar portion of the gap as household returns. Finally, differences in marital status appear to be important in explaining the Black-White gap, but not the Hispanic-White gap.

Table 4: **Median Oaxaca–Blinder (RIF) Decomposition of ACW by Race and Ethnicity**

	Black–White		Hispanic–White	
	Estimate	Std. Error	Estimate	Std. Error
Total gap	0.763	0.021	0.976	0.029
Explained	0.545	0.018	0.641	0.028
Education	0.082	0.008	0.171	0.022
Bequest expectations	0.280	0.012	0.325	0.018
Household returns	0.057	0.004	0.054	0.006
OOP medical spending	0.052	0.006	0.075	0.010
Married	0.067	0.007	0.008	0.003
Other controls	0.000	0.000	0.000	0.000
Unexplained	0.236	0.017	0.385	0.023
Interaction	-0.019	0.013	-0.051	0.022

Notes: The table decomposes differences in annualized comprehensive wealth (ACW) by race and ethnicity, following Firpo et al. (2009). This method partitions the gap in the unconditional median of log ACW into an "explained" component, capturing differences in observables, and an "unexplained" component, capturing differences in coefficients. "Other controls" include age, age squared, cohort, expected inheritance, subjective life-expectancy ratios, household size, and year fixed effects. Standard errors are clustered at the household level, and all estimates are weighted using HRS sampling weights. Data come from the 1998–2022 waves of the HRS.

Taken together, these results indicate that ACW tends to rise with age for many households,

[34] Firpo et al. (2018) develop a method of using recentered influence regressions to extend the Oaxaca–Blinder decomposition to other distributional measures, including the unconditional median.

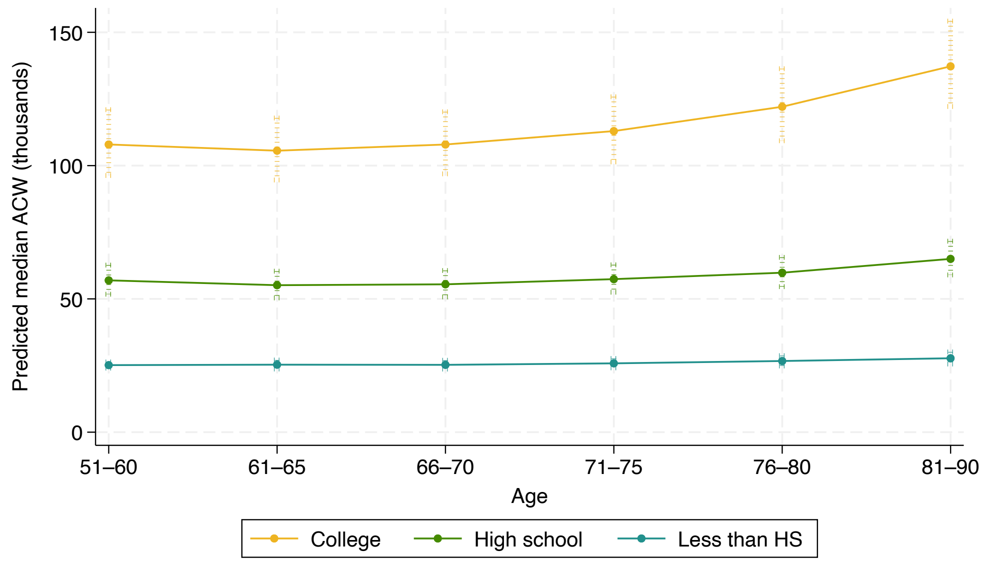

Figure 13: Trajectory of median ACW, by education

Notes: The figure plots the age trajectory of ACW using the marginal estimates of a set of age dummies interacted with education categories from a quantile fixed effects regression that includes controls for bequest expectations, inheritance expectations, subjective life expectancy (relative to actuarial expectations), out-of-pocket medical expenditures, household fixed effects, and year effects. Data come from the 1998–2022 waves of the HRS.

