

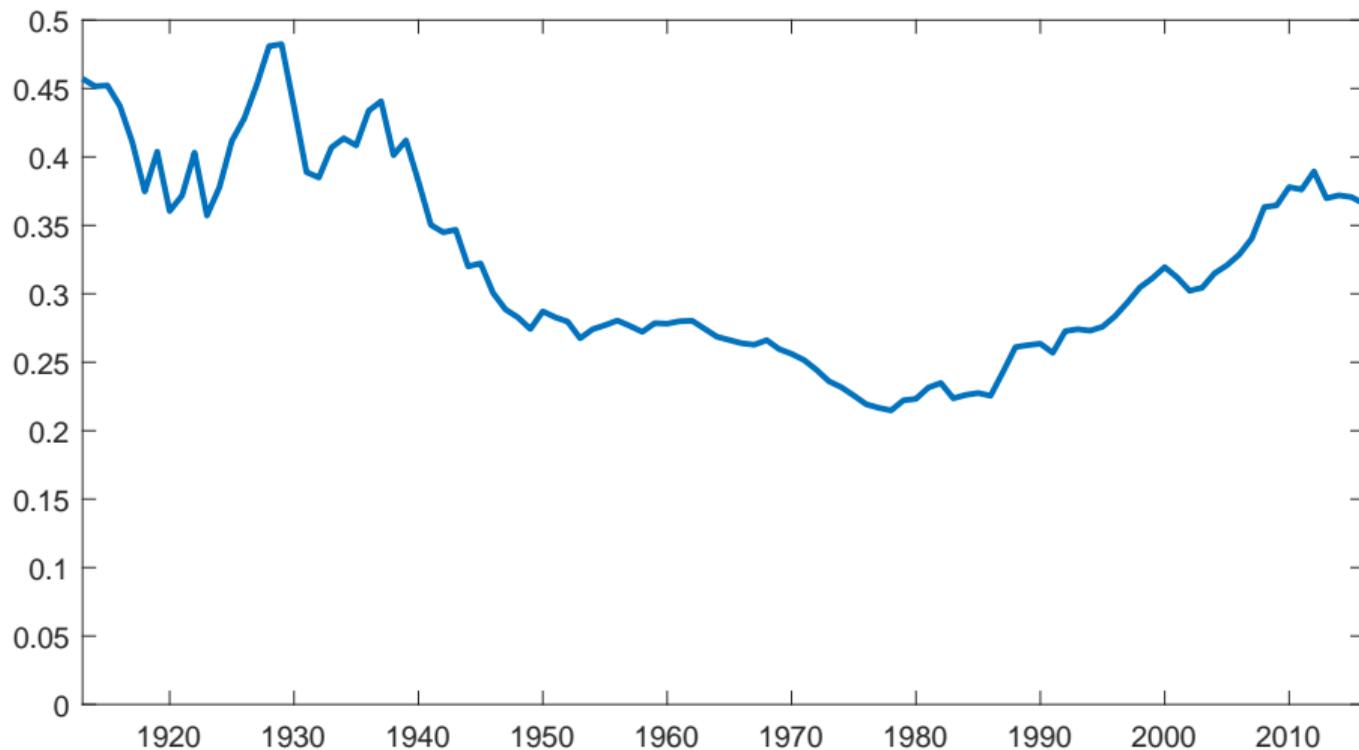
Social Security and Trends in Inequality

Sylvain Catherine
Wharton

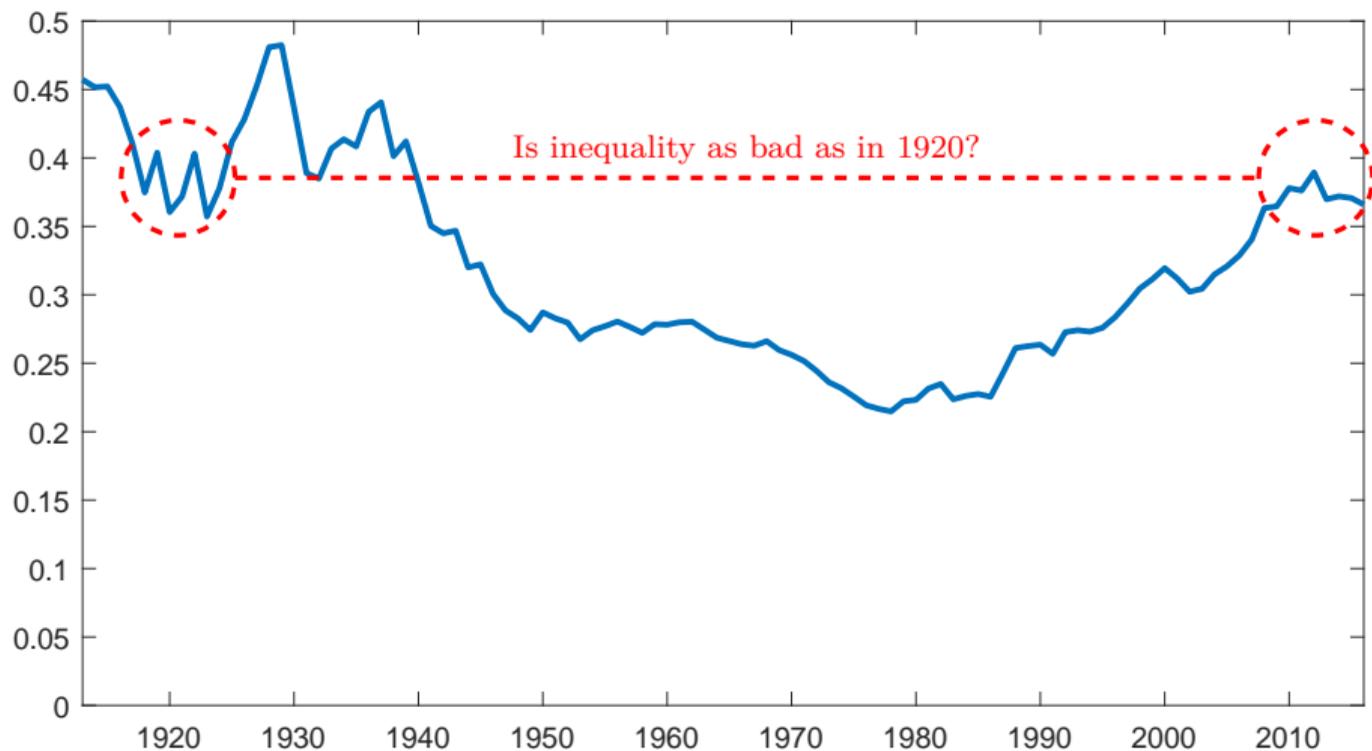
Max Miller
Wharton

Natasha Sarin
PennLaw & Wharton

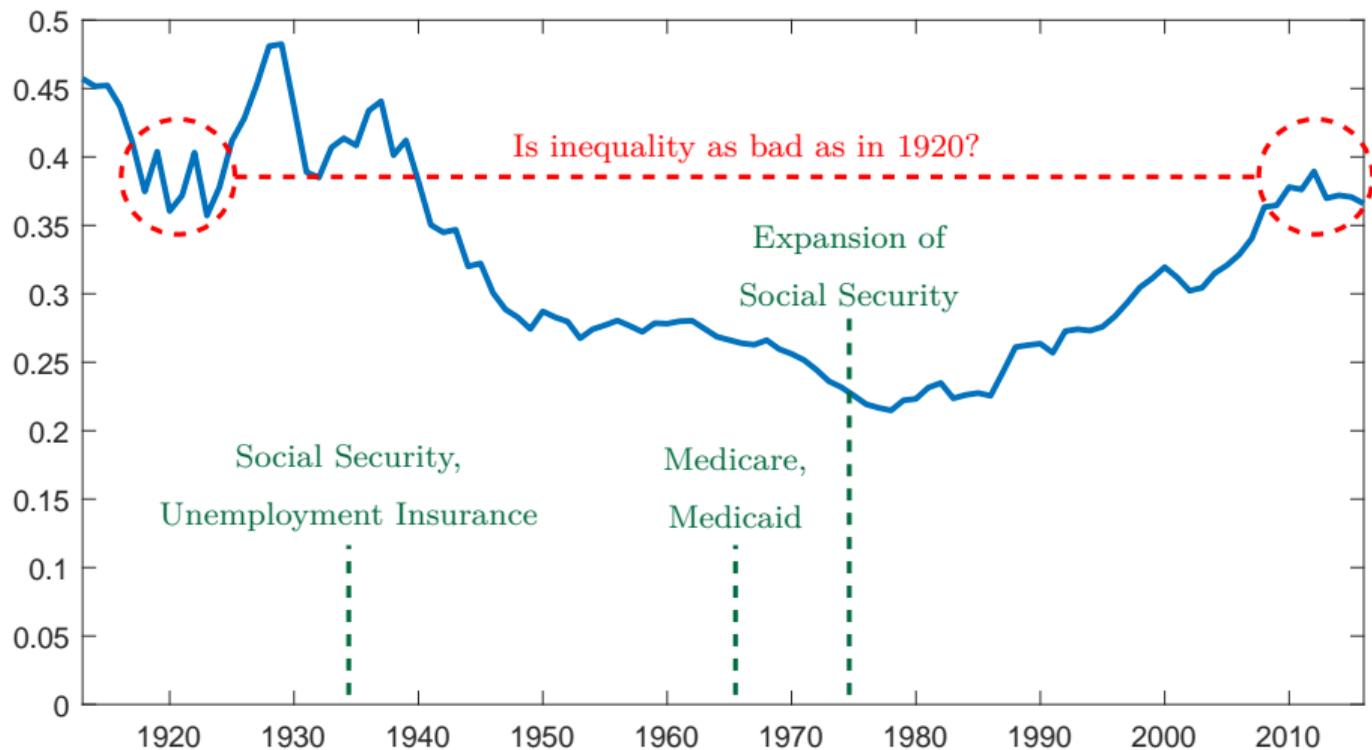
Motivation – Top 1% wealth share



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This Paper

- **Compute aggregate Social Security wealth**
 - Present value of future benefits, net of future taxes
 - Based on Survey of Consumer Finances (SCF) for retirees
 - Using Monte Carlo simulations for working households

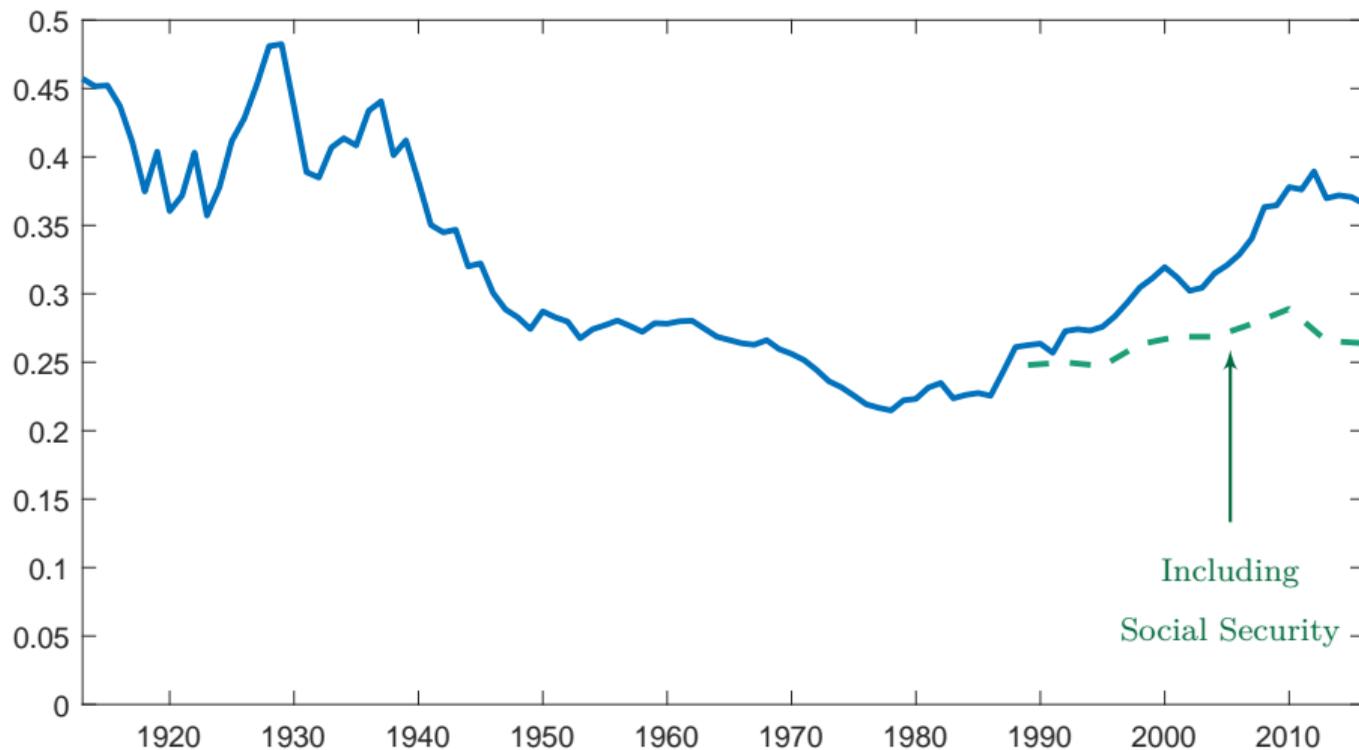
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- **Distribute aggregate Social Security wealth between bottom 90% and top 10%**

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- **Distribute aggregate Social Security wealth between bottom 90% and top 10%**
- **Recompute the evolution of top wealth shares between 1989-2016**

Key finding – Top 1% wealth share



HOW DOES SOCIAL SECURITY WORK?

How Does Social Security Work?

- Paying in
 - 12.4% payroll tax: 10.6% to old-age program, 1.8% as disability
 - NB: we exclude disability, conservative
 - Up to cap (2019 \$132,900)

How Does Social Security Work?

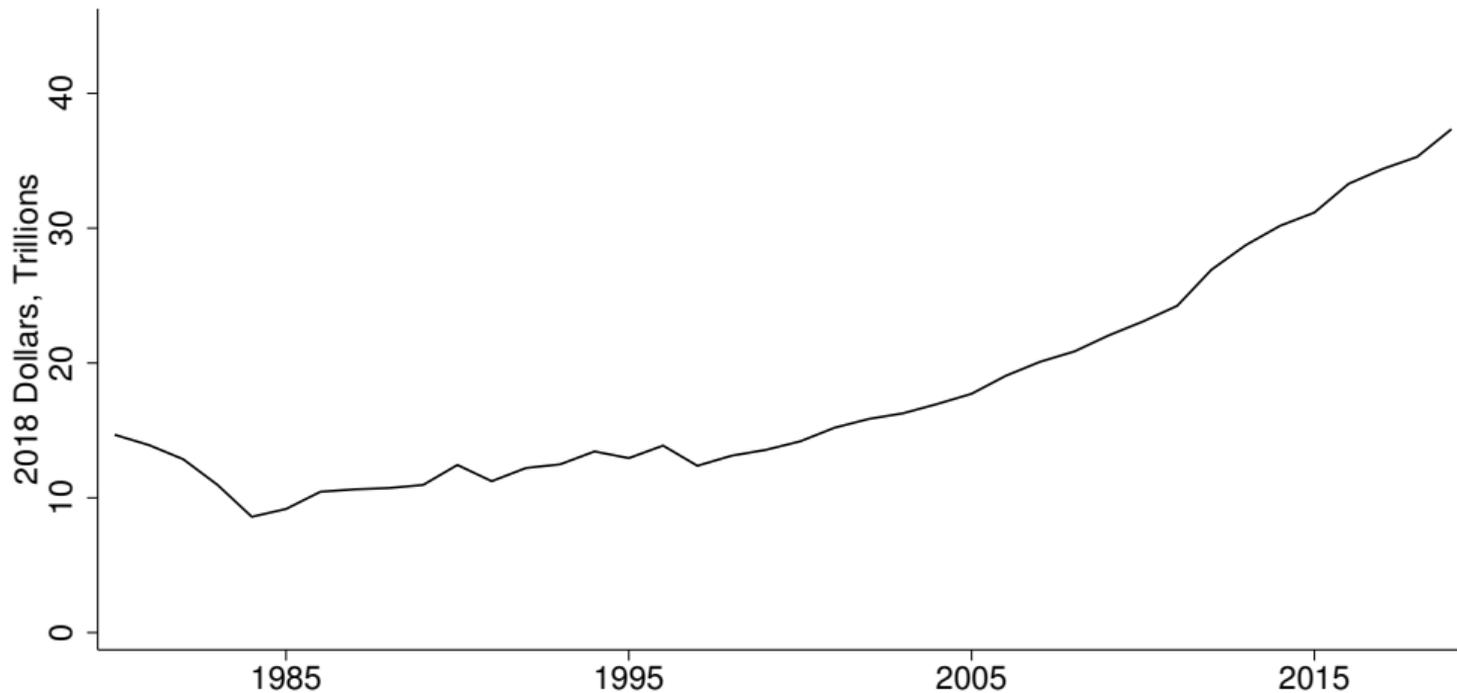
- Paying in
 - 12.4% payroll tax: 10.6% to old-age program, 1.8% as disability
 - NB: we exclude disability, conservative
 - Up to cap (2019 \$132,900)
- Benefits replace higher share for lower-wage workers
 - Take best 35 years and adjust for inflation and real wage growth
 - Replace
 - 90% of AIYE below first bend point (2019: \$11,112)
 - 32% between first and second (2019: \$66,996)
 - 15% above the second

STYLIZED FACTS:

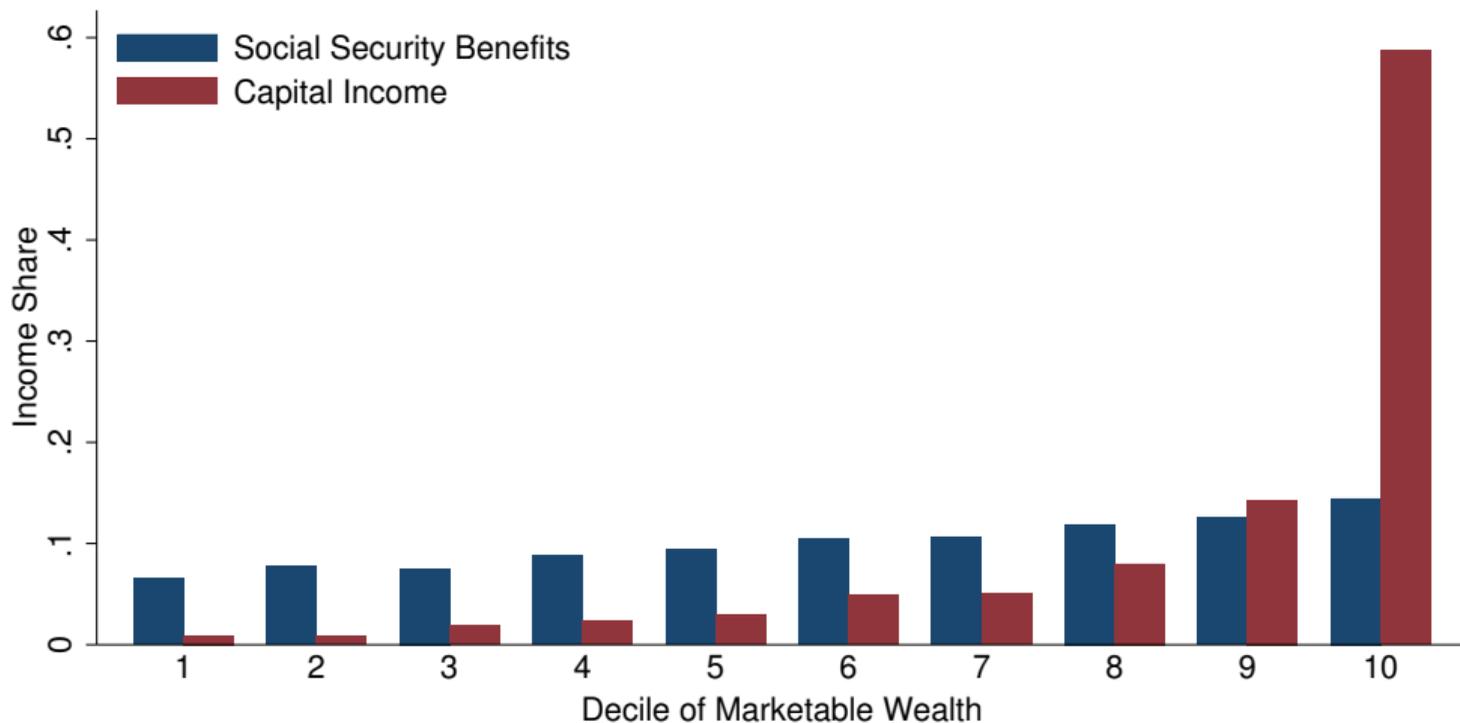
WHY DOES SOCIAL SECURITY MATTER?

Social Security promises are worth more than \$30tr

SSA Estimates of NPV of Social Security Promises



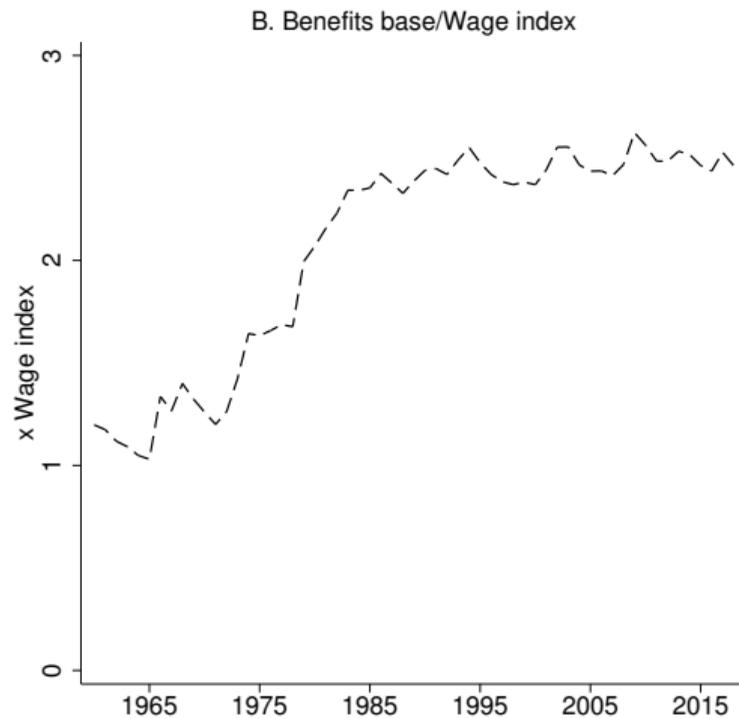
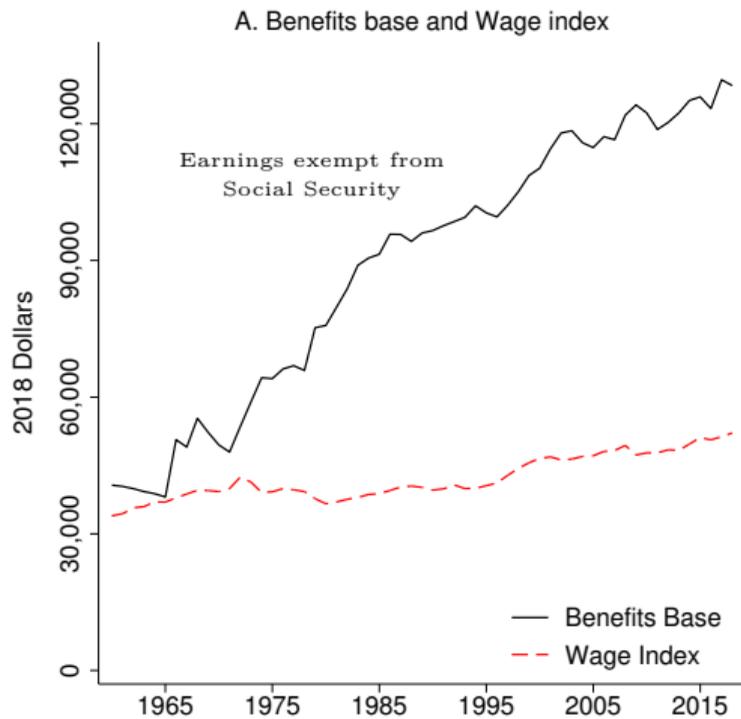
Social Security benefits are fairly evenly distributed



STYLIZED FACTS:

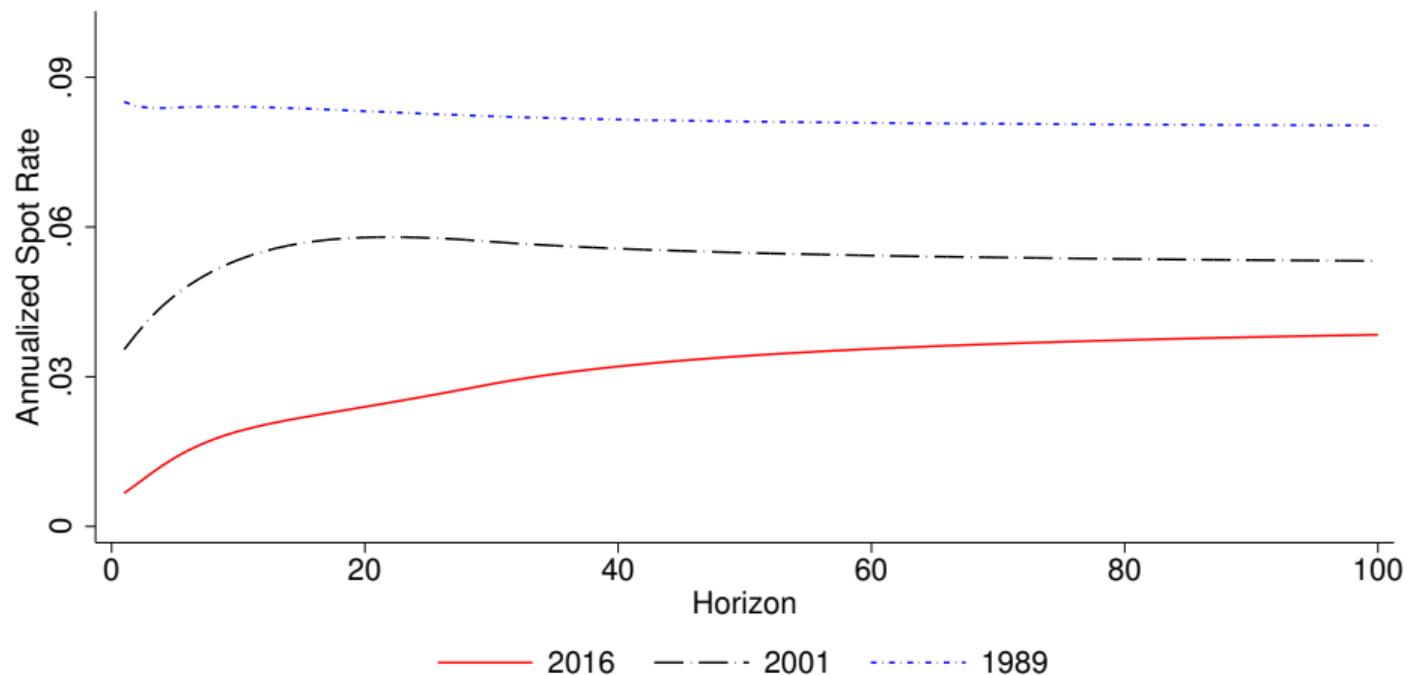
WHY DID AGGREGATE SOCIAL SECURITY WEALTH INCREASE?

Social Security wage base increased

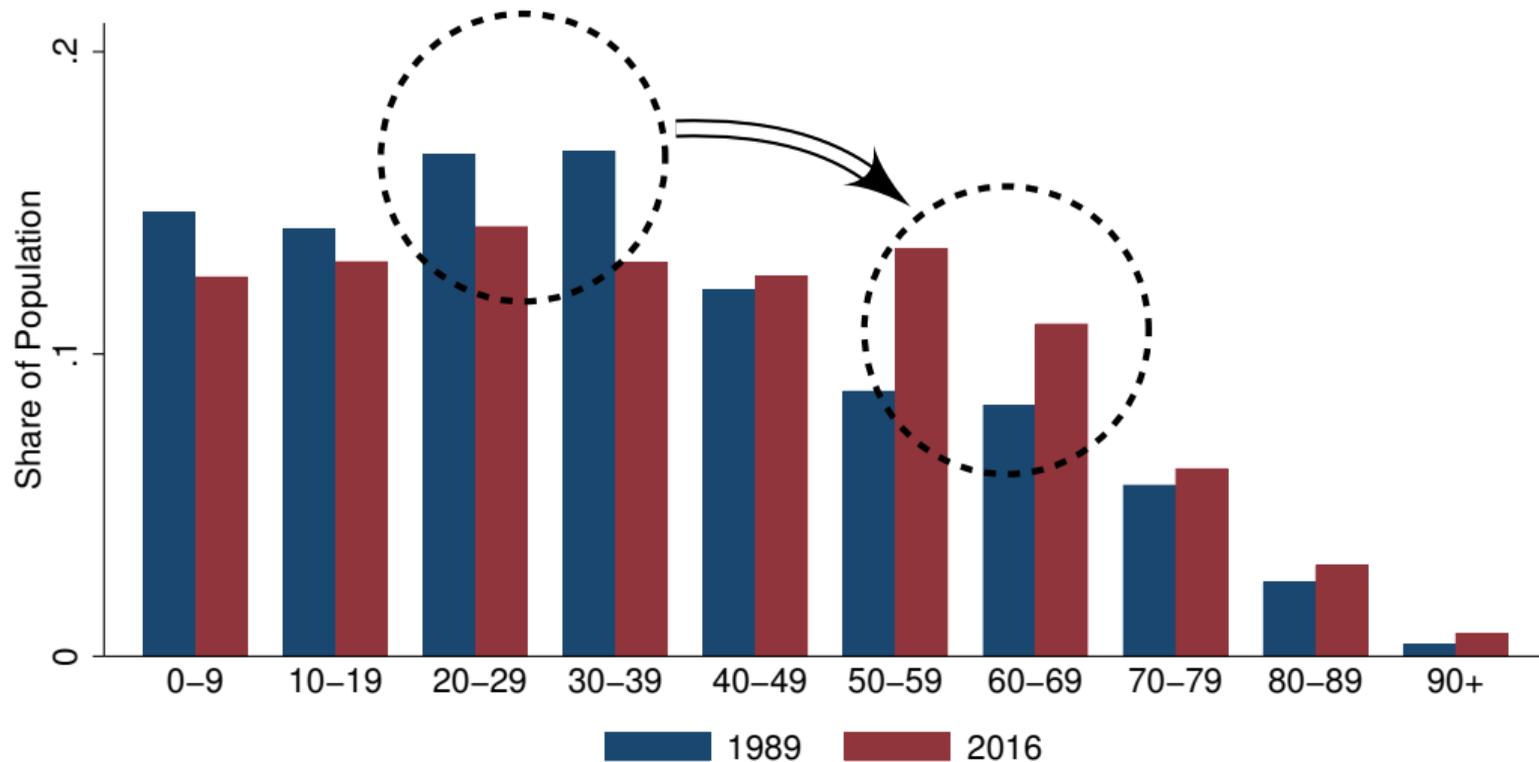


Discount rates declined

Market Implied Nominal Yield Curve



Boomers are reaching retirement age



METHODOLOGY

Defining Social Security wealth

- Net present value of Social Security

$$\begin{aligned} \text{Social Security Wealth}_{it} = & \sum_{s=c+66}^T \left(\prod_{k=t}^{s-1} (1 - m_{itk}) \right) \frac{\mathbb{E}[\text{Benefits}_{it}]}{(1 + r_{ts})^{s-t}} \\ & - \sum_{s=t+1}^{c+65} \left(\prod_{k=t}^{s-1} (1 - m_{itk}) \right) \frac{\mathbb{E}[\text{Taxes}_{it}]}{(1 + r_{ts})^{s-t}} \end{aligned}$$

- r_{ts} : market yield curve in year t
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- r_{ts} : market yield curve in year t
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- For retirees

$$\text{Social Security Wealth}_{it} = \sum_{s=t}^T \left(\prod_{k=t}^{s-1} (1 - m_{itk}) \right) \frac{\text{Benefits}_{it}}{(1 + r_{t,s})^{s-t}} \frac{\mathbb{E}[\text{CPI}_s]}{\text{CPI}_t}$$

- Benefits are observed in the data

Social Security wealth of workers

- For each SCF survey year, we simulate mean Social Security wealth for each cohort and gender

Social Security wealth of workers

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- **Simulating past and future earnings trajectories:**
 - Stochastic component: rich process estimated in [Guvenen et al. \(2019\)](#), which matches moments from the cross-section and dynamics of earnings
 - Life-cycle component: matches earnings per cohort \times gender \times year reported in [Guvenen et al. \(2018\)](#)
 - Goal: emulating Social Security administrative panel data

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 - Goal: emulating Social Security administrative panel data
- For each simulated path, we discount future benefits net of future taxes

Calibration & Aggregation

- **Social Security parameters**

- We assume that parameters of Social Security formula scale up with the wage index
 - e.g. Earnings cap, bend points
- Consistent with the last 40 years

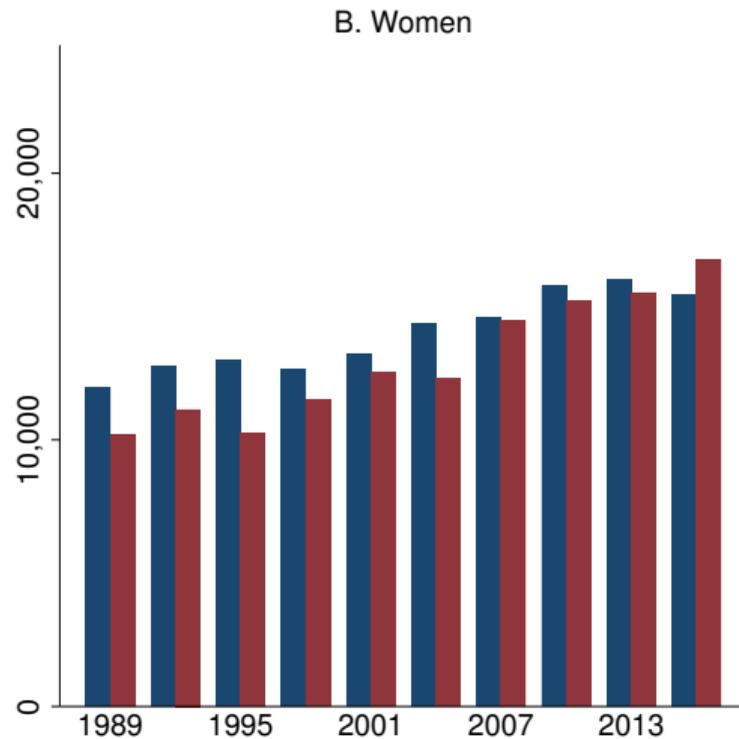
