Years and Dollars

Survival, Social Security, and Closing the U.S. Black–White Wealth Gap

Damon Kirk and Steven Farrar
The Understanding Company, Detroit, Michigan

Working paper, version 2.2 · October 18, 2026 · Not peer reviewed
Correspondence: hello@theunderstanding.company

Abstract

Black Americans hold less wealth and live shorter lives than White Americans; we ask how much of the wealth gap shorter lives explain and what would close it. Three accounting models, not causal estimates, draw on the 2024 U.S. life tables, the 2025 Survey of Consumer Finances, and Social Security's mortality projections. Most of the life expectancy gap arises before 65, but the channels net worth records are small: 1.5% of the log wealth gap through age structure, 1.3% through shorter working lives. Shorter survival costs a young Black man $15,500 of Social Security wealth (present value, all benefits). A microsimulation calibrated to that survey and run forward from 1992 tracks later surveys' Black-to-White ratio of median wealth at only 5 of 10 waves. Under current conditions that ratio (the median across runs) moves from 0.11 to 0.19 by 2100. No single lever closes the gap (a ratio of at least 0.9 held to that year), and a one-time transfer alone fades. Equal earnings, mobility, returns, and survival raise it to 0.69 by then with Black households' fitted saving rate, and to 0.92 with the White rate, closing the gap in 58% of runs. No combination tested, even with a transfer, closes it in nine runs of ten. Near-equal fits disagree on the sign of the fitted saving gap and on the first of these results, not the second. The model understates past White wealth growth and overstates the newest survey's ratio, so its current-conditions path is probably optimistic.

Keywords: racial wealth gap; survival; life tables; Social Security wealth; microsimulation; Survey of Consumer Finances

1 Introduction

Black Americans hold far less wealth than White Americans, and they live shorter lives. In the 2025 Survey of Consumer Finances, the median White family held $332,100 in net worth, 9.0 times the Black median of $36,800, the widest ratio the survey has recorded since 2016 [1]. Measured per person, White Americans held about six times as much wealth as Black Americans in 2020, and the gap has widened since the 1980s as gains on assets went mostly to White households [2]. In 2024, life expectancy at birth was 74.8 years for the non-Hispanic Black population and 78.9 for the non-Hispanic White population [3]. The two gaps are linked in both directions. Higher income predicts longer life at every percentile of the income distribution [4], and wealth predicts survival in middle and later life more strongly than education or in-

come [5, 6]. A shorter life, in turn, leaves fewer years in which to earn, save, and draw retirement income. How much of the wealth gap can be attributed to the survival gap by accounting, and what would close the wealth gap?

We answer the first question with accounting exercises that let only survival differ between the two populations, not with causal estimates. In the 2024 life tables, 77–79% of the gap in life expectancy at birth arises from deaths before 65 (Section 3). The channels that can be put on the scale of net worth are small: about 1.5% of the log wealth gap through the age structure of the adult population and about 1.3% through shorter working lives. The channels that net worth does not record are worth more. A projection model built on the Social Security Trustees' mortality assumptions puts the cost of shorter lives at $15,500 of Social Security wealth for a Black man entering work in 2024, counting disability and family benefits. For a Black couple aged 30, shorter lives add $45,450 to expected lost earnings, or $25,900 net of the deceased partner's own consumption (Section 4).

We answer the second question with a microsimulation of household wealth, calibrated to the 2025 survey and tested by running it forward from the 1989, 1992, and 2022 surveys (Sections 5 and 6). Its paths are accounting under stated assumptions, not forecasts or causal effects. Under current conditions the gap does not close. No single lever closes it, where closing means a Black-to-White ratio of median wealth that reaches 0.9 and stays there through 2100, and earnings parity is the largest lever. Equal earnings, mobility, returns, and survival together reach 0.69 by 2100 if Black households keep their fitted saving rate. With equal saving as well they reach 0.92, and the gap is closed in 58% of runs. No combination we test, even with a one-time transfer of $250,000 per Black household, closes the gap in 90% of runs. Like the life-cycle model of Ashman and Neumuller [7], the general-equilibrium model of Aliprantis, Carroll, and Young (a working paper) [8], and the dynastic model of Boerma and Karabarbounis [9], we find that a transfer alone fades. Even added to equal conditions and equal saving, it moves the year from which half the runs are closed only from 2094 to 2088. The model's headline specification fits each group's base saving rate separately. That fitted gap is a residual whose sign the survey targets do not identify: four calibration starts of near-equal fit give saving gaps (Black minus White) from -2.8 to $+0.5$ points and equal-conditions ratios of 0.69–0.92 in 2100. The results we rely on are therefore those that do not depend on that sign: the equal-saving paths, the ranking of the levers, and the accounting of Sections 3 and 4. A sensitivity with one saving schedule for both groups is reported beside the headline and labeled so.

This version is built on the 2025 survey, released on October 9, 2026. Between the 2022 and 2025 surveys the median net worth of Black families fell 25% in real terms while their mean net worth rose 5%. The change in the median is within the survey's sampling error, and Section 3.1 sets out what moved. The previous version of this paper, calibrated to the 2022 survey, put the 2025 ratio of median wealth at 0.12 to 0.15. That band lies above the 0.11 the survey recorded, though inside the survey's own 90% interval of 0.07–0.15. The recalibrated model, run from 2022, also predicts 0.14 for 2025 (Section 5.7). That miss, and backcasts from 1992 that stay within 0.03 of the surveys' ratio at only 5 of 10 waves, are why we describe the current-conditions path as probably optimistic.

The paper makes three contributions.

1. We locate the Black–White survival gap by age in the 2024 life tables and bound four accounting channels through which it reaches net worth, using the 2025 survey's age profile of wealth (Section 3).
2. We build an open projection model that prices the channels net worth does not record: Social Security wealth with disability, spousal, survivor, and children's benefits; the loss of a partner; and bequests, with forecasts to 2075 (Section 4).
3. We build a microsimulation of household wealth, tested by backcasts from earlier surveys, that asks what would close the gap, what each lever contributes by Shapley value, and what equal conditions would add in dollars and years of life (Sections 5 and 6).

Section 7 sets the model beside mechanisms outside its headline: the historical dispossession behind the starting distribution, property tax over-assessment and tax foreclosure, and the income shocks that force sales; the last two enter as sensitivities. Section 8 reviews later life and other wealth gaps, Section 9 lists the threats to validity, and Section 10 concludes.

Three strands of work are closest. Decompositions of the Black–White gap in life expectancy by age and cause locate the survival gap but do not price it [10, 11]; we add the accounting. The money's-worth literature on Social Security shows that differential mortality undoes much of the benefit formula's progressivity [12–14], and that the program's redistribution toward the poor is poorly targeted [15]. The race-specific evidence is older [16], and Section 4 updates it with disability and family benefits. Accounting studies of the wealth gap attribute about two thirds of the gap in mean wealth to earnings [17] and 10–20% to financial inheritances [18]. A calibrated life-cycle model attributes 43% of the gap in levels to income differences alone [7]. Long-run series show no narrowing of the gap in seventy years [19] and attribute its level to conditions at Emancipation [2]. Derenoncourt and colleagues' accumulation model shows that transfers made without changing the conditions of accumulation fade; Section 6 asks whether any combination of changed conditions and transfers closes the gap. In method, the microsimulation follows dynamic models of retirement income such as the Urban Institute's DYNASIM, which ages a representative sample year by year under current policy [20]. Ours applies the method to net worth by race, with an explicit survival channel.

A note on terms. "Black" and "White" refer to the non-Hispanic Black and non-Hispanic White populations as classified by the National Center for Health Statistics and the Survey of Consumer Finances. Racial differences in survival and wealth reflect differences in conditions, opportunities, and exposures, not biology [2, 21]. "The ratio" means the Black-to-White ratio of median household net worth, written as a decimal. "The survival gap" is the difference in the life-table quantities of Table 1; "the life expectancy gap" is the difference at birth. Dollar amounts are in 2024 dollars unless stated.

2 Wealth and survival: what the evidence shows

2.1 Wealth predicts survival

The income gradient in U.S. mortality is steep and continuous. Linking 1.4 billion person-year tax records to death records, Chetty and colleagues found that life expectancy rises with income throughout the distribution. In 2001–2014 the gap in life expectancy at age 40 between the rich-

est and poorest 1% was 14.6 years for men and 10.1 years for women, and it widened over the period [4]. The National Academies projected that men born in 1960 who reach 50 can expect to live to about 89 in the top fifth of earners and to about 76 in the bottom fifth. That gap of more than 12 years is up from about 5 years for men born in 1930 [22].

For mortality in middle and later life, wealth is a sharper predictor than income, perhaps because it measures accumulated security rather than one year's flow. In the Midlife in the United States cohort, the mortality disparity by wealth was larger than the disparities by education, occupation, income, or childhood socioeconomic status. After age 65, adults with no assets had an estimated 40% chance of surviving to 85, against 71% for those with at least $300,000 in 1995 dollars; after full adjustment for confounders the figures were 51% and 70% [5]. In the Health and Retirement Study, Americans aged 54–64 in the lowest wealth quintile had a 17% risk of death and a 48% risk of disability over ten years, against 5% and 15% in the highest quintile [6]. The gradient is unusually steep in the United States: among 73,838 adults aged 50–85 in American and European cohorts, survival in the wealthiest American quartile appeared similar to survival in the poorest quartile of northern and western Europe [23]. Changes in wealth matter as well as levels. Among Americans aged 51–61 at entry to the Health and Retirement Study, a loss of 75% or more of net worth over two years was associated with an adjusted hazard ratio for death of 1.50 [24].

Whether wealth itself lengthens life is less settled, and the distinction matters for the models below. Swedish lottery winners show no detectable effect of wealth on adult mortality: the estimates rule out effects on 10-year mortality one sixth as large as the cross-sectional gradient [25], and inheritances in the Health and Retirement Study have no substantial effect on health [26]. U.S. quasi-experimental evidence is mixed. In the Health and Retirement Study, a 10% loss of stock-market wealth was followed by impairments of 2–3% of a standard deviation in physical health, mental health, and survival [27]. Yet the cohort that received higher Social Security benefits because of the 1970s benefit "notch" had higher, not lower, mortality after retirement [28]. The microsimulation of Section 5 therefore treats only a share of the wealth–mortality gradient as causal, drawn between 0 and one sixth, and reports runs at fixed shares of 0, one sixth, and one half.

2.2 Survival shapes wealth

The reverse direction is stated less often, but it is mechanical. Wealth is a stock accumulated from flows over time: earnings saved, returns compounded, debts repaid. Each additional working year adds a year of earnings and contributions, and each additional year of life lengthens the horizon over which assets compound. Social Security retirement benefits are an annuity, paid only while the beneficiary lives; in December 2024, 55.0 million Americans aged 65 or older received Social Security benefits (56.1 million counting Supplemental Security Income) [29]. Health shocks are also wealth shocks. Three years after a hospital admission, insured adults admitted at ages 50–59 were 11 percentage points less likely to be employed and earned $9,000 a year less, a loss far larger than the $1,400 annual rise in their out-of-pocket medical spending [30]. Deaths impose further costs on survivors: lost earnings, funeral expenses, caregiving time, and often the sale of a home or business to settle an estate.

History shows how large this channel can be. Karger and Wray estimate that the average White man born in 1900 earned 2.6 times as much over his lifetime as the average Black man, nearly twice the cross-sectional earnings gap. The reason is survival: 48% of Black men born in 1900 died before age 30, against 26% of White men. Convergence in mortality halved the Black–White welfare gap between the 1900 and 1920 birth cohorts; for cohorts born between 1920 and 1970 the gap stagnated, as differences in income and life expectancy remained large [31].

3 Two gaps: wealth and survival

3.1 Wealth: the 2025 survey, and what changed since 2022

The 2025 Survey of Consumer Finances, released on October 9, 2026, put median net worth at $332,100 for White non-Hispanic families and $36,800 for Black non-Hispanic families, and mean net worth at $1,694,700 and $242,400, in 2025 dollars [1]. The ratio of medians is 0.11 and the ratio of means 0.14. The typical Black family therefore held 11.1% of the wealth of the typical White family. The gap's origins are historical and structural (Section 7.1): starting conditions after Emancipation [2], exclusion from mortgage credit and homeownership, including through the 1930s Home Owners' Loan Corporation maps [32], and continuing differences in income, returns, and access to credit. Differences in education, saving rates, or financial literacy account for little of it: earnings differences explain about two thirds of the gap in mean wealth [17], and saving rates do not differ significantly at equal income [33]. Family transfers sustain it. In the 2019 survey, 29.9% of White families had received an inheritance or gift, against 10.1% of Black families, and 71.9% against 40.9% could get $3,000 from family or friends in an emergency. Among middle-aged families, 65% of White and 44% of Black families held a retirement account [34].

Between the 2022 and 2025 surveys the Black median fell from $49,100 to $36,800, both in 2025 dollars, a fall of 25%, while the White median rose 6% to $332,100 [1, 35]. The ratio of medians fell from 0.16 to 0.11 (standard error 0.024), and the Federal Reserve's Bulletin describes the White median as nine times the Black median, the largest ratio recorded since 2016 [1]. Three qualifications matter. First, the decline is confined to the median: mean Black net worth rose 5% over the same period, and the ratio of means moved little. Second, the change in the median is not statistically distinguishable from zero. The Federal Reserve's published standard errors are $12,200 on the 2022 Black median and $7,500 on the 2025 median [36]. The two surveys are independent cross-sections, so the change has a standard error of about $14,400 ($z = -0.86$), and a 90% interval for it runs from −73% to +23%. The 2022 Black median was itself imprecisely estimated, as the Federal Reserve noted at the time [37], and Black respondents were 11.5% of weighted families in 2022 against 13.9% in 2025. Third, the 2025 level remains 20% above the 2019 median of $30,600 in 2025 dollars: the 2025 survey gave back about two thirds of a 2019–2022 gain that was itself imprecise.

What moved is an asset-composition story that the survey's own tables record [36]. The median Black family's balance sheet is a vehicle, a checking account, perhaps a small retirement account, and, for just under half of families, a house. Between the two surveys, among Black families that held each asset, the real median value of vehicles fell 27% (from $25,200 to $18,400), of

retirement accounts 26% ($42,700 to $31,400), and of transaction accounts 26% ($2,300 to $1,700). The median primary residence fell 5% ($273,600 to $259,000). The share of Black families owning a business fell from 11.0% to 7.6%, and the share holding stocks directly from 13.2% to 7.0%. The assets that drove the national gains between the surveys, stocks and large retirement balances, are thinly held in the lower half of the Black distribution, which is consistent with a falling Black median beside a rising Black mean. Income moved the same way: median Black family income for the year before the survey fell 2% in real terms while the White median rose 7% [1]. The survey's balance sheets were collected mostly from April to December 2025, so they predate most of the 2025–2026 labor-market changes; the asset-price movements behind them, in used cars, house prices, and interest rates, were in motion from 2022.

3.2 Survival

In 2024, life expectancy at birth was 74.8 years for the non-Hispanic Black population and 78.9 for the non-Hispanic White population, a gap of 4.16 years. The gap was 5.4 years for men (71.3 against 76.7) and 3.1 for women (78.2 against 81.3) [3]. Table 1 summarizes the quantities used below; all are computed from the complete 2024 period life tables, which describe one year's death rates rather than a cohort's experience.

Table 1. Survival in 2024, non-Hispanic White and Black populations, from the complete period life tables [3]. Years lived are life-table person-years per person alive at 22 (T_{67}/l_{22} and $(T_{22} - T_{67})/l_{22}$).

	White	**Black**	**White men**	**Black men**	**White women**	**Black women**
Life expectancy at birth (years)	78.9	74.8	76.7	71.3	81.3	78.2
Life expectancy at 65 (years)	19.5	18.3	18.2	16.5	20.6	19.8
Alive at 65, share of birth cohort	84.1%	76.4%	80.6%	70.7%	87.7%	82.1%
Reach 67, share of 22-year-olds (period)	82.7%	75.2%	79.0%	69.1%	86.6%	81.1%
Reach 85, share of 22-year-olds	43.5%	35.4%	37.1%	27.1%	49.9%	43.1%
Die between 22 and 65	15.1%	21.7%	18.4%	27.3%	11.6%	16.4%
Years lived at 67+, per 22-year-old	14.9	12.8	13.3	10.6	16.5	14.9
Years lived at 22–66, per 22-year-old	42.8	41.6	42.2	40.5	43.4	42.6

3.3 Where the survival gap arises

Figure 1 plots survivors by age. The curves separate early and widen through middle age. By 65, 84.1% of a White birth cohort is still alive against 76.4% of a Black cohort, and half of each cohort has died by about age 83 and 79 respectively. After 65 the remaining difference is small: a Black 65-year-old can expect 18.3 more years and a White 65-year-old 19.5, a difference of 1.14 years.

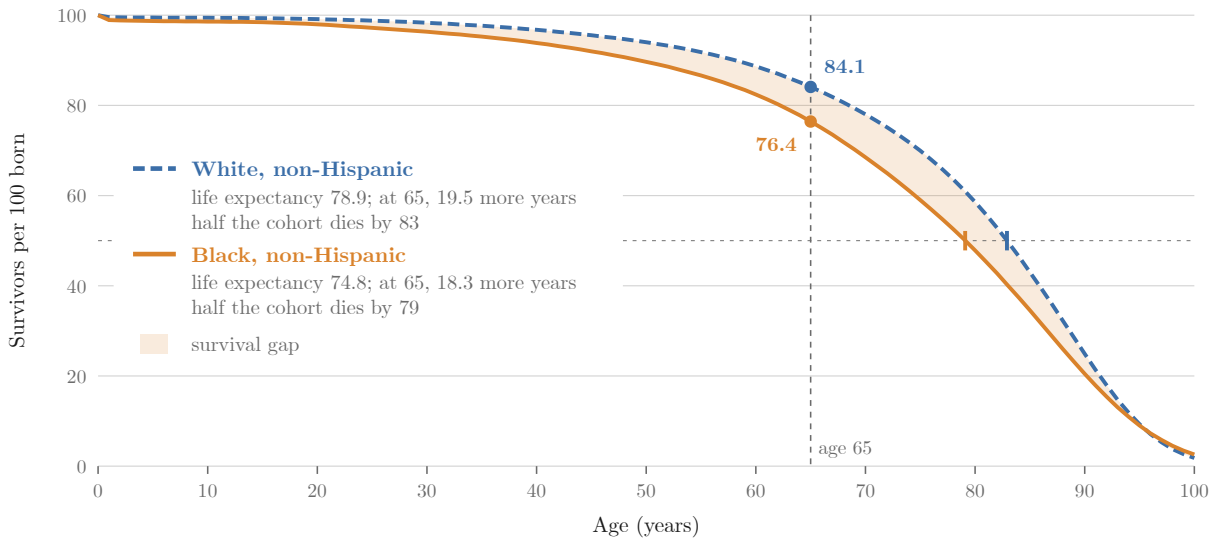


Figure 1. Survivors per 100 born, non-Hispanic White and Black populations, 2024. The gap opens early and is widest in middle age: by 65, 84.1% of the White and 76.4% of the Black birth cohort are alive. Notes: period life tables [3]; the shaded area is the survival gap; ticks on the dotted line mark the age by which half the cohort has died.

To locate the gap by age, we decompose the difference in life expectancy at birth by age at death with the method of Arriaga [38]. For single years of age x, with survivors l_x, person-years lived L_x, and person-years remaining T_x, and superscripts B and W for the two populations, the contribution of deaths at age x to $e_0^W - e_0^B$ is

$$\Delta_x = \frac{l_x^B}{l_0}\left(\frac{L_x^W}{l_x^W} - \frac{L_x^B}{l_x^B}\right) + \frac{T_{x+1}^W}{l_0}\left(\frac{l_x^B}{l_x^W} - \frac{l_{x+1}^B}{l_{x+1}^W}\right), \tag{1}$$

with the open age interval at 100 handled by a single term. The contributions sum exactly to the gap. Of the 4.16-year difference, 3.3 years (79%) arise from deaths before age 65 and 2.3 years (56%) from deaths at working ages, 22–64 (Figure 2). Deaths at 45–64 alone contribute 1.27 years (31%); infant deaths contribute 0.52 years. Above 85 the contribution is slightly negative (−0.17 years). Recorded death rates at the oldest ages are slightly lower for Black than for White Americans, which may partly reflect selective survival and the quality of data at those ages, where the life tables rely on Medicare records and smoothed death rates [3]. The decomposition depends on which population is the starting point. Reversing the roles of the two populations in Equation 1 attributes 3.2 years (77%) to deaths before 65 and −0.22 years to deaths above 85. The average of the two directions attributes 78% to deaths before 65.

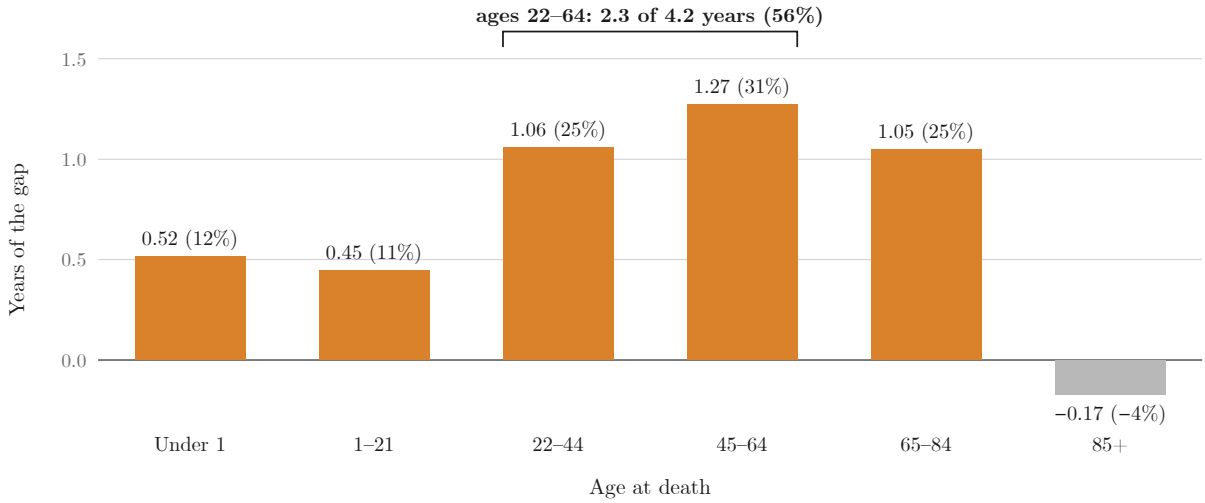


Figure 2. Contributions of deaths at each age to the 4.16-year gap in life expectancy at birth between the non-Hispanic White and Black populations in 2024. Most of the gap arises before 65, and deaths at 45–64 contribute most of any age group. Notes: Arriaga decomposition (Equation 1); percentages are shares of the total gap; data from the 2024 period life tables [3].

This age pattern is consistent with what Geronimus called weathering, the cumulative physiological toll of chronic social and economic adversity [39], and with the cause-of-death evidence. The stress mediators that protect the body in the short run damage it when they are activated chronically [40]. In national data, Black adults had higher allostatic load scores than White adults at all ages, most of all at 35–64, and the difference was not explained by poverty [21]. Over 1990–2018 the gap in life expectancy narrowed by almost half, mostly through falling Black mortality from cancer, homicide, HIV, and causes originating in infancy; the narrowing stalled after 2012 [11]. Wealth is part of the story: in the Health and Retirement Study, the far lower asset holdings of Black adults predicted their survival independently of income and education [41]. Among adults aged 25 and older, savings, stock ownership, and homeownership were associated with better health and debt with worse health, with no evidence that debt was more harmful to Black than to White adults [42]. Bereavement compounds the burden: in two national surveys, Black Americans were more likely than White Americans to have lost a mother, a father, or a sibling by midlife, and a child or a spouse during adulthood [43].

3.4 How shorter lives reach wealth

We now ask how the survival differences in Table 1 enter wealth when everything else is held equal. Each calculation gives both populations identical earnings, saving, returns, and benefit rules and lets only survival differ. These are accounting exercises, not causal estimates; their purpose is to bound how much of the wealth gap the survival gap can carry through each channel.

Channel 1: age composition. Wealth rises with age into the late sixties (Figure 3A). A population whose members die younger has fewer adults at the ages when wealth peaks. To isolate this effect, we weight the 2025 age-wealth profile of all U.S. families, $w(a)$ [1], by each population's adult person-years:

$$\bar{W}_g = \frac{\sum_{a \geq 22} w(a)\, L_a^g}{\sum_{a \geq 22} L_a^g}. \tag{2}$$

Because Black survival is lower, Black adult person-years tilt toward younger ages (Figure 3B). The age-standardized wealth index is 3.2% lower using median wealth by age and 2.8% lower using mean wealth by age. Against the observed Black-to-White ratios of median wealth (11.1%) and mean wealth (14.3%), this is 1.5% of the log gap with medians and 1.5% with means. Across the metrics in Table 2, which also start adulthood at 18 and measure the gap in levels, the share lies in the range 1.5–3.9%. The channel is stable across survey waves: recomputed on the 2022 survey's profile and medians it was of the same size. Because the weights come from period life tables, the calculation isolates the effect of mortality on age structure; the actual Black and White adult populations also differ in age structure through fertility and migration. The national age-wealth profile is itself shaped by differential survival, since wealthier people live longer. The compositional channel is real but small.

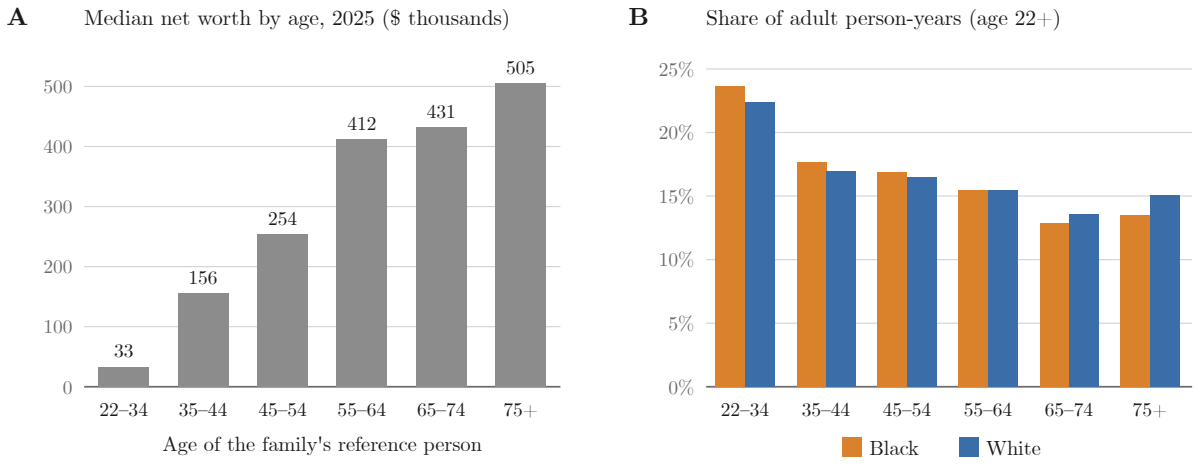


Figure 3. (A) Median family net worth by age of the reference person, 2025 Survey of Consumer Finances [1]. (B) Share of adult person-years (ages 22 and over) in each age group implied by the 2024 Black and White life tables. Weighting panel A by panel B (Equation 2) lowers the Black index by 3.2%, about 1.5% of the observed log gap.