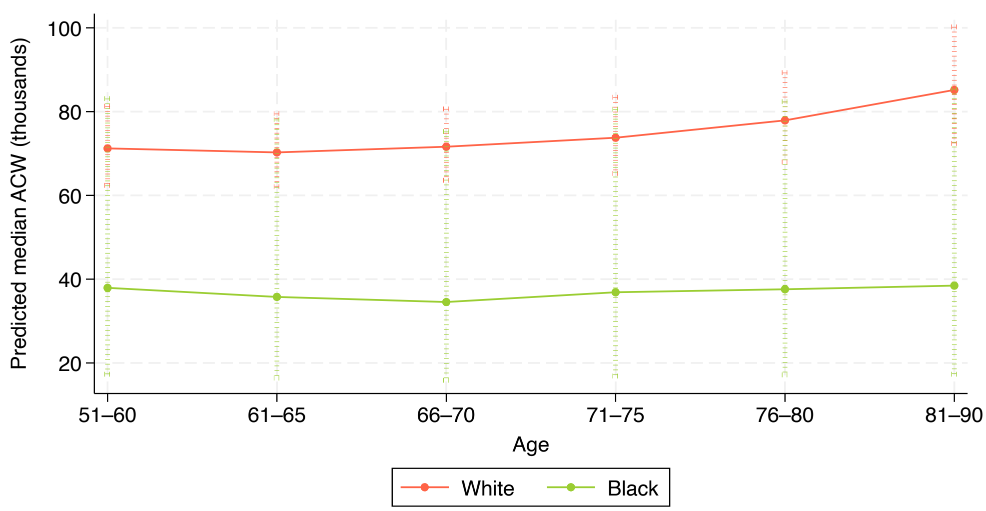

Figure 14: Trajectory of median ACW, by race

Notes: The figure plots the age trajectory of ACW using the marginal estimates of a set of age dummies interacted with race categories from a quantile fixed effects regression that includes controls for bequest expectations, inheritance expectations, subjective life expectancy (relative to actuarial expectations), and out-of-pocket medical expenditures. Data come from the 1998–2022 waves of the HRS.

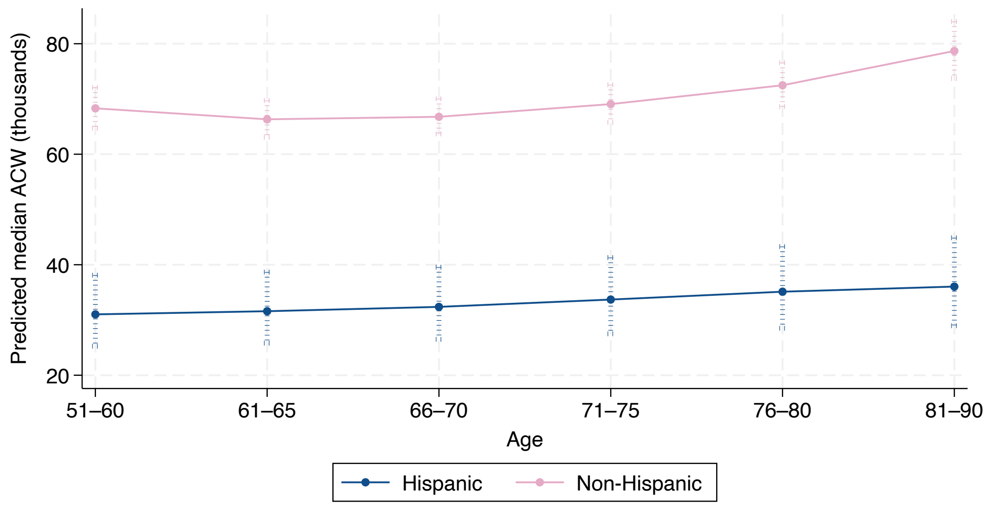

Figure 15: Trajectory of median ACW, by ethnicity

Notes: The figure plots the age trajectory of ACW using the marginal estimates of a set of age dummies interacted with ethnicity categories from a quantile fixed effects regression that includes controls for bequest expectations, inheritance expectations, subjective life expectancy (relative to actuarial expectations), out-of-pocket medical expenditures, household fixed effects, and year effects. Data come from the 1998–2022 waves of the HRS.

and that this pattern is especially pronounced for college-educated and White households. Further, these age patterns emerge even after controlling for time-varying household characteristics and year fixed effects in the regressions.

To explore further how these age patterns vary with observable household characteristics, we estimate a series of OLS fixed effect regressions of log ACW that sequentially add blocks of household characteristics. Table 5 reports the results from these "layered" regressions of log ACW, each of which includes household and year fixed effects and a common set of age dummies. Column (1) includes only the age dummies. Column (2) adds a financial block consisting of the household-specific return, log out-of-pocket medical costs, and the financial and nonfinancial shares of ACW. Column (3) adds an expectations block that includes the probabilities of leaving bequests of different sizes, the life expectancy ratio, and the probability of entering a nursing home. Column (4) adds household size and an indicator of marital-status.

