Longevity 21

Subjective Survival Beliefs, Financial Flexibility, and Retirement (Mis)planning

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2 A Stylized Model of Belief Revisions in Retirement

3 Data and Wealth-Belief Measurement

4 Empirical Evidence for the Wealth Implication

5 Calibrated Welfare Exercise

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Retirement planning under mortality risk

Retirement planning is a problem of decision-making under mortality risk

- Retirees choose consumption and asset drawdown while uncertain about how long resources need to last.
- Standard life-cycle reasoning uses actuarial survival probabilities, but households make decisions using subjective survival beliefs.
- These beliefs are informative, imperfectly calibrated, and economically relevant in prior work.
- This paper asks whether a given survival-belief distortion matters more when households have more financial flexibility.

The central distinction

The relevant distinction is between biased beliefs and room to act

- A retiree who becomes more optimistic about survival has a reason to preserve resources for a longer horizon.
- A retiree who becomes more pessimistic has less incentive to delay consumption.
- But these incentives need not show up equally in wealth dynamics.
- When necessities absorb most resources, belief updates may have little room to affect observed saving or drawdown.

The empirical object is not whether richer households are more biased. It is whether the same belief distortion is more behaviorally relevant when wealth gives households more adjustment margin.

Research question

The paper asks whether behavioral relevance varies with household wealth

Does the association between subjective survival belief bias and post-retirement wealth dynamics become stronger at higher wealth levels?

- Mechanism: financial flexibility in retirement.
- Empirical setting: HRS retiree panel, individual and wave fixed effects.
- Welfare interpretation: calibrated finite-horizon consumption-saving model.

Relation to prior work

The point of departure is not whether subjective beliefs matter on average

- Subjective survival beliefs contain information, but are noisy and miscalibrated.
  - Hurd and McGarry (2002); Smith, Taylor, and Sloan (2001); Elder (2013); Bago d'Uva et al. (2020)

- Subjective beliefs enter consumption, saving, annuity demand, retirement-product choice, portfolio choice, and bequest decisions.
  - Gan et al. (2015); Salm (2010); Post and Hanewald (2013); Inkmann et al. (2011); Chen, Hieber, and Rach (2021); O'Dea and Sturrock (2023); Heimer et al. (2019)

- Related work links survival beliefs to wealth accumulation before retirement.
  - Nivakoski (2020); Foltyn and Olsson (2024)

- This paper studies wealth as a moderator of the belief-outcome relationship during retirement.

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Economic intuition

Retirees re-optimize as subjective survival beliefs evolve

Belief revision	Intertemporal motive	Observed margin
Higher perceived survival	Preserve resources for later life	Lower drawdown / higher wealth growth
Lower perceived survival	Consume earlier / preserve less	Faster drawdown / lower wealth growth

- The same belief revision has more scope to change behavior when consumption and asset drawdown are adjustable.
- Wealth is used as the observed state variable capturing this adjustment margin.

Model prediction

Financial-flexibility mechanism

The retiree periodically re-optimizes consumption and saving as subjective survival beliefs change:

$$V_t(W_t) = \max_{C_t} \left\{ u(C_t) + \beta p_t^{subj} \mathbb{E}_t[V_{t+1}(W_{t+1})] \right\}.$$

- Objective survival probabilities exist, but the retiree makes decisions using the current subjective belief state.
- At each decision date, the household revises beliefs and re-solves the consumption-saving problem conditional on current wealth.
- The strength of that adjustment depends on the resources available when the revision occurs.

Model prediction

The proportional wealth response is increasing in cash-on-hand

In a two-period subsistence-log benchmark, a higher subjective survival probability:

$$\frac{\partial C_t^*}{\partial p_t^{subj}} < 0, \qquad \frac{\partial W_{t+1}^*}{\partial p_t^{subj}} > 0.$$

The proportional wealth response is increasing in cash-on-hand:

$$\frac{\partial^2 \log W_{t+1}^*}{\partial p_t^{subj} \partial X_t} > 0.$$

- When cash-on-hand is low, a given belief revision has limited scope to alter proportional wealth dynamics.
- As cash-on-hand rises, more resources are discretionary, and the same increase in perceived survival generates a larger response in log next-period wealth.

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HRS panel and belief measure

Subjective survival belief bias compares reported and actuarial survival probabilities

- Data: RAND HRS Longitudinal File, waves 5–16.
- Sample: respondents age 65 and older with valid subjective and actuarial survival probabilities.
- HRS asks respondents for the percent chance of living to an age-specific target age.
- Main belief-bias measure:

$$\mathrm{SSB}_{it} = P_{it}^{subj} - P_{it}^{obj} = \frac{\texttt{RwLIV10}_{it} - \texttt{RwLIV10P}_{it}}{100}.$$

Sample and variation

The main sample uses lagged SSB and non-housing wealth

Item	Count / mean	SD
Individuals	14,278	
Observations	57,615	
Mean waves per person	4.04	
Age at belief report	73.72	6.05
Forecast horizon	12.81	1.82
Lagged log non-housing wealth	11.97	1.58
Δ log non-housing wealth	-0.01	0.91
Lagged SSB (percentage points)	3.55	30.08
Mean within-person SD of lagged SSB	17.94 pp	
Share with at least 2 regression waves	0.79	

Main lagged-SSB non-housing regression-eligible sample; wealth is restricted to at least \$5,000 before logs are taken.

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Empirical design

Model specification

$$\Delta \log W_{it}^{NH} = \beta_1 \mathrm{SSB}_{i,t-1} + \beta_2 \log W_{i,t-1}^{NH} + \beta_3 (\mathrm{SSB}_{i,t-1} \times \log W_{i,t-1}^{NH}) + \alpha_i + \gamma_t + \epsilon_{it}.$$

- Outcome: biennial change in log total non-housing wealth.
- Main timing: SSB is measured at the beginning of the wealth-change interval.
- Individual fixed effects absorb time-invariant health, education, preferences, sophistication, and persistent optimism.
- Wave fixed effects absorb common time shocks and aggregate trends; the coefficient of interest is β_3.

Baseline interaction

The lagged SSB interaction is positive for non-housing wealth

	Baseline	+ Horizon
Lagged survival belief bias	$-0.2307^{\cdot}$	$-0.2271^{\cdot}$
	(0.1356)	(0.1357)
Lagged log non-housing wealth	-0.8656^{***}	-0.8658^{***}
	(0.0081)	(0.0081)
SSB $\times$ lagged log wealth	0.0234^{*}	0.0236^{*}
	(0.0112)	(0.0112)
Lagged forecast horizon		$-0.0036^{\cdot}$
		(0.0021)
Observations	54,598	54,598
Individuals	11,261	11,261

Individual and wave fixed effects included; standard errors clustered at the original household level.

Magnitude

The economically relevant object is the wealth-specific marginal effect

Using the horizon-adjusted baseline estimates,

$$\frac{\partial \Delta \log W_t^{NH}}{\partial \mathrm{SSB}_{t-1}} = -0.2271 + 0.0236 \times \log W_{t-1}^{NH}.$$

The marginal association switches sign at roughly \$15,000 in lagged non-housing wealth, below the main sample's 25th percentile. A 10 pp higher lagged SSB corresponds to about 0.4% higher biennial log wealth growth at \$100,000 and about 0.8% at \$500,000.

Robustness

The wealth-dependent association remains stable across specifications

- Forecast horizon controls leave the interaction unchanged.
- Health dynamics and widowhood controls leave the interaction positive; in the fully saturated specification it is 0.0215 and just below the 5-percent threshold.
- Retirement-income controls leave the interaction close to the baseline: 0.0233^{*} with income-to-poverty and 0.0228^{*} with household income.
- Survival-measurement checks point in the same direction: excluding 0/100 responses strengthens the interaction, while the Cox-adjusted benchmark mainly speaks to objective-measurement sensitivity.
- Alternative wealth concepts show the same qualitative pattern: total net wealth 0.0252^{*}, primary-residence value 0.0372^{**}, and financial wealth positive but less precise.
- Current-SSB timing checks also produce positive interactions, while lagged SSB remains the preferred beginning-of-interval measure.

▸ Health/widowhood ▸ Income ▸ Survival measurement ▸ Alternative wealth ▸ SSB timing ▸ Wealth floor

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From association to welfare

The exercise translates belief distortions into welfare terms

- The reduced-form estimates document a wealth gradient in the behavioral relevance of belief bias.
- The welfare question is different: how costly is it to plan under a biased survival-belief state?
- I use a calibrated finite-horizon consumption-saving model to compare:
  - the consumption path chosen under subjective survival beliefs;
  - the benchmark path chosen under actuarial survival probabilities.
- The exercise is a model-based interpretation, not a full structural estimation.

▸ Welfare setup

Calibration

The calibration uses HRS moments and interquartile belief distortions

- Household begins at age 73 and solves a two-year-period retirement problem through age 100.
- Objective survival follows a Gompertz hazard calibrated to HRS actuarial survival at the median target horizon.
- SSB scenarios use the 25th and 75th percentiles of lagged individual-wave SSB:

$$\delta^{pess} = -16.8 \text{ pp}, \qquad \delta^{opt} = 24.5 \text{ pp}.$$

- Initial non-housing wealth is calibrated at \$50k, \$173k, \$509k, and \$1.146m.
- Preferences and prices: annual discount factor 0.96, annual return 2%, CRRA $\gamma = 2$, annual consumption floor \$17,264.

Consumption and wealth effects

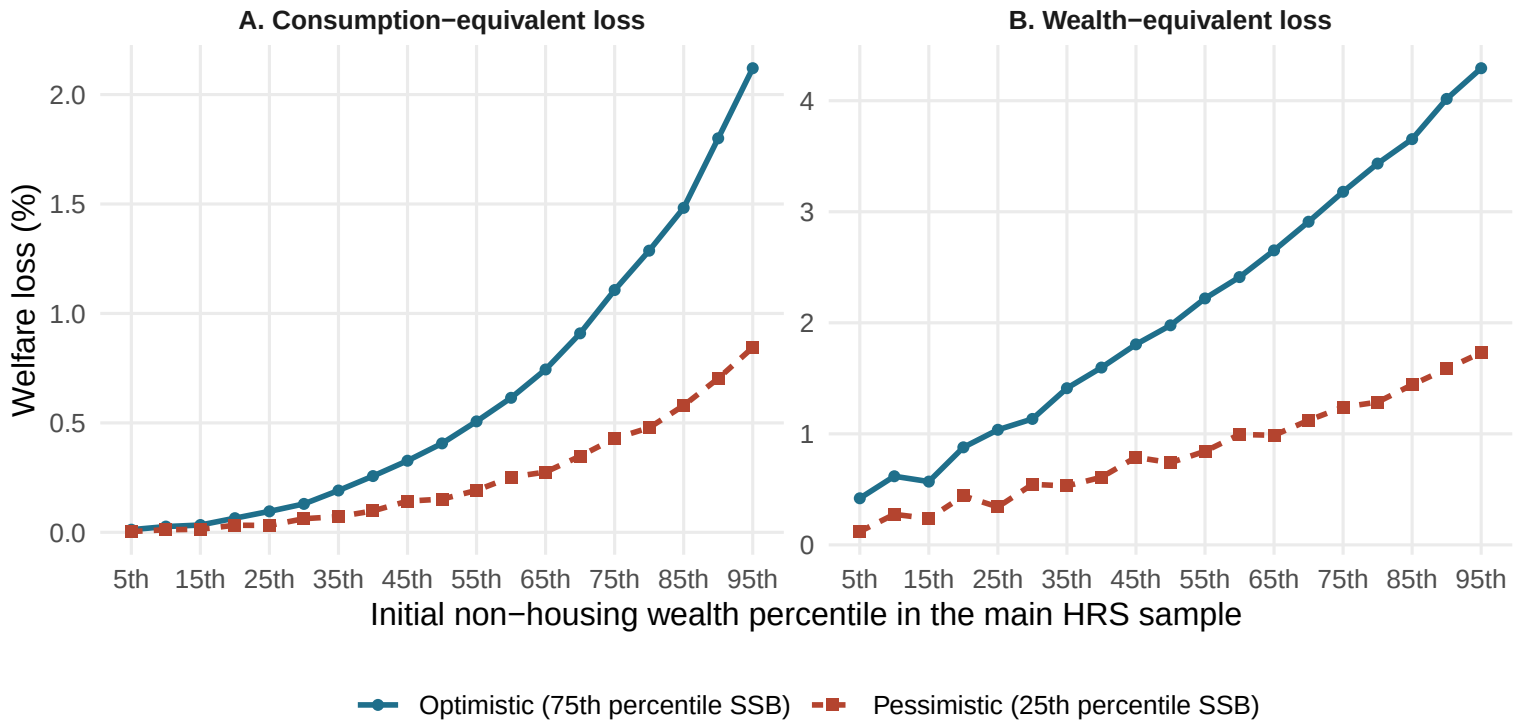
Consumption-equivalent and wealth-equivalent losses summarize the welfare cost

Scenario	Wealth percentile	Initial wealth	CE loss %	Wealth loss dollars
Optimistic	25th	$50,000	0.10	$518
Optimistic	50th	$173,000	0.41	$3,421
Optimistic	75th	$509,000	1.11	$16,185
Optimistic	90th	$1,146,000	1.80	$46,025
Pessimistic	25th	$50,000	0.03	$171
Pessimistic	50th	$173,000	0.15	$1,281
Pessimistic	75th	$509,000	0.43	$6,316
Pessimistic	90th	$1,146,000	0.70	$18,172

CE loss is the constant proportional increase in consumption along the subjective-belief path required to match objective-benchmark welfare. Wealth loss is the amount of initial wealth removed under the objective benchmark that gives the same welfare.

Welfare losses

The welfare cost rises with initial wealth



- Optimistic scenario: CE loss rises from 0.10% at the 25th wealth percentile to 1.80% at the 90th percentile.
- Pessimistic scenario: CE loss rises from 0.03% to 0.70% over the same wealth range.
- Wealth-equivalent losses also rise as a share of initial wealth, reaching 4.02% in the optimistic scenario and 1.59% in the pessimistic scenario at the 90th wealth percentile.

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Interpretation

These results provide evidence consistent with the financial-flexibility mechanism

- The association between subjective survival belief bias and subsequent non-housing wealth dynamics becomes stronger as wealth rises.
- Health dynamics, widowhood, alternative wealth concepts, timing checks, and wealth-floor checks do not explain away the positive interaction.
- Financial flexibility shapes how subjective longevity expectations map into observed retirement wealth dynamics.
- The calibrated welfare exercise further suggests that these differences are welfare-relevant.

Main implication

The consequences of belief distortions depend on both beliefs and the environment

- Biased survival beliefs can move households away from the consumption path implied by actuarial mortality.
- The consequences of survival-belief distortions depend on both the beliefs themselves and the economic environment in which households act on them.
- Future work can extend the analysis to annuity decisions and other retirement outcomes, and incorporate richer modeling of retirement choices, medical risk, bequest motives, and belief formation.

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Thank you!

Extended specifications

Health dynamics and widowhood do not explain away the interaction

	Health	Health+medical	Widowhood	All controls
Lagged survival belief bias	−0.2190	−0.2164	−0.2073	−0.2048
	(0.1365)	(0.1365)	(0.1367)	(0.1367)
Lagged log non-housing wealth	−0.8667***	−0.8669***	−0.8673***	−0.8674***
	(0.0081)	(0.0081)	(0.0081)	(0.0081)
SSB × lagged log wealth	0.0229*	0.0227*	0.0218·	0.0215·
	(0.0113)	(0.0113)	(0.0113)	(0.0113)
Newly widowed			−0.0526*	−0.0509*
Already widowed			−0.1230***	−0.1218***
Observations	54,350	54,350	54,350	54,350

All specifications include forecast horizon, individual fixed effects, and wave fixed effects. Standard errors are clustered at the original household level. The health column includes self-rated health and health deterioration; the medical columns further add hospital stays, nursing-home stays, and log out-of-pocket medical spending.

◂ Back to robustness

Retirement income

Retirement-income controls do not absorb the wealth interaction

	Baseline	Income sample	Income-to-poverty	Household income
Lagged survival belief bias	$-0.2271^{\cdot}$	$-0.2243^{\cdot}$	$-0.2252^{\cdot}$	-0.2221
	(0.1357)	(0.1359)	(0.1359)	(0.1358)
Lagged log non-housing wealth	-0.8658^{***}	-0.8660^{***}	-0.8699^{***}	-0.8709^{***}
	(0.0081)	(0.0081)	(0.0081)	(0.0081)
SSB $\times$ lagged log wealth	0.0236^{*}	0.0234^{*}	0.0233^{*}	0.0228^{*}
	(0.0112)	(0.0113)	(0.0113)	(0.0113)
Lagged log income-to-poverty ratio			0.0505^{***}	
Lagged log household income				0.0633^{***}
Observations	54,598	54,476	54,476	54,556

All specifications include forecast horizon, individual fixed effects, and wave fixed effects. The income-to-poverty ratio centers income relative to basic needs; household income provides a broader income-level control.

◂ Back to robustness

Measurement checks separate subjective and objective survival inputs

	Baseline	Exclude 0/100	Cox sample	Cox SSB	Cox + exclude
Lagged survival belief bias	−0.2271·	−0.3293·	−0.2370·		
	(0.1357)	(0.1737)	(0.1394)		
Lagged Cox-adjusted belief bias				−0.1517	−0.3559*
				(0.1374)	(0.1702)
SSB × lagged log wealth	0.0236*	0.0312*	0.0237*		
	(0.0112)	(0.0142)	(0.0116)		
Cox-adjusted SSB × lagged log wealth				0.0162	0.0319*
				(0.0114)	(0.0140)
Observations	54,598	44,984	52,243	52,243	43,017

Focal-response checks exclude lagged subjective survival responses of 0 or 100. Cox-adjusted SSB replaces the RAND/HRS actuarial benchmark with a Cox-predicted survival probability based on mortality-relevant covariates.

◂ Back to robustness

Alternative wealth measures

Alternative wealth concepts show the same qualitative pattern

	Non-housing	Total net	Financial	Home equity
Lagged survival belief bias	−0.2048	−0.2886*	−0.1561	−0.4231**
	(0.1367)	(0.1310)	(0.1893)	(0.1596)
Lagged log wealth	−0.8674***	−0.8106***	−0.8962***	−0.8374***
	(0.0081)	(0.0088)	(0.0089)	(0.0096)
SSB × lagged log wealth	0.0215·	0.0252*	0.0127	0.0372**
	(0.0113)	(0.0103)	(0.0164)	(0.0135)
Observations	54,350	63,097	40,013	55,296

Augmented specifications include forecast horizon, health controls, widowhood controls, individual fixed effects, and wave fixed effects. Standard errors are clustered at the original household level. Total net wealth includes housing wealth; home equity isolates the primary-residence margin.

◂ Back to robustness

Timing of belief bias

Current-SSB timing checks also produce positive interactions

	Preferred lagged SSB	Current SSB full sample	Current SSB same sample
Current survival belief bias		-0.4228^{**}	-0.3519^{*}
		(0.1290)	(0.1383)
Lagged survival belief bias	$-0.2307^{\cdot}$		
	(0.1356)		
Lagged log non-housing wealth	-0.8656^{***}	-0.8495^{***}	-0.8666^{***}
	(0.0081)	(0.0076)	(0.0081)
Current SSB $\times$ lagged log wealth		0.0364^{***}	0.0311^{**}
		(0.0107)	(0.0114)
Lagged SSB $\times$ lagged log wealth	0.0234^{*}		
	(0.0112)		
Observations	54,598	60,624	54,598

Column 3 keeps the same sample as the preferred lagged-SSB specification. Standard errors are clustered at the original household level. Lagged SSB remains the main timing because it is measured at the beginning of the wealth-change interval.

◂ Back to robustness

Wealth floor

The positive interaction is not created by the $5,000 floor

	$5k floor Base	$1k floor Base	$5k floor Augmented	$1k floor Augmented
Lagged survival belief bias	$-0.2307^{\cdot}$	-0.4040^{**}	-0.2048	-0.3837^{**}
	(0.1356)	(0.1321)	(0.1367)	(0.1323)
Lagged log non-housing wealth	-0.8656^{***}	-0.8660^{***}	-0.8674^{***}	-0.8686^{***}
	(0.0081)	(0.0078)	(0.0081)	(0.0078)
SSB $\times$ lagged log wealth	0.0234^{*}	0.0375^{***}	$0.0215^{\cdot}$	0.0362^{**}
	(0.0112)	(0.0110)	(0.0113)	(0.0110)
Observations	54,598	59,683	54,350	59,394

Augmented columns include forecast horizon, health controls, widowhood controls, individual fixed effects, and wave fixed effects. Standard errors are clustered at the original household level.

◂ Back to robustness

Welfare setup

The subjective-belief rule is compared with the objective benchmark

Objective benchmark

$$V_t^o(W_t) = \max_{C_t} \left\{ u(C_t) + \beta p_t^o V_{t+1}^o(W_{t+1}) \right\},$$
$$W_{t+1} = (1+r)(W_t + Y_t - C_t), \qquad \underline{C} \leq C_t \leq W_t + Y_t.$$

Subjective-belief problem

$$V_t^s(W_t;\delta) = \max_{C_t} \left\{ u(C_t) + \beta p_t^s(\delta) V_{t+1}^s(W_{t+1};\delta) \right\}.$$

Objective evaluation of the subjective rule

$$\widetilde{V}_t(W_t;\delta) = u(C_t^s(W_t;\delta)) + \beta p_t^o \widetilde{V}_{t+1}(W_{t+1}^s;\delta),$$
$$W_{t+1}^s = (1+r)(W_t + Y_t - C_t^s(W_t;\delta)).$$

◂ Back to welfare setup