

Financial and Total Wealth Inequality with Declining Interest Rates

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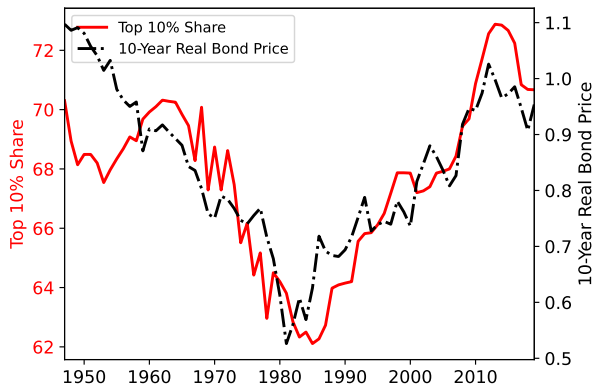
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ABFER Household Finance Conference

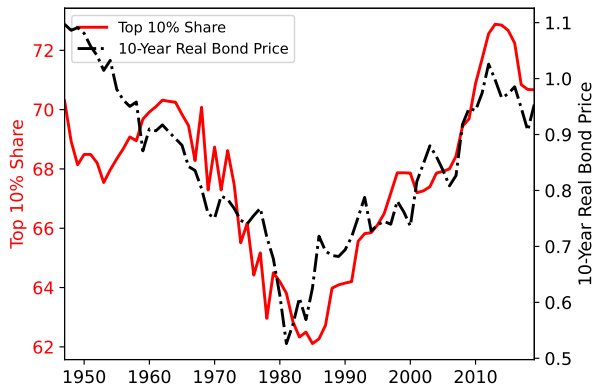
Motivation

- ▶ **Left Axis:** Top 10% US financial wealth share.
- ▶ **Right Axis:** 10-Year Real Bond Prices.
- ▶ Relation also holds for France and the UK.



Motivation

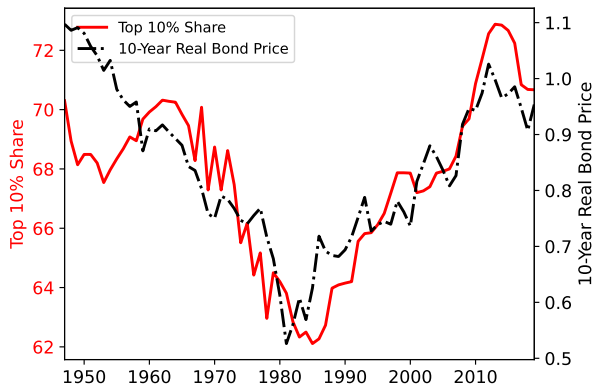
- ▶ 10Y real bond yield: -4.5pp ↓ between 1980s and 2010s
- ▶ Top-10% share: +8.3pp ↑ between 1980s and 2010s



Motivation

► Challenges for interpretation:

- Rates influence valuations, but inequality depends on portfolio *heterogeneity*.
- Decomposition of “paper” gains vs. consumption unclear.



This Paper

► Research Questions:

1. What share of rising **fin. wealth inequality** is explained by falling interest rates?
2. What are the implications for **total wealth (consumption) inequality**?

► Approach: Combine new empirical estimates with structural model.

- Cross-sectional estimates \implies exposure of portfolios (duration) across wealth distribution.
- Realistic consumption-savings model \implies exposure of consumption plan.

► Results:

- Observed decline in rates **explains 95% of 8.3pp rise** in top-10% share since 1980s.
- The fall in interest rates also affects consumption inequality.
- Low-wealth young most harmed, high-wealth older agents gain.

Related Literature

- ▶ **Measurement of Income and Wealth Inequality:** Piketty and Saez (03), Lustig, Van Nieuwerburgh, Verdelhan (13), Piketty (15), Piketty and Zucman (15), Huggett and Kaplan (16), Alvaredo et al. (18), Fagereng, Blomhoff, Moll, Natvik (19), Zucman (19), Smith, Zidar, Zwick (19), Catherine, Miller, Sarin (20), Bach, Calvet, and Sodini (20), Fagereng, Guiso, Malacrino, and Pistaferri (20), Piketty and Zucman (20), Kopczuk and Zwick (20), Kuhn, Schularick, Steins (20), Heathcote, Storeletten, and Violante (21), Mian, Straub, Sufi (21).

Here: New measures of portfolio duration at the household level.

- ▶ **Theoretical Drivers of Wealth Inequality:** Cagetti and De Nardi (06), Benhabib, Bisin, Luo (17), Benhabib and Bisin (18), Gomez and Gouin-Bonenfant (20), Hubmer, Krusell, Smith (20), Moll (20), Mian, Straub, Sufi (21).

Here: Focus on covariance of financial duration with wealth as key.

- ▶ **Interest Rate Risk and Hedging:** Doepke and Schneider (06), Auclert (19).

Here: Role of duration hedging beyond inflation, payment indexation effects.

Outline

1. Theoretical analysis
2. Calibrated life cycle model
3. Repriced distribution (actual wealth update using observed portfolios)
4. Compensated distribution (wealth changes needed to afford prior cons. plan)

Theoretical Analysis

Theory: Interest Rate Decline

- ▶ How does financial wealth inequality react to a change in interest rates?
- ▶ Key statistic is **duration** of household portfolio, equal to elasticity of value to permanent change in gross discount rates.
 - Change in financial wealth inequality driven by
 - (i) **heterogeneity** in duration
 - (ii) **correlation** with level of financial wealth
- ▶ **Proposition:** If covariance between financial wealth and duration is positive, then a **decline in rates increases financial wealth inequality.**

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Theory: Total Wealth Inequality

- ▶ At equilibrium, financial wealth is equal to present value of excess consumption.

$$\underbrace{\theta_0}_{\text{fin. wealth}} = E_0 \underbrace{\sum_{t=0}^{\infty} \hat{R}^{-t} (c_{i,t} - y_{i,t}^L)}_{\text{PV of excess consumption}}$$

- ▶ But while levels are equal, sensitivity with respect to interest rates may not be.
 - **Duration mismatch** \Rightarrow real consumption effects of interest rate decline.
- ▶ **Proposition:** Consumption allocation with high rates (\hat{R}) is still equilibrium under low rates (\tilde{R}), given **compensating** wealth transfers

$$\tilde{\theta}_0 = \theta_0 + E_0 \sum_{t=0}^{\infty} (\tilde{R}^{-t} - \hat{R}^{-t}) (c_{i,t} - y_{i,t}^L)$$

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Duration of Excess Consumption Plan: Sufficient Stat.

Compensating transfer needed depends on duration of excess consumption plan

$$D^{c-y}(\theta_0) = \frac{E_0 \sum_{t=0}^{\infty} t \cdot \hat{R}^{-t}(c_{i,t} - y_{i,t})}{E_0 \sum_{t=0}^{\infty} \hat{R}^{-t}(c_{i,t} - y_{i,t})}$$

1. If duration of financial wealth = excess consumption duration D^{c-y} , household is **perfectly hedged** against rate shocks
2. If duration of financial wealth $>$ excess consumption duration D^{c-y} , household is **over- hedged** against rate shocks
3. If duration of financial wealth $<$ excess consumption duration D^{c-y} , household is **under-hedged** against rate shocks

Calibrated Model

Duration

- Compute durations for each asset and liability
- For most risky assets, Gordon Growth Model (GGM):

$$D_t = 1 + \frac{P_t}{Div_t}$$

	Duration
Equities	49.78
Real Estate	12.28
Corporate Private Business Wealth	55.93
Non-Corporate Private Business Wealth	16.33
Vehicles	3.41
Fixed Income	5.28
Cash and Deposits	0.25
Mortgage Debt	4.81
Vehicle Debt	1.45
Student Debt	4.50
Other Debt	1.00

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Initial Financial Durations

► Households portfolios: Survey of Consumer Finance (SCF) / SCF+ 1983-2019

	Duration	Portfolio Shares			
		All	Bottom 90	P90-P99	Top 1
Equities	49.78	0.21	0.15	0.24	0.23
Real Estate	12.28	0.47	0.79	0.40	0.23
Corporate PBW	55.93	0.09	0.01	0.07	0.19
Non-Corporate PBW	16.33	0.12	0.05	0.11	0.20
Vehicles	3.41	0.04	0.09	0.02	0.01
Fixed Income	5.28	0.15	0.15	0.16	0.14
Cash and Deposits	0.25	0.08	0.10	0.08	0.05
Mortgage Debt	4.81	0.13	0.29	0.08	0.02
Vehicle Debt	1.45	0.01	0.03	0.00	0.00
Student Debt	4.50	0.00	0.01	0.00	0.00
Other Debt	1.00	0.01	0.02	0.01	0.01
Average (EW) Duration	19.50				
Aggregate (VW) Duration	25.42				

Initial Financial Durations

- Wealthier households → higher share of equity-like assets

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Initial Financial Durations

- ▶ Aggregate duration >> average duration.
- ▶ Implies falling rates increase financial wealth inequality.

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Calibrated Life-Cycle Model

- ▶ **Life-cycle**: mortality risk, accidental bequests given to newborn agents.
- ▶ CRRA preferences with risk aversion $\gamma = 2$ and time discount factor $\beta = 1/R$
- ▶ Household income consists of **regular** and **superstar** component.
 - Comprehensive measure: wages + salaries, labor component of business income, transfer income (UI, SS), DB pension.
 - Estimate **regular income process on PSID data** with persistent and transitory risk, age profile, structural break at retirement.
 - Households have 0.02% annual chance to enter **superstar state** with stochastic length (average = 40 years). Superstar income 36x average, calibrated to target top-10% FW share in 1980s.

Calibrated Life-Cycle Model

- ▶ To calibrate model, regress fin. duration on age and wealth percentile bin:

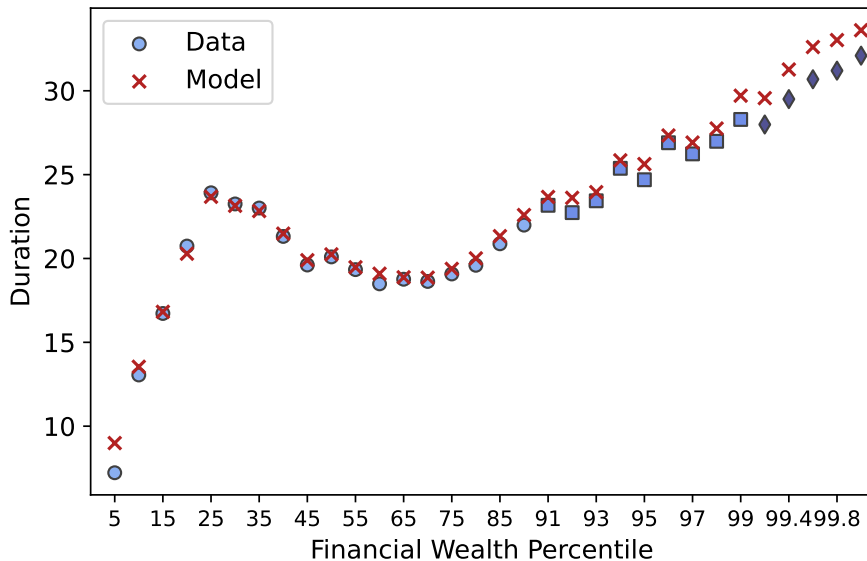
$$D_i^{fin} = \alpha + \beta \text{Age}_i + \sum_j \gamma_j \text{FinancialWealthBin}_{i,j} + \varepsilon_i$$

- ▶ Assign financial duration household by household as fitted value:

$$\hat{D}_i^{fin} = \hat{\alpha} + \hat{\beta} \text{Age}_i + \sum_j \hat{\gamma}_j \text{FinancialWealthBin}_{i,j},$$

- ▶ Assume households invest in zero coupon bonds with maturity = duration

Financial Duration Heterogeneity by Wealth



Repriced Distribution

Repriced Financial Wealth Distribution – Gradual

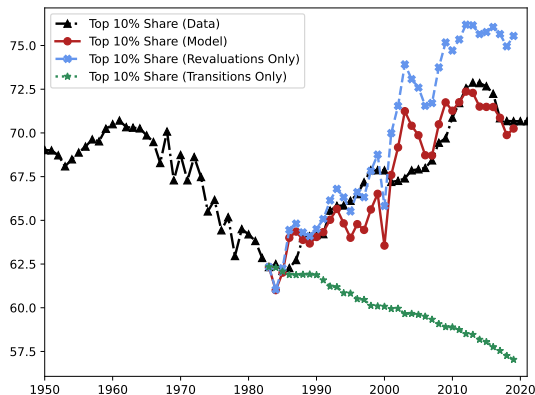
- ▶ Initialize model at steady state wealth distribution in 1983
- ▶ Measure annual innovations in the 10-year real bond yield $\{\hat{R}_t\}$
 - Feed in these interest rate shocks sequentially as unexpected permanent changes
- ▶ Households choose pre-revaluation wealth (savings) $\theta_{i,t+1}$.
- ▶ Following surprise change in interest rates, revalue portfolio

$$\tilde{\theta}_{i,t+1}^{repriced} \simeq \theta_{i,t+1} \exp \left\{ -\Delta \hat{R}_{t+1} \times D_{i,t}^{fn} \right\}$$

Repriced Financial Wealth Distribution – Gradual

- Transition path: top-10% fin. wealth share +7.9pp in model vs. +8.3pp in data.

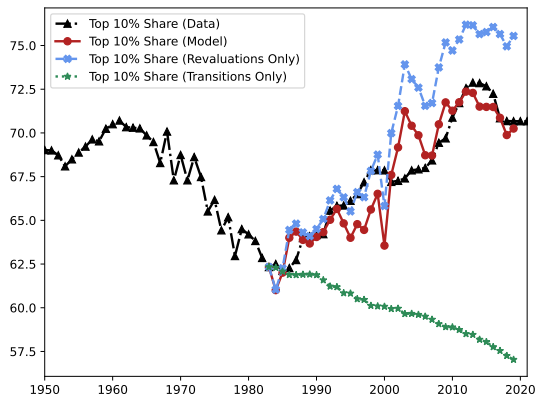
(a) Top-10% Share: Transition



Repriced Financial Wealth Distribution – Gradual

- ▶ **Chained repricing effect** offset by **mean-reversion effect**
- ▶ Steady-state inequality under low rates is lower (less compounding)

(a) Top-10% Share: Transition

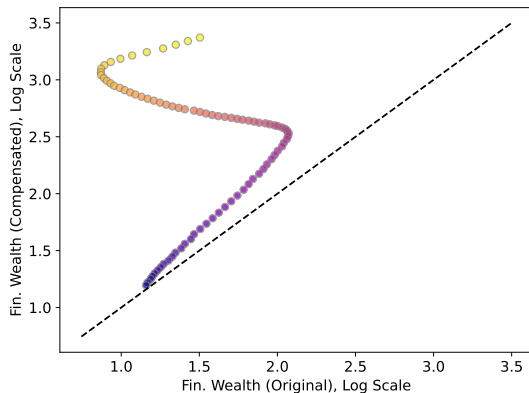


Compensated Distribution

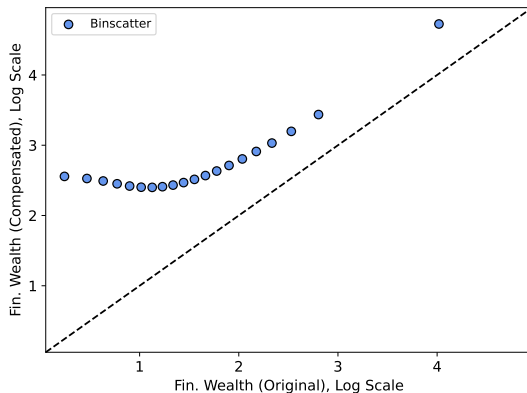
Compensated Financial Wealth Distribution: Heterogeneity

- ▶ Compensated vs. original distribution, by age (Young to Old) and wealth.
- ▶ Compensation depends on duration of excess consumption.

(a) By Age (Median)



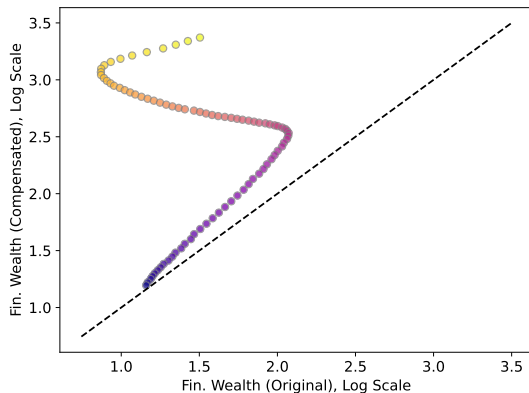
(b) By Fin. Wealth



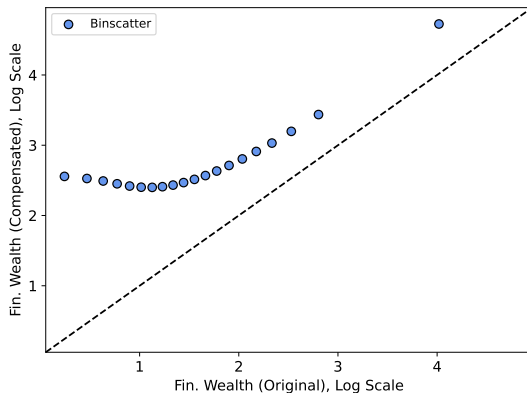
Compensated Financial Wealth Distribution: Heterogeneity

- ▶ Young (yellow) have highest duration D^{c-y} : save, then consume
- ▶ Old (purple) need least compensation, depend least on asset returns.

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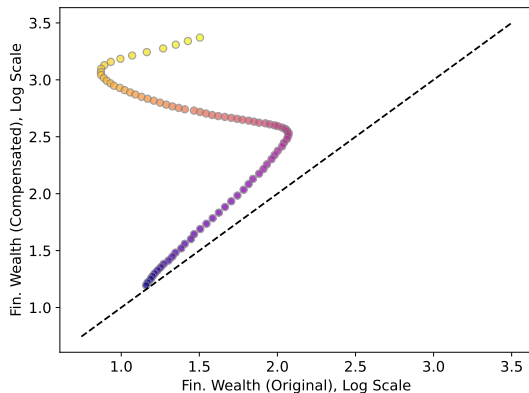
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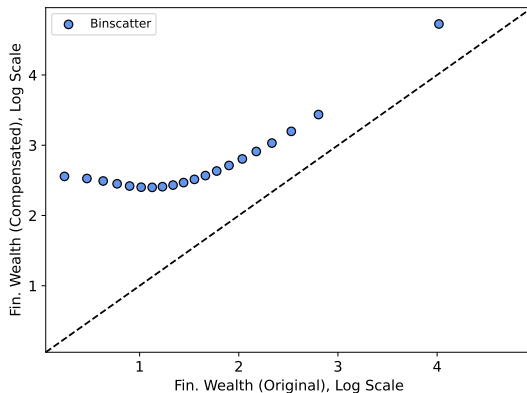
Compensated Financial Wealth Distribution: Heterogeneity

- ▶ Least wealthy need most compensation; young (without bequests) dominate overall result

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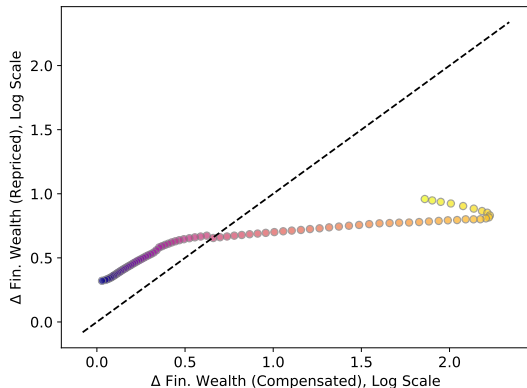
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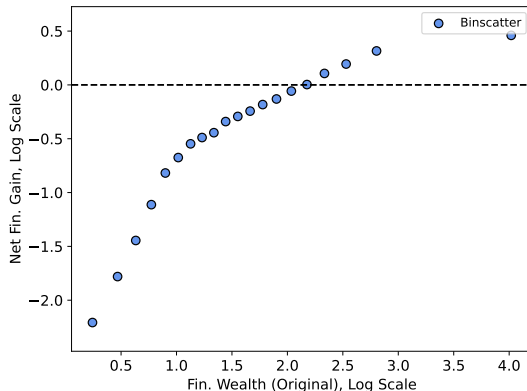
Repriced vs. Compensated Wealth Distributions

- ▶ Left: change under compensated (x-axis) vs. repriced (y-axis) distributions.
- ▶ Too little financial gains for young (yellow). Old (purple) are over-hedged.

(a) Compensated vs. Repriced: Age Medians



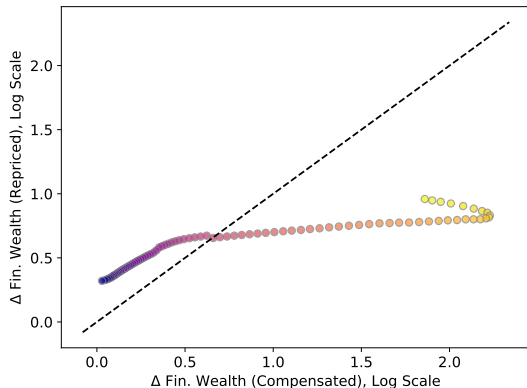
(b) Scatter: Repriced Gain



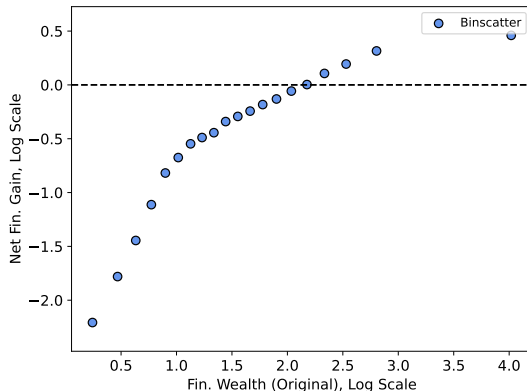
Repriced vs. Compensated Wealth Distributions

- ▶ Right: net financial gain (change in repriced minus compensated).
- ▶ Least wealthy lose most, wealthiest gain from decline in rates.

(a) Compensated vs. Repriced: Age Medians



(b) Scatter: Repriced Gain



Conclusions

- ▶ How do declines in asset returns influence financial and total wealth inequality?
- ▶ Used household-level portfolio data + life-cycle model to compare repriced, compensated financial wealth distributions.
- ▶ Repricing using observed portfolio durations \implies large rise in financial wealth inequality of order observed in the data.
- ▶ Real effects due to mismatch between repriced, compensated distributions.
 - Low-wealth young harmed most by low rates due to timing of excess consumption.
 - Older, wealthier households gain from large asset appreciations.