The age coefficients in column (1) show that ACW tends to increase with age, which is consistent with the median profiles above. Adding the financial variables in column (2) leaves the age estimates practically unchanged, despite the fact that all of these variables are statistically significant. The household-specific return, log medical costs, and the financial share of ACW are all strongly and positively associated with ACW. The coefficient estimate on the nonfinancial share is negative and statistically significant, which may seem surprising in light of the slow drawdown of housing wealth. This result likely reflects the fact that the fixed-effects specification identifies the association between *changes* in the nonfinancial share and *changes* in log ACW. Because the annuitized components of ACW (e.g., Social Security) are relatively flat by construction, changes in financial wealth will both raise ACW and decrease the share of nonfinancial wealth, leading to a negative coefficient on the nonfinancial share.

When the expectations block is added in column (3), the age coefficient estimates are dampened, particularly in the case of ages 71–75, where the estimate falls by about 40%. The positive and significant estimates on the bequest probabilities and the life-expectancy ratio suggest that these life-cycle expectations play an important role in shaping saving behavior in retirement. The probability of entering a nursing home, however, does not appear for be economically or statistically significant.

Finally, adding the variables for household composition in column (4) actually strengthens the upward-sloping age pattern, bringing it almost in line with the age pattern in column (1). Here, the effects are driven by the indicator variable for married, which has a negative and significant coefficient estimate. The most common marital transition in retirement occurs with the death of a spouse. Because the household needs to support one fewer person, this transition will tend to increase the amount of ACW for a given level of comprehensive wealth, which explains why we see a negative association between changes in marital status and changes in log ACW.

Overall, the layered OLS fixed effects regressions suggest the life-cycle variables explain some, but not most, of the age pattern in ACW during retirement. Even in the specification with all of the life-cycle covariates, the age pattern of ACW increases with age and remains statistically significant. We do not interpret this as evidence that these factors are not the key drivers behind the slow draw down of retirement resources, but rather that they likely interact in structural ways not captured by our linear regression specification.

4 Inequality in Annualized Comprehensive Wealth

4.1 Changes in inequality with age and over time

Inequality in annualized comprehensive wealth is not constant, but can vary cross-sectionally with age and also change over time. The age variability is driven in part by age-related variance in medical expenses, bequest motivations, and survival expectations. The time dimension, by

Table 5: **OLS Fixed-Effect Regressions of ACW on Household Characteristics**

	(1)	(2)	(3)	(4)
	(1)	(2)	(3)	(4)
Age 61–65	-0.008	-0.010	-0.019***	-0.015**
	(0.007)	(0.007)	(0.007)	(0.007)
Age 66–70	0.009	0.008	-0.007	-0.001
	(0.010)	(0.010)	(0.010)	(0.010)
Age 71–75	0.046***	0.046***	0.027**	0.036***
	(0.014)	(0.014)	(0.013)	(0.014)
Age 76–80	0.095***	0.100***	0.078***	0.088***
	(0.018)	(0.017)	(0.017)	(0.017)
Age 81–90	0.161***	0.162***	0.147***	0.157***
	(0.022)	(0.022)	(0.021)	(0.021)
HH return		0.489***	0.509***	0.512***
		(0.061)	(0.060)	(0.060)
Log(OOP)		0.009***	0.008***	0.008***
		(0.001)	(0.001)	(0.001)
Financial share		0.310***	0.253***	0.248***
		(0.032)	(0.032)	(0.032)
Nonfinancial share		-0.456***	-0.515***	-0.523***
		(0.028)	(0.027)	(0.028)
P(Beq>10k)			0.001***	0.001***
			(0.000)	(0.000)
P(Beq>100k)			0.001***	0.001***
			(0.000)	(0.000)
P(Beq>500k)			0.002***	0.002***
			(0.000)	(0.000)
Life exp. ratio			0.003***	0.003***
			(0.001)	(0.001)
Nursing home prob			0.000	0.000
			(0.000)	(0.000)
No. living in HH				-0.001
				(0.002)
Married				-0.028***
				(0.008)
N	159405	159405	159405	159405
HH FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Financial block	No	Yes	Yes	Yes
Expectations block	No	No	Yes	Yes
HH size/marriage block	No	No	No	Yes

Notes: The table reports coefficient estimates from OLS fixed-effect regressions of ACW on household characteristics. All regressions include survey year fixed effects, and standard errors are clustered at the household level. Data come from the 1998–2022 waves of the HRS.

contrast, captures broader year-to-year trends in portfolio composition and the effect of economy-wide shocks (such as inflation and asset returns) on household wealth.