Channel 2: the annuity structure of retirement income. Social Security retirement benefits are paid for as long as the beneficiary lives. For a person alive at 22, expected years of life at 67 and older are 12.8 in the Black population and 14.9 in the White population, 14% fewer; for men the figures are 10.6 and 13.3, 20% fewer. To translate years into money, consider two workers with identical earnings who pay payroll tax from 22 through 66 while alive and receive the same benefit from 67 while alive. The ratio of the expected present value of benefits to that of contributions is

$$\mathrm{MW}_g = \frac{\sum_{x \geq 67} v^{\,x+\frac{1}{2}-22}\, L_x^g}{\sum_{x=22}^{66} v^{\,x+\frac{1}{2}-22}\, L_x^g}, \qquad v = (1+r)^{-1}, \tag{3}$$

and the Black-to-White ratio of **MW** isolates survival. At a 2% real discount rate, a Black worker's expected retirement benefits per dollar of contributions are 11.7% lower than those of a White worker with the same earnings, and 17.2% lower for men (Table 3). The result barely moves with the discount rate.

Table 2. Sensitivity of the age-composition channel (Equation 2): the age-standardized Black–White wealth gap as a share of the observed gap, by summary statistic, starting age, and scale. The level gap is 1 minus the Black-to-White ratio. The youngest age group in the Survey of Consumer Finances is "under 35" [35], so starting at 18 or at 22 are both defensible. Weights are adult person-years from the 2024 period life tables [3], so the calculation isolates the effect of mortality on age structure; actual adult age structures also reflect fertility and migration.

Share of the observed gap	**Adults 22 and older**	**Adults 18 and older**
Log gap, medians by age	1.5%	1.6%
Log gap, means by age	1.5%	1.6%
Level gap, medians by age	3.6%	3.9%
Level gap, means by age	3.3%	3.7%

Table 3. Retirement-only Social Security money's worth (Equation 3) of a Black worker relative to a White worker with identical earnings and benefits. Values below 1 mean fewer expected benefit dollars per contribution dollar. The calculation omits disability and survivor benefits. For the full program, the GAO found that Black Americans as a group receive relatively more benefits per tax dollar than White Americans because of lower lifetime earnings and higher disability rates; that comparison does not hold earnings equal [16].

Real discount rate	**All**	**Men**	**Women**
0%	0.887 (−11.3%)	0.830 (−17.0%)	0.921 (−7.9%)
2%	0.883 (−11.7%)	0.828 (−17.2%)	0.916 (−8.4%)
3%	0.881 (−11.9%)	0.828 (−17.2%)	0.915 (−8.5%)

Retirement benefits are not the whole of Social Security. The program also pays disability and survivor benefits, and its formula replaces a larger share of earnings for lower earners. In a 2003 microsimulation of the full program for people born from 1931 to 1964, the General Accounting Office found that Black and Hispanic Americans as groups tend to receive more in benefits relative to taxes than White Americans, because of lower lifetime earnings and higher disability rates. It also found these differences small next to the differences between high and low earners within each group [16]. That comparison does not hold earnings equal, so it does not offset the 11.7% shortfall at equal earnings in Table 3. Through the retirement component alone, which depends heavily on life expectancy, Black Americans fare worse, as the GAO also noted [16]. Section 4 models the disability and family benefits explicitly.

Table 4. Channels from survival to wealth, holding earnings, saving, returns, and benefit rules equal. Computed from the 2024 life tables [3] and the 2025 age-wealth profile [1]; comparison rows from the 2025 Survey of Consumer Finances [1, 44].

Channel and measure	Black	White	Difference	Share of observed log gap
Age composition				
Age-standardized wealth index, medians by age ($ thousands)	265.5	274.1	−3.2%	1.5%
Same, means by age ($ thousands)	1161.9	1195.7	−2.8%	1.5%
Working life				
Years lived at 22–66, per 22-year-old	41.6	42.8	−2.9%	1.3%*
Retirement annuity				
Years lived at 67+, per 22-year-old	12.8	14.9	−14%	not comparable†
Retirement benefits per contribution dollar, equal earnings, r = 2%			−11.7% (men −17.2%)	not comparable†
Partner loss				
Couple aged 30: at least one partner dies before 67	42.4%	30.7%	+11.7 points	not comparable‡
For comparison				
Median family net worth, 2025 ($ thousands of 2025)	36.8	332.1	−89%	100%
Ever received an inheritance or gift, 2025	11.1%	35.2%	−24.2 points	

Shares are the log of the Black-to-White ratio for the channel divided by the log of 36.8 ÷ 332.1, the observed ratio of median net worth in the 2025 survey; the means row uses the ratio of mean net worth, 242.4 ÷ 1,694.7. Table 2 gives other metrics for the composition channel. * If net worth scaled one-for-one with expected years lived at 22–66, holding annual earnings and saving equal. † Social Security wealth is not part of the net worth that the Survey of Consumer Finances measures [35, 45], so this channel cannot be expressed as a share of the observed gap. For the full program, which also pays disability and survivor benefits, the GAO found that Black Americans as a group receive relatively more benefits per tax dollar because of lower lifetime earnings and higher disability rates; that comparison does not hold earnings equal [16]. ‡ A probability, not an amount of wealth.

Channel 3: the loss of a partner. Households pool earnings, and a death before retirement removes an earner. If two partners aged 30 face independent survival risks, the probability that at least one dies before 67 is $1 - S_m(30, 67)\, S_f(30, 67)$, where S denotes survival between the two ages in the sex-specific life tables. For Black couples that probability is 42.4%; for White couples, 30.7%. For couples aged 40, it is 39.3% and 28.4%. These figures assume partners of the same age whose survival is independent and follows the population life tables, which include unmarried people, who tend to die younger than married people; partners' risks are also correlated, so the levels are approximate. Each such death is a compound wealth shock: lost earnings, net of the consumption the deceased would have had, which Section 4 does not subtract; funeral and end-of-life costs; and, for a surviving parent of young children, years of single-income saving.

Channel 4: working lives. For a person alive at 22, expected years lived between 22 and 66 are 41.6 in the Black population and 42.8 in the White population, 2.9% fewer (4.0% for men). Holding annual earnings equal, expected lifetime labor income falls by the same proportion; if net worth scaled one-for-one with years worked, this channel would account for about 1.3% of the log median wealth gap. For the cohort born in 1900 this channel nearly doubled the earnings gap (Section 2.2) [31]. Today it is modest, but it is concentrated in the deaths at 45–64 that Figure 2 highlights, when earnings and savings are near their peak.

Channels we do not quantify. Health shocks before death reduce employment and earnings [30]. Medical debt is more common among Black households: 28% reported it in a 2018 Census Bureau survey summarized by the Consumer Financial Protection Bureau, against 17% of White households [46]. Early and repeated bereavement strains the same family networks that provide emergency help and transfers [34, 43].

3.5 Summary of the channels

Table 4 collects the estimates. They support three conclusions. First, shorter lives account for little of the measured wealth gap directly. The two channels that can be put on the scale of observed net worth are small. The compositional effect is about 1.5% of the log gap (1.5–3.9% across metrics), and shorter working lives account for about 1.3% if wealth scaled one-for-one with years worked. The gap is primarily a product of history and of continuing differences in income, inheritance, homeownership, and access to credit (Section 7) [2, 32].

Second, survival differences bear on forms of wealth and risk that net worth does not record. At equal earnings, retirement benefits per contribution dollar are 11.7% lower for Black workers, and a Black couple aged 30 has a 42% rather than 31% chance of losing a partner before 67, under the assumptions above. Social Security wealth is excluded from the survey measure of net worth [1, 45], and the partner calculation is a probability, so neither can be read as a share of the observed gap. Section 4 puts these channels, and bequests, in dollars.

Third, the arrows run both ways. Lower wealth predicts earlier death [5, 24, 41], and earlier death lowers what a household can accumulate. Chronic stress is one candidate for a common contributor to both gaps, through weathering [21, 39] and through spending and borrowing under strain (Section 8). The evidence reviewed here does not show that it drives either gap, whose main causes lie in the history and institutions cited above.

4 Projecting the channels net worth does not record

Section 3 put two survival channels on the scale of measured net worth and left three as ratios or probabilities: Social Security wealth, the loss of a partner, and bequests. This section builds an open projection model for those three. It asks what the Black–White survival gap is worth in dollars through each channel, for whom, and how the amounts change as death rates fall. Like Section 3, the model is accounting, not causal inference: it changes survival, and where stated earnings, while holding behavior fixed.

4.1 A projection model

Mortality. We start from the 2024 life tables for non-Hispanic Black and White men and women [3]. We carry them forward with the improvement in death rates by age and sex that the 2026 Social Security Trustees Report projects to 2100 [47]:

$$q^{g}_{x,t} = q^{g}_{x,2024}\,\frac{q^{\mathrm{SSA}}_{x,t}}{q^{\mathrm{SSA}}_{x,2024}},$$

where $q^{g}_{x,t}$ is the probability that a member of group g aged x in year t dies before reaching $x+1$. Under the Trustees' intermediate assumptions this holds the Black–White gap in log death rates at its 2024 value at every age, so the gap measured in years narrows as death rates fall. Their low-cost and high-cost assumptions give the range of mortality improvement we consider; they do not bound the model's other uncertainties. A second scenario lets the gap close linearly to zero by 2050. Each cohort lives through the projected rates year by year, and the model reproduces the 2024 life expectancies exactly. Section 3 used period measures; the figures in this section are cohort measures with projected improvement, and Table 5 labels them so.

Earnings and benefits. Each worker earns the age profile of the Social Security Administration's medium scaled worker, whose average over the highest 35 years equals the national average wage index ($69,846.57 in 2024) [48, 49]. Earnings are scaled by the group's mean earnings relative to all earners aged 25 to 64 in the Current Population Survey [50]: 1.28 for White men, 0.85 for Black men, 0.88 for White women, and 0.73 for Black women. One representative earner per group discards the within-group distribution of earnings, so Table 5 also reports the penalty at each group's median earnings and for the Social Security Administration's very-low to high scaled earners. Benefits follow the law [49, 51]: the average of the highest 35 years of earnings up to the taxable maximum (fewer years for deaths before 62), the 2026 benefit formula indexed to 2024 wages, and claiming at the full retirement age of 67. A spousal benefit is up to half the other spouse's benefit, and a survivor benefit equals the deceased worker's benefit. We report two measures. The retirement measure sets retirement, spousal, and survivor benefits from 67 against the 10.6% retirement and survivors share of the payroll tax paid while alive. The full measure adds the benefits that pay out on disability and on early deaths, with the family maximum applied throughout [52, 53]. A disabled worker draws a disabled-worker benefit, and each child and a spouse caring for a child under 16 draw 50% of it. A deceased worker's children under 18 (19 in high school) and a surviving parent under 60 caring for a child under 16 each draw 75%, and a widow(er) may draw a reduced benefit from 60, subject to the earnings test. The full measure sets these against the full 12.4% tax in years not spent on disability.

Disability rates are the Social Security Administration's December 2024 counts of disabled workers by sex and age [54], divided by the population of that sex and age. Each is multiplied by the group's receipt rate relative to everyone of its sex and age band in the 2025 Current Population Survey microdata, with standard errors from its replicate weights [55]. At 60 to 66, 20% of Black and 13% of White men receive them, and 21% of Black and 11% of White women. A disabled worker receives the average benefit of 2024 awards for that sex, scaled by the group's ratio of reported benefits in the survey ($1,794 a month for Black and $2,305 for White men).

The ages of children in each family come from the same microdata. Claiming at 62 is a sensitivity. Amounts are in 2024 dollars and present values use a 2% real discount rate. Benefits are those scheduled under current law. The 2026 Trustees project that once the combined trust funds are depleted, in 2034, only 83% of scheduled benefits are payable, falling to 65% by 2100 [47]; a payable-benefits sensitivity applies those shares to both groups (Table 5).

Wealth and costs. Net worth by race, age, and marital status comes from the 2025 Survey of Consumer Finances microdata, with standard errors from its 999 replicate weights and five implicates [44]. A death costs the median funeral with viewing and burial, $8,300 in 2023 ($8,500 in 2024 dollars) [56]. From age 65 it also costs the out-of-pocket medical spending of the last five years of life measured in the Health and Retirement Study, a mean of $56,400 and a median of $33,300 [57], converted to 2024 dollars with the consumer price index [58]. Couples are a woman and a man two years older whose lives are independent; Section 3's couples were the same age and faced 2024 death rates, and Table 7 shows both. The code and every input are in the replication files.

4.2 Social Security wealth

Table 5. Social Security wealth of workers entering work in 2024, by race and sex, from the projection model.

	Black men	White men	Black women	White women
Earnings, multiple of the medium worker	0.85	1.28	0.73	0.88
Monthly benefit at 67	$2,321	$3,123	$2,101	$2,377
Alive at 67, share of those alive at 21 (cohort, projected improvement)	74.7%	83.2%	85.2%	89.7%
Receiving disability benefits at 60–66	20.1%	12.5%	21.0%	11.3%
Benefits per dollar of contributions				
Retirement benefits, equal earnings (medium worker)	0.81	0.92	1.00	1.05
Retirement benefits, own earnings	0.85	0.87	1.10	1.10
All benefits, equal earnings (medium worker)	0.96	0.97	1.09	1.03
All benefits, own earnings	1.00	0.89	1.26	1.08
Expected present value at 21, own earnings				
Retirement benefits	$126,500	$200,700	$146,600	$178,000
Disability benefits	$26,800	$23,100	$31,800	$17,000
Benefits for the worker's children	$12,500	$11,400	$7,100	$5,000
Retirement and survivors payroll tax (10.6%)	$148,400	$231,600	$133,000	$162,400
Full payroll tax (12.4%), years not disabled	$165,600	$262,900	$147,500	$184,500
Net Social Security wealth, retirement only	−$21,900	−$30,800	$13,600	$15,600
Net Social Security wealth, all benefits	$200	−$27,600	$37,900	$15,500
Same, with White survival	$15,700	—	$46,200	—
Survival penalty, all benefits	$15,500	—	$8,200	—
Survival penalty, retirement only	$17,600	—	$8,800	—
Survival penalty, all benefits, undiscounted	$59,600	—	$28,200	—

	Black men	White men	Black women	White women
Survival penalty, all benefits, claiming at 62	$13,100	—	$7,100	—
Same, at the group's median earnings	$13,700	—	$7,500	—
Same, payable rather than scheduled benefits	$9,100	—	$5,200	—
Same, SSA's very low to high scaled earners	$10,300–$19,900	—	$5,700–$11,800	—
Chance of living long enough to recover contributions				
Equal earnings (medium worker)	41%	51%	56%	62%
Own earnings	44%	45%	61%	62%

Workers aged 21 in 2024, single, claiming at 67 unless stated; 2024 dollars; 2% real discount rate; scheduled benefits unless stated. Mortality: the 2024 life tables with the Trustees' intermediate improvement. Earnings: the medium scaled worker times the group's mean earnings relative to all earners 25–64 (median earnings in the row that says so). "With White survival" keeps the group's earnings, disability rates, and children. Retirement only: against the 10.6% retirement and survivors tax. All benefits adds disability and children's benefits (Section 4.1) against the full 12.4% tax. Payable: benefits scaled to 83% of scheduled from 2034, falling to 65% by 2100 (2026 Trustees Report). Claiming at 62: work ends at 61 and benefits are 30% lower.

At equal earnings, survival alone means that a Black man entering work in 2024 can expect 12% less in retirement benefits per dollar of contributions than a White man entering at the same time (Table 5). With 2024 death rates held fixed the model gives 17%, the figure in Table 3; projected improvement narrows the gap in years and so the gap in money's worth. At the two groups' actual earnings the difference nearly disappears (0.85 against 0.87), because the benefit formula replaces a larger share of lower earnings. Counting disability and family benefits against the full tax closes the gap at equal earnings almost entirely (0.96 in benefits per dollar of tax for a Black man against 0.97 for a White man). At actual earnings a Black man then expects more per dollar than a White man (1.00 against 0.89), because Black workers are more likely to draw disability benefits and to leave children who draw survivor benefits.

The progressive formula and these benefits mask the survival penalty rather than removing it. Lower lifetime earnings buy a higher replacement rate, higher disability and earlier deaths draw more of the program's insurance, and shorter lives take part of it back. Giving Black workers White survival while keeping their own earnings, disability rates, and families isolates the penalty. Counting all benefits, for a Black man entering work in 2024 it is $15,500 of expected Social Security wealth in present value ($59,600 undiscounted; $17,600 counting retirement benefits only). For a Black woman it is $8,200 ($28,200), and for a Black couple $18,300 ($78,200). Had everyone claimed at 62, the man's penalty would be $13,100. At median rather than mean earnings it is $13,700, and across the Social Security Administration's very-low to high scaled earners it ranges from $10,300 to $19,900. Under payable rather than scheduled benefits it is $9,100, because the cuts fall on the retirement years in which the penalty accrues. The chance of living long enough to recover one's contributions in benefits tells the same story: at equal earnings it is 41% for Black men and 51% for White men, and at actual earnings 44% and 45%.

4.3 Counting Social Security wealth

Table 6. Net worth and Social Security wealth of older households, thousands of 2024 dollars.

Households aged 65–74	**Black**	**White**	**Black ÷ White**
Net worth, median (standard error)	71 (28)	592 (56)	0.12
Net worth, mean (standard error)	282 (82)	2,305 (138)	0.12
Social Security wealth at 70, median earnings	401	558	0.72
Social Security wealth at 70, mean earnings	469	679	0.69
Net worth plus Social Security wealth, medians	472	1,150	0.41
Net worth plus Social Security wealth, means	751	2,984	0.25
Survival penalty in Social Security wealth at 70	18.4–21.4	—	—
Sensitivity: every household claimed at 62			
Social Security wealth at 70, median earnings	287	398	0.72
Net worth plus Social Security wealth, medians	358	990	0.36
Net worth plus Social Security wealth, means	617	2,790	0.22
Couples / single men / single women	40% / 24% / 36%	55% / 18% / 27%	
Families sampled	109	524	

Net worth: 2025 Survey of Consumer Finances, households whose reference person is 65–74, race of the reference person, 2024 dollars; five implicates and 999 replicate weights. Social Security wealth: expected present value at 70 of the household's remaining retirement, spousal, and survivor benefits under the projection model, for a couple or a single person in the survey's proportions, using each group's median (typical) or mean earnings, claimed at 67. The first sum adds median net worth to the Social Security wealth of median earners; neither is a median of the sum. The survival penalty is the gain if the same households had White survival. Claimed at 62: own benefits 30% and spousal benefits 35% below the full amounts, and survivor benefits limited to the larger of 82.5% of the deceased's benefit and the deceased's reduced benefit; most households claim between the two ages.

For an older Black household at the median of net worth and of earnings, Social Security wealth is worth about 6 times its net worth; for the corresponding White household, the two are of similar size. Among households aged 65 to 74, median net worth was $71,000 for Black households (standard error $28,000) and $592,000 for White households ($56,000), in 2024 dollars. The Social Security wealth of a typical-earning household of each group at 70 is $401,000 and $558,000 (Table 6). Counting it raises the Black-to-White ratio of typical wealth from 0.12 to 0.41 and of mean wealth from 0.12 to 0.25, consistent with evidence that adding Social Security wealth reduces measured wealth inequality [45]. Had every household claimed at 62, the typical ratio would be 0.36. Because older Black households depend more on this asset, its survival penalty bears more heavily on them: at 70, shorter remaining lives cost Black households $18,400 to $21,400 of expected Social Security wealth, about 5% of it. This counts only the survival gap after 70; for workers who are 21 today the penalty also includes the higher chance of dying before benefits begin (Table 5). The Black estimates rest on 109 sampled families, hence their wide standard errors.

4.4 The loss of a partner

For couples aged 30 and 32 in 2024, the model projects that 39% of Black couples and 28% of White couples will lose a partner before the woman turns 67 (Table 7). It projects that 26% of Black women and 18% of White women will be widowed by then, spending on average 3.5 and 2.3 years widowed before 67. Section 3's 42% and 31% are higher because they hold 2024 death rates fixed. The expected present value of the earnings a household loses when a partner dies before 65 is $135,300 for Black couples and $126,800 for White couples, whose higher earnings make each death more costly. With White survival, Black couples would lose $89,900: shorter lives add $45,450 to their expected loss. These figures are gross of the deceased partner's own consumption. Net of the 22.3% of household consumption the deceased would have taken, the losses are $77,200 and $74,100 and the penalty $25,900 (Table 7); life insurance is not netted out.

Table 7. The loss of a partner: probabilities and expected costs for couples aged 30, from the projection model.

Couples aged 30 and 32 in 2024	**Black**	**Black, White survival**	**White**
Monthly benefits at 67, woman / man	$2,101 / $2,321	$2,101 / $2,321	$2,377 / $3,123
Before the woman turns 67			
A partner dies	39.0%	27.9%	27.9%
The woman is widowed	26.1%	18.3%	18.3%
The man is widowed	12.9%	9.7%	9.7%
Years the woman spends widowed	3.5	2.3	2.3
Expected present value at 30			
Earnings lost to a partner's death before 65	$135,300	$89,900	$126,800
Same, net of the deceased partner's own consumption†	$77,200	$51,200	$74,100
Funeral and end-of-life costs, all deaths	$36,700	$38,000	$38,000
Survivor benefits above own benefit, from 67	$7,800	$7,100	$25,300
Reduced survivor benefits, 60 to 66, after the earnings test	$15,300	$11,100	$12,700
Benefits for children and for a parent caring for them	$24,000	$15,400	$18,900
All survivor benefits	$47,100	$33,600	$56,900
Survivor benefits from 60 and 67, without the earnings test*	$30,600	$23,500	$46,300
Disability benefits for the partners and their children	$80,500	$83,500	$54,300
Sensitivity: a partner dies before the woman turns 67			
Partners the same age	36.4%	—	25.9%
2024 death rates held fixed	45.3%	—	33.0%
Black death rates converge to White by 2050	30.2%	—	—

A woman aged 30 and a man aged 32 in 2024, both alive, independent lives, each group's mean earnings; 2024 dollars; 2% real discount rate. "Black, White survival" keeps Black earnings. Lost earnings run from the year after a death through the deceased's 64th year while the other partner lives. Survivor benefits follow the rules in Section 4.1 (earnings test, children's and young parents' benefits, family maximum; children's ages from the 2025 Current

Population Survey); all survivor benefits sums the three rows above it. Disability benefits use each partner's receipt rate by age (Table 5). † Less 22.3% of the couple's combined earnings in those years, the share of a two-adult household's needs that one adult accounts for in the official 2024 poverty thresholds. * An upper bound: every widowed partner draws 71.5% of the deceased's benefit at 60, rising to 100% at 67, ignoring the earnings test.

Survivor insurance replaces part of the loss through three kinds of benefit. Children under 18 and a surviving parent caring for a child under 16 draw benefits while the children are young; their expected value is $24,000 for Black couples and $18,900 for White couples. A surviving partner may draw a reduced survivor benefit from 60, subject to the earnings test: $15,300 and $12,700. From 67 the survivor receives the larger of the two partners' benefits, which is worth most when one partner earned much more than the other. Black partners' benefits are lower and closer together ($2,101 and $2,321 a month) than White partners' ($2,377 and $3,123), so this part is worth $7,800 to Black couples and $25,300 to White couples. In all, survivor benefits are worth $47,100 to Black and $56,900 to White couples and replace 35% and 45% of their expected lost earnings. The benefits that pay out on deaths before 67 are larger for Black couples ($39,300 against $31,600). The extra survivor benefits that higher mortality brings Black couples, $13,500, offset 30% of the $45,450 that their shorter lives add to lost earnings. Survivor insurance therefore pays less, and replaces less of the loss, where widowhood comes earliest. Disability benefits for the partners and their children add $80,500 for Black and $54,300 for White couples. Children's ages for these families come from 816 Black and 8,937 White married couples in the survey microdata.

4.5 Bequests

Shorter lives change when children inherit more than how much. A child born in 2024 to Black parents aged 28 and 30 expects to inherit from the last surviving parent at about 60, and at about 61 if the parents had White survival (Table 8). The mother's age is the group's mean age at first birth in 2023 plus the all-race difference between the mean age at all births and at first births, rounded; the father is two years older [59]. The expected estate, measured by the net worth of unmarried households of the parent's age less funeral and end-of-life costs, is $30,900 at the median and $124,300 at the mean, and nearly the same with White survival ($31,200 and $123,900). For a child of White parents aged 30 and 32 it is $297,000 and $1,040,600. These are estates for a single child; Section 5 splits estates among 2.7 children on average for Black and 2.1 for White households. The bequest gap is a gap in parents' wealth, not in their lifespans. What shorter lives do change is the risk of losing both parents early. 8.5% of Black children are projected to lose both parents before 45, against 4.4% with White survival and 5.8% of White children, whose parents are older when they are born [59]. These estimates rest on small samples of unmarried Black households (99 families aged 65 and older), and the wealth of living households overstates that of decedents, who are poorer on average [41].

Table 8. Inheritance from the last surviving parent, from the projection model.

Child born in 2024	**Black parents**	**Black parents, White survival**	**White parents**
Parents' ages at the birth, mother / father	28 / 30	28 / 30	30 / 32
Child's expected age when the last parent dies	60.0	61.5	59.4

Child born in 2024	Black parents	Black parents, White survival	White parents
Has lost both parents by 30	1.3%	0.6%	0.8%
Has lost both parents by 45	8.5%	4.4%	5.8%
Expected estate, 2024 dollars			
From median net worth	$30,900	$31,200	$297,000
From mean net worth	$124,300	$123,900	$1,040,600
Present value at the child's age 30			
From median net worth	$17,200	$16,800	$167,000
From mean net worth	$70,500	$67,600	$586,600
Unmarried households aged 65 and older, 2025 survey, thousands of 2024 dollars			
Net worth, median (standard error)	73 (11)	—	342 (39)
Net worth, mean (standard error)	188 (36)	—	1,113 (93)
Families sampled	99	—	299
Sensitivity: child's expected age when the last parent dies			
2024 death rates held fixed	56.4	—	56.4
Black death rates converge to White by 2050	61.3	—	—

Parents: the mother's age is the group's mean age at first birth in 2023 plus the all-race difference between the mean ages at all births and at first births (2.1 years), rounded; the father is two years older; independent lives. The estate is the net worth of unmarried households of the surviving parent's age (2025 Survey of Consumer Finances, ages 18–44, 45–64, and 65 and older, in 2024 dollars), less the median funeral and, from 65, end-of-life medical spending, and not below zero. "Black parents, White survival" keeps Black parents' ages and wealth. Present values discount at 2% from the child's 30th birthday. Assumes a single child and no taxes or transfers before death.

