Longevity as a Luxury: Saving Behavior at the Top of the Wealth Distribution

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Outline

1. Background & Motivation
2. Contributions
3. Saving Across the Wealth Distribution
4. Medical Expenditure Across the Wealth Distribution
5. Precautionary Saving Model
6. Comparative Statics
7. Conclusion

The US Wealth Concentration

- Top 1% $\rightarrow$ >30% of wealth
- Top 5% $\rightarrow$ >50% of wealth
- Precautionary motive alone $\not\Rightarrow$ saving at the top

Common ground

Each extension $\rightarrow$ one more channel (De Nardi and Fella2017)

Alternative channels:

- Luxury bequests (De Nardi2004)
- Time preferences (Cagetti2003)
- Earnings risk (Castaneda et al.2003)
- Return heterogeneity (Benhabib et al.2011, 2015)
- Entrepreneurship (Cagetti and De Nardi2006)

The Rising Share of Health Spending

- Wealth literature $\rightarrow$ health spending exogenous
- Health literature $\rightarrow$ spending $\uparrow$ with **income and wealth**

(Hall and Jones2007; Ales et al.2014; Ozkan2014; French and Kelly2016; Dickman et al.2016, 2017)

Key difference: how health shocks enter the model.

Exogenous risk

wealth $\uparrow \Rightarrow$ self-insure $\Rightarrow$ health spending flat

Luxury good

wealth $\uparrow \Rightarrow$ survival still valuable $\Rightarrow$ spending $\uparrow$

Main Question

Luxury-good health spending → two questions:

Q1 — Saving

Precautionary motive still relevant at the **top**?

Q2 — Stationary wealth distribution

This channel *alone* → **fat upper tail**?

To answer:

1. **Puzzle in our data?** — saving *and* medical spending both ↑ with wealth
2. If yes → **luxury-health model**: saving ↑ at the top, stationary Pareto tail

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Empirical Findings

- Saving is positive throughout, but jumps between deciles 9 and 10: couples save ≈\$80k in decile 9, then ≈\$1.1m in the top decile
- Imputed total medical spending rises with wealth, but jumps 24% between deciles 9 and 10: the top decile spends \$10.6k, 2.6× the bottom decile

Theoretical Contributions

- Sufficient conditions under which the precautionary motive to self-insure against mortality persists, so saving against health shocks is higher in volume for richer families (to pay for better private care) — in contrast with standard wealth models, where this motive fades as wealth grows; consistent with the data
- **Theorem 1:** applies the condition to an income-fluctuation model with luxury health in the low state (in the spirit of (Hall and Jones2007)) — the condition holds as long as the marginal utility of consumption falls faster than the marginal return to surviving another year
- **Theorem 2:** applies the random-separation argument of (Gabaix2009) to show the implied stationary distribution exists and is Pareto — consistent with the data

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The Central Empirical Puzzle

Standard model prediction:

- Saving declines with wealth; wealthier households draw down assets
- Saving turns negative at the top

What the data say:

- Saving = Δ net worth (2 years)
- Saving is positive throughout the distribution
- **Top decile:**
  - Couples: \$1,092,000
- Saving *accelerates* at the top for couples.

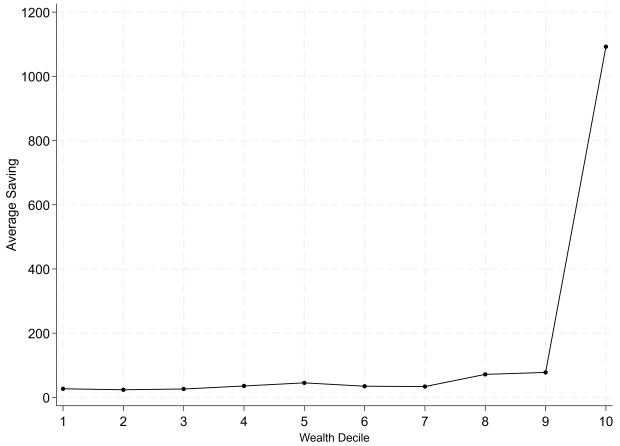
Sample

HRS wave 3 (1996–1998)
Ages 55–64
$N = 1{,}346$ households

Contribution

Documents that standard models cannot explain the saving behavior at the top.