We examine patterns of inequality in annualized comprehensive wealth using four common statistics: the Gini coefficient, the 90–10 ratio, the top 10 percent share, and the Theil index.[35]

Figure 16 shows how these four measures of inequality evolve with age and across cohorts. Most of the measures show generally increasing inequality with age, especially for the older cohorts. The measures also suggest generally higher inequality at ages 51–60 for more recent cohorts, though this pattern is not consistently observed after age 60.

The increase in inequality with age could reflect factors highlighted by the life-cycle model. First, there is survivorship bias at older ages: wealthier individuals tend to live longer, so that households observed at advanced ages are increasingly drawn from higher-wealth groups. Second, heterogeneity in bequest motives leads some households to preserve financial and non-financial wealth later in life, while others draw down resources more quickly. Finally, the rising inequality may reflect the increasing variance of medical expense and long-term care shocks at older ages (French and Jones, 2004).

Figure 17 traces the evolution of inequality in ACW across years. All four measures vary across years, but some common patterns emerge. At the onset of the financial crisis in 2008, inequality was higher than it was in 2000, due in part to rising house prices, which disproportionately increased in higher-wealth areas. Similarly, all four measures show that inequality fell during the peak period of the financial crisis from 2010–2012, as financial and housing asset prices declined sharply, shaving more wealth off the upper end of the distribution than the lower. Inequality then increased markedly through 2018 as financial asset prices recovered.[36] The movements in 2020 and 2022 likely reflect the disruptive effects of the COVID-19 pandemic on asset valuations and housing conditions.

4.2 Impact of household characteristics on inequality

The results in Figure 16 suggest that inequality increases with age and may be higher in recent cohorts, which likely reflects differences in household characteristics across age and time. An important question is whether inequality rises with age independently, or whether the observed

[35]The Theil index is an entropy-based measure of inequality that equals zero under perfect equality and rises as resources become more concentrated. It is defined as $T = \frac{1}{n}\sum_{i=1}^{n} \frac{x_i}{\bar{x}} \ln\left(\frac{x_i}{\bar{x}}\right)$, where, in this case, x_i is a household's ACW and $\bar{x}$ is the average ACW across households.

[36]A large literature documents the evolution of inequality around the Financial Crisis. See, for example, Bricker et al. (2012), Pfeffer et al. (2013), Christelis et al. (2015), and Shchepeleva et al. (2022).