4.6 Forecasts to 2075

Under the intermediate assumptions with the 2024 gap held in proportion, life expectancy rises for both groups and the gap in years narrows slowly: for men from 5.4 years in 2024 to 4.8 in 2050 and 4.2 in 2075, and for women from 3.1 to 2.6 and 2.05 (Figure 4). The penalties shrink more slowly still (Table 9). For Black men entering work in 2054, the Social Security penalty is $13,900, against $15,500 for those entering in 2024; across the Trustees' low-cost and high-cost assumptions the 2024 figure ranges from $13,500 to $16,500. The share of couples aged 30 who lose a partner before 67 falls from 39% to 32% for Black couples who are 30 in 2054, and from 28% to 22% for White couples. Falling mortality alone does not close these gaps. If Black death rates instead converged to White rates by 2050, the Social Security penalty for today's 21-year-olds would nearly vanish (−$200, within rounding of zero), because most of it arises at ages they would reach after 2050. Couples aged 30 today would still bear $24,300 of their $45,450 partner-loss penalty, because the excess deaths before 2050 fall in their working years.

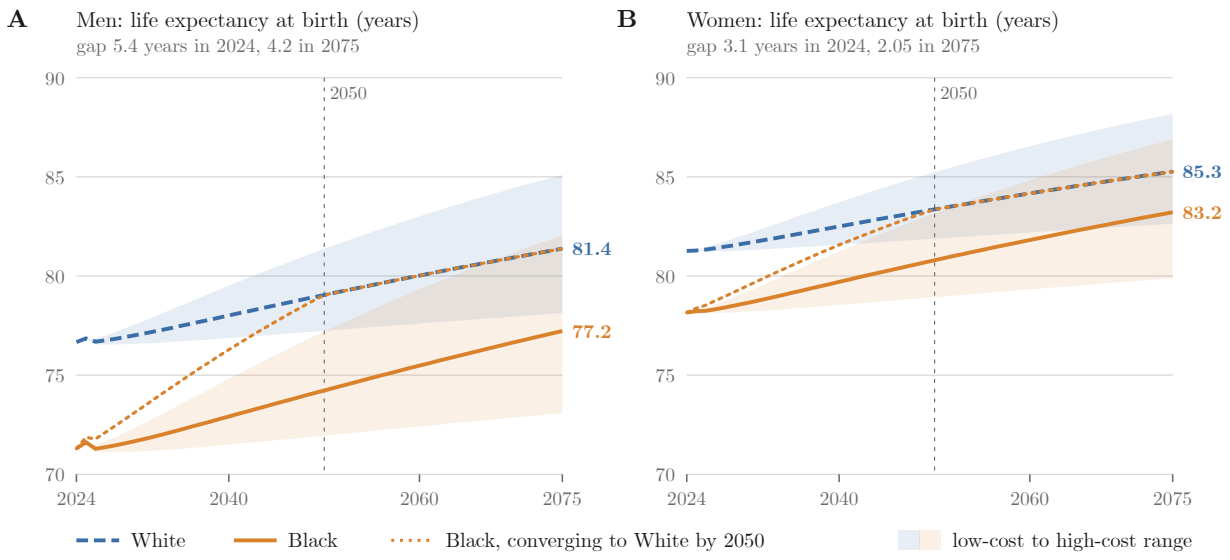


Figure 4. Projected period life expectancy at birth, 2024–2075, for non-Hispanic Black and White men (A) and women (B). Both groups gain years, and the gap narrows slowly under the intermediate assumptions. Notes: the 2024 life tables [3] carried forward with the improvement in death rates in the 2026 Trustees Report [47]; lines hold the 2024 gap in log death rates constant; shaded bands span the Trustees' low-cost and high-cost assumptions, not sampling error; the dotted line lets Black rates converge to White rates by 2050. The Trustees' death probabilities are lower in 2025 than in 2026, hence the early rise and dip.

Table 9. Forecasts by the year a cohort starts, under each mortality scenario.

Year the cohort starts	**2024**	**2034**	**2044**	**2054**
Black men aged 21: Social Security survival penalty				
Intermediate	$15,500	$15,000	$14,400	$13,900
Low-cost	$16,500	$16,400	$16,300	$16,100
High-cost	$13,500	$12,400	$11,200	$10,300
Converging by 2050	−$200	$0	$0	$0
Intermediate, retirement benefits only	$17,600	$17,000	$16,200	$15,600
Black women aged 21: Social Security survival penalty				
Intermediate	$8,200	$7,700	$7,100	$6,700
Converging by 2050	$100	$0	$0	$0
Couples aged 30: a partner dies before the woman turns 67				
Black, intermediate	39%	36%	34%	32%
White, intermediate	28%	26%	24%	22%
Black, converging by 2050	30%	27%	24%	22%
Black couples aged 30: survival penalty in expected lost earnings				
Intermediate	$45,500	$43,500	$40,600	$37,800
Converging by 2050	$24,300	$9,400	$1,300	$0
Offset by survivor benefits, intermediate	$13,500	$13,000	$12,200	$11,500

Penalties are the gain in expected present value, at the cohort's starting age, if the cohort had White survival with its own earnings, disability rates, and children; 2024 dollars, 2% real discount rate. Social Security penalties count all benefits (Table 5) unless stated. The offset is the extra survivor benefits (Table 7's "All survivor benefits") that Black

couples receive because of their higher mortality. Intermediate, low-cost, and high-cost are the Trustees' mortality assumptions applied to the 2024 race-sex life tables with the 2024 gap in log death rates held constant (the low-cost assumptions have the slowest decline in death rates). "Converging by 2050" closes the gap in log death rates linearly between 2024 and 2050. Amounts are rounded to the nearest $100; the text gives the 2024 couples' penalty as $45,450, the difference of the unrounded entries of Table 7.

What the model adds. Through the channels that net worth does not record, the survival gap is worth tens of thousands of dollars to each Black household: $8,200 to $18,300 of Social Security wealth in present value, and $45,450 of expected lost earnings for a couple ($25,900 net of the deceased's own consumption). Survivor insurance replaces about 30% of the gross figure. These sums are large next to the median net worth of Black families and small next to the White–Black gap in it (Section 3.1). They confirm the conclusion of Section 3 from a second direction. The racial wealth gap is primarily a product of history and of continuing differences in income, inheritance, homeownership, and access to credit. Shorter lives impose an additional, measurable cost on the assets that Black households depend on most, and the cost persists for as long as the survival gap does.

5 A microsimulation of household wealth

Sections 3 and 4 measured what shorter lives cost. Sections 5 and 6 ask the question in reverse: what it would take to close the Black–White wealth gap, how quickly, and what equal conditions would add to the economy and to Black lives. We answer it with a microsimulation that starts from the households of the 2025 Survey of Consumer Finances and follows them and their descendants to 2100, simulating 10 million households for each path. We check it by running it forward from the surveys of 1989, 1992, and 2022. Like the rest of Part I, the model is accounting under stated assumptions. It shows what each lever would do if it were achieved, not whether any policy would achieve it. Its headline specification lets each group's base saving rate differ, and every result in Section 6 is run under it. A sensitivity with one saving schedule for both groups is reported beside the headline and labeled so.

5.1 Households

Each simulated household begins as a non-Hispanic Black or White household drawn, with its survey weight, from the 2025 Survey of Consumer Finances [44]. Each year its net worth changes as

$$W_{i,t+1} = W_{i,t}\,(1 + r_{i,t}) + \big(s_g(p_i) - \phi_g\big)\,Y_{i,t} - c_a\,W^{+}_{i,t} - D_{i,t} + T_{i,t},$$

where $Y_{i,t}$ is income other than interest, dividends, and capital gains, set by the household's rank p_i in the national income distribution, an age profile, and real wage growth. $s_g(p_i)$ is the share of that income saved, which rises with income rank from a base rate fitted for each group g, and ϕ_g is the share of income given as support to relatives and friends outside the household. The survey measures that support, given less received, at 1.34% of income for Black and 1.33% for White households under 67 (24% and 18% give any; support received, first asked in 2025, is 0.53% and 0.53% of income) [44]. The gap in support between the groups that version 2.1 measured in the 2022 survey has all but disappeared in 2025. c_a is consumption out of positive

wealth, which after 67 draws wealth down over the expected remaining lifetime. $D_{i,t}$ is the cost of deaths in the household, including an end-of-life and estate-settlement cost at the last death, and $T_{i,t}$ is gifts and inheritances received. The model runs in wage-indexed dollars. Real wages grow at their 1969–2019 average of 0.78% a year in the calibration and on the 2026 Trustees Report's intermediate path in the projections, 1.76% a year from 2025 to 2034 and 1.14% thereafter [47]. Results are in real 2024 dollars.

5.2 Returns

The return $r_{i,t}$ follows the household's portfolio. For each group, age band, and wealth band, the survey gives the dollars held in stocks, businesses, real estate, and safe assets. To each we apply the 1870–2015 arithmetic mean real returns of Jordà and colleagues (their Tables IX and XI), with the year-to-year volatility they report, plus a persistent household-specific component [60]. The returns are 8.46% a year on equities including dividends; the equity capital-gain component, 4.19%, on private businesses as well; 0.90% a year in capital gains on housing, whose rental yield is treated as consumed; and 1.92% on safe assets. Where a cell holds fewer than 15 sampled families, as 32 of the 84 cells do, it pools the group's age bands within its wealth band (32 cells). Where that is still too few, it uses the other group's portfolios at the same age (0 cells: listed in the replication files). Black homeowners with mortgages earn less on their homes: 2.3 percentage points a year in the raw comparison of Kermani and Wong's working paper, and about 1.5 points within county and purchase year. They trace the gap to foreclosures and short sales rather than to slower appreciation [61]. The model draws the gap uniformly between the two figures; Section 7.3 discusses the shock process behind it.

5.3 Lives and families

Deaths follow the race-, sex-, and age-specific probabilities of Section 4, adjusted for wealth. Within each group, death rates after 40 fall with household wealth in proportion to the hazard ratios of Machado and colleagues (0.80, 0.68, and 0.60 for the second, third, and top wealth quartiles relative to the lowest) [23]. Only a share of that gradient is treated as causal. In each run the share is drawn between 0 and one sixth of their logarithm, the bound set by the Swedish lottery evidence reviewed in Section 2.1 [25]. Because the U.S. evidence from wealth shocks is mixed [27, 28], Section 6.4 also reports runs with the share fixed at 0, one sixth, and one half.

When its head reaches about 55, a household forms a successor household, standing for its children. The successor's income rank follows an intergenerational equation with the slopes that Chetty and colleagues estimate, 0.28 for Black and 0.32 for White children [62]. Its intercepts are set so that each group's steady-state mean rank equals its mean rank in the 2025 survey (36.1 for Black and 53.1 for White households). The implied gap between a Black and a White child whose parents hold the same rank is 11.2 to 13.2 percentiles across parent ranks, against 12.6 percentiles in Chetty and colleagues' estimates. Newer estimates find that this gap narrowed by about 30% for children of low-income parents between the 1978 and 1992 birth cohorts [63], so the mobility lever may be smaller for today's children than the model assumes. Parents with substantial wealth give a gift when the successor forms, and education debt falls with parents' wealth. When the last member of a household dies, its estate, net of an end-of-life and settlement cost and of a share that leaves the households modeled, is split equally among the par-

ents' living children. Their number is drawn from the survey's distribution by race (a mean of 2.7 for Black and 2.1 for White households aged 55 to 74). The successor takes one share, and households of the same race and generation, standing for its siblings, take the others.

5.4 The levers

Each lever phases in linearly from 2025 and is defined once here; the same names are used in every table.

- **Earnings parity.** Black workers reach the White income distribution at the same within-group rank by 2040, their children's income ranks follow the White intergenerational equation, and Black households' net support to relatives reaches the White rate. Because it includes mobility, the tables call it earnings and mobility parity.
- **Mobility parity.** Black children's income ranks follow the White intergenerational equation by 2040, with parents' earnings unchanged; the tables call it mobility parity only.
- **Equal returns.** Black households hold White portfolios at the same age and wealth, without the housing-distress gap, by 2035.
- **Survival parity.** Black death rates converge to White rates by 2050.
- **Equal saving.** Black households' base saving rate, and their net support to relatives, reach the White ones by 2035. With one saving schedule for both groups there is nothing left to equalize, so the lever does not exist in that sensitivity.
- **Baby bonds.** Up to $50,000 at household formation, falling with parents' income rank, for children born from 2025.
- **Transfer.** $250,000 to each Black household in 2030.
- **Fair assessment.** The excess property tax Black homeowners pay on their homes is removed, phased in from 2025 to 2030 (Section 7.2); a sensitivity.
- **Income stability.** In the shocks specification only (Section 7.3), Black households' job-loss rate, income loss on job loss, and share with thin liquid buffers reach the White ones; a sensitivity.

Equal conditions combines earnings parity (with the mobility it includes), equal returns, and survival parity, with Black households keeping their fitted base saving rate. **Equal conditions and equal saving** adds equal saving, and **equal conditions, equal saving, and the transfer** adds the transfer. In each run the ratio is the Black median over the White median in that run. A run **closes the gap** from the first year in which its ratio reaches 0.9 and stays at or above 0.9 through 2100, so the share of runs closed in 2100 is the share at or above 0.9 in that year. A combination closes the gap by a target year when at least 90% of runs are at or above 0.9 in that year and in every later year through 2100. The criterion has no upper bound, so we also report the share of runs within 0.9 and 1.1 in 2100.

5.5 Calibration

Eleven parameters are chosen to bring the model's balanced-growth steady state under unchanged conditions as close as the loss allows to the 2025 survey's median and mean net worth by age for both groups (Table 10). They are chiefly the saving schedule, the drawdown of wealth in retirement, and the size of gifts and estates. It also targets the share of households that have ever received $10,000 or more in inheritances and gifts, by age, measured as the survey asks it. The loss minimized is a weighted sum of scaled squared errors over 30 moments, with the two oldest Black age bands pooled because they rest on few families; it has no likelihood interpretation, so differences in it rank fits but do not test them. A loss that weights each moment by its survey precision was tried first and rejected for the headline. In a misspecified model it fits the precisely measured White means and receipt shares and puts the Black medians at 0.3–8.7 times their targets, with a steady-state ratio of 0.31 against the survey's 0.11; it is kept as a labeled sensitivity. That choice was made after a backcast of the precision-weighted fit had been seen (Section 5.7).

The optimizer does not converge to one point: from four starting points it stalls at different parameter sets of nearly equal loss, and the headline is the best of them on fresh simulation seeds, not a global optimum. In the headline specification each group's base saving rate is fitted separately, 9.8% of income at the median income rank for Black households and 12.6% for White households in the selected fit. The sign of that gap is not identified by the targets: across the fits it ranges from -2.8 to $+0.5$ points (Black minus White), and Section 5.6 reports what that does to the results. Everything in Section 6 uses the selected fit. The selected fit's lower Black rate goes in the direction of the survey, in which Black households under 65 were less likely than White households to have spent less than their income in five of five income quintiles. It is a residual that absorbs whatever the model leaves out, not a measured saving rate. Version 2.0, with a different treatment of inheritances and no wage growth, fitted a higher Black rate (5.9% against 3.5%), and in panel data racial differences in saving rates are not significant once income is controlled [33]. We therefore also report a sensitivity with one saving schedule for both groups (10.2% at the median rank, ten parameters). It fits the survey worse on the calibration's loss (6.38 against 5.93, with one parameter fewer) and its backcast fails more often (Section 5.7), which is why it is not the headline. The calibration implies consumption out of wealth of 2.9% a year, against the 3.2 cents per dollar estimated for stock wealth [64], a figure it did not target.

Its largest problem is inheritances. Splitting estates among children brings receipt near the survey: 8.0% of Black and 41.4% of White households against 10.3% and 33.0% (version 2.0: 50.4% and 78.1%). It does so only with an end-of-life and settlement cost of up to $445,000 at the last death and a further 28% of each remaining estate leaving the households modeled. White recipients receive a median of $384,000 against $149,000 in the survey. Real estates do not shrink that much. The wedge more plausibly stands in for transfers the survey does not record and for late-life spending the model lacks. In the Federal Reserve's own accounting, inheritances and gifts explain 26% of all household wealth at a 3% real return and 51% at 5%, and White households are 73% of the population but 88% of recipients [65]. The one-schedule calibration needs a smaller wedge ($363,000 and 22%) but overstates receipt (12.8% and 45.4%). The headline calibration understates White mean wealth in five of six age bands and overstates the Black median by more than a tenth in four, by the most at 35–44, where the survey's Black

median sits far below its neighbors (Table 10 shows each miss). The two oldest Black bands, pooled in the calibration, rest on 106 and 48 families, so the fit at those ages is partly a fit to sampling noise. In its steady state the ratio of median wealth over all ages is 0.16, against 0.11 in the survey (0.17 with one saving schedule). The calibration targets wealth by age within each group, not the overall ratio, and does not reproduce the gap it starts from.

Table 10. Calibration of the wealth microsimulation (headline specification): the model's steady state against the survey.

Age of the reference person	Black, survey	Black, model	White, survey	White, model
Net worth, median (standard error) / mean, thousands of 2024 dollars				
25–34 (121 / 209)	10 (4) / 56	9 / 26	67 (10) / 174	54 / 375
35–44 (147 / 297)	11 (6) / 107	58 / 100	198 (18) / 850	223 / 604
45–54 (132 / 420)	49 (36) / 283	98 / 172	309 (43) / 1,564	429 / 1,276
55–64 (124 / 492)	80 (22) / 359	125 / 235	744 (93) / 2,439	702 / 1,790
65–74 (106 / 522)	72 (28) / 282	113 / 237	594 (56) / 2,305	742 / 2,017
75+ (48 / 375)	204 (43) / 505	36 / 119	600 (55) / 2,182	427 / 1,868
Black 65+ pooled (targeted) (154)	124 (34) / 364	62 / 173	—	—
Inheritances and gifts of $10,000 or more ever received (standard error)				
All households	10.3% (1.2%)	8.0%	33.0% (1.0%)	41.4%
Ages 18–44	6.7% (1.6%)	3.6%	17.8% (1.3%)	22.0%
Ages 45–64	13.8% (2.3%)	9.9%	32.4% (1.5%)	45.6%
Ages 65+	11.1% (2.0%)	11.1%	46.0% (1.8%)	56.2%
Median received, recipients (thousands)	105	56	149	384
Not targeted				
Net worth zero or negative	15.9%	13.0%	6.3%	2.9%

Survey: 2025 Survey of Consumer Finances, non-Hispanic Black and White households (families sampled in parentheses, Black / White), 2024 dollars; standard errors from the replicate weights and the five implicates. Model: the balanced-growth steady state under unchanged conditions, the last 20 of 150 simulated years. Fitted parameters: base saving 9.8% (Black) and 12.6% (White) of non-capital income at the median rank, rising 23 points across ranks; consumption out of wealth 2.9% a year before 67; gifts of 28% of a parent's wealth above $2.2 million; an end-of-life and settlement cost of up to $445,000; an estate leak of 28%; household return heterogeneity of 3.3 points. Loss 5.93 (Section 5.5): version 2.1's weighted sum of squared misses over 30 moments, the two oldest Black bands pooled into 65+ (shown separately but not targeted).

5.6 Uncertainty

Each path is simulated 500 times with 20,000 households, half Black and half White, reweighted to the population. Each run draws the long-run asset returns, the housing gap, the causal share of the wealth–mortality link, the cost of debt, and the Trustees' low-cost, intermediate, or high-cost mortality from ranges around their estimates. Each run also draws a different sequence of

market returns. Markets, each group's households, and each group's heirs draw from separate random streams, so paths are compared run by run, and a lever that acts only on Black households leaves every White household's path unchanged. For each year we report the median across runs, a pointwise median rather than a single run, and the 5th to 95th percentiles across runs. These ranges contain the drawn parameters and Monte Carlo variation only; the calibrated parameters and the survey targets are held fixed within them, so they are not confidence intervals.

The calibration's own uncertainty is not in these ranges either, and it is large. Refitting on the survey's replicate-weight resamples did not move the optimizer from the selected fit, so the calibration's sampling uncertainty is unmeasured. The four fits of the headline specification from different starting points, close in loss, give 2100 ratios of 0.16–0.21 under current conditions, 0.69–0.92 under equal conditions, and 0.87–0.92 under equal conditions and equal saving. The equal-saving result is stable across these fits; the keep-saving result is not, and we report it with that range beside it. It also depends on the loss: the precision-weighted sensitivity of Section 5.5, whose steady state is far from the survey, puts equal conditions at 1.01 by 2100 and equal conditions with equal saving at 0.95. The Monte Carlo standard error of a 2100 median ratio is at most 0.005 in the headline specification and 0.007 with one saving schedule. The share of runs in which the gap is closed in 2100 is 0% under equal conditions (none of the 500 runs) and 58% with equal saving, the latter with a binomial standard error of about 2.2 percentage points. The paired estimate of wealth added by 2075 carries a bootstrap standard error of about $0.3 trillion. Where we date a closing in the median run, it is the run whose 2100 ratio is the median. In all, the analysis simulates about 875 million households.

5.7 Validation against earlier surveys, and the 2025 survey

Fit to the targets is not validation. We therefore ran the model forward from the households of the 1989 and 1992 surveys through the realized conditions of each later year, with the calibration unchanged, and compared it with each later survey (Table 11). The realized conditions are S&P 500, house-price, and Treasury-bill returns, real wage growth, and historical death rates. The pass criteria were written down before any run, with the one-schedule calibration in mind. They named 1989 as the start and 1992 as a check, but noted in advance that the 1989 survey's small Black sample made 1992 the more reliable test, and we treat it as the primary one. The headline specification was chosen after both backcasts had been seen, and in this version the calibration loss was chosen after a backcast of the precision-weighted fit had failed at every wave. For those choices the backcast is evidence of fit, not a test made in advance. The criteria test waves from the second after the start, so the 1995 wave is not counted.

Table 11. Validation: the model run forward from earlier surveys under realized conditions, against each later survey.

Survey wave	Survey	From 1992, headline	From 1992, one saving schedule	From 1989, headline
Black-to-White ratio of median net worth (model minus survey in parentheses)				
1992	0.14	—	—	0.07 (−0.07)
1995	0.14	0.19 (+0.04)	0.19 (+0.05)	0.08 (−0.06)

Survey wave	Survey	From 1992, headline	From 1992, one saving schedule	From 1989, headline
1998	0.16	0.17 (+0.01)	0.17 (+0.01)	0.07 (−0.09)
2001	0.16	0.16 (+0.00)	0.16 (+0.00)	0.08 (−0.08)
2004	0.14	0.16 (+0.02)	0.17 (+0.02)	0.09 (−0.05)
2007	0.12	0.16 (+0.04)	0.17 (+0.04)	0.08 (−0.04)
2010	0.12	0.15 (+0.03)	0.15 (+0.03)	0.07 (−0.05)
2013	0.09	0.15 (+0.06)	0.15 (+0.06)	0.08 (−0.02)
2016	0.10	0.18 (+0.07)	0.19 (+0.09)	0.09 (−0.01)
2019	0.13	0.18 (+0.05)	0.19 (+0.07)	0.09 (−0.03)
2022	0.16	0.19 (+0.03)	0.20 (+0.04)	0.09 (−0.07)
2025	0.11	0.18 (+0.07)	0.20 (+0.09)	0.09 (−0.02)
Criteria fixed before the version 2.1 runs				
Waves within ±0.03 of the survey ratio		5 of 10	3 of 10	3 of 11
Black median, 2022 (thousands)	47	44	41	22*
White median, 2022 (thousands)	305	239*	210*	248*
Black median, 2025 (thousands)	35	48	44	22
White median, 2025 (thousands)	324	262*	228*	265*
Growth of the Black median to 2025	×1.61	×2.16*	×2.02*	×2.11*
Growth of the Black mean to 2025	×2.21	×1.55*	×1.66	×1.34*
Growth of the White median to 2025	×2.09	×1.70	×1.48*	×1.48
Growth of the White mean to 2025	×3.31	×1.28*	×1.23*	×1.10*

Backcasts start from the households of an earlier Survey of Consumer Finances and replay each later year's realized S&P 500, house-price, and Treasury-bill returns, real wage growth, and death rates through 2025, each specification's 2025 calibration unchanged (200 runs of 20,000 households). Survey: all five implicates, non-Hispanic Black and White households, 2024 dollars; model values are medians across runs; growth is from each column's start wave (the survey column from 1992). The criteria were written before the version 2.1 backcasts: the ratio within 0.03 of the survey from the second wave after the start; each 2022 median inside the survey's 95% interval; real growth of each median and mean within 25% of the survey's. The 2025 rows apply the same tests to the new wave. * Fails its criterion.

From 1992 the headline specification keeps the ratio within 0.03 of the survey at only 5 of 10 waves, with a largest miss of 0.07; version 2.1, calibrated to the 2022 survey, passed at every wave it tested. The new calibration follows the ratio until 2004 but overstates it by 0.04–0.07 in four of the five waves from 2007 to 2019, missing the depth of the Great Recession's losses for Black households. It also overstates the 2025 ratio (0.18 against 0.11), although 2025 is the survey it was calibrated to, since the calibration targets the steady state by age, not the path from 1992. Its 2022 Black median, \$44,000, is inside the survey's 95% interval (the survey median is \$47,000), and from 1992 to 2022 Black median wealth grows by a factor of 2.02 against 2.15 in the survey, within the criterion; to 2025 it grows too fast (Table 11). With one saving schedule for both groups the model passes at only 3 of 10 waves, overstating the ratio by more than the headline at every wave, and its Black median grows by a factor of 1.88 to 2022.

Both specifications fail on White wealth. From 1992 to 2022 the White median grows by a factor of 1.54 in the headline specification and 1.36 with one saving schedule, against 1.97 in the survey, and the White mean by 1.13 and 1.09 against 2.95. The model gives all households one rate of consumption out of wealth and holds the income distribution at its starting shape, so large fortunes do not compound at realized returns and the rise in top incomes is missing. It therefore probably understates the growth of White wealth and overstates the ratio under current conditions. From 1989 the headline passes at only 3 of 11 waves: the 1989 survey's Black sample is 307 families, and its ratio of 0.06 becomes 0.14 in 1992, a jump no model of accumulation reproduces. Receipt of inheritances in the backcasts' later waves is low by construction (3.1% and 13.5% in the headline backcast's 2022 wave), because households start with no record of past receipt.