Figure: Average Saving by Wealth Decile



What Drives Saving?

Correlation of saving rates with income components, within each wealth decile:

- **Earnings:** weak and flat across all deciles (< 0.2 everywhere)
- **Capital income:** rises from 0.08 (decile 1) to 0.41 (decile 9) for couples
- Total income correlation mirrors capital income, not earnings

Implication: Wealth returns, not labor income, drive saving heterogeneity at the top.

Key takeaway

1. Couples save more as wealth grows—contradicts BAH
2. Saving jumps at the top
3. Capital income correlation rises with wealth, consistent with more diversified portfolio

This is consistent with portfolio diversification.

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Medical Spending in MEPS - Wealth details in HRS

The problem:

- HRS records only *out-of-pocket* (OOP) medical costs
- OOP could compress the true spending gradient

Imputation (the solution):

- We use the imputation method of Blundell et al.2004).
- Contribution: mean-consistent imputations
- Contribution: the wealth–health spending gradient

Imputation equation

$$p_i = D_i\beta + \gamma h_i + \epsilon_i$$

$$\hat{h}_i = \frac{p_i - D_i\hat{\beta}}{\hat{\gamma}}$$

p: OOP spending;
h: total spending;
D: demographics.

Donor: MEPS
Main: HRS

Consistency Results

Three theoretical results:

1. **Mean consistency:** Under classical OLS assumptions, $\hat{h}$ converges in probability to the true mean μ_h
2. **OLS consistency (main theorem):** Using $\hat{h}$ as dependent variable in a regression on wealth preserves consistency of slope coefficients, under standard OLS assumptions

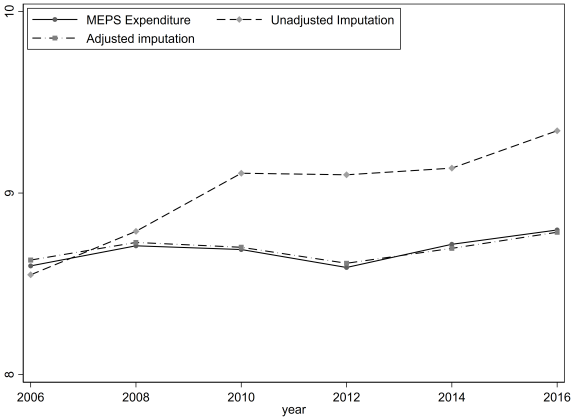
Cross-survey adjustment

$$plim\bar{\hat{h}}_H \;=\; \mu_h \;+\; \frac{1}{\hat{\gamma}}\,(\bar{p}_H - \bar{p}_M)$$

OLS consistency

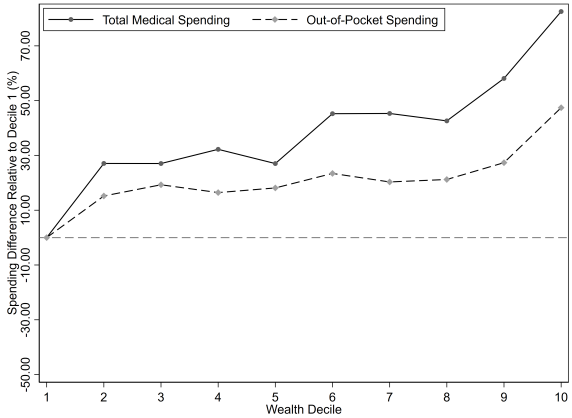
$$\operatorname{plim}\hat{\alpha} \;=\; \alpha + \operatorname{plim}(\ddot{w}'\ddot{w})^{-1}\operatorname{plim}(\ddot{w}'\ddot{u}) + \operatorname{plim}(\ddot{w}'\ddot{w})^{-1}\operatorname{plim}(\ddot{w}'\epsilon)$$

Mean Consistency



- Naive cross-survey imputation (MEPS OOP–total relationship applied to HRS OOP) over-predicts spending: the unadjusted line drifts above the MEPS mean as the surveys' OOP distributions diverge over time
- The cross-survey adjustment (MEPS–HRS OOP mean gap, scaled by $1/\hat{\gamma}$) restores the level: the **adjusted imputation tracks the MEPS mean**

Total vs. Out-of-Pocket Spending by Wealth Decile — Couples



- Total spending rises monotonically with wealth: +82.5% from decile 1 to decile 10
- Out-of-pocket spending is much flatter: only about half the total gradient at the top
- OOP alone compresses the spending–wealth gradient: total spending must be imputed before the precautionary channel can be identified

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Theoretical Results

Theorem 1 (Positive saving at the tail)

When the curvature of marginal utility exceeds the curvature of the marginal product of health spending, the saving in the health-shock model **cannot be negative above some wealth threshold** $\bar{b}$.

Theorem 2 (Zipf's law)

The combination of (i) positive saving above $\bar{b}$ and (ii) random separation (mortality) generates a **stationary wealth distribution that follows Zipf's law** in the upper tail, consistent with Pareto wealth distributions observed in the US, Canada, and Europe.

What makes this distinct:

- The fat tail is generated *purely* by precautionary saving
- No bequest motive
- No return heterogeneity
- No entrepreneurship
- Single novel channel: **shocks to marginal continuation value**

The Mechanism: Health as a Luxury Good

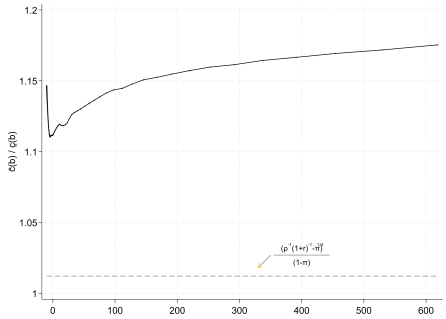
Before the health shock:

$$\begin{aligned}\bar{V}(b) = \max_{c,b'} \quad & \left\{u(c) + \rho\left[\pi \bar{V}(b') + (1-\pi)\underline{V}(b')\right]\right\} \\ s.t. \quad & b' = (1+r)b + y - c, \\ & b' \geq \underline{b},\end{aligned}$$

High-utilization state:

$$\begin{aligned}V(b) = \max_{c,m,b'} \quad & \left\{u(c) + \rho \cdot \chi(m) \cdot V(b')\right\} \\ s.t. \quad & b' = (1+r)b + y - c - m, \\ & b' \geq b.\end{aligned}$$

Positive saving threshold:



$$\left[\frac{\bar{c}(b)}{\underline{c}(b)}\right]^{\sigma} > \left[\frac{\rho^{-1}(1+r)^{-1} - \pi}{1-\pi}\right]$$

Estimating the Health Production Function

Health production function:

$$\chi(m) = 1 - \left(\frac{1}{\alpha m + \underline{h}} \right)^{\beta}$$

Estimated via nonlinear least squares:

Parameter	Estimate	S.E.	p-value
α	0.0136	0.0044	0.002
β	0.3928	0.0009	0.000
$N = 4{,}618$,	$R^2 = 0.997$		

Robustness

Using out-of-pocket spending to estimate α:
$\hat{\alpha} = 0.0144$, $t = 0.30$

Using imputed total spending:
$\hat{\alpha} = 0.0136$, $t = 3.08$

Total spending confirms identification.

Luxury condition confirmed

$\hat{\beta} = 0.3928 < \sigma - 1 = 1$, so the curvature condition holds: health is a luxury good in the calibrated model.

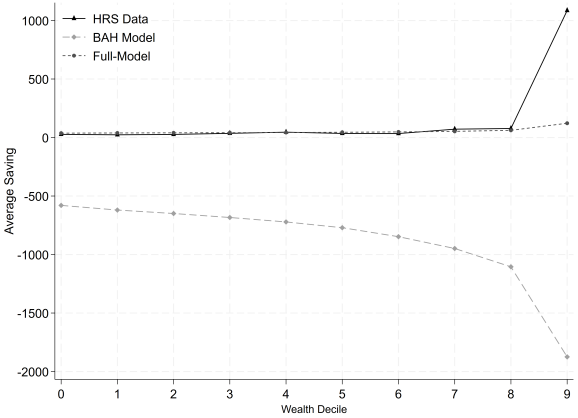
Calibration Summary

Parameter	Value	Parameter	Value
High income $\bar{y}$	\$87,002	Discount factor ρ	0.97
Low income $\underline{y}$	\$41,668	Risk aversion σ	2
Retire prob. $\gamma_{\bar{y}\to\underline{y}}$	0.17	Value of life ν	20
Health trans. Γ_h	8% entry	Borrowing limit $\underline{b}$	$-$\$646.7k
Medicaid transfer $\underline{m}$	\$93.85k	α (NLS)	0.0136
Interest rate r	4%	β (NLS)	0.3928

Sources: α, β from NLS (Chapter 3 imputation). $\underline{m}$ from Kopecky and Koreshkova2014). ρ, σ from Hosseini2015). Income states and transitions from HRS.