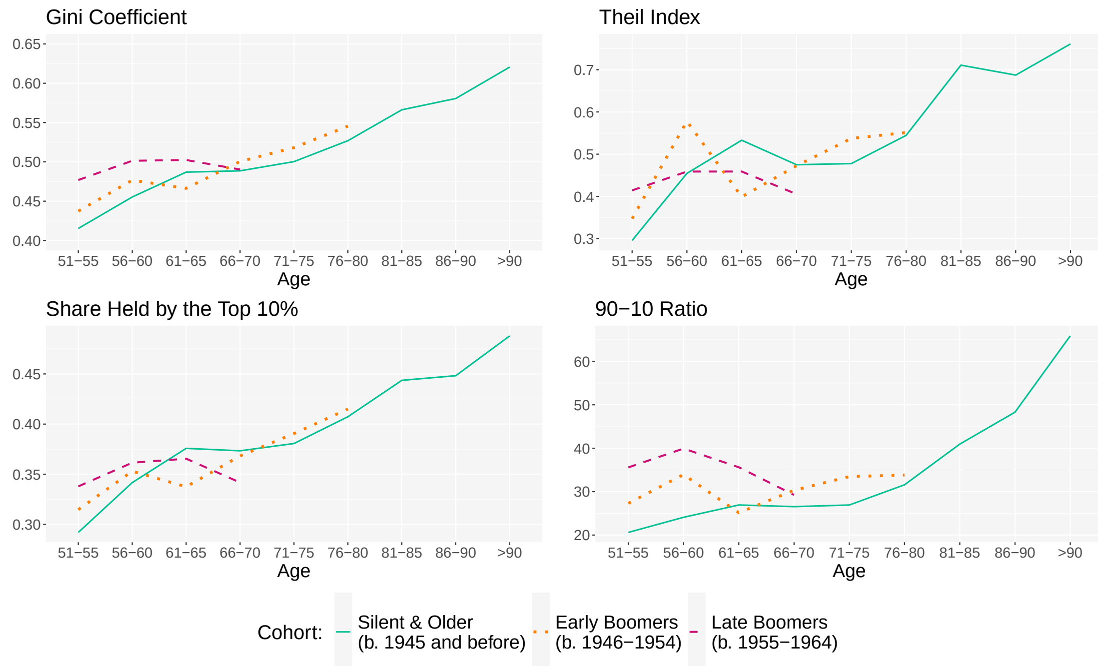

Figure 16: Inequality measures by age and cohort

Notes: The figure depicts four measures of inequality in annualized comprehensive wealth across survey years. Clockwise from top left: Gini coefficient, Theil index, top 10 percent share, and 90–10 ratio. Data come from the 1998–2022 waves of the HRS.

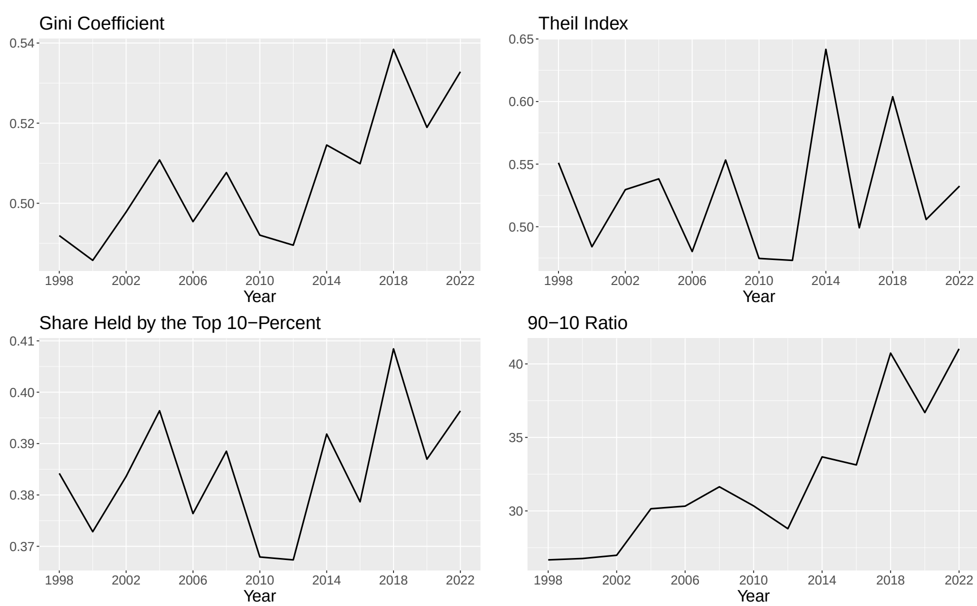

Figure 17: Inequality measures over HRS survey years

Notes: The figure depicts four measures of inequality in annualized comprehensive wealth across survey years. Clockwise from top left: Gini coefficient, Theil index, top 10 percent share, and 90–10 ratio. Data come from the 1998–2022 waves of the HRS.

pattern primarily reflects changes in other household characteristics. To assess the importance of these characteristics on measured inequality, we estimate recentered influence function (RIF) regressions (see Firpo et al. (2009)), which allow us to evaluate the relationship between covariates and distributional measures such as the Gini coefficient, the 90–10 ratio, the top 10-percent wealth share, and the Theil index.

A recentered influence function describes how a covariate affects a distributional statistic, such as the Gini coefficient. Let the inequality statistic of interest be a functional $\nu(F)$ that maps the population distribution F of ACW (here denoted Y) into a real number (for example, the Gini coefficient or the Theil index). For each observation y of Y, the influence function measures how $\nu(F)$ would change if we added infinitesimal mass at the point y:

$$IF(y; \nu, F) = \lim_{\epsilon \to 0} \frac{\nu\big((1-\epsilon)F + \epsilon\Delta_y\big) - \nu(F)}{\epsilon},$$

where Δ_y places all its mass on y. The *recentered* influence function adds back the statistic itself:

$$RIF(y; \nu, F) = \nu(F) + IF(y; \nu, F),$$

ensuring that $\mathbb{E}[RIF(y; \nu, F)] = \nu(F)$. Firpo et al. (2009) show that the impact of covariates on the distribution measure can be estimated by regressing the RIF on the explanatory variables.