The 2025 survey gives the model its first test made in advance. Version 2.1 of this paper, calibrated to the 2022 survey, was fixed before the 2025 survey was released. Its current-conditions path put the 2025 ratio of median wealth between 0.12 and 0.15 in the headline specification (the 5th to 95th percentiles across runs) and between 0.13 and 0.16 with one saving schedule. The survey recorded 0.11 (standard error 0.024; 90% interval 0.07–0.15), below both bands. The headline band lies inside the survey's interval, so the miss is suggestive rather than decisive. The recalibrated model repeats it. Run from the 2022 survey's households [66] through the realized conditions of 2023 to 2025, it predicts 0.14 for 2025 (0.13 to 0.16 across runs) against the survey's 0.11. It does not produce the fall in the Black median between the two surveys: its 2025 Black median is $48,000, against $35,000 in the survey. Both misses are in the same direction as the backcasts' understatement of White wealth growth and their misses after 2004: the model keeps the ratio higher than the surveys do. The backcasts from 1992 now run through the 2025 wave, which is also the calibration target, so only the run from 2022 and version 2.1's band are tests made in advance.

5.8 An independent re-implementation

Before version 2.1 we built a second model of the same question from the same primary data, with separate code written without reading the first model's output until the second had been specified, calibrated, and run. We compared the two against version 2.0 of this paper. It is a re-implementation of the question, not of the code: an annual accounting model with cells by race, age, and income rank, seven calibrated parameters, and 120 paired draws. Its four levers are defined differently from ours, with earnings parity as a reference path: survival parity; parity in the receipt of inheritances and in family help in emergencies; equal access to assets, including portfolios, leverage, and housing returns; and parity in high-cost interest, fees, and stress spending. Its inputs reproduce ours: 12 of 12 entries of Table 1 that it recomputed from the life tables agree to the printed precision. It puts the age-composition channel at 1.39–1.56% of the log wealth gap, against 1.39–1.54% in Section 3 at the time. It reproduces four qualitative conclusions. Earnings parity is the largest lever (a ratio of 0.90 by 2100). Survival parity barely moves median wealth. A one-time transfer fades: $200,000 per Black household in 2030 closes 70% of the log gap by 2035 and 0.5% by 2100. And the levers are additive in log wealth: all four together close 0.94–0.99 times the sum of what each closes alone at horizons from 2035 to 2100 (5th to 95th percentiles across draws from 0.82 to 1.34). Its calibrated saving residual has the sign op-

posite to version 2.0's, with Black households saving less (11.8% against 15.9% at the median rank). That the sign follows the specification is why this paper treats the saving gap as a fitted residual and equal saving as a separate lever. Its lever on high-cost interest, fees, and stress spending is small: about $109 per Black household a year in 2050 and, as a stand-alone effect, 0.7% of the log gap by 2075. Its outputs are summarized in the replication files; its code is not included, so this check cannot itself be rerun by readers, which limits its weight.

6 What would close the gap

6.1 Under current conditions, the gap does not close

If today's conditions persist, the ratio of median Black to median White household wealth, 0.11 in the model's 2025, is 0.12 in 2050, 0.16 in 2075, and 0.19 in 2100, with 90% of runs between 0.12 and 0.23 (Figure 5). The model starts from the survey's households, so its first-year ratio is close to the survey's 0.11; from there the households are carried through the model's returns, consumption, and deaths, and the calibration does not reproduce the survey's own ratio (Section 5.5). This path is largely the model converging toward its own balanced-growth steady state, whose median ratio under unchanged conditions is 0.16 (0.16 to 0.17 across five simulation seeds) at the calibration's wage growth of 0.78% a year, above the survey's 0.11. With one saving schedule the steady state is 0.17 (0.17 to 0.18) and the 2100 ratio 0.21. The level the ratio reaches by 2100 is therefore a property of the calibration, not a forecast that the gap narrows, and the model cannot attribute the movement to younger cohorts. Because the backcasts understate the growth of White wealth, and because the model run from 2022 predicts a 2025 ratio above the survey's (Section 5.7), the path is probably optimistic.

White wealth falls in real terms while wages grow. White household wealth is $133 trillion in 2025, $126 trillion in 2050, and $122 trillion by 2075, while real wages grow by a factor of 1.86, and Black household wealth goes from $4.4 trillion to $5.0 trillion. These are survey-concept aggregates; the Federal Reserve's Distributional Financial Accounts, which include defined-benefit pensions, put Black household wealth at $5.6 trillion and White household wealth at $139 trillion in 2025. Relative to wages, the White median falls by 26% by 2100 and the Black median rises by 23%. Part of the movement in the ratio therefore comes from White wealth falling relative to wages. The backcasts, in which White wealth grows far too slowly, mark this as a weakness of the model rather than a forecast.

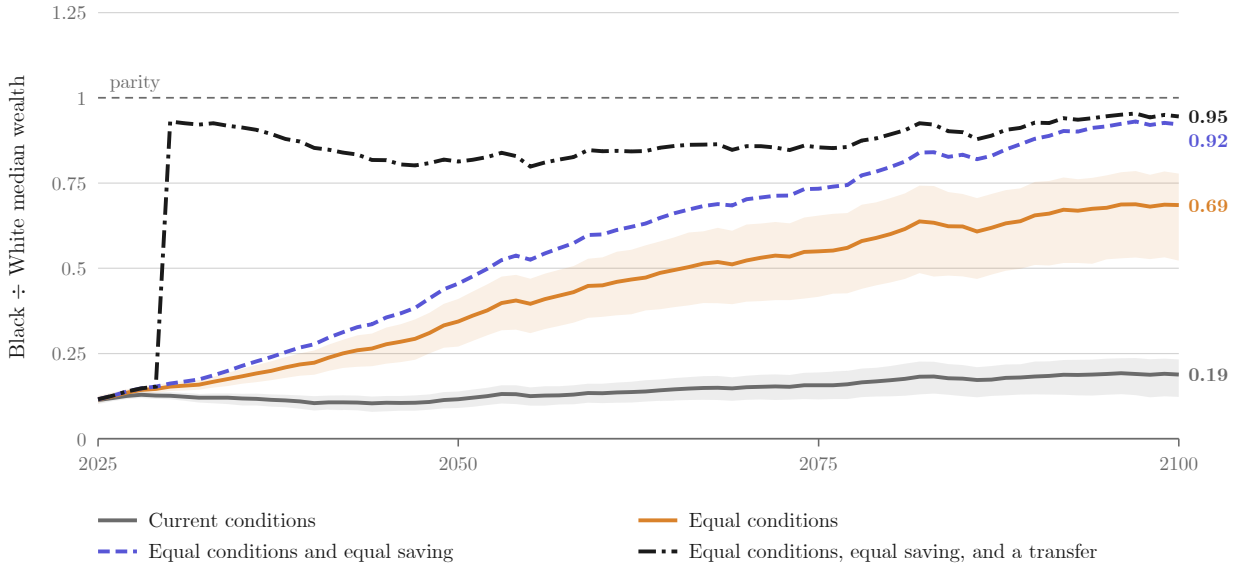


Figure 5. The Black-to-White ratio of median household wealth, 2025–2100, under four paths in the headline specification. Under current conditions the ratio moves toward the calibration's steady state; only the paths with equal saving come near parity, late in the century. Notes: each group's base saving rate fitted separately; in each year, the pointwise median across 500 runs of 20,000 households each; shaded bands span the 5th to 95th percentiles across runs for current and for equal conditions and reflect drawn parameters and simulation noise, not sampling error. The paths are defined in Section 5.4: equal conditions keeps Black households' fitted saving rate; equal saving brings their base saving rate and support to relatives to the White schedule by 2035; the transfer is $250,000 to each Black household in 2030.

6.2 One lever at a time

Table 12 applies each lever alone. Earnings parity, which includes mobility, is the largest single lever: the ratio rises to 0.27 by 2050 and 0.45 by 2100, and earlier parity ends higher (parity by 2035, 2045, and 2060 gives 0.46, 0.45, and 0.43). It works slowly because higher earnings raise wealth only through saving and, over generations, through gifts and inheritances. Mobility parity alone, which reaches only children, takes longer still (0.38 by 2100). Equal returns raise the ratio to 0.29 by 2100. Survival parity barely moves median wealth (0.19); its value runs through Social Security, partners, and years of life (Section 4 and Section 6.4) more than through net worth. Baby bonds reach 0.21, and equal saving alone 0.29. A one-time transfer of $250,000 to each Black household in 2030 lifts the ratio to 0.87 at once. Under unchanged conditions it decays to 0.19 by 2100, the current-conditions level, as Derenoncourt and colleagues found for transfers made without changing the conditions of accumulation [2]; by then its effect alone is 0.00 (Table 14). Structural models reach the same conclusion. In a general-equilibrium model, one-time transfers have only transitory effects unless the earnings gap closes [8]. In a life-cycle model with race-specific income processes, income differences alone account for 43% of the gap in levels and intergenerational transfers for much of the rest [7]. And in a model in which exclusion has left Black dynasties pessimistic about risky returns, transfers that close today's average gap do not produce long-run convergence [9]. With one saving schedule for both groups, equal conditions reach 0.89 by 2100 against 0.69 in the headline (Table 12, Panel B).

Table 12. The Black-to-White ratio of median household wealth under each path: Panel A in the headline specification, Panel B with one saving schedule for both groups.

Path	2050	2075	2100	First reaches 0.5	Closed from*	Closed in 2100†
Panel A: headline, each group's base saving rate fitted separately (9.8% Black, 12.6% White)						
Current conditions	0.12	0.16 (0.12–0.19)	0.19	after 2100	after 2100	0%
Earnings and mobility parity by 2040	0.27	0.39 (0.28–0.49)	0.45	after 2100	after 2100	0%
Mobility parity only, by 2040	0.15	0.25 (0.18–0.32)	0.38	after 2100	after 2100	0%
Equal returns by 2035	0.16	0.23 (0.18–0.27)	0.29	after 2100	after 2100	0%
Survival parity by 2050	0.12	0.16 (0.12–0.20)	0.19	after 2100	after 2100	0%
Equal saving by 2035	0.17	0.24 (0.17–0.31)	0.29	after 2100	after 2100	0%
Baby bonds, up to $50,000	0.12	0.18 (0.13–0.23)	0.21	after 2100	after 2100	0%
One-time transfer of $250,000, 2030	0.35	0.20 (0.15–0.25)	0.19	2030	after 2100	0%
Fair assessment by 2030	0.12	0.16 (0.12–0.20)	0.19	after 2100	after 2100	0%
Equal conditions	0.34	0.55 (0.42–0.65)	0.69	2066	after 2100	0%
Equal conditions and equal saving	0.46	0.73 (0.56–0.87)	0.92	2053	2094	58%
Equal conditions and baby bonds	0.34	0.56 (0.43–0.67)	0.70	2065	after 2100	0%
Equal conditions and the transfer	0.71	0.66 (0.54–0.76)	0.70	2030	after 2100	0%
Equal conditions, equal saving, and the transfer	0.81	0.85 (0.68–0.96)	0.95	2030	2088	68%
Panel B: sensitivity, one base saving schedule for both groups (10.2%)						
Current conditions	0.11	0.17 (0.12–0.21)	0.21	after 2100	after 2100	0%
Earnings and mobility parity by 2040	0.31	0.47 (0.33–0.63)	0.58	2078	after 2100	0%
Equal returns by 2035	0.16	0.25 (0.19–0.30)	0.34	after 2100	after 2100	0%
Survival parity by 2050	0.11	0.17 (0.12–0.21)	0.22	after 2100	after 2100	0%
Equal conditions	0.39	0.67 (0.49–0.83)	0.89	2058	after 2100	47%
Equal conditions and the transfer	0.79	0.81 (0.63–0.94)	0.92	2030	2094	57%

Median across 500 runs of 20,000 households each, in each year; in parentheses, the 5th to 95th percentile across runs (parameter and Monte Carlo draws; not the calibration or survey sampling error). Paths are defined in Section 5.4; levers phase in linearly from 2025. * The median, across runs, of the first year from which a run's ratio of median wealth stays at or above 0.9 in every year through 2100. † Share of runs at or above 0.9 in 2100.

6.3 Combinations of levers

No combination of levers we test closes the gap in nine runs of ten by 2100, and the paths that come closest all include equal saving. In the headline specification, equal conditions raise the ratio to 0.34 by 2050, 0.55 by 2075, and 0.69 by 2100 (90% of runs between 0.52 and 0.78) if Black households keep their fitted saving rate. In 2100, 0% of runs are at or above 0.9, and the median run does not close the gap. Across the other fits of the headline calibration the same path ends anywhere in 0.69–0.92 (Section 5.6), so this result is not identified. Equal conditions stop the measured forces that keep the gap open but leave the initial difference in wealth, and whatever the fitted saving gap stands for, to be worked off across generations.

Equal saving is therefore a separate lever. If Black households' base saving rate also reaches the White one by 2035, the ratio reaches 0.46 by 2050, 0.73 by 2075, and 0.92 by 2100. In 2100, 58% of runs are at or above 0.9 and 58% are within 0.9 and 1.1. Half the runs are closed from 2094, and the median run from 2094. Across the calibration fits this path ends in 0.87–0.92, the one result in this section that is stable across fits. It is not stable across specifications: in the shocks specification of Section 7.3, where the fitted saving gap all but disappears, equal saving does not raise the ratio (0.64 with equal conditions, against 0.67 without). Because the saving gap is a fitted residual, not a measured behavior (Section 5.5), what would move it, and whether it reflects saving at all rather than something the model leaves out, is unknown. With one saving schedule for both groups, equal conditions reach 0.89 by 2100 (47% of runs at or above 0.9); without the end-of-life cost in that calibration, 0.90.

A one-time transfer of $250,000 to each Black household in 2030 does not close the gap at once even on these paths. Added to equal conditions alone, it ends at 0.70 in 2100, against 0.69 without it. Added to equal conditions and equal saving, it raises the 2100 ratio to 0.95 and the share of runs closed in 2100 to 68%, and half the runs are closed from 2088 rather than 2094. In version 2.1, half the runs on that path were closed from 2030, the year the transfer was paid. Unless accumulation and saving are equal, the transfer is worked off by the same dynamics that work off the starting gap; even when they are, it brings closing forward by years, not decades.

To find the smallest steps that would suffice, we screened the combinations of the levers in Section 5.4 and reran the most promising at full size, 10 million households each (Table 13). No combination of the levers tested keeps the ratio at or above 0.9 in every year to 2100 in at least 90% of runs. The closest is earnings parity by 2035, equal saving, equal returns, and a $250,000 transfer, which does so in 74% of full-size runs (median ratio 0.95 in 2100). Without a transfer or equal saving, the share of screening runs in which earnings parity and equal returns close the gap is 0% (parity by 2035), 0% (parity by 2045), and 0% (parity by 2060). Table 13 therefore reports the closest combinations and the share of runs each closes rather than a passing set.

Table 13. No combination of levers closes the gap in at least 90% of runs: the closest combinations, by target

year.

Gap closed by	Smallest combinations of levers	Runs that close	Within 0.9–1.1	Median ratio then
2050 (none passes)	Closest: earnings parity by 2035; equal saving; equal returns; survival parity; a $250,000 transfer‡	12%	10%	0.87
	Closest: earnings parity by 2035; equal saving; equal returns; a $250,000 transfer	11%	10%	0.84
2075 (none passes)	Closest: earnings parity by 2035; equal saving; equal returns; survival parity; a $250,000 transfer‡	33%	33%	0.88
	Closest: earnings parity by 2035; equal saving; equal returns; a $250,000 transfer	29%	28%	0.87
	Closest: earnings parity by 2035; equal saving; equal returns‡	2%	2%	0.76
2100 (none passes)	Closest: earnings parity by 2035; equal saving; equal returns; a $250,000 transfer	74%	74%	0.95
	Closest: earnings parity by 2035; equal saving; equal returns; survival parity; a $250,000 transfer‡	67%	67%	0.98
	Closest: earnings parity by 2035; equal saving; equal returns‡	65%	65%	0.94

Headline specification. 272 combinations without the product (Section 5.4), screened with 48 runs of 8,000 households; the most promising was rerun with 500 runs of 20,000, and the table reports those runs. A combination closes the gap by a year when, in at least 90% of runs, the median ratio is at least 0.9 in every year from then through 2100; "Within 0.9–1.1" also requires it to stay at or below 1.1. Ranked by the number of levers, then the transfer and endowment; each kind once, with the earliest parity year that passes. Where none passes, the three closest are shown; ‡ screening runs only.

Table 14 divides the change in the median ratio among four levers by their Shapley values: each lever's added effect averaged over every order in which the levers could be added, computed run by run from the screening grid. By 2100, earnings parity contributes +0.33 and equal returns +0.17, although equal returns alone add only +0.09; adding equal saving as a fifth lever gives it +0.16. That difference does not mean the levers amplify each other. Each lever raises Black wealth by roughly a constant factor, so a lever moves the ratio more once another lever has raised Black wealth. On the ratio, the four levers together add 1.40–1.46 times the sum of their effects alone between 2050 and 2100. On the logarithm of the ratio they add 0.80–0.99 times that sum, close to additive, which the independent re-implementation of Section 5.8 also finds. Survival parity contributes 0.00. The transfer contributes +0.30 in 2050 but +0.01 by 2100. That earnings dominate agrees with the general-equilibrium model of Aliprantis, Carroll, and Young [8] and with Barsky and colleagues' estimate that differences in earnings account for about two thirds of the Black–White gap in mean wealth [17].

Table 14. Shapley values of the levers for the Black-to-White ratio of median wealth.

Lever	2050	2075	2100
Shapley value: mean contribution to the median ratio (5th–95th percentile across runs)			
Earnings and mobility parity, with equal family support	+0.20 (+0.14 to +0.25)	+0.29 (+0.23 to +0.35)	+0.33 (+0.28 to +0.39)

Lever	2050	2075	2100
Equal returns	+0.13 (+0.10 to +0.16)	+0.15 (+0.12 to +0.18)	+0.17 (+0.14 to +0.21)
Survival parity	0.00 (−0.01 to +0.01)	0.00 (−0.01 to +0.01)	0.00 (−0.01 to +0.02)
One-time transfer of $250,000	+0.30 (+0.21 to +0.40)	+0.07 (+0.03 to +0.13)	+0.01 (−0.01 to +0.03)
Effect of the lever alone, for comparison			
Earnings and mobility parity, with equal family support	+0.18	+0.24	+0.26
Equal returns	+0.04	+0.07	+0.09
Survival parity	0.00	0.00	0.00
One-time transfer of $250,000	+0.23	+0.04	0.00
Shapley value with equal saving as a fifth lever			
Earnings and mobility parity, with equal family support	+0.22	+0.32	+0.38
Equal returns	+0.14	+0.17	+0.20
Survival parity	0.00	0.00	0.00
One-time transfer of $250,000	+0.30	+0.08	+0.01
Equal saving	+0.09	+0.14	+0.16
Median ratio			
No lever	0.12	0.15	0.18
All four levers	0.74	0.68	0.71

Headline specification. Computed run by run from the screening grid (48 runs of 8,000 households per combination, common random numbers), with earnings parity by 2035, equal returns by 2035, survival parity by 2050, the transfer in 2030, and equal saving by 2035. A Shapley value is the lever's added effect averaged over every order of adding the levers; the values sum to the effect of all levers together. On the ratio the four levers together add 1.40–1.46 times the sum of their separate effects; on its logarithm, 0.80–0.99 times.

Three implications follow within the model. First, a transfer fades unless the forces that widen the gap stop: unequal pay and opportunity, unequal access to diversified assets that do not have to be sold in distress, and, on the selected fit, unequal saving. Second, the initial difference in wealth is worked off slowly, through children's endowments. A capital transfer of $250,000 to $500,000 per Black household, about $4.7 trillion to $9.4 trillion in all, shortens the wait by years; in no combination we test does it close the gap in nine runs of ten. Third, closing the survival gap barely moves the wealth ratio but accounts for most of the gains in years of life.

6.4 What equal conditions would add

Table 15 compares current and equal conditions in the headline specification, with Black households keeping their fitted saving rate. By 2050, equal conditions would add about $4.6 trillion to Black household wealth, and $9.8 trillion by 2075 ($12.9 trillion with equal saving as well). Version 2.1, calibrated to the 2022 survey, put the 2075 figure at $22.8 trillion. These are real 2024 dollars on a path where real wages grow by a factor of 1.40 between 2024 and 2050. Black household income before 67 would be $0.94 trillion a year higher by 2050, or $0.67 trillion in 2024 wage terms, 2.3% of 2024 gross domestic product [67]. That comparison is a scale compari-

son only: the model has no production side, so none of the added income is an estimate of added output rather than redistribution. The added wealth alone would support about $147 billion a year in consumer spending at the 3.2 cents per dollar per year that Chodorow-Reich and colleagues estimate for stock wealth, applied here to all wealth [64].

Through survival parity and the wealth–mortality link, life expectancy at 40 would rise by 2075 from 40.2 to 42.9 years for Black men and from 44.7 to 46.0 years for Black women. Survival parity, which is imposed by assumption rather than produced by the other levers, accounts for most of that gain; the 2075 figures under equal conditions are the White levels by construction. How much wealth adds depends on the share of the wealth–mortality gradient treated as causal. In runs with that share fixed at zero, one sixth, and one half, earnings parity alone adds 0.00, 0.12, and 0.37 years to Black men's life expectancy at 40. Survival parity alone adds 2.7, 2.5, and 2.0, and equal conditions give 42.9, 42.7, and 42.4 years. The death rate of simulated Black adults aged 25 to 64 would fall from 370 to 249 per 100,000 on the simulated age structure, and from 394 to 260 standardized to the 2024 life-table population. The share of Black couples aged 30 who lose a partner before 67 would fall from 33% to 23%, and the share of Black children who lose both parents by 45 from 6.6% to 3.4%.

Table 15. What equal conditions would add: Black household wealth, income, spending, and years of life.

Black households and adults	**2050, current**	**2050, equal**	**2075, current**	**2075, equal**
Wealth and income, trillions of 2024 dollars				
Household wealth	4.2	8.8	5.0	14.7
Household income before 67, per year	1.66	2.60	2.32	3.44
Added wealth (standard error)*	—	4.6 (0.1)	—	9.8 (0.3)
Added wealth with equal saving as well*	—	5.9	—	12.9
Added income, share of 2024 GDP*‡	—	2.3%	—	2.0%
Added spending from added wealth, per year†	—	147 bn	—	314 bn
Life and family (period measures)				
Life expectancy at 40, men	37.9	40.9	40.2	42.9
Life expectancy at 40, women	42.8	44.3	44.7	46.0
Deaths at 25–64 per 100,000, age-standardized§	488	322	394	260
Deaths at 25–64 per 100,000, crude rate of simulated adults	459	309	370	249
Die between 25 and 65, men	22.7%	15.3%	18.9%	12.6%
Couple aged 30 loses a partner before 67	38.9%	28.1%	33.0%	23.4%
Child loses both parents by 45	9.2%	4.9%	6.6%	3.4%

Headline specification; equal conditions as defined in Section 5.4, with Black households keeping their fitted saving rate. Real 2024 dollars on the Trustees' real wage path (wages ×1.40 by 2050). Medians across runs. Life outcomes apply the death probabilities to simulated heads and partners. * Median of run-by-run differences from current conditions; bootstrap standard error in parentheses. † 3.2 cents per dollar of wealth per year, a demand-side estimate. ‡ Income added divided by real wage growth since 2024, against 2024 GDP. § Standardized to the 2024 U.S. life table's stationary population.

6.5 Where the gains would land

The microsimulation is national, so it does not say where its gains would arise. To show where they would be largest, we apportion them to the 50 states and the District of Columbia. For each state, the 2020–2024 American Community Survey Public Use Microdata Sample gives the number of households headed by a non-Hispanic Black person and the mean income of non-Hispanic Black and of non-Hispanic White households, the groups of the national model [68]. From these we compute, for each state, the income its Black households would add if their mean income reached that of White households in the same state. We divide the national gains of equal conditions ($9.8 trillion by 2075) among the states in proportion to that shortfall. This is an apportionment, not a state-level simulation: it assumes that the gains would arise where today's shortfall is, and it ignores migration and differences between states in prices, growth, and returns.

By construction, the apportioned gains follow the Black population and its income shortfall. The Census Bureau's South region, home to 59% of Black households, would receive 57% of the national gain, and ten states would receive 61% (Table 16). Texas, New York, and Georgia lead; Texas alone would gain about $1.0 trillion in Black household wealth by 2075. Relative to the size of their economies, the gains would be largest in Mississippi and the District of Columbia, where the added income in 2050, in 2024 wage terms, would equal about 9% of their 2024 gross domestic product [69], against 2.3% for the nation. Apportioning by each state's share of Black households instead gives almost the same ranking (Spearman correlation 0.98); weighting by the income gap raises states where that gap is wider per household, such as New York, California, and New Jersey. Counting Black householders of any ethnicity, as the published summary tables do and version 2.0 of this paper did, moves no state's share by more than 0.4 percentage points (the largest change is in New York; Spearman correlation 0.998). The survey's 80 replicate weights put the 90% margin of error of each of the ten largest shares at 0.2 percentage points or less. Estimates for the nine states with the fewest Black households (Alaska, Idaho, Maine, Montana, New Hampshire, North Dakota, South Dakota, Vermont, and Wyoming) are imprecise, and the replication data flag them.

Table 16. Where the gains would land: the ten states with the largest apportioned gains under equal conditions.

State	Black households (thousands)	Wealth added by 2075 (billions)	Share of the national gain	Income added in 2050, share of 2024 state GDP
Texas	1,404	980	10.0%	2.4%
New York	989	744	7.6%	2.2%
Georgia	1,253	724	7.4%	5.6%
California	787	662	6.8%	1.1%
Florida	1,136	643	6.6%	2.6%
North Carolina	879	510	5.2%	4.1%
Illinois	676	502	5.1%	2.9%
Maryland	704	450	4.6%	5.7%
Virginia	622	425	4.3%	3.8%

State	Black households (thousands)	Wealth added by 2075 (billions)	Share of the national gain	Income added in 2050, share of 2024 state GDP
New Jersey	423	353	3.6%	2.9%
These ten states	8,872	5,995	61.2%	3.6%
United States	15,342	9,798	100.0%	2.3%

An apportionment of the national gains under equal conditions in the headline specification (Table 15), not a state-level simulation. Each state's share is its Black households times the gap between White and Black non-Hispanic mean household income in the state, from the 2020–2024 American Community Survey microdata [68]; dollar figures are that share of the national totals, in 2024 dollars, and the last column divides income added in 2050 (in 2024 wage terms) by 2024 GDP [69]. The 90% margin of error of each share is at most 0.2 points in these states. Rank correlation with an apportionment by Black households alone: 0.98; with version 2.0's key (Black householders of any ethnicity): 0.998.

What the microsimulation adds. In the model the wealth gap is not a fixed sum to be paid off once. It is a flow, sustained by unequal earnings and unequal returns acting on an unequal starting point; unequal lives cost years more than wealth. Stopping the measured flow closes the stock by 2100 only if saving also equalizes, and then only in a majority of runs; no combination we test closes it in nine runs of ten. The model puts dollars and years of life on what equal conditions would return. Its numbers depend on its assumptions, above all on a fitted saving residual whose sign the survey does not identify, and all of them are in the replication files.