$\underline{h} = 53.2$ calibrated to match survival probability when spending is negligible: $\chi(0, \underline{h}) = 0.790$, matching mean survival in the bottom 1% of the spending distribution.

Calibration Fit



- **Data:** saving positive throughout, nearly flat, then jumps at the top decile ($\approx$\$1.1m)
- **BAH benchmark:** predicts growing *dissaving* ($-$\$1.99m at the top) — wrong sign
- **Full model:** positive saving throughout, captures the jump: $\approx$\$122k at the top $\approx$ 11% of observed
- Residual: channels the model deliberately omits (bequests, return heterogeneity, entrepreneurship)

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Comparative Statics: Robustness of the Channel

Exercise	Top-decile saving	Share of observed
Baseline	\$121.96k	11.2%
Borrowing limit halved	\$122.22k	11.2%
No borrowing	\$122.57k	11.3%
Medicaid $\underline{m}$ doubled	\$121.68k	11.2%
σ: 2.0 $\rightarrow$ 2.5	\$139.06k	12.8%
σ: 2.0 $\rightarrow$ 1.5	\$50.78k	4.7%
ν: 20 $\rightarrow$ 15 / 25	\$116.69k / \$125.44k	10.8% / 11.6%

Top-decile saving in thousands of 2010\$; share = model saving / observed mean saving (\$1,085.28k). All other parameters held at baseline.

Robust

The 11–13% share holds for every perturbation tested: borrowing limit, health technology, insurance generosity, value of life.

The one exception

$\sigma = 1.5$ cuts the share to 4.7%: it sits just above the 1.39 threshold ($\sigma > 1 + \hat{\beta}$, Theorem 1). Below it the luxury condition fails and the mechanism switches off.

Comparative Statics: Asymmetry Across the Distribution

- **Borrowing limit:** effects are graded by wealth—+5.1% at decile 1 (closest to the constraint) vs. +0.5% at decile 10 (never near it). The constraint is not what generates the top-decile pattern.
- **Medicaid generosity:** a more generous transfer crowds out private saving (moral hazard), but the effect decays with wealth: -0.9% at decile 1, only -0.23% at decile 10. The wealthy save against catastrophic care, not for eligibility.
- **Risk aversion:** a fall in σ hits the bottom hardest (decile-1 saving turns negative) and cuts top-decile saving by 58%, still explaining 4.7%.
- **Value of life:** a higher ν raises saving everywhere, proportionally most where saving is smallest.

Policy Angle: Medical Technology (AI)

Two opposing channels:

- **Productivity:** AI improves health technology efficiency; $\beta \uparrow \Rightarrow$ top-decile saving $+14.8\%$ (share 11.2 $\rightarrow$ 12.9%)
- **Socialization:** AI expands coverage; $\alpha \downarrow \Rightarrow$ saving returns to baseline

Exercise	Top-decile saving	Share
Baseline	\$121.96k	11.2%
β: 0.39 $\rightarrow$ 0.7	\$140.00k	12.9%
$+\ \alpha \rightarrow 0.0009$	\$119.04k	11.0%

Top-decile saving in thousands of 2010\$.

Net effect

Net effect ambiguous in principle; the efficiency channel typically survives coverage expansion, so progress more likely *strengthens* than eliminates the precautionary channel.

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Conclusion

Empirically, the paper documents:

- Saving *and* imputed total medical spending both jump between deciles 9 and 10
- A saving pattern at the top that standard BAH models cannot explain

Theoretically, it establishes:

- Sufficient conditions under which the precautionary motive to self-insure against health shocks remains active at arbitrarily high wealth (Theorem 1)
- The first mechanism generating a stationary Pareto (Zipf) upper tail from precautionary saving alone (Theorem 2)

Quantitatively: the channel explains 11% of top-decile saving, robust at 11–13% across all perturbations tested.

Thank You

Questions welcome

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