Table 6 presents the RIF regression estimates for the Gini coefficient, the 90-10 ratio, the Theil index, and the top-10% share. The coefficient estimates provide a measure of how each inequality measure would change if we shifted a small amount of the population mass toward households with that characteristic, holding constant the distribution of the other covariates.

Across all measures, the coefficients on the age dummies show little systematic relationship between age and inequality until after age 80. Even controlling for other characteristics, there is substantial inequality in ACW among the oldest households. Interestingly, the results suggest that increasing the proportion of Baby Boomers and more recent generations relative to those born before 1948 would reduce inequality.

Education also matters for inequality. A higher share of high-school–educated households is associated with significantly lower inequality across all measures, including the Gini coefficient, the 90–10 ratio, the Theil index, and the top 10 percent share. In contrast, a higher share of college-educated households is associated with higher inequality across each of these measures. Together, these results indicate that educational composition plays an important role in shaping inequality in retirement resources.

Race and ethnicity are also strongly correlated with inequality. A higher share of Black or Hispanic households is associated with significantly higher inequality in ACW. These results reflect considerable dispersion in ACW within these groups, even after controlling for other household characteristics.

The bequest expectations – both intending to leave and intending to receive – show a surprising pattern. Increasing the share of households with higher reported probabilities of leaving bequests would actually lower inequality, presumably because many of the households in the middle of the ACW distribution plan to leave some sort of bequest. Households expecting to *receive* bequests are also associated with lower inequality for all four measures. One interpretation is that these households may have less incentive to accumulate substantial resources on their own.

Household-specific rates of return are strongly and positively associated with inequality (at least for the Gini and the 90-10 ratio), suggesting that returns may play an important role in sharing the distribution of ACW in retirement. Portfolio composition and risk exposure vary systematically across households, particularly by education, wealth, and race/ethnicity (see the compositional figures in the appendix). Households with more exposure to higher-return assets, such as equities, experienced a larger run-up in wealth after the financial crisis, which likely increased the dispersion of comprehensive wealth. Independent of actual saving behavior, differences in household returns are likely to magnify inequality throughout the distribution.

Looking at the other coefficients, out-of-pocket medical costs are associated with declining inequality, at least for two of our measures, perhaps indicating that higher-resource households are more likely to engage in ”optional” higher-expense medical spending, while lower-resource households rely more on Medicaid. Finally, increasing the share of married households would tend to reduce inequality, while increasing the share of larger households would increase it slightly. Taken together, the results suggest that household returns, demographics, and cohort-specific environments combine to influence measured inequality in annualized comprehensive wealth.

Taken together, the RIF regressions indicate that much of the observed inequality in annualized comprehensive wealth reflects differences in household characteristics. Education, cohort, race and ethnicity, bequest motives, medical expenses, and marital status are all associated with our measures of inequality. Household returns appear to be particularly important in explaining the distribution of annual retirement resources. Given the transition from DB pensions to retirement accounts, this could have implications for the future evolution of inequality in retirement resources.

Table 6: **RIF Regressions of Inequality Measures.**

	Gini	90–10 ratio	Theil	Top 10% share
Age 66–70	0.000	0.239	-0.023	-0.003
	(0.007)	(0.288)	(0.026)	(0.008)
Age 71–75	-0.002	-0.134	-0.039	-0.008
	(0.008)	(0.310)	(0.031)	(0.010)
Age 76–80	0.010	0.439	-0.020	0.006
	(0.009)	(0.320)	(0.036)	(0.011)
Age 81–90	0.055***	1.989***	0.171**	0.056***
	(0.013)	(0.339)	(0.071)	(0.016)
High School	-0.070***	-5.433***	-0.121***	-0.042***
	(0.004)	(0.246)	(0.014)	(0.004)
College	0.034***	2.887***	0.099***	0.024**
	(0.008)	(0.308)	(0.038)	(0.010)
Boomers (1948–1965)	-0.036***	-0.009	-0.131***	-0.051***
	(0.010)	(0.349)	(0.041)	(0.012)
Post-Boomers (1966+)	-0.055**	-1.915	-0.179***	-0.067**
	(0.023)	(1.467)	(0.064)	(0.027)
Black	0.019***	1.916***	0.038***	0.010***
	(0.003)	(0.283)	(0.010)	(0.003)
Hispanic	0.059***	6.578***	0.136***	0.042***
	(0.006)	(0.404)	(0.018)	(0.007)
P(Beq>10k)	-0.126***	-8.750***	-0.234***	-0.089***
	(0.006)	(0.285)	(0.027)	(0.007)
P(Inherit)	-0.067***	0.503	-0.224***	-0.086***
	(0.011)	(0.554)	(0.040)	(0.013)
Life exp. ratio	0.003	0.177***	-0.000	0.002
	(0.002)	(0.044)	(0.010)	(0.003)
HH return	0.333***	41.068***	0.432	0.109
	(0.126)	(2.681)	(0.624)	(0.158)
Log(OOP)	-0.003***	-0.923***	-0.003	0.001
	(0.001)	(0.041)	(0.004)	(0.001)
Married	-0.082***	-3.508***	-0.224***	-0.072***
	(0.006)	(0.209)	(0.031)	(0.008)
HH size	0.006***	-0.007	0.020*	0.007***
	(0.002)	(0.091)	(0.011)	(0.003)
Constant	0.632***	20.613***	0.824***	0.477***
	(0.012)	(0.603)	(0.055)	(0.015)
Observations	111,031	111,031	111,031	111,031

Notes: The dependent variable is the recentered influence function (RIF) of each inequality measure. Regressions include a full set of year dummies, as well as dummies for 5-year age buckets. Columns report results for the Gini coefficient, the 90–10 ratio, the Theil index (GE(1)), and the top 10 percent share. Standard errors are shown in parentheses. Statistical significance denoted by * $p < 0.10$, ** $p < 0.05$, and *** $p < 0.01$.

5 Conclusion

We applied a comprehensive measure of annual household resources to the 1998–2022 waves of the HRS in order to investigate the extent of inequality in retirement preparation. The annual measure provides a way to compare retirement resources across families with different composition and longevity expectations. Although previous work has investigated the typical trajectory of annual resources, this paper focuses on the inequality in annual resources, with an emphasis on the roles of education, race, cohort, household portfolio composition, and household-level asset returns.

We report three main findings. First, the average and median ACW increases with age for all cohorts, reflecting the fact that households across generations decumulate wealth more slowly than the basic life cycle model would predict. There is, however, considerable heterogeneity in the trajectories of ACW. Much of the upward-sloping trajectory for the sample as a whole appears to be driven by the experiences of households with a college degree and, to a lesser extent, White households. An implication of this finding is that gaps in retirement preparation across education and demographic groups are likely to widen with age during retirement.

Second, we find that inequality in annual resources increases with age. This is true for the Gini coefficient, the Theil index, the top 10% share, and the 90-10 ratio. Third, we show that household-specific returns on equity, fixed income, and housing play a crucial role in shaping these patterns. In particular, differences in returns are strongly associated with higher values of the Gini coefficient and the 90–10 ratio, highlighting the importance of asset-market fluctuations in amplifying inequality during retirement.

While our results are primarily descriptive, they underscore the importance of the factors that have dominated the more recent literature on life-cycle consumption and saving: the importance of precautionary saving against medical shocks, the role of bequests, frictions in the housing market, differential longevity, and the connection between household portfolio choice and aggregate movements in asset prices over time.

6 Declaration of generative AI and AI-assisted technologies in the manuscript preparation process.

No AI was used in the writing, data construction, or analysis. We did, however, use ChatGPT to assist with some of the Stata code used to export results to tables and figures for the Latex source document. We reviewed all of the code and take full responsiility for all aspects of the paper.

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7 Appendix

Figure 18: Average annualized comprehensive wealth (ACW) composition by wealth bracket, education, and race/ethnicity.

Notes: The bars in the top panel show the average composition of ACW for respondents aged 61-70 by wealth category for the bottom 10 percent holders of wealth, the middle 40 percent, and the top 10 percent. The bars in the second panel show the composition by education group, and the bars in the bottom panel show the composition by race and ethnicity (White, Black, Non-Hispanic, and Hispanic). Data come from the 1998-2022 waves of the HRS.