7 Mechanisms outside the model

The microsimulation carries the levers that accounting and structural studies rank first: earnings, mobility, portfolio returns, the housing-distress gap, survival, inheritances and gifts, family support, and saving. Several mechanisms that the literature documents with causal designs are outside its headline. This section sets out the three that matter most for how the results should be read, what each does or would do inside the model, and why two of them enter only as sensitivities.

7.1 Historical dispossession as the origin of the starting distribution

The model starts from the 2025 survey's households and lets only future conditions change. The starting distribution is itself the residue of dispossession that the literature identifies with quasi-experimental designs, which is why we do not treat it as a lever. Emancipation created a population with almost no property. Where freed people did receive land, in the Cherokee Nation after the Civil War, they were wealthier in 1880 and less unequal with White households, and their children kept the advantage in 1900 [70]. Families with accounts at the Freedman's Savings Bank gained in schooling, occupation, business ownership, and real estate, until the bank's collapse in 1874 destroyed their deposits [71]. Families whose ancestors were enslaved until the Civil War have lower education, income, and wealth today than families free before it. A regression discontinuity at the borders of strict Jim Crow regimes attributes much of that persistence to those regimes [72]. The 1930s Home Owners' Loan Corporation maps lowered homeownership, house values, and rents in the neighborhoods they marked for decades [32]. Across the whole period, the per capita wealth ratio narrowed fast in the first fifty years after

Emancipation, stalled after 1950, and has widened since the 1980s as capital gains accrued to the assets White households hold [2]. The long-run survey series shows no narrowing of the Black–White gaps in income or wealth over seventy years, and attributes the dynamics to portfolio composition, with housing in the middle of the distribution and equity at the top [19]. The model's equal-conditions path stops the measured forces that keep the gap open; it does not undo the starting point, which, with the fitted saving gap kept, is not worked off by 2100 (Section 6.3).

7.2 Property tax over-assessment and tax foreclosure

Property taxes are the one mechanism in this section that acts directly on the asset Black households hold most. Nationally, in panel data on 118 million homes and about 75,000 taxing jurisdictions, Black and Hispanic homeowners bear a 10–13% higher property tax burden than White homeowners for the same public services, with jurisdiction and tax rate held fixed [73]. Two channels produce the gap: assessments respond less than market prices to neighborhood characteristics, and minority owners appeal less often and with less success. Assessments built from small-area price indexes would remove 55–70% of the inequity [73]. The gap is also regressive within jurisdictions. In millions of residential sales, homes in the bottom decile of price are assessed at about twice the ratio to price of homes in the top decile, a pattern not explained by sale-price error or assessment limits [74].

Detroit is the extreme case. Its assessments were both horizontally and vertically inequitable through the housing collapse, with similar homes taxed very differently and lower-value homes taxed at higher effective rates [75]. Michigan's constitution caps assessments at half of market value. Between 2011 and 2015 Wayne County completed tax foreclosure on about one in four Detroit properties, a rate not seen in an American city since the Depression [76]. Homes with higher assessment ratios were more likely to be foreclosed later, with sale price, location, and timing controlled. An estimated 10% of all Detroit tax foreclosures since 2011, and 25% among homes in the bottom price quintile, were caused by assessments above the constitutional cap [77]. The loss has not always ended at foreclosure. In *Tyler v. Hennepin County*, decided in 2023, a Minnesota county had sold a condominium for $40,000 to collect about $15,000 in taxes, interest, and penalties and kept the surplus. The Supreme Court held unanimously that keeping it was a taking [78].

Inside the model, the national channel is a tax wedge on the home. In the 2025 survey Black homeowners pay 0.95% of home value a year in real estate taxes and White homeowners 0.90% (medians 0.87%). Applying the 10–13% excess of Avenancio-León and Howard to the Black rate gives 0.10% of home value a year, $200 on a $200,000 home, small against the median gap but paid over a lifetime of ownership. Version 2.2 carries it as a **fair assessment** lever, a sensitivity under which that excess is removed, phased in from 2025 to 2030. Alone it moves the 2100 ratio to 0.19, a paired change of +0.003 (Table 12): on the national ratio of medians, over-assessment is a small channel. The foreclosure channel is different in kind, removing the whole equity stake at once, and it is concentrated among low-value homes in a few cities. It is not modeled, because no national hazard by race exists to calibrate it; the Detroit record shows what it can do locally. Detroit is estimated to have overtaxed homeowners by at least $600 million (in nominal dollars) over 2010–2016, when 159,160 of the 173,000 homes reviewed (92%) were over-assessed. Wayne

County completed about 100,000 tax foreclosures on Detroit properties from 2011 to 2015, an estimated 10,000 of them caused by the inflated assessments. After reassessment, tax foreclosures of owner-occupied homes fell from 6,408 in 2015 to 708 in 2018 [76, 77, 79]. A Detroit model run would need owner-occupied foreclosure counts by year, the equity lost in each, and owners' race, which no source we could verify provides.

7.3 Income shocks and forced sales

The model's income is deterministic given a household's rank and age, so it has no job loss, no unemployment spell, and no forced sale. The literature identifies each. Black unemployment is substantially higher and more cyclical than White unemployment, driven by a higher risk of job loss, and observable characteristics explain very little of the difference [80]. Wealth losses in the Great Recession, and the size and timing of the recovery, varied substantially by race [81], and both backcasts miss the depth of those losses (Section 5.7). The housing-return gap the model imports is itself a distress mechanism. Kermani and Wong find that Black and Hispanic owners are more likely to sell under distress and to live where distressed sales erase more value. Absent distress, minority-owned homes do not appreciate substantially slower, and differences in liquid wealth and income stability are important determinants [61]. A loss of three quarters of net worth over two years is followed by a 50% higher adjusted risk of death [24], and a hospital admission at 50–59 cuts employment and earnings for years [30]. In the 2019 survey, 71.9% of White and 40.9% of Black families could raise $3,000 from family or friends in an emergency [34], so the same shock is more often absorbed by a sale in Black households.

Version 2.2 adds a **shocks specification** as a sensitivity, with its own calibration. Each year a household loses a job with its race's probability in the 2025 Current Population Survey, 11.2% of Black and 7.5% of White households in 2024, and loses the corresponding share of that year's earnings net of unemployment insurance, 28% and 20% [55]. The loss comes out of wealth with no cut in spending, an upper bound. A mortgaged owner with a thin liquid buffer (62% of Black and 39% of White mortgaged owners under 65 in the 2025 survey) then sells the home under distress at a 30% discount, the loss Kermani and Wong measure [61]. The probability that a job loss forces a sale is set so that White owners' annual distressed-sale hazard matches Kermani and Wong's spell share over a ten-year holding period (1.2%); the Black hazard then follows at 3.0% a year, against the 2.5% their Black share implies, an untargeted check. The fixed return wedge of Section 5.2 is switched off, since this process replaces it. The survey itself cannot calibrate distress: almost no Black homeowner reported losing a home to foreclosure in 2020–2025, years of forbearance.

The shocks specification fits the survey better than the headline on the same loss (5.38 against 5.93), a ranking of fits rather than a test (Section 5.5). Its fitted base saving rates are 11.2% for Black and 10.8% for White households, a Black-minus-White gap of +0.3 points against −2.8 in the selected headline fit. This was the test the mechanism review proposed. Once job losses and distressed sales are modeled rather than averaged, the fitted saving gap all but disappears, although the value lies inside the range the headline's own starts span (−2.8 to +0.5 points), so it does not settle the sign either. The 2100 ratio under current conditions is 0.17. The **income stability** lever alone, under which Black households' job-loss rate, income loss, and thin-buffer share reach the White ones, raises it to 0.28. Equal conditions reach 0.67

(against 0.69 in the headline), equal conditions with equal saving 0.64, and equal conditions with income stability 0.91. In this specification income stability, not equal saving, is the lever that brings the ratio near parity, which is what one would expect if the headline's saving residual partly stands in for income risk. What the specification still lacks is the tax-foreclosure hazard of Section 7.2, emergency help from family after a job loss, a persistent component of income, and job-loss rates from a year other than 2024, a low-unemployment year. It has not been run as a backcast, so its fit through recessions is untested.

7.4 Other mechanisms

Four further mechanisms are documented by race and absent from the model, and we list them so that the equal-conditions path is read as what it is: a path that stops the forces the model carries, not every force. Health shocks and medical debt reduce employment and earnings and fall more often on Black households [30, 46]; the model's mortality draw has no non-fatal counterpart. Education debt is modeled only as a function of parents' wealth, not calibrated by race. Homeownership is a portfolio share in each cell rather than a tenure state with an entry barrier. The model therefore cannot say whether closing the ownership gap would raise Black wealth through leveraged appreciation or expose more households to the distress of Section 7.3; the net is a result this model cannot produce. And the tax treatment of returns, which favors the capital gains and step-up in basis of assets White households hold, enters only through pre-tax returns. On the evidence cited, each would more likely widen the modeled gap or slow its closing than narrow it; none has been run, so whether any would change the ordering of the levers in Section 6 is unknown.

8 Later life and other wealth gaps

Longevity counts years; people live in them, and the mechanisms of Sections 2–7 are not specific to race. This section reviews published evidence on the quality of the later years and on eight other wealth gaps; Table 17 lists the evidence for each with its year and measure. It is a narrative review, not a systematic one, and it does not estimate how much any mechanism contributes to any gap (Section 9).

Healthy years. In 1980 Fries argued that if the onset of chronic illness could be postponed faster than death, illness would be compressed into a short period at the end of life [82]; whether that happens for a given person depends heavily on resources. In harmonized data from England and the United States, the socioeconomic disadvantage in disability-free life expectancy was largest for wealth. At age 50, people in the poorest group could expect seven to nine fewer years without disability than those in the richest [83]. Among Americans aged 54–64, those in the poorest wealth quintile had more than three times the ten-year risk of disability of those in the richest (48% against 15%) [6]. In life-table models built from 1990 census data, Black Americans lived the fewest years of the major racial groups and spent a high proportion of them with a chronic health problem [84].

Money in later life. Under the Census Bureau's official measure (the "official+" series it uses when comparing with the supplemental measure, identical for ages 65 and older), 9.8% of Americans aged 65 and older were poor in 2025. Under the Supplemental Poverty Measure,

which subtracts out-of-pocket medical spending and accounts for taxes and benefits, the rate was 15.4%, the highest of any age group, and medical expenses alone raised the older-adult rate by 3.8 percentage points [85]. Poverty in later life is unequal by race: under the official measure, 17.3% of Black adults aged 65 and older were poor in 2020–2022, more than twice the rate among older White adults, 7.7% [86]. Social Security lifted 20.9 million people aged 65 and older out of poverty under the supplemental measure in 2025 [85], which is why the annuity channel in Section 3 matters.

Decisions in later life. Financial mistakes follow a U-shape over the life cycle; across ten kinds of credit decisions, they are least costly around age 53 and become more common with age thereafter [87]. Financial trouble can also precede a dementia diagnosis. Medicare beneficiaries living alone who were later diagnosed with Alzheimer disease or a related dementia were slightly more likely than similar beneficiaries to miss credit payments as early as six years before diagnosis (7.7% against 7.3%), and the difference grew after diagnosis [88]. The early difference is small, so a missed payment says little about any one person. Across 148 studies, people with stronger social relationships had a 50% greater likelihood of survival over the follow-up periods studied, an association comparable in size to that of quitting smoking [89]. On this evidence, a good later life requires enough wealth to compress illness into the end of life, protection from costly mistakes as cognition changes, and the connection that makes long life worth having. All three are distributed unequally by wealth and therefore by race.

Women: more years, fewer dollars. Women live longer. In 2024, life expectancy at 65 was 20.8 years for women and 18.4 for men, and a woman alive at 22 can expect 16.7 years of life at 67 and older against 13.4 for a man, 25% more [3]. Those years must be funded from smaller balances. In 2022, among unmarried householders, women had less median wealth than men under 35, at 35–54, and at 65 and over; unmarried women under 35 held a median of $8,040, 30.9% of their male counterparts' wealth [90]. Older women are more often poor: in 2020–2022, 11.0% of women aged 65 and over were below the official poverty line, against 8.5% of men [86]. The partner channel of Section 3 adds to the burden. If both partners are 30 and their risks are independent, the 2024 life tables give the woman a 59% chance of outliving the man (64% if he is two years older). The longest stretch of later life is therefore most often funded by a woman alone.

Hispanic Americans: long lives, thin buffers. Hispanic Americans live longer than non-Hispanic White Americans (81.8 years at birth against 78.9 in 2024) [3], a pattern described in 1986 as an epidemiologic paradox because it coexists with lower incomes [91]. Their wealth does not match their longevity. In 2025 the median Hispanic family held $79,600 in net worth, up 18% from 2022; the White median was a bit more than four times as large, the smallest White–Hispanic ratio in the modern survey [1]. In 2022, 15.5% of Hispanic households had zero or negative wealth [90], and among middle-aged families in 2019, 28% of Hispanic families held a retirement account against 65% of White families [34]. A Hispanic 22-year-old can expect 17.5 years of life at 67 and older, 18% more than a White 22-year-old, to be financed with a fraction of the savings. Older Hispanic adults are poor at more than twice the rate of older White adults (17.4% against 7.7%) [86]. Here longevity is an advantage that the wealth gap turns into a risk: outliving one's savings.

American Indian and Alaska Native people: the shortest lives. In 2024, American Indian and Alaska Native people had the lowest life expectancy of any racial or ethnic group in the life tables, 71.1 years, and only 65.4% of a birth cohort survives to 65 [3]. Older American Indian and Alaska Native adults are poor at the same rate as older Hispanic adults, 17.4% [86]. The survival channels of Section 3 are larger for this population. Under 2024 death rates, an American Indian or Alaska Native 22-year-old would have a 64.2% chance of reaching 67 (White: 82.7%) and could expect 11.6 years of life after 67, 22% fewer than a White 22-year-old. Old-age mortality for this population is modeled in the life tables, which adds uncertainty [3]. The Census Bureau's wealth report and the Survey of Consumer Finances both fold American Indian and Alaska Native households into a combined "other" category [1, 90], so the wealth gap is poorly measured. We flag it rather than estimate it.

Table 17. Wealth gaps that the mechanisms in Sections 2–7 may widen, with the year and measure of each source. Sources differ in years, measures, and populations, and the table does not decompose any gap (Section 9).

Gap	Evidence	Mechanism
Women	Women 65+ poor at 11.0% vs. 8.5% of men, 2020–2022 [86]; 16.7 vs. 13.4 expected years at 67+ per 22-year-old, 2024	More years to fund from smaller balances; most surviving partners are women
Hispanic Americans	Median family wealth $79,600 in 2025, 24% of White [1]; 17.5 expected years at 67+ per 22-year-old, 2024	Long lives funded from thin savings
American Indian and Alaska Native people	Life expectancy 71.1 in 2024; 64.2% of 22-year-olds reach 67; older-adult poverty 17.4%, 2020–2022 [86]	Shorter lives: the survival channels in Section 3, at greater magnitude; wealth poorly measured
Disability and mental health	Working-age poverty 25.3% vs. 11.4%, 2023 [92]; 93% in a self-selected U.K. survey said they spent more when unwell [93]	Higher costs and lower incomes; money harder to manage when unwell
Gambling harm	Credit scores fell about 0.7 points with any legal sports betting and about 12 points where online betting was added [94]	Always-available betting; debt
Penalty fees	9% of accounts paid 79% of overdraft and NSF fees [95]	Fees concentrated where buffers are thinnest
Values-based exclusion	Religious reasons cited as a barrier to accounts, mainly in the Middle East, North Africa, and South Asia, 2011 data [96]	Saving outside the financial system
Age	Under-35 median family wealth $33,000 in 2025 [1]; costly mistakes more common among younger and older adults [87]; missed payments slightly more common years before a dementia diagnosis [88]	Inexperience; cognitive change

Disability and mental health. In 2023, 25.3% of working-age people with disabilities lived in poverty, against 11.4% of those without [92]. Poor mental health and money problems are closely linked. In a self-selected online survey of 5,413 people in the United Kingdom with lived expe-

rience of mental health problems, 93% said they had spent more than usual when unwell, 92% found financial decisions harder, and 59% had taken out a loan they otherwise would not have [93]. A meta-analysis found that people with unsecured debt had about three times the odds of a mental disorder (odds ratio 3.24), although the direction of causation is unclear [97]. Among 8,400 young American adults, high debt relative to assets was associated with higher perceived stress and depression, worse self-rated health, and higher diastolic blood pressure [98].

Stress and spending. Chronic stress shortens lives through the body; whether it also drains wealth through behavior is a hypothesis, and we do not model it. In experiments with real goods and money, induced sadness raised the prices people chose to pay [99], and sad, self-focused participants spent more on the same item [100]; one night without sleep moved healthy volunteers' risky choices toward pursuing gains [101]. Prompting people to think about a costly financial problem reduced cognitive performance among lower-income participants but not among higher-income ones [102], and scarcity focuses attention on the present problem at the expense of the future [103]. An audit that repeated 20 studies of the psychological consequences of scarcity found considerable variation in how well they replicated [104]. After states legalized online sports betting, savings fell as risky bets crowded out investment, and among financially constrained households credit card debt and overdrafts rose [105]. None of this work links consumer-device measures of sleep or stress to regretted spending in dollars, and none of it shows that stress drives the racial wealth gap (Section 3.5).

Gambling harm. Where sports betting has been legalized, household finances have measurably worsened. In credit-report data on roughly 7 million consumers, average credit scores fell by about 0.7 points where any legal sports betting became available and by about 12 points where online or mobile betting was added in states that already allowed retail betting. Bankruptcy filings, debt sent to collections, credit card delinquencies, and auto loan delinquencies rose [94].

Penalty fees. Fees concentrate on households with the least slack. In data from large banks, the 9% of accounts with more than ten overdraft or nonsufficient-funds transactions a year paid 79% of all such fees [95]. Combined with scarcity's toll on attention [102, 103], small, avoidable shortfalls become a steady drain on the households with the least wealth.

Values-based exclusion. Some households avoid interest-bearing products, or particular industries, for religious or ethical reasons. Evidence on how much this keeps people out of the financial system comes from outside the United States and is dated. In 2011 survey data, religious reasons were among the barriers people reported for not having an account, most often in the Middle East and North Africa and in South Asia. Demirgüç-Kunt and Klapper estimated that products compatible with religious beliefs could raise account ownership there by up to 10 and 5 percentage points respectively, while cautioning that such analysis cannot support causal statements [96]. When the only savings products conflict with a household's values, saving may happen in cash or not at all.

Age. Families headed by someone under 35 held a median of $33,000 in 2025, down 23% from 2022, the largest decline of any age group [1], and costly financial mistakes are more common among both younger and older adults than in middle age [87]. In later life, missed payments become slightly more common years before a diagnosis of dementia [88].

Across these gaps the pattern matches Section 3. Longer or shorter lives change how far wealth must stretch, chronic strain is associated with worse health and more debt, and products that profit from hard moments can widen gaps fastest among those with the least room for error. Any product aimed at these mechanisms should be evaluated for harm as well as benefit in exactly these households.

9 Threats to validity

Table 18 lists the main threats to the results of Sections 3 to 6, what this version did about each, what changed, and what remains. Five matter most for the headline. First, whether Black and White households save alike at equal income. The selected fit has Black households saving less, and under equal conditions it gives 0.69 by 2100 unless saving also equalizes (0.92). But the saving gap is a fitted residual whose sign the targets do not identify: across calibration starts the equal-conditions path ends anywhere in 0.69–0.92 (Section 5.6). If the residual partly stands for income risk, as the shocks specification suggests (Section 7.3), the equal-saving path overstates what a saving lever could do. Second, the model fits the survey's inheritance receipt only by removing most estate wealth. Third, its validation is weaker than version 2.1's. From 1992 it keeps the ratio within 0.03 of the survey at 5 of 10 waves and understates the growth of White wealth, and run from 2022 it predicts 0.14 for 2025 against the survey's 0.11 (Section 5.7), so the current-conditions path is probably optimistic. Fourth, the current-conditions path largely converges toward the calibration's steady state (0.16), above the survey's ratio, so its level in 2100 is a property of the calibration. Fifth, the optimizer does not converge, the replicate-weight refits did not leave the selected fit, and that fit misses the Black median at 35–44 by a wide margin (Table 10). The calibration's sampling uncertainty is therefore unmeasured, and the spread across starts stands in for it.

The ranges reported for the microsimulation contain the drawn parameters and Monte Carlo variation only. Section 7 lists the mechanisms outside the headline model; on the evidence cited, each would more likely widen the modeled gap or slow its closing than narrow it. Two of them, fair assessment and income shocks, are run as sensitivities, and no path run under either closes the gap in nine runs of ten. The reviews in Sections 2, 7, and 8 rest largely on observational studies. Several of the sources they cite were checked against their abstracts rather than their full texts; the replication files list them.

Table 18. Threats to validity: what each threat is, what version 2.2 did about it, what changed, and what remains.

Threat	What we did	What changed	What remains
Saving rates absorb what the model leaves out	Each group's base saving rate fitted separately (headline); one schedule for both groups as a sensitivity; equal saving a separate lever	Fitted base saving 9.8% (Black) and 12.6% (White); equal conditions reach 0.69 by 2100 and 0.92 with equal saving; with one schedule, 0.89	The fitted gap ranges −2.8 to +0.5 points across starting points, so its sign is not identified in the 2025 survey; it is a residual, not measured behavior

Threat	What we did	What changed	What remains
Inheritances reach too many or too few households	Estates split among children; receipt measured as the survey asks it and targeted by age	Receipt of $10,000 or more: 8.0% Black, 41.4% White (survey 10.3%, 33.0%)	Matching needs an end-of-life and settlement cost of up to $445,000 and a 28% estate leak
Income is deterministic given rank and age	Income-shock and distressed-sale specification, recalibrated (Section 7.3)	Fitted base saving 11.2% (Black) and 10.8% (White); current conditions 0.17 by 2100, equal conditions 0.67	Job-loss rates are 2024's, a low-unemployment year; households are assumed not to cut spending when a job is lost (an upper bound)
No growth; one cross-section	Trustees' real wage growth; backcasts from 1989, 1992, and 2022 against fixed criteria	From 1992 the ratio is within 0.03 of the survey at 5 of 10 waves	White mean growth from 1992 is far too slow (×1.13 against ×2.95 to 2022), so the current-conditions ratio is probably too high
The newest survey falls outside the model's band	Version 2.1's 2025 band checked against the 2025 survey; version 2.2 recalibrated to it	Version 2.1 put 2025 at 0.12–0.15; the survey gives 0.11 (90% interval 0.07–0.15)	The 2022–2025 fall in the Black median is within the survey's sampling error
Current-conditions path mistaken for a forecast	Steady state of each calibration computed and reported	Under current conditions the ratio moves toward the calibration's steady state (0.16; 0.19 by 2100), from the survey's 0.11	The 2100 level is a property of the calibration
Wealth is assumed to lengthen lives	Causal share of the gradient bounded by lottery evidence (0 to one sixth); runs with the share fixed at 0, one sixth, and one half	Earnings parity adds 0.00, 0.12, or 0.37 years to Black men's life expectancy at 40	Survival parity is imposed, not produced by any lever
Social Security: scheduled benefits, one earner per group	Disability and family benefits; scaled earners, median earners, and payable benefits as sensitivities	A Black man's survival penalty is $15,500 (all benefits); $9,100 under payable benefits; $10,300–$19,900 across SSA's scaled earners	Remarriage and children living apart from a parent
Bands mistaken for confidence intervals	Each statistic defined; Monte Carlo standard errors; calibration fitted from four starts and refit on replicate-weight targets	Monte Carlo standard error of the 2100 median ratio at most 0.005; across the four near-equal calibration fits, equal conditions reach 0.69–0.92 in 2100	Survey sampling error of the initial population is not propagated
Levers judged one at a time	Shapley decomposition over the combinations grid (headline specification); an independent re-implementation	Equal returns are worth +0.17 of the 2100 ratio by Shapley value against +0.09 alone; in log wealth the levers are close to additive	Screening runs are small (Monte Carlo error larger than in the full-size paths)
"Closing" rewards overshoot	Every-year criterion, a 0.9–1.1 band beside it, and median ratios reported	No combination closes the gap in 90% of runs; the closest does so in 74% of runs	Thresholds other than 0.9 and 1.1 not tested
State view counted Black householders of any ethnicity	Non-Hispanic groups from the ACS microdata, with replicate-weight margins of error	Rank correlation with version 2.0's shares 0.998	An apportionment, not a state simulation

Threat	What we did	What changed	What remains
Small samples of older Black households	The two oldest Black bands pooled into 65+ in the headline loss; a precision-weighted loss as a sensitivity; standard errors reported	Black calibration targets at 65–74 and 75+ rest on 106 and 48 families; 32 of 84 portfolio cells borrow pooled or other-group portfolios	Not pooled across survey waves
Life-table accounting (Section 3)	Arriaga decomposition in both directions; the composition channel under several metrics (Table 2)	—	Period tables; one national age-wealth profile; the Black–White crossover above 85 and race misclassification on death certificates
Couples, careers, and mortality trends (Sections 4 and 5)	Partners of the same age as a sensitivity (Table 7); lost earnings net of the deceased's consumption	—	Independent lives on population tables; the Trustees' improvement is not race-specific; no feedback from Black wealth to prices or others' incomes
Evidence in Sections 2, 7, and 8	Full texts checked where open	—	Mostly observational; a narrative, not systematic, review

Every figure is computed from the replication files. The life tables adjust for the misclassification of race on death certificates, which adds uncertainty [3].

10 Conclusion

Shorter lives account for little of the Black–White wealth gap that net worth records, and for more of the wealth that it does not. In the latest life tables most of the gap in life expectancy arises before 65. Yet the channels that can be measured in net worth, the age structure of the adult population and the length of working lives, together account for only a few percent of the log wealth gap. Through Social Security, partner loss, and the timing of bequests, the same survival gap is worth tens of thousands of dollars to each Black household, and survivor insurance replaces only part of it. These are accounting results under stated assumptions, not causal estimates, and wealth predicts survival in these data without the paper establishing that it causes it.

Nothing we test closes the wealth gap with confidence this century. Under current conditions the model's ratio of median wealth moves toward its calibration's steady state, not toward parity. No single lever closes the gap; earnings parity is the largest, equal returns the second, and survival parity barely moves median wealth while accounting for most of the gains in years of life. Equal earnings, mobility, returns, and survival together reach a ratio of 0.69 by the end of the century if Black households keep their fitted saving rate. With equal saving as well they reach 0.92, closing the gap in a majority of runs, late in the century. A one-time transfer fades on its own; added to those conditions it brings closing forward by years, not decades, and no combination we test closes the gap in nine runs of ten. The levers are close to additive in log wealth, so combinations are needed because no lever is large enough, not because the levers amplify each other.

The main uncertainty is the fitted saving gap, a residual that absorbs whatever the model leaves out, and recalibrating on the newest survey shows that its targets do not identify even the residual's sign. Fits of nearly equal quality put the equal-conditions path anywhere in 0.69–0.92, so the result that is stable across fits is the equal-saving path, not the keep-saving one. If the residual stands for mechanisms in Section 7 rather than for saving, equal saving is not a lever anyone can pull. The second uncertainty is validation. The model understates past White wealth growth, passes its backcast criterion at only half the waves, and, run forward from the previous survey, does not produce the fall in the Black median that the newest survey recorded. The current-conditions path is therefore probably optimistic, and the task of closing the gap larger than the model says.

The next question is what the residual is. The shocks specification of Section 7.3 gives a first answer. Once the job losses and forced sales that Black households absorb more often are modeled rather than averaged, the fitted saving gap all but disappears, equal saving stops helping, and income stability becomes the lever that brings the ratio near parity. A fuller module, with tax foreclosure and emergency help from family inside it, and a backcast through the recessions it should explain, is the next step. If the residual stays near zero there, the headline specification should give way to it; if it does not, the paper has a finding. Either way, the 2028 survey will be the model's next test made in advance.

PART II

Company technical note: why we exist, what the model asks of the product, the Understanding engine and API, and a planned evaluation

Part II is written by The Understanding Company about its own product, Vueni, which has not launched, and about the Understanding API, which is built but not deployed. It describes a design and a plan, not research findings, and Part I does not depend on it.

11 Why we exist

The Understanding Company exists because we think one moment that matters for financial health is invisible to the institutions that hold people's money. A bank sees an amount, a merchant, and a time. It does not see that a purchase came at 11:48 p.m. after a night with two hours less sleep than usual, that it is the third order of the evening, or that the last order from this merchant went back. A health app sees the sleep and the heart rate but not the purchase. Each holds half of the story, and neither acts on it.

We believe financial health is a health behavior and should be designed like one. That means treating the moment before a purchase as a moment of care: understanding why someone is spending, not only what; offering friction the person chose in advance; and protecting essential purchases. It also means taking seriously the evidence in Part I: chronic strain and thin buffers are associated with shorter lives, wealth and years compound together, and the burden of both falls hardest on households with the least room for error. Vueni does not target any racial, ethnic, gender, or disability group, and none of these characteristics is an input to any of its models.

Our product, Vueni, is a card and account built on seven commitments:

1. **Understanding, not judgment.** Every signal Vueni acts on is shown to the member in plain language ("Short sleep · 2h 12m below your usual"). An unexplained score reads as judgment; an explained one reads as understanding.
2. **Act before, not after.** Vueni's interventions take effect ahead of the next purchase, while a choice can still be made, rather than arriving as a lecture after the money is gone.
3. **Essentials protected.** Groceries, pharmacy, fuel, transit, utilities, insurance, and medical care are never flagged, and Calm Mode's limit is set above the member's typical large essential purchase (Section 13.6), so that most essential purchases go through; any declined essential purchase is counted as a harm (Section 14).
4. **The member is in charge.** Calm Mode is off, suggest, or auto, chosen by the member, and the default is suggest. A guardrail the member sets has a cooldown before it can be switched off: a commitment chosen in a calm moment for a hard one.
5. **Privacy by architecture.** Health data is reduced to three numbers on the phone, raw samples never leave it, and health data is never used for credit, underwriting, or advertising.

6. **Values-aware, not values-imposing.** Values mode lets members choose guardrails, interest-free savings, and a giving rule that fit their beliefs. Vueni does not certify any product as meeting a religious standard.
7. **Measure outcomes and publish them.** Section 14 sets out what we plan to measure and report, including results that do not flatter us.

Table 19 lists the mechanisms from Part I that these features are aimed at. The features are matched to mechanisms, not to groups.

Table 19. Mechanisms from Part I and the Vueni features aimed at them. Features are matched to mechanisms, not to groups: Vueni does not target any racial, ethnic, gender, or disability group, and the engine does not use these characteristics as inputs or attempt to infer any health condition, disability, or cognitive decline. None of these features has been evaluated (Section 14).

Mechanism	Evidence	Vueni feature (optional for the member)
Long horizons to fund from thin savings	Sections 3 and 8	Cash-flow forecast; Pots (named savings goals)
Shortfalls that trigger penalty fees	Section 8	Forecast warning before a projected shortfall
Stress, sleep loss, and low mood shifting purchases	Section 11.1	Stress score with its reasons shown; Smart Nudges; Calm Mode limits and pauses (suggest mode by default)
Buy-and-return loops	Section 11.1	Return-window reminders
Always-available gambling and speculation	Sections 8 and 11.1	Values guardrails: network blocks, detection, and a seven-day cooldown
Savings products that conflict with a household's values	Section 8	Values mode: an interest-free savings option and a giving rule the member chooses; no religious certification
Harder financial decisions early and late in adult life	Section 8	Smart Nudges; accountability partners the member chooses

We are not a bank: Vueni's accounts, cards, and money movement are provided through Whop's financial infrastructure and its partners. Nor do we claim that a card can close a racial wealth gap built over centuries. Our hypothesis is narrower: that a product that understands stress, buffers shocks, and helps people keep what they earn can improve everyday quantities, such as unplanned debt, regretted purchases, and savings that survive a bad month. Section 14 describes how we plan to test it.

11.1 The stress-spending hypothesis

Chronic stress shortens lives through the body (Section 3.3). It may also drain wealth through behavior; one everyday route is spending that soothes a state rather than serves a goal. We use *stress spending* for purchases whose timing and content are better explained by the buyer's momentary state (sadness, exhaustion, anxiety, depletion) than by their plans. This is a construct for product design, not a validated measure, and Part I does not model it.

Incidental emotions change what people will pay. In experiments with real goods and money, induced sadness raised the prices people chose to pay and lowered the prices at which they would sell, reversing the usual endowment effect [99]; sad participants who were also self-focused spent more on the same item [100]. Shopping can also repair mood: making purchase decisions reduced residual sadness by restoring a sense of personal control [106], and unplanned treats bought to repair a bad mood were not, on average, followed by regret or guilt [107]. A product that treated every comfort purchase as pathology would therefore be wrong as well as unkind; the target is the pattern that hurts, which is repeated, escalating, regretted spending. In a laboratory study, one night without sleep moved healthy volunteers' risky choices away from avoiding losses and toward pursuing gains, with matching changes in brain activity [101]. Heart rate variability is linked to activity in brain regions that regulate emotion and threat and is widely used as a marker of stress [108]. Sleep debt, lower heart rate variability, and higher resting heart rate, each measured against a person's own baseline, are therefore plausible but unvalidated indicators of the moments when self-regulation is hardest. None of the work we cite shows that consumer-device measures of sleep or heart rate predict regretted spending.

Scarcity narrows attention. Prompting people to think about a costly financial problem reduced cognitive performance among lower-income participants but not among higher-income ones, and the same sugarcane farmers performed worse before harvest, when poor, than after it [102]; scarcity focuses attention on the present problem and leads people to over-borrow against the future [103]. Some of this literature has not held up: an audit that repeated 20 studies of the psychological consequences of scarcity found considerable variation in how well they replicated [104]. Mental health and money move together (Section 8), and products can make it worse: after states legalized online sports betting, savings fell as risky bets crowded out investment, and among financially constrained households credit card debt and overdrafts rose [105].

Together these findings describe a loop (Figure 6): adversity raises stress; stress, sleep loss, and low mood change what people buy; unplanned spending and debt raise financial strain; and financial strain is itself a chronic stressor. Income support, debt relief, and health care act on its largest drivers. A smaller point of intervention is the moment just before the next purchase, when a little context, a little friction, or a commitment made in a calmer moment might change what happens next. Defaults [109], precommitment to future behavior [110], and self-chosen commitment devices [111] have changed financial behavior in other settings. Whether the same tools, timed by context, can interrupt stress spending is untested.

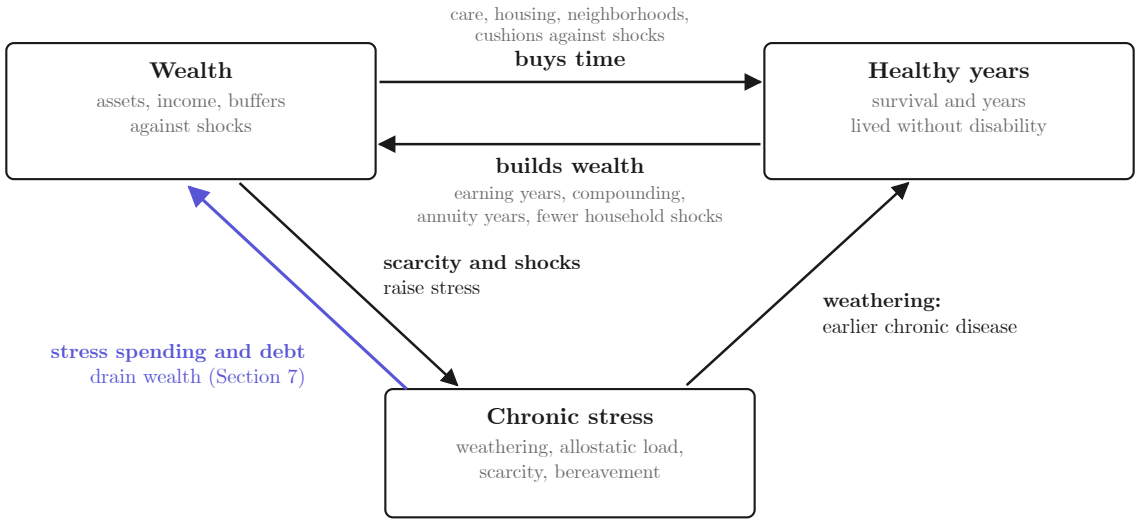


Figure 6. A conceptual map of the channels Part II is built on. Arrows show hypothesized links, not estimated effects: Section 2 reviews the two upper arrows, Section 3 quantifies the "builds wealth" arrow for the Black–White gap, and this section describes the stress-spending path (in color), which Part I does not model.

12 What the model asks of the product

Section 6 shows which levers narrow the wealth gap most and what each is worth. Most belong to employers, schools, health systems, and governments: earnings, mobility, survival, transfers, and endowments. A consumer financial product can reach four, all of which matter most for households with thin buffers. They are the share of income saved; the share lost to high-cost interest [112], fees, and stress spending; whether a shock forces the distressed home sale behind the Black–White gap in housing returns [61]; and whether savings earn diversified returns. Vueni is built around these four (Table 19). This section uses the microsimulation to set targets for them.

12.1 Effects we assume and must test

We have not measured Vueni's effects (Section 14). For planning we assume that an active member raises saving by 2 percentage points of income, halves high-cost interest, cuts stress spending by half a percent of income, halves the housing-distress gap through emergency buffers, and earns half a percentage point more on positive wealth. We also assume that 90% of members remain active each year. The saving assumption is small next to the effects of automatic enrollment and commitment devices in workplace and field settings [109–111]; the others are hypotheses that the evaluation in Section 14 is designed to test. Eligibility does not depend on race: households under 67 whose net worth is below the national median for their age.

12.2 Reach targets

Table 20 and Figure 7 show what these assumptions imply, in the headline specification of Section 5. Reaching half of eligible households, about 15 million households in 2030, 4.7 million of them Black, would add about $6,500 to the wealth of the median Black household by 2050

and raise the ratio by 0.012; reaching every eligible household would raise it by 0.023. The 90% interval around the median gain, $6,400–$6,600, is Monte Carlo error around an assumed effect, not an estimate of the product's effect. With equal conditions, the same half reach would add $10,500 to the median Black household and 0.013 to the ratio. Among the levers of Section 6 the product is small: its Shapley value for the 2100 ratio, computed with the six levers of the screening grid, is +0.01, and added to equal conditions it moves the 2100 ratio from 0.69 to 0.70. The product cannot close the gap, and in the model no combination of the larger levers closes it in nine runs of ten either; at most it can narrow the gap slightly alongside them. Our targets follow from the model: reach half of eligible households by 2030, keep nine in ten active each year, and demonstrate the assumed effects in a randomized evaluation before claiming them.

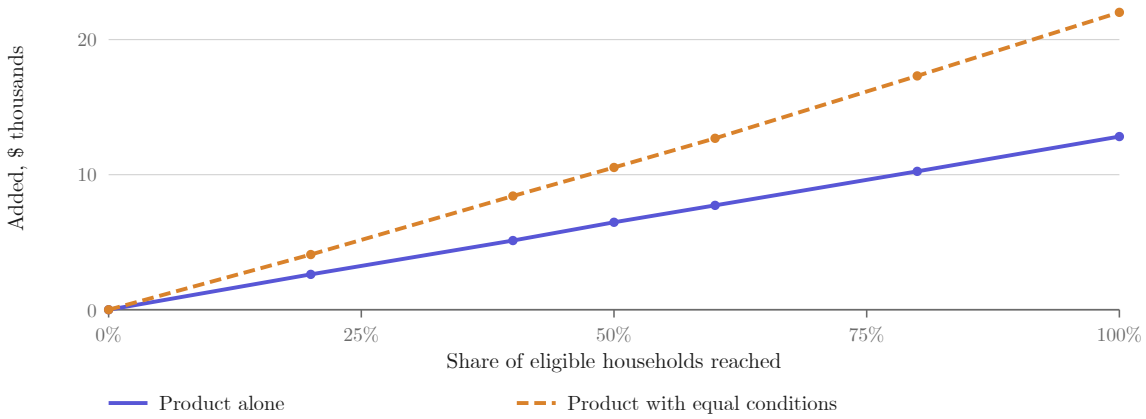


Figure 7. Wealth added to the median Black household by 2050, in thousands of 2024 dollars, against the share of eligible households the product reaches, alone and with equal conditions. The curve is nearly linear in reach, and small at every level. Notes: the planning assumptions of Section 12.1; medians of run-by-run differences in 1,000 runs of 12,000 households for each level of reach; bands are Monte Carlo error around assumed effects, not estimates of the product's effect.

Table 20. Product reach and the wealth gap: planning targets from the microsimulation.

Eligible households reached	Adopters, 2030 (millions)	Black adopters, 2030	Median Black wealth added, 2050	Ratio change, 2050	With equal conditions
20%	6.1	1.9	$2,600 ($2,600–$2,600)	+0.005	+0.005
40%	12.2	3.8	$5,100 ($5,100–$5,200)	+0.010	+0.011
50%	15.1	4.7	$6,500 ($6,400–$6,600)	+0.012	+0.013
60%	18.2	5.6	$7,700 ($7,700–$7,800)	+0.014	+0.015
80%	24.2	7.5	$10,200 ($10,100–$10,300)	+0.019	+0.021
100%	30.3	9.4	$12,800 ($12,700–$12,900)	+0.023	+0.026

Headline specification. Eligible: households under 67 with net worth below the national median for their age (both races). Adopters raise saving by 2 points of income, halve high-cost interest, cut stress spending by 0.5% of income, halve the housing-distress gap, and earn 0.5 points more on positive wealth; 90% remain active each year. These effects are assumptions for planning (Section 12.1), not estimates. Effects are medians of run-by-run differences from no

product, in 1,000 runs of 12,000 households for each level of reach; in parentheses, a 90% bootstrap interval for that median, which is Monte Carlo error around an assumed effect, not an estimate of the product's effect. The last column adds the product to equal conditions.

13 The Understanding engine and the Understanding API

This section describes the Understanding engine as it exists in our codebase on October 17, 2026. The engine is pure, deterministic TypeScript: given the same member snapshot, it returns the same scores, matches, cycles, and interventions. On October 1, 2026 it was covered by 45 unit tests, and every spending-related number in the app screens on our website (scores, cycles, forecasts, suggestions) is computed by the engine on a synthetic member rather than typed by hand. The iOS app that will supply health signals is not yet built, the engine has not been evaluated with members, and every weight below was set by hand. We report them so that they can be criticized. The engine does not use race, ethnicity, gender, or disability as inputs, and it does not attempt to infer any health condition, disability, or cognitive decline. Some of its inputs, such as health signals, time of day, and merchant category, are correlated with those characteristics and with shift work and income, so Section 14.2 plans an audit for disparate impact.

Since October 2026 the engine is also the facts layer of the Understanding API, which answers one bounded question about money in a single call. Four decisions are built: whether a merchant is a restricted one (gambling and similar categories), what kind of spending a purchase is, which purchase a receipt belongs to, and which purchase a refund pairs with. All four concern merchants and transactions, not people, and none is a credit decision. The engine first adds the facts it already knows to the question: the network's description of the merchant category, the rule checks that fire by definition, and, for each candidate charge or refund, the differences in amount and time, the similarity of names, and the share returned. Cases that rules settle, such as a receipt with no purchase to match, are answered without a model. The rest go to a hosted decision model of the kind now called a System One model: a model built to read a state and a typed question and return a typed answer with a probability in one pass, rather than prose. We do not name the model here because the contract is ours and the model underneath can change. Every answer carries the decision, the answer, its probability, the reasons behind it, and an abstain flag that is true when the probability falls under a threshold or the model declines, so that unclear cases go to a person rather than to a guess. The reasons and the abstain flag are built in code, with their own tests, but the endpoint is not deployed and has no users. The engine's own functions were benchmarked in process on test sets we built, on October 12, 2026; the model layer has not been benchmarked, and no deployment at any bank, credit union, or health company exists.

13.1 Constraints that shaped the design

Three facts about the platform shaped the engine. First, the card platform reports transactions after authorization and offers no real-time approve-or-decline hook, so the engine cannot stop a purchase in flight; it acts ahead of the next one by adjusting the card's per-purchase limit, pausing the card briefly, or scheduling a reminder. Second, the card program declines some merchant categories at authorization by default, including the gambling codes; gambling-adjacent merchants that code themselves differently, such as sweepstakes casinos and prediction markets, can

be detected only after the charge. Third, health data must stay on the phone. The iOS app will compute three deltas against the member's own 14-day baseline (minutes of sleep below baseline, percent change in overnight HRV, and percent change in resting heart rate) and send only those. The server route accepts nothing else.

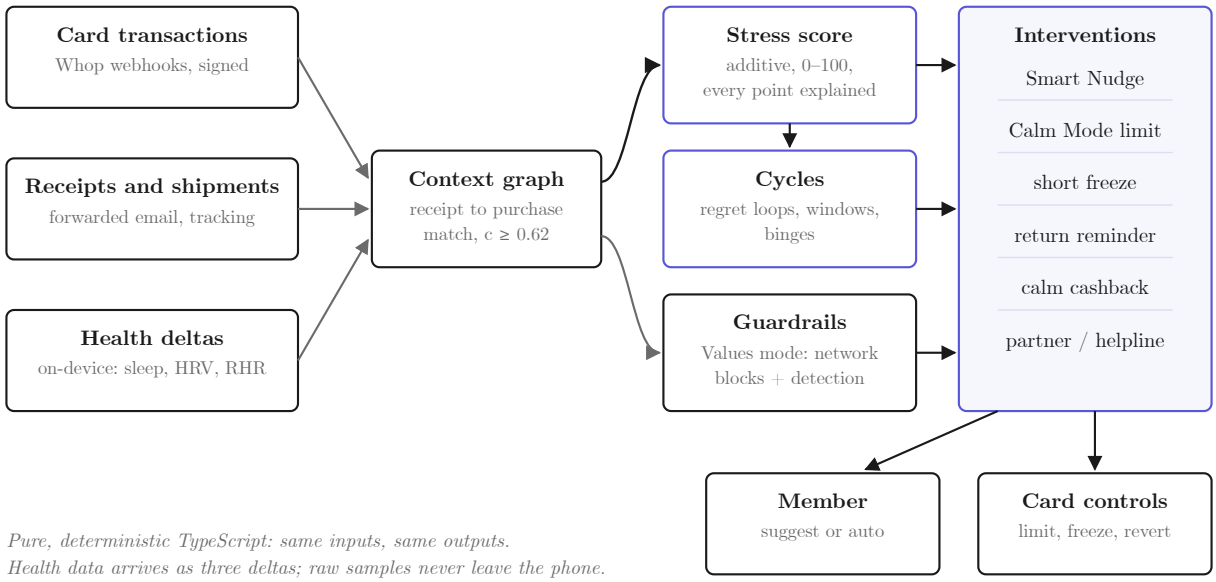


Figure 8. The Understanding engine. A card transaction anchors a context graph of receipts, shipments, and health deltas; explainable scores and named cycles drive a ladder of interventions, which the member accepts (suggest mode) or is told about (auto mode), and values guardrails run alongside. The same facts layer feeds the Understanding API.

13.2 The context graph and receipt matching

A card transaction is the anchor; receipts, shipments, and health signals attach to it (Figure 8). Receipts arrive by email forwarding. A rule-based parser extracts the total, order number, items, return window, and tracking numbers; emails it cannot parse are reserved for a language-model extraction pass with the same output schema. A receipt is matched to the transaction it paid for by a weighted confidence

$$c = 0.50\, s_{\text{amount}} + 0.35\, s_{\text{merchant}} + 0.15\, s_{\text{time}}, \tag{4}$$

where s_{amount} is 1 for an exact match to the cent, declines linearly to 0.4 at a 3% difference (absorbing tax, tips, and split shipments), and is 0 beyond; s_{merchant} is a bigram similarity after stripping payment-processor prefixes; and s_{time} declines linearly to 0 at three days. A match requires $c \geq 0.62$; otherwise the engine reports no match rather than guessing.

13.3 The stress score

For each purchase t, the version-0 stress score is additive:

$$S_t = \min\Big(100,\ \sum_{k \in \mathcal{K}_t} p_k\, m_k\Big), \qquad m_k = \begin{cases} \beta(b_t)\,\sigma(a_t), & k \in \mathcal{C}, \\ 1, & \text{otherwise}, \end{cases} \tag{5}$$

where $\mathcal{K}_t$ is the set of factors present, p_k are the points in Table 21, and $\mathcal{C}$ is the set of contextual factors (time of day, sleep debt, HRV, and resting heart rate). The bucket weight β is 0 for essential merchant categories, 0.5 for uncategorized ones, and 1 for discretionary ones, and the size weight σ is 0.5 for purchases under $15 and 1 otherwise. Context therefore never adds points to an essential purchase and counts for less on a small coffee after a bad night. An essential purchase can still earn the non-contextual points for an unusually large amount or for a merchant with past returns, at most 22 points, which is below the elevated threshold, so essentials are never flagged. Health factors apply only when the latest signal was observed no more than 18 hours before the purchase or up to one hour after it. Scores of 35 and above are *elevated*; 60 and above, *high*. The model is deliberately simple: every point traces to a reason the member can see, so the explanation is the model. It is a heuristic built from the evidence in Section 11.1, not a validated measure of stress spending.

Table 21. Factors and points in the version-0 stress score (Equation 5). Starred factors are contextual and are multiplied by the bucket weight β and size weight σ, so they never count on essential purchases. "Buying fast" applies only to discretionary purchases.

Factor	Condition	Points
Late night*	11 p.m. to 4 a.m., member's local time	18
Late evening*	9 to 11 p.m.	8
Short sleep*	≥ 90 / ≥ 45 minutes below 14-day baseline	16 / 8
HRV down*	$\leq -15\%$ / $\leq -8\%$ against baseline	16 / 8
Resting heart rate up*	$\geq +8\%$ / $\geq +4\%$ against baseline	10 / 5
Buying fast	1 / 2 / ≥ 3 earlier discretionary purchases in 24 hours	4 / 10 / 14
Impulse category	department stores, apparel and shoes, electronics, digital goods, beauty, gifts, online catalogs	10
Comfort purchase	restaurants, bars, fast food and delivery, liquor, tobacco	6
Bigger than usual	$\geq 2.5\times$ the member's median purchase in the same bucket (5+ prior)	10
Returned here before	1 / ≥ 2 refunds at a similar merchant in 120 days	8 / 12

13.4 Cycles

Stress spending is rarely a single purchase. The engine names three recurring shapes back to the member. A *regret loop* is two or more stressed purchases (score of at least 35) refunded within 45 days. A *recurring window* is three or more stressed purchases on the same weekday and in the same part of the day (mornings, afternoons, evenings, or nights, with purchases after midnight counted with the previous evening) across at least two weeks. A *binge* is three or more stressed purchases within six hours.

Table 22. The intervention ladder. In suggest mode (the default) the member accepts each limit or pause; in auto mode it applies and the member is told why. Every limit and pause reverts automatically. None of these responses has been evaluated with members (Section 14).

Trigger	Response	Rationale
Elevated purchase (35–59) in the last two hours	Smart Nudge only	Light prompts preserve choice; reminder messages have changed saving behavior in field experiments [113]
High-stress purchase (60+) in the last two hours	Per-purchase limit (Equation 6) until 8 a.m.	One night without sleep shifted risky choices toward seeking gains in a laboratory study [101]
High-stress purchase within a binge, if enabled	Three-hour pause	Self-chosen commitment devices raise follow-through [111]
Known recurring window	Calm Mode offered an hour before it opens	Commit before the hard moment, as in Save More Tomorrow [110]
Stressed purchase with a return window	Reminder three days before the window closes	Regret that can still be undone; breaks buy-regret-return loops
Seven days without a high-stress purchase	1% cashback for seven days	Rewards calm rather than only restricting stress
Values guardrail match	Network decline, or pause, partner, and support	Self-excluders generally report benefits, though programs are under-used [114]

13.5 Interventions and Smart Nudges

Interventions follow a ladder that matches the strength of the response to the strength of the evidence (Table 22). When the most recent purchase, made within the past two hours, is high-stress, Calm Mode proposes, or in auto mode applies, a per-purchase limit until 8 a.m. local time; if the member has enabled it and the purchase is part of a binge, it proposes a three-hour pause instead. The limit is

$$L = \max\left(F,\ 5\left\lceil 1.1\, Q_{0.9}(E)/5 \right\rceil\right), \tag{6}$$

where $Q_{0.9}(E)$ is the member's essential purchase at the 90th-percentile rank (with the member's n essential purchases sorted from smallest, the one in position $\lfloor 0.9\mathrm{n} \rfloor + 1$, which is the largest when $\mathrm{n} \leq 10$) and F is a floor of \$50. An elevated purchase triggers only a Smart Nudge, a short in-app or push message such as "Heavier day than usual. Want to sleep on the next one?" When a recurring window is known, Calm Mode is offered an hour before it opens. Stressed purchases with a stated return window generate a reminder three days before it closes. A week without a high-stress purchase earns a week of 1% cashback. Every limit and pause reverts automatically.

13.6 Forecast

A cash-flow forecast identifies recurring flows (paychecks, rent, subscriptions) as three or more flows with the same counterparty at a weekly, biweekly, or monthly cadence whose amounts vary by less than 15%, and projects the balance for 30 days. Remaining spending is modeled as

independent daily draws from the last 60 days of history, so the 80% band widens with the square root of the horizon d:

$$\hat{B}_d = B_0 + d\,\hat{\mu} + R_d + X_d, \qquad \hat{B}_d \pm 1.2816\,\hat{\sigma}\sqrt{d}, \tag{7}$$

where $\hat{\mu}$ is the mean daily discretionary flow over the last 60 days (negative, because only outflows enter it), $\hat{\sigma}$ its standard deviation, R_d the sum of recurring flows due by day d, and X_d the sum of known one-off flows such as pending refunds.

13.7 Values guardrails

Members can turn on guardrails for gambling, alcohol, tobacco and vaping, adult content, and crypto and trading apps. Enforcement has two tiers, which the product never blurs. In a *network block*, the card program declines a merchant category at authorization. In *detection*, the engine recognizes a merchant after the charge and then pauses the card, notifies an accountability partner the member chose, or surfaces support resources such as a problem-gambling helpline. Switching a guardrail off takes effect only after a cooldown (seven days for gambling, two to three days for the others), so the guardrail is a commitment chosen in a calm moment rather than a setting undone in a hard one. Self-exclusion programs built on a similar idea are underused and do not stop all gambling, although participants generally report benefits, including less gambling [114].

13.8 A worked example

Figures 9 and 10 show the engine's output on the synthetic member behind our website: 23 days of card transactions (September 12 to October 4, 2026, New York time), three receipts, and six health signals for "Alex," whose Sunday nights are hard. Groceries, pharmacy, and fuel score 0 even after short nights. A $6.50 coffee the morning after a poor night scores 25, below the elevated threshold, because context counts half on small tickets. The engine finds all three cycles: a regret loop (two stressed purchases totaling $306, both returned within 45 days), a recurring window (Sunday nights: six stressed purchases across four Sundays, $566), and a binge (three purchases in six hours, $244). At 11:48 p.m. on the fourth Sunday, a $128 order from a merchant whose previous order Alex had sent back scores 83. The engine matches the order-confirmation email to the charge with confidence 1.0 and proposes a $125 per-purchase limit until 8 a.m.: 110% of $112.45, the largest of Alex's nine essential purchases, which the rule in Equation 6 selects when there are ten or fewer, rounded up to $5. It also schedules a return reminder three days before the stated return window closes.

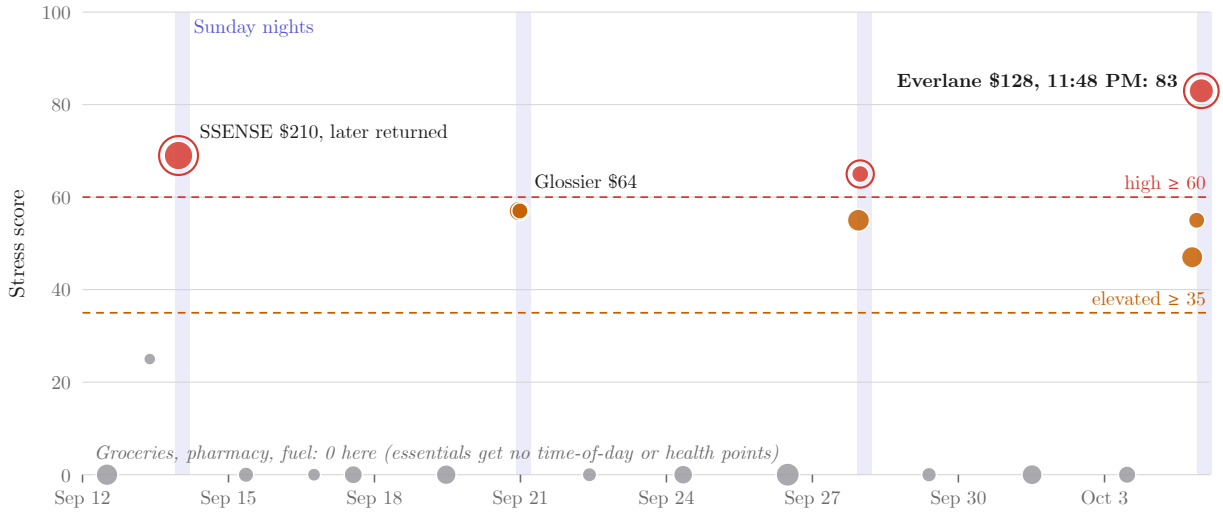


Figure 9. Twenty-three days of the synthetic member through the engine. Each circle is a purchase, colored by level (grey calm, orange elevated, red high, with an outer ring on high); shaded columns are Sunday nights, the recurring window the engine detects. Essential purchases get no time-of-day or health points, and in this example all of them score 0.

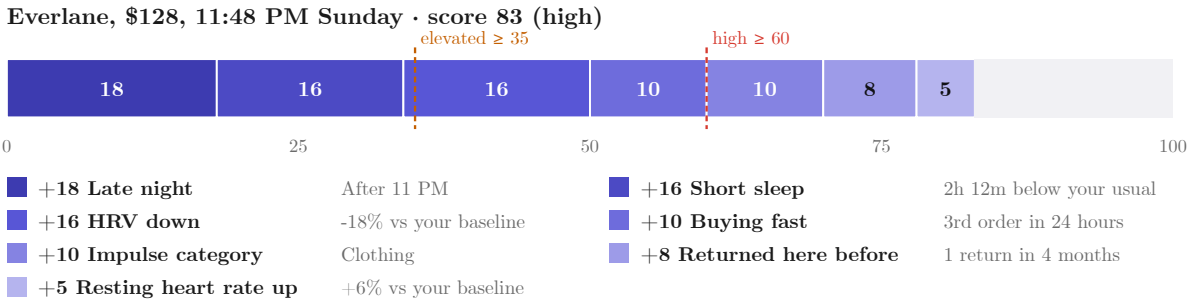


Figure 10. The explanation shown to the member for the 11:48 p.m. purchase. Each segment is one factor from Table 21; the sum is the score.

13.9 The engineering harness

The engine is a set of pure functions composed by a single entry point, `understand(member)`, which matches receipts, scores purchases, detects cycles, and plans interventions. Card events arrive by signed webhooks (verified under the Standard Webhooks scheme and deduplicated), receipts by an inbound-email route, and health deltas by an authenticated route that discards any field other than the three deltas. In auto mode, interventions execute through the card platform's API; in suggest mode they are shown to the member first. A scheduled job reverts every temporary limit and pause. The unit tests cover receipt parsing, matching, scoring, cycle detection, intervention planning, guardrails, giving calculations, and webhook verification; the API's contract, reasons, and abstain logic have tests of their own.

13.10 From hand-set weights to learned models

The version-0 weights are priors, chosen from the literature in Section 11.1 and from product judgment. Once members consent to outcome measurement, we plan to learn per-member weights. Our candidate is a generalized additive logistic model of the probability that a purchase is later regretted, with regret labeled by returns of the item, by the member's own answers in the app, and by declined Calm Mode suggestions treated as disagreement. An additive model keeps the property we care about most: each prediction decomposes into per-factor contributions that can be shown to the member. Member-level random effects let the model learn that Sunday nights are hard for one person and Friday afternoons for another; monotonicity constraints keep explanations sensible (more sleep debt never lowers a score); and thresholds will be set to bound the rate of interventions on purchases members later endorse. Race, ethnicity, gender, disability, and direct stand-ins for them, such as names or neighborhoods, will not be features. Other features, including health signals and time of day, are correlated with these characteristics, so any learned model would face the same audit as version 0 (Section 14.2). Language models will be used where language is the task, such as extracting receipts and explaining an answer after it is made, not to score people or to make the decision of record.

14 Planned evaluation and ethics

14.1 What we plan to measure

We plan to register the design and the outcomes in Table 23 in a public registry before launch. Members who opt in to Calm Mode would be randomized, for a fixed period, between suggest mode and a holdout in which scores are computed but no interventions are shown, and analyzed by intention to treat. New intervention types would roll out in steps so that each can be evaluated against the others.

Status. This is a plan, not a registered protocol. Nothing has been registered and no registry has been chosen; no institutional review board or other independent ethics committee has reviewed the design; and the sample size, minimum detectable effects, unit of randomization, stopping rules for harm, data-retention periods, and consent language have not been set. Members assigned to the holdout would not receive interventions they might expect from Calm Mode, so the consent language would need to say so before randomization.

14.2 Fairness

Because the burden of stress spending is unequal, its benefits and harms might be too. We plan to report outcomes by income band and age band and, for members who choose to share them, by self-reported gender, race and ethnicity, disability, and shift work, the last because the time-of-day factor may fall more often on people who work at night. These answers would be collected only for auditing and stored apart from every decision system. We would check that interventions do not fire more often for some groups than others at equal underlying risk, and that the essentials floor protects lower-income members, whose essential purchases are smaller. We would also check that the calm-week cashback does not pay less to members whose health signals differ

because of illness, disability, or medication. The API's decisions concern merchants and transactions rather than people, but error rates can still differ by neighborhood and by the kinds of merchants a community uses, so the same audit would apply to them.

14.3 Privacy, autonomy, and paternalism

Health data is sensitive. Whether the Federal Trade Commission's Health Breach Notification Rule [115] or state consumer health-data laws apply to Vueni is a legal question that this paper does not settle; we treat health deltas as sensitive in storage, logs, and analytics regardless. Members can turn Calm Mode off at any time; suggest mode is the default; every intervention explains itself and reverts automatically; and the only friction that persists is friction the member chose in advance. We will not sell data, use health data for credit or advertising, or optimize for engagement.

Table 23. Planned outcomes for a randomized evaluation of Calm Mode (suggest mode against a scored-but-silent holdout). To be registered before launch; not yet registered.

Outcome	Measure	Role
Regretted spending	Dollar value of stressed purchases later returned or marked as regretted	Primary
Financial distress	Overdraft, declined-payment, and late-payment events	Primary
Savings	90-day change in savings balances	Primary
Use of the tool	Calm Mode acceptance and override rates; recurrence of named cycles	Secondary
Wellbeing	Self-reported financial stress on a validated scale; sleep and HRV trends for members who share them	Secondary
Harms	Declined essential purchases (target: zero), complaints, opt-outs, spending displaced to other cards	Harm
Equity	All of the above by income band and age band and, for members who choose to share them, by self-reported gender, race and ethnicity, disability, and shift work	Audit

14.4 What we will publish

We will publish the registered protocol; the outcome results, whether or not they favor the product; the distribution of interventions across groups; and every change to the model's weights and thresholds. Part II has described what we built, how it works, and how we plan to learn whether it helps. We invite scrutiny of all three.

Data and code for Part II. The reach targets of Section 12 are computed by `wealthsim.mjs` (its reach phase) in the replication files, under the planning assumptions stated there. The worked example of Section 13 is the Understanding engine's output on a synthetic member, included in the replication files as `engine-demo.json`; the engine's source code and the API are proprietary.

Data and code availability

Life tables: National Center for Health Statistics, *United States Life Tables, 2024*, spreadsheet tables at https://ftp.cdc.gov/pub/Health_Statistics/NCHS/Publications/NVSR/75-05/. Mortality projections: Social Security Administration, Office of the Chief Actuary, death probabilities from the 2026 Trustees Report at

https://www.ssa.gov/oact/Downloadables/CY/. Earnings: U.S. Census Bureau, Current Population Survey, 2025 Annual Social and Economic Supplement, table PINC-03, at https://www.census.gov/data/tables/time-series/demo/income-poverty/cps-pinc/pinc-03.2024.html. Wealth: Board of Governors of the Federal Reserve System, Survey of Consumer Finances, 2025 summary extract, replicate weights, and historical tables, at https://www.federalreserve.gov/econres/scfindex.htm. States: U.S. Census Bureau, American Community Survey 2020–2024 5-year Public Use Microdata Sample at https://www2.census.gov/programs-surveys/acs/data/pums/2024/5-Year/ and Summary File at https://www2.census.gov/programs-surveys/acs/summary_file/2024/table-based-SF/, and U.S. Bureau of Economic Analysis, GDP by state (table SAGDP2) at https://apps.bea.gov/regional/zip/SAGDP.zip. Social Security disability: Social Security Administration, *Annual Statistical Report on the Social Security Disability Insurance Program, 2024*, and the Current Population Survey 2025 public-use microdata at https://www2.census.gov/programs-surveys/cps/datasets/2025/march/. Validation: the 1989–2025 Survey of Consumer Finances summary extracts and the 2022 and 2025 full public data sets (same address as above), the Federal Reserve's Distributional Financial Accounts, realized market returns from Aswath Damodaran's historical returns table, the FHFA house price index, and consumer prices, with their sources listed in the replication files. Every number in Sections 3 to 6 and 8 that is not quoted from a source is computed by the replication files published with this paper at https://theunderstanding.company/research: `analysis.py` for the life-table accounting, `projection.py` and `cps_micro.py` for the projection model, `wealthsim_inputs.py`, `backcast_inputs.py`, and `wealthsim.mjs` for the microsimulation and its validation (Node.js; on a 6-core laptop the calibration took about 30 minutes and the runs behind the published results about 1.9 hours; seeds are fixed in the scripts), `wealthsim_steady.mjs` for the steady state of each calibration, `cross-check.json` for the outputs of the independent re-implementation of Section 5.8, `states.py` for the state view, and their public inputs (the largest survey files are downloaded by the scripts). Two components cannot be rerun from the package: the code of the independent re-implementation, which is not included, and the proprietary engine behind the website's worked example.

Disclosures

Competing interests. The authors are with The Understanding Company, which is developing Vueni, a consumer financial product that has not launched, and the Understanding API, which is built but not deployed; no outcome data exist. The company would benefit if the product succeeds, so readers should weigh our interpretation accordingly. Sections 1–10 do not describe or evaluate the product. Nothing here is financial, medical, or legal advice.

AI assistance and reference checking. The paper was prepared with the assistance of AI tools, which were used to draft text, write the analysis code, and check citations; the authors are responsible for its content. Every reference has been checked, with AI assistance, against the publisher's record (Crossref), PubMed, OpenAlex, or the issuing agency's own document, and every web address opened; the references added in version 2.2 were checked the same way on October 18, 2026. Sources checked against their abstracts only are listed in the replication README, which also records the three claims, three mis-cited sources, and one superseded reference that earlier checks found and corrected.

Changes from version 2.1

Version 2.2 (October 18, 2026) moves the paper to the 2025 Survey of Consumer Finances, runs every microsimulation result under the headline specification, adds Section 3.1 on the change between the 2022 and 2025 surveys and Section 7 on mechanisms outside the model, and rewrites the text throughout. The findings change: equal conditions with equal saving reach 0.92 rather than parity, a transfer no longer closes half the runs in the year it is paid, no combination closes the gap in 90% of runs, the fitted saving gap's sign is not identified, and the 1992 backcast passes 5 of 10 waves; the previous version's 2025 band is kept as an out-of-sample check (Section 5.7). The full version history is in Appendix A.

Appendix A. Version history

Version 2.2 (October 18, 2026) rebuilds the data and models on the 2025 Survey of Consumer Finances and rewrites the text. Headline numbers change where the starting population changes; the replication notes list each change.

- Data: the 2025 survey replaces the 2022 survey as the starting population, calibration targets, and net-worth inputs of Sections 3 and 4; 2022 stays as a comparison, as a backcast wave, and as the start of a new backcast to 2025. New Section 3.1 reports the change between the two surveys with the Federal Reserve's standard errors.
- Microsimulation: every result (single levers, the combinations grid, the Shapley values, the fixed causal shares, the state view, and the product's reach) is now run under the headline specification; one saving schedule for both groups is a sensitivity block. The calibration loss pools the two oldest Black age bands; a loss weighting each target by its precision was tried, rejected for the headline, and kept as a sensitivity. Fits from four starting points are reported; refits on replicate-weight targets did not leave the selected fit. The mobility equation is described as the model runs it. Monte Carlo standard errors are reported for closing shares and paired differences. Two sensitivities are new: a fair-assessment lever (Section 7.2) and a shocks specification with job loss, thin buffers, and distressed sales (Section 7.3). Version 2.1's 2025 band is reported against the 2025 survey as an out-of-sample check.
- Effect on the headline numbers: under current conditions the 2100 ratio is 0.19 (version 2.1: 0.21); equal conditions keeping the fitted saving rate reach 0.69 with 0% of runs closed (were 0.90 and 48%); with equal saving 0.92 (was 1.07); with the transfer as well, half the runs are closed from 2088 (was 2030); wealth added by 2075 is $9.8 trillion (was $22.8 trillion); earnings parity alone reaches 0.45 (was 0.65 with one schedule) and the transfer alone 0.19 (was 0.26); the fitted base saving rates are 9.8% and 12.6% (were 9.0% and 10.5%); no combination closes the gap in 90% of runs (several did, each with a transfer); the 1992 backcast passes 5 of 10 waves (version 2.1 passed every wave it tested, through 2022).
- Text: the abstract, introduction, and conclusion are rewritten to the house style guide; causal language is removed where the evidence is associational; the lever bundles are defined once (Section 5.4); the review sections are shortened and merged (Section 8); new Section 7 adds historical dispossession, property tax overassessment and tax foreclosure, and income shocks as literature-grounded mechanisms; Part II describes the Understanding API as built.
- References: twenty-seven added (structural and accounting studies of the gap, the money's-worth literature, U.S. quasi-experimental evidence on wealth and mortality, the property-tax and Detroit literature, labor-market and wealth-shock evidence, the historical origins of the gap, the 2025 survey, and a microsimulation precedent), each checked against Crossref or the issuing agency.

Version 2.1 (October 2, 2026) revised the microsimulation and the Social Security model, added a validation and an independent replication, and changed the microsimulation's headline specification; several headline numbers changed.

- Microsimulation, saving: each group's base saving rate was fitted separately, less measured support to relatives outside the household, and the fit reversed version 2.0's: Black households save less (version 2.0: 5.9% against 3.5%). This became the headline specification because it fit the survey better than one saving schedule for both groups and its backcast from 1992 passed at more waves; the choice was made after both backcasts were seen. "Equal conditions" came to mean equal earnings and mobility, returns, and survival, with Black households keeping their lower saving; equal saving became a separate, named lever. Version 2.0's equal conditions lowered Black saving and reached 0.91 by 2100; keeping Black saving gave 1.29.
- Microsimulation, inheritances: estates are split among the parents' living children; receipt of $10,000 or more is measured as the survey asks it and targeted by age; an end-of-life and settlement cost is calibrated. Modeled receipt fell from 50.4% (Black) and 78.1% (White) in version 2.0.

- Microsimulation, growth and corrections: real wages grow as the 2026 Trustees Report projects; survey incomes, stated in 2022 dollars, had been converted as if in 2021 dollars, overstating them by 8%; markets and each group's households and heirs draw from separate random streams (version 2.0 showed $1.1 trillion of White wealth "added" by equal conditions in 2100, now zero), and survival-parity runs keep each run's own mortality draw. The causal share of the wealth–mortality gradient is bounded by lottery evidence (0 to one sixth, from a quarter to three quarters), with runs at fixed shares.
- Effect on the headline numbers of version 2.1: under current conditions the 2050 ratio was 0.11 in version 2.0 and the 2100 ratio 0.23; version 2.0's equal conditions, which also equalized saving, reached 0.91 with 51% of runs closed; with equal saving and the transfer the gap closed from 2074; Black wealth added by 2075 was $10.8 trillion; income added in 2050 was 5.0% of 2024 GDP in unadjusted dollars; earnings parity added 0.5 years to Black men's life expectancy at 40 through wealth.
- New: a validation that runs the model forward from the 1989 and 1992 surveys against criteria fixed in advance (Table 11); the steady state of each calibration; an independent re-implementation with separate code, run against version 2.0 (Section 5.8); Shapley values of the levers (Table 14), with wording that implied the levers amplify each other removed; definitions of every reported statistic, the median run, and Monte Carlo standard errors; and a comparison with structural models. Income added is set against GDP in 2024 wage terms.
- Social Security (Section 4): disability benefits, benefits for children and young surviving parents, the reduced widow(er)'s benefit from 60 under the earnings test, and the family maximum were added, against the full payroll tax, with claiming at 62 as a sensitivity. A Black man's survival penalty became $15,500 (retirement-only measure: $17,600), a Black woman's $8,200 ($8,800), and a Black couple's $18,300 ($27,900). Survivor benefits offset 30% of the partner-loss penalty (version 2.0 gave 15% as an upper bound). Tables 5, 6, 7, and 9 gained rows.
- States (Section 6.5): non-Hispanic Black and White householders from the 2020–2024 ACS microdata, with replicate-weight margins of error, replaced Black householders of any ethnicity; the ranking was nearly unchanged (Spearman correlation 0.998).
- Facts and references: every reference was re-checked against Crossref and every web address opened; two references cite their versions of record; the 2025 poverty report replaced the 2024 one; the samples behind the older Black targets and the portfolio cells that borrow other portfolios are disclosed; rounded differences agree with the figures printed beside them. Ten references were added.
- Structure: Part I no longer depends on Part II. The product's rows in Tables 12 and 13 moved to Section 12, the subtitle, abstract, introduction, captions, and data statement no longer refer to Part II, the "steps" of Section 6.3 are stated as implications of the model, and the list of limitations is replaced by a table of threats to validity (Table 18).

Version 2.0 added a projection model; Part I's other results were unchanged.

- New Section 4: an open projection model of Social Security wealth with spousal and survivor benefits, the loss of a partner, and bequests, with forecasts to 2075 under the Social Security Trustees' mortality assumptions (Tables 5–9 and Figure 4). Later sections were renumbered, and the abstract, introduction, Section 3.5, limitations, and conclusion report its results.
- New Section 5: a microsimulation of household wealth, calibrated to the 2022 Survey of Consumer Finances and run for 10 million households per path, that projects the gap to 2100 under current conditions and under each lever, finds the smallest combinations that close it, and estimates what closing it would add in wealth, income, spending, and years of life (Tables 10–15 and Figure 5).
- New Section 5.7 (5.6 in version 2.0; 6.5 in this version): where the gains of equal conditions would land, apportioning the national gains to the 50 states and the District of Columbia with the 2020–2024 American Community Survey and GDP by state (Table 16); two references were added.

- New Section 12 in Part II: product targets from the microsimulation (Table 20 and Figure 7). Later sections were renumbered.
- The conflict-of-interest statement moved from page 1 to the Disclosures section.
- New data: the 2026 Trustees Report death probabilities, Social Security benefit-formula parameters and scaled earnings factors, Current Population Survey earnings for 2024, the 2022 Survey of Consumer Finances microdata with replicate weights, funeral, end-of-life, consumer-price, and maternal-age sources, and, for the microsimulation, long-run asset returns, housing returns by race, intergenerational mobility by race, and the consumption response to wealth; sixteen references were added.

Version 1.1 corrected version 1.0 as follows.

- Gambling (Section 8 and Table 17): credit-score effects now come from the published version of Hollenbeck, Larsen, and Proserpio (about 0.7 points with any legal sports betting and about 12 points where online betting was added), replacing figures from their April 2025 working paper.
- Section 3.3: removed a claim, attributed to Boen, Keister, and Aronson, that unsecured debt harmed young Black adults' health more than White adults'; their study of adults 25 and older reports no such difference.
- Social Security (abstract, Section 3.4, Tables 3 and 4, Section 9): the GAO (2003) finding concerns the full program and lower lifetime earnings; it is no longer described as offsetting the shortfall at equal earnings.
- Abstract, Introduction, and Sections 3.5 and 10: the interpretation is restated within what the accounting shows. Table 4 now gives each channel's share of the wealth gap where one can be computed, and Table 2 gives the composition channel under other metrics.
- Citations corrected or qualified: Glei et al. and Makaroun et al. (Section 1), Derenoncourt et al. (Section 1), Machado et al. (Section 2), Nicholas et al. (Section 8), Gainsbury (Section 13 and Table 22), Madrian and Shea (replaced by Karlan et al. in Table 22), Venkatraman et al. (Table 22), and Baker et al. (identified as a working paper that has since been published).
- Structure: product material moved into a separately labeled Part II (Sections 11–14); the table that paired product features with demographic groups was replaced by one that pairs features with mechanisms (Table 19); a conflict-of-interest statement was added on page 1.
- The statement that the engine uses no proxy for protected characteristics was replaced with an accurate one, and the evaluation in Section 14 is now described as a plan that has not been registered or reviewed.
- Added: related work, the reversed Arriaga decomposition, a partner age-gap sensitivity, survival figures for American Indian and Alaska Native people, the older Black poverty rate, a replication caveat for research on scarcity, and corrections to the engine description (essential purchases, the health-signal window, the forecast mean, the percentile used for the limit, and the length of the worked example).

References

[1] Aladangady A, Bricker J, Chang AC, et al. Changes in U.S. family finances from 2022 to 2025: evidence from the Survey of Consumer Finances. *Federal Reserve Bulletin*. Washington, DC: Board of Governors of the Federal Reserve System; October 2026. doi:10.17016/8799.1

[2] Derenoncourt E, Kim CH, Kuhn M, Schularick M. Wealth of two nations: the U.S. racial wealth gap, 1860–2020. *Q J Econ*. 2024;139(2):693–750. doi:10.1093/qje/qjad044

[3] Arias E, Xu JQ, Tejada-Vera B. United States life tables, 2024. *National Vital Statistics Reports*. 2026;75(5):1–64. Hyattsville, MD: National Center for Health Statistics; August 25, 2026. doi:10.15620/cdc/252458

[4] Chetty R, Stepner M, Abraham S, et al. The association between income and life expectancy in the United States, 2001–2014. *JAMA*. 2016;315(16):1750–1766. doi:10.1001/jama.2016.4226. Erratum: *JAMA*. 2017;317(1):90. doi:10.1001/jama.2016.18691

[5] Glei DA, Lee C, Weinstein M. Assessment of mortality disparities by wealth relative to other measures of socioeconomic status among US adults. *JAMA Netw Open*. 2022;5(4):e226547. doi:10.1001/jamanetworkopen.2022.6547

[6] Makaroun LK, Brown RT, Diaz-Ramirez LG, et al. Wealth-associated disparities in death and disability in the United States and England. *JAMA Intern Med*. 2017;177(12):1745–1753. doi:10.1001/jamainternmed.2017.3903

[7] Ashman H, Neumuller S. Can income differences explain the racial wealth gap? A quantitative analysis. *Rev Econ Dyn*. 2020;35:220–239. doi:10.1016/j.red.2019.06.004

[8] Aliprantis D, Carroll DR, Young ER. The dynamics of the racial wealth gap. Working Paper 19-18R. Cleveland, OH: Federal Reserve Bank of Cleveland; 2022. doi:10.26509/frbc-wp-201918r

[9] Boerma J, Karabarbounis L. Reparations and persistent racial wealth gaps. *NBER Macroecon Annu*. 2023;37:171–221. doi:10.1086/723578

[10] Harper S, Lynch J, Burris S, Davey Smith G. Trends in the black-white life expectancy gap in the United States, 1983–2003. *JAMA*. 2007;297(11):1224–1232. doi:10.1001/jama.297.11.1224

[11] Schwandt H, Currie J, Bär M, et al. Inequality in mortality between Black and White Americans by age, place, and cause and in comparison to Europe, 1990 to 2018. *Proc Natl Acad Sci U S A*. 2021;118(40):e2104684118. doi:10.1073/pnas.2104684118

[12] Liebman JB. Redistribution in the current U.S. Social Security system. In: Feldstein M, Liebman JB, eds. *The Distributional Aspects of Social Security and Social Security Reform*. Chicago: University of Chicago Press; 2002:11–48. Also NBER Working Paper 8625, December 2001. doi:10.3386/w8625

[13] Goda GS, Shoven JB, Slavov SN. Differential mortality by income and Social Security progressivity. In: Wise DA, ed. *Explorations in the Economics of Aging*. Chicago: University of Chicago Press; 2011:189–204. doi:10.7208/chicago/9780226903385.003.0007

[14] Bosworth B, Burtless G, Zhang K. *Later Retirement, Inequality in Old Age, and the Growing Gap in Longevity Between Rich and Poor*. Washington, DC: Brookings Institution; January 2016. Accessed October 18, 2026. https://www.brookings.edu/wp-content/uploads/2016/02/BosworthBurtlessZhang_retirementinequalitylongevity_012815.pdf

[15] Brown JR, Coronado JL, Fullerton D. Is Social Security part of the social safety net? *Tax Policy Econ*. 2009;23:37–72. doi:10.1086/597054

[16] U.S. General Accounting Office. *Social Security and Minorities: Earnings, Disability Incidence, and Mortality Are Key Factors That Influence Taxes Paid and Benefits Received*. GAO-03-387. Washington, DC; April 23, 2003. Accessed October 2, 2026. https://www.gao.gov/products/gao-03-387

[17] Barsky R, Bound J, Charles KK, Lupton JP. Accounting for the Black–White wealth gap: a nonparametric approach. *J Am Stat Assoc*. 2002;97(459):663–673. doi:10.1198/016214502388618401

[18] Menchik PL, Jianakoplos NA. Black–white wealth inequality: is inheritance the reason? *Econ Inq*. 1997;35(2):428–442. doi:10.1111/j.1465-7295.1997.tb01920.x

[19] Kuhn M, Schularick M, Steins UI. Income and wealth inequality in America, 1949–2016. *J Polit Econ*. 2020;128(9):3469–3519. doi:10.1086/708815

[20] Favreault MM, Smith KE, Johnson RW. *The Dynamic Simulation of Income Model (DYNASIM): An Overview*. Washington, DC: Urban Institute; September 28, 2015. Accessed October 18, 2026. https://www.urban.org/research/publication/dynamic-simulation-income-model-dynasim-overview

[21] Geronimus AT, Hicken M, Keene D, Bound J. "Weathering" and age patterns of allostatic load scores among blacks and whites in the United States. *Am J Public Health*. 2006;96(5):826–833. doi:10.2105/AJPH.2004.060749

[22] National Academies of Sciences, Engineering, and Medicine. *The Growing Gap in Life Expectancy by Income: Implications for Federal Programs and Policy Responses*. Washington, DC: The National Academies Press; 2015. doi:10.17226/19015

[23] Machado S, Kyriopoulos I, Orav EJ, Papanicolas I. Association between wealth and mortality in the United States and Europe. *N Engl J Med*. 2025;392(13):1310–1319. doi:10.1056/NEJMsa2408259

[24] Pool LR, Burgard SA, Needham BL, Elliott MR, Langa KM, Mendes de Leon CF. Association of a negative wealth shock with all-cause mortality in middle-aged and older adults in the United States. *JAMA*. 2018;319(13):1341–1350. doi:10.1001/jama.2018.2055

[25] Cesarini D, Lindqvist E, Östling R, Wallace B. Wealth, health, and child development: evidence from administrative data on Swedish lottery players. *Q J Econ*. 2016;131(2):687–738. doi:10.1093/qje/qjw001

[26] Kim B, Ruhm CJ. Inheritances, health and death. *Health Econ*. 2012;21(2):127–144. doi:10.1002/hec.1695

[27] Schwandt H. Wealth shocks and health outcomes: evidence from stock market fluctuations. *Am Econ J Appl Econ*. 2018;10(4):349–377. doi:10.1257/app.20140499

[28] Snyder SE, Evans WN. The effect of income on mortality: evidence from the Social Security notch. *Rev Econ Stat*. 2006;88(3):482–495. doi:10.1162/rest.88.3.482

[29] Social Security Administration. *Fast Facts & Figures About Social Security, 2025*. SSA Publication No. 13-11785. Washington, DC; September 2025. Accessed October 2, 2026. https://www.ssa.gov/policy/docs/chartbooks/fast_facts/2025/

[30] Dobkin C, Finkelstein A, Kluender R, Notowidigdo MJ. The economic consequences of hospital admissions. *Am Econ Rev*. 2018;108(2):308–352. doi:10.1257/aer.20161038

[31] Karger E, Wray A. The Black–white lifetime earnings gap. *Explor Econ Hist*. 2024;94:101629. doi:10.1016/j.eeh.2024.101629

[32] Aaronson D, Hartley D, Mazumder B. The effects of the 1930s HOLC "redlining" maps. *Am Econ J Econ Policy*. 2021;13(4):355–392. doi:10.1257/pol.20190414

[33] Gittleman M, Wolff EN. Racial differences in patterns of wealth accumulation. *J Hum Resour*. 2004;39(1):193–227. doi:10.2307/3559010

[34] Bhutta N, Chang AC, Dettling LJ, Hsu JW. Disparities in wealth by race and ethnicity in the 2019 Survey of Consumer Finances. *FEDS Notes*. Washington, DC: Board of Governors of the Federal Reserve System; September 28, 2020. doi:10.17016/2380-7172.2797

[35] Aladangady A, Bricker J, Chang AC, et al. Changes in U.S. family finances from 2019 to 2022: evidence from the Survey of Consumer Finances. *Federal Reserve Bulletin*. Washington, DC: Board of Governors of the Federal Reserve System; October 2023. doi:10.17016/8799

[36] Board of Governors of the Federal Reserve System. 2025 Survey of Consumer Finances: historical tables (public data, real 2025 dollars) and standard errors for Tables 1 and 2 of the 2026 Bulletin. Washington, DC; October 9, 2026. Accessed October 17, 2026. https://www.federalreserve.gov/econres/files/scf2025_tables_public_real_historical.xlsx and https://www.federalreserve.gov/econres/files/2025_tables1_2_stderrs.xlsx

[37] Aladangady A, Chang AC, Krimmel J. Greater wealth, greater uncertainty: changes in racial inequality in the Survey of Consumer Finances. *FEDS Notes*. Washington, DC: Board of Governors of the Federal Reserve System; October 18, 2023. doi:10.17016/2380-7172.3405

[38] Arriaga EE. Measuring and explaining the change in life expectancies. *Demography*. 1984;21(1):83–96. doi:10.2307/2061029

[39] Geronimus AT. The weathering hypothesis and the health of African-American women and infants: evidence and speculations. *Ethn Dis*. 1992;2(3):207–221.

[40] McEwen BS. Protective and damaging effects of stress mediators. *N Engl J Med*. 1998;338(3):171–179. doi:10.1056/NEJM199801153380307

[41] Bond Huie SA, Krueger PM, Rogers RG, Hummer RA. Wealth, race, and mortality. *Soc Sci Q*. 2003;84(3):667–684. doi:10.1111/1540-6237.8403011

[42] Boen C, Keister L, Aronson B. Beyond net worth: racial differences in wealth portfolios and Black–White health inequality across the life course. *J Health Soc Behav*. 2020;61(2):153–169. doi:10.1177/0022146520924811

[43] Umberson D, Olson JS, Crosnoe R, Liu H, Pudrovska T, Donnelly R. Death of family members as an overlooked source of racial disadvantage in the United States. *Proc Natl Acad Sci U S A*. 2017;114(5):915–920. doi:10.1073/pnas.1605599114

[44] Board of Governors of the Federal Reserve System. 2025 Survey of Consumer Finances: summary extract public data, full public data set, and replicate weight files. Washington, DC; October 2026. Accessed October 18, 2026. https://www.federalreserve.gov/econres/scfindex.htm

[45] Sabelhaus J, Henriques Volz A. Social Security wealth, inequality, and lifecycle saving. NBER Working Paper 27110. Cambridge, MA: National Bureau of Economic Research; May 2020. doi:10.3386/w27110

[46] Consumer Financial Protection Bureau. *Medical Debt Burden in the United States*. Washington, DC; March 2022. Accessed October 2, 2026. https://www.consumerfinance.gov/data-research/research-reports/medical-debt-burden-in-the-united-states/

[47] Board of Trustees, Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds. *The 2026 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds*. Washington, DC: Social Security Administration; 2026. Accessed October 2, 2026. https://www.ssa.gov/oact/TR/2026/. Death probabilities by sex and single year of age under the intermediate, low-cost, and high-cost assumptions (files DeathProbsE_M/F_Hist and _Alt1–3_TR2026), Office of the Chief Actuary. Accessed October 1, 2026. https://www.ssa.gov/oact/Downloadables/CY/

[48] Burkhalter K, Rose K. *Scaled Factors for Hypothetical Earnings Examples Under the 2026 Trustees Report Assumptions*. Actuarial Note 2026.3. Baltimore, MD: Social Security Administration, Office of the Chief Actuary; June 2026. Accessed October 2, 2026. https://www.ssa.gov/oact/NOTES/ran3/an2026-3.pdf

[49] Social Security Administration, Office of the Chief Actuary. National average wage index (2024: $69,846.57), https://www.ssa.gov/oact/COLA/AWI.html; benefit formula bend points (2026: $1,286 and $7,749), https://www.ssa.gov/oact/COLA/bendpoints.html; contribution and benefit base (2024: $168,600), https://www.ssa.gov/oact/COLA/cbb.html; and Social Security tax rates (OASI, 10.6% combined since 2019), https://www.ssa.gov/oact/progdata/oasdiRates.html. Baltimore, MD. Accessed October 1, 2026.

[50] U.S. Census Bureau. Current Population Survey, 2025 Annual Social and Economic Supplement. Table PINC-03: educational attainment, people 25 years old and over, by total money earnings in 2024, work experience in 2024, age, race, Hispanic origin, and sex. Washington, DC; 2025. Accessed October 1, 2026. https://www.census.gov/data/tables/time-series/demo/income-poverty/cps-pinc/pinc-03.2024.html

[51] Social Security Administration. *Survivors Benefits*. Publication No. 05-10084. Baltimore, MD; April 2026. Accessed October 2, 2026. https://www.ssa.gov/pubs/EN-05-10084.pdf

[52] Social Security Administration, Office of the Chief Actuary. Formula for family maximum benefit (2026: 150% of the first $1,643 of PIA, 272% to $2,371, 134% to $3,093, and 175% above), https://www.ssa.gov/oact/cola/familymax.html; exempt amounts under the earnings test (2026: $24,480, and $65,160 in the year of reaching full retirement age), https://www.ssa.gov/oact/cola/rtea.html; and effect of early or delayed retirement on retirement benefits, https://www.ssa.gov/oact/quickcalc/earlyretire.html. Baltimore, MD. Accessed October 2, 2026.

[53] Social Security Administration. *Social Security Handbook*, sections 320, 338, 407, 412, 414, 418, 420, 503, 724, 730, and 731, https://www.ssa.gov/OP_Home/handbook/; and Program Operations Manual System, RS 00615.320 (reduced widow(er)'s benefit: the widow(er)'s limit), https://secure.ssa.gov/poms.nsf/lnx/0300615320. Baltimore, MD. Accessed October 2, 2026.

[54] Social Security Administration, Office of Research, Evaluation, and Statistics. *Annual Statistical Report on the Social Security Disability Insurance Program, 2024*. Washington, DC; December 2025. Tables 19 and 43. Accessed October 2, 2026. https://www.ssa.gov/policy/docs/statcomps/di_asr/2024/index.html

[55] U.S. Census Bureau. Current Population Survey, 2025 Annual Social and Economic Supplement: public-use microdata and replicate weights (asecpub25csv.zip). Washington, DC; 2025. Accessed October 2, 2026. https://www2.census.gov/programs-surveys/cps/datasets/2025/march/

[56] National Funeral Directors Association. 2023 NFDA General Price List Study shows inflation increasing faster than the cost of a funeral. News release. Brookfield, WI; December 8, 2023. Accessed October 2, 2026. https://content.nfda.org/news/media-center/nfda-news-releases/id/8134/2023-nfda-general-price-list-study-shows-inflation-increasing-faster-than-the-cost-of-a-funeral

[57] Kelley AS, McGarry K, Fahle S, Marshall SM, Du Q, Skinner JS. Out-of-pocket spending in the last five years of life. *J Gen Intern Med*. 2013;28(2):304–309. doi:10.1007/s11606-012-2199-x

[58] U.S. Bureau of Labor Statistics. Consumer Price Index for All Urban Consumers, U.S. city average, all items (series CUUR0000SA0), annual averages 2008 and 2022–2024. Washington, DC. Accessed October 1, 2026. https://data.bls.gov/timeseries/CUUR0000SA0

[59] Brown AD, Hamilton BE, Kissin DM, Martin JA. Trends in mean age of mothers: United States, 2016–2023. *National Vital Statistics Reports*. 2025;74(9). Hyattsville, MD: National Center for Health Statistics; June 13, 2025. doi:10.15620/cdc/174598

[60] Jordà Ò, Knoll K, Kuvshinov D, Schularick M, Taylor AM. The rate of return on everything, 1870–2015. *Q J Econ*. 2019;134(3):1225–1298. doi:10.1093/qje/qjz012

[61] Kermani A, Wong F. Racial disparities in housing returns. *Am Econ Rev*. 2026;116(1):287–331. doi:10.1257/aer.20240327. The 2.3-percentage-point gap cited in Section 5 is from the working-paper version: NBER Working Paper 29306, September 2021, revised March 2024. doi:10.3386/w29306

[62] Chetty R, Hendren N, Jones MR, Porter SR. Race and economic opportunity in the United States: an intergenerational perspective. *Q J Econ*. 2020;135(2):711–783. doi:10.1093/qje/qjz042

[63] Chetty R, Dobbie W, Goldman B, Porter S, Yang C. Changing opportunity: sociological mechanisms underlying growing class gaps and shrinking race gaps in economic mobility. NBER Working Paper 32697. Cambridge, MA: National Bureau of Economic Research; July 2024 (revised September 2024). doi:10.3386/w32697

[64] Chodorow-Reich G, Nenov PT, Simsek A. Stock market wealth and the real economy: a local labor market approach. *Am Econ Rev*. 2021;111(5):1613–1657. doi:10.1257/aer.20200208

[65] Feiveson L, Sabelhaus J. How does intergenerational wealth transmission affect wealth concentration? *FEDS Notes*. Washington, DC: Board of Governors of the Federal Reserve System; June 1, 2018. doi:10.17016/2380-7172.2209

[66] Board of Governors of the Federal Reserve System. 2022 Survey of Consumer Finances: summary extract public data and replicate weight files. Washington, DC; 2023 (summary extract revised March 2024). Accessed October 1, 2026. https://www.federalreserve.gov/econres/scfindex.htm

[67] U.S. Bureau of Economic Analysis. Gross domestic product (GDPA), annual, 2024: $29,381.0 billion. Retrieved from FRED, Federal Reserve Bank of St. Louis. Accessed October 1, 2026. https://fred.stlouisfed.org/series/GDPA

[68] U.S. Census Bureau. American Community Survey, 2020–2024 5-year Public Use Microdata Sample, housing records (csv_hus.zip). Washington, DC; March 5, 2026. https://www2.census.gov/programs-surveys/acs/data/pums/2024/5-Year/. Also: American Community Survey, 2020–2024 5-year estimates, Summary File (table-based format), tables B11001B, B11001H, B19013B, B19013H, B19025B, B19025H, B25003B, and B25003H: households, median and aggregate household income, and tenure, for householders who are Black or African American alone and White alone, not Hispanic or Latino. Washington, DC; January 29, 2026. https://www2.census.gov/programs-surveys/acs/summary_file/2024/table-based-SF/. Both accessed October 2, 2026.

[69] U.S. Bureau of Economic Analysis. SAGDP2: Gross domestic product (GDP) by state, all industry total, millions of current dollars, 2024. Released with GDP (Third Estimate), Industries, Corporate Profits, State GDP, and State Personal Income, 2nd Quarter 2026; State PCE, 2025 (BEA 26-42). Washington, DC; September 30, 2026. Accessed October 2, 2026. https://apps.bea.gov/regional/zip/SAGDP.zip

[70] Miller MC. Land and racial wealth inequality. *Am Econ Rev*. 2011;101(3):371–376. doi:10.1257/aer.101.3.371

[71] Stein LCD, Yannelis C. Financial inclusion, human capital, and wealth accumulation: evidence from the Freedman's Savings Bank. *Rev Financ Stud*. 2020;33(11):5333–5377. doi:10.1093/rfs/hhaa013

[72] Althoff L, Reichardt H. Jim Crow and Black economic progress after slavery. *Q J Econ*. 2024;139(4):2279–2330. doi:10.1093/qje/qjae023

[73] Avenancio-León CF, Howard T. The assessment gap: racial inequalities in property taxation. *Q J Econ*. 2022;137(3):1383–1434. doi:10.1093/qje/qjac009

[74] Berry CR. Reassessing the property tax. Working paper. Chicago: University of Chicago, Harris School of Public Policy; 2021. Accessed October 18, 2026. https://papers.ssrn.com/abstract=3800536

[75] Hodge TR, McMillen DP, Sands G, Skidmore M. Assessment inequity in a declining housing market: the case of Detroit. *Real Estate Econ*. 2017;45(2):237–258. doi:10.1111/1540-6229.12126

[76] Atuahene B. Predatory cities. *Calif Law Rev*. 2020;108. Accessed October 18, 2026. https://scholarship.kentlaw.iit.edu/fac_schol/996

[77] Atuahene B, Berry C. Taxed out: illegal property tax assessments and the epidemic of tax foreclosures in Detroit. *UC Irvine Law Rev*. 2019;9(4):847. Accessed October 18, 2026. https://escholarship.org/uc/ucilr/9/4

[78] *Tyler v. Hennepin County*, 598 U.S. 631 (2023). No. 22-166, decided May 25, 2023. Accessed October 18, 2026. https://www.supremecourt.gov/docket/docketfiles/html/public/22-166.html

[79] Citizens Research Council of Michigan. *Tackling Detroit's Over-Assessment Problem*. October 21, 2021. Accessed October 18, 2026. https://crcmich.org/tackling-detroits-over-assessment-problem

[80] Cajner T, Radler T, Ratner D, Vidangos I. Racial gaps in labor market outcomes in the last four decades and over the business cycle. Finance and Economics Discussion Series 2017-071. Washington, DC: Board of Governors of the Federal Reserve System; June 2017. doi:10.17016/FEDS.2017.071

[81] Dettling LJ, Hsu JW, Jacobs L, Moore KB, Thompson JP. Recent trends in wealth-holding by race and ethnicity: evidence from the Survey of Consumer Finances. *FEDS Notes*. Washington, DC: Board of Governors of the Federal Reserve System; September 27, 2017. doi:10.17016/2380-7172.2083

[82] Fries JF. Aging, natural death, and the compression of morbidity. *N Engl J Med*. 1980;303(3):130–135. doi:10.1056/NEJM198007173030304

[83] Zaninotto P, Batty GD, Stenholm S, et al. Socioeconomic inequalities in disability-free life expectancy in older people from England and the United States: a cross-national population-based study. *J Gerontol A Biol Sci Med Sci*. 2020;75(5):906–913. doi:10.1093/gerona/glz266

[84] Hayward MD, Heron M. Racial inequality in active life among adult Americans. *Demography*. 1999;36(1):77–91. doi:10.2307/2648135

[85] Bijou C, Shrider EA. *Poverty in the United States: 2025*. Current Population Reports P60-290. Washington, DC: U.S. Census Bureau; September 2026. Accessed October 2, 2026. https://www.census.gov/library/publications/2026/demo/p60-290.html

[86] Ochieng N, Cubanski J, Neuman T, Damico A. *How Many Older Adults Live in Poverty?* San Francisco: KFF; May 21, 2024. Accessed October 2, 2026. https://www.kff.org/medicare/how-many-older-adults-live-in-poverty/

[87] Agarwal S, Driscoll JC, Gabaix X, Laibson D. The age of reason: financial decisions over the life cycle and implications for regulation. *Brookings Pap Econ Act*. 2009;2009(2):51–117. doi:10.1353/eca.0.0067

[88] Nicholas LH, Langa KM, Bynum JPW, Hsu JW. Financial presentation of Alzheimer disease and related dementias. *JAMA Intern Med*. 2021;181(2):220–227. doi:10.1001/jamainternmed.2020.6432

[89] Holt-Lunstad J, Smith TB, Layton JB. Social relationships and mortality risk: a meta-analytic review. *PLoS Med*. 2010;7(7):e1000316. doi:10.1371/journal.pmed.1000316

[90] Sullivan B, Ghosh S. *Wealth of Households: 2022*. Current Population Reports P70BR-202. Washington, DC: U.S. Census Bureau; November 2024. Accessed October 2, 2026. https://www.census.gov/library/publications/2024/demo/p70br-202.html

[91] Markides KS, Coreil J. The health of Hispanics in the southwestern United States: an epidemiologic paradox. *Public Health Rep.* 1986;101(3):253–265.

[92] Houtenville AJ, Bach S. *Annual Report on People with Disabilities in America: 2025*. Durham, NH: Institute on Disability, University of New Hampshire; 2025. Accessed October 2, 2026. https://www.researchondisability.org/resource/2025-annual-report-people-disabilities-america-adsc

[93] Money and Mental Health Policy Institute. *Money on Your Mind*. London; June 2016. Accessed October 2, 2026. https://www.moneyandmentalhealth.org/wp-content/uploads/2016/06/Money-on-your-mind-full-report.pdf

[94] Hollenbeck B, Larsen P, Proserpio D. The financial consequences of legalized sports gambling. *Manage Sci.* Published online July 21, 2026. doi:10.1287/mnsc.2025.02515

[95] Consumer Financial Protection Bureau. *Data Point: Frequent Overdrafters*. Washington, DC; August 2017. Accessed October 2, 2026. https://www.consumerfinance.gov/data-research/research-reports/cfpb-data-point-frequent-overdrafters/

[96] Demirgüç-Kunt A, Klapper L. *Measuring Financial Inclusion: The Global Findex Database*. Policy Research Working Paper 6025. Washington, DC: World Bank; April 2012. doi:10.1596/1813-9450-6025

[97] Richardson T, Elliott P, Roberts R. The relationship between personal unsecured debt and mental and physical health: a systematic review and meta-analysis. *Clin Psychol Rev.* 2013;33(8):1148–1162. doi:10.1016/j.cpr.2013.08.009

[98] Sweet E, Nandi A, Adam EK, McDade TW. The high price of debt: household financial debt and its impact on mental and physical health. *Soc Sci Med.* 2013;91:94–100. doi:10.1016/j.socscimed.2013.05.009

[99] Lerner JS, Small DA, Loewenstein G. Heart strings and purse strings: carryover effects of emotions on economic decisions. *Psychol Sci.* 2004;15(5):337–341. doi:10.1111/j.0956-7976.2004.00679.x

[100] Cryder CE, Lerner JS, Gross JJ, Dahl RE. Misery is not miserly: sad and self-focused individuals spend more. *Psychol Sci.* 2008;19(6):525–530. doi:10.1111/j.1467-9280.2008.02118.x

[101] Venkatraman V, Huettel SA, Chuah LYM, Payne JW, Chee MWL. Sleep deprivation biases the neural mechanisms underlying economic preferences. *J Neurosci.* 2011;31(10):3712–3718. doi:10.1523/JNEUROSCI.4407-10.2011

[102] Mani A, Mullainathan S, Shafir E, Zhao J. Poverty impedes cognitive function. *Science.* 2013;341(6149):976–980. doi:10.1126/science.1238041

[103] Shah AK, Mullainathan S, Shafir E. Some consequences of having too little. *Science.* 2012;338(6107):682–685. doi:10.1126/science.1222426

[104] O'Donnell M, Dev AS, Antonoplis S, et al. Empirical audit and review and an assessment of evidentiary value in research on the psychological consequences of scarcity. *Proc Natl Acad Sci U S A.* 2021;118(44):e2103313118. doi:10.1073/pnas.2103313118. Correction: *Proc Natl Acad Sci U S A.* 2022;119(48):e2217321119. doi:10.1073/pnas.2217321119

[105] Baker SR, Balthrop J, Johnson MJ, Kotter J, Pisciotta K. Gambling away stability: sports betting's impact on vulnerable households. *J Financ Econ.* 2026;183:104330. doi:10.1016/j.jfineco.2026.104330. The findings cited here were read in the working-paper version, NBER Working Paper 33108, November 2024 (doi:10.3386/w33108); the published text was not available to us.

[106] Rick SI, Pereira B, Burson KA. The benefits of retail therapy: making purchase decisions reduces residual sadness. *J Consum Psychol.* 2014;24(3):373–380. doi:10.1016/j.jcps.2013.12.004

[107] Atalay AS, Meloy MG. Retail therapy: a strategic effort to improve mood. *Psychol Mark.* 2011;28(6):638–659. doi:10.1002/mar.20404

[108] Thayer JF, Åhs F, Fredrikson M, Sollers JJ III, Wager TD. A meta-analysis of heart rate variability and neuroimaging studies: implications for heart rate variability as a marker of stress and health. *Neurosci Biobehav Rev.* 2012;36(2):747–756. doi:10.1016/j.neubiorev.2011.11.009

[109] Madrian BC, Shea DF. The power of suggestion: inertia in 401(k) participation and savings behavior. *Q J Econ.* 2001;116(4):1149–1187. doi:10.1162/003355301753265543

[110] Thaler RH, Benartzi S. Save More Tomorrow™: using behavioral economics to increase employee saving. *J Polit Econ*. 2004;112(S1):S164–S187. doi:10.1086/380085

[111] Ashraf N, Karlan D, Yin W. Tying Odysseus to the mast: evidence from a commitment savings product in the Philippines. *Q J Econ*. 2006;121(2):635–672. doi:10.1162/qjec.2006.121.2.635

[112] Board of Governors of the Federal Reserve System. Consumer Credit, G.19: interest rate on credit card plans, accounts assessed interest, 2024 (annual), 22.89 percent. Washington, DC. Accessed October 1, 2026. https://www.federalreserve.gov/releases/g19/current/

[113] Karlan D, McConnell M, Mullainathan S, Zinman J. Getting to the top of mind: how reminders increase saving. *Manage Sci*. 2016;62(12):3393–3411. doi:10.1287/mnsc.2015.2296

[114] Gainsbury SM. Review of self-exclusion from gambling venues as an intervention for problem gambling. *J Gambl Stud*. 2014;30(2):229–251. doi:10.1007/s10899-013-9362-0

[115] Federal Trade Commission. Health Breach Notification Rule. Final rule. *Fed Regist*. 2024 May 30;89:47028–47064. 16 CFR Part 318. FR Doc. 2024-10855. Accessed October 2, 2026. https://www.federalregister.gov/documents/2024/05/30/2024-10855/health-breach-notification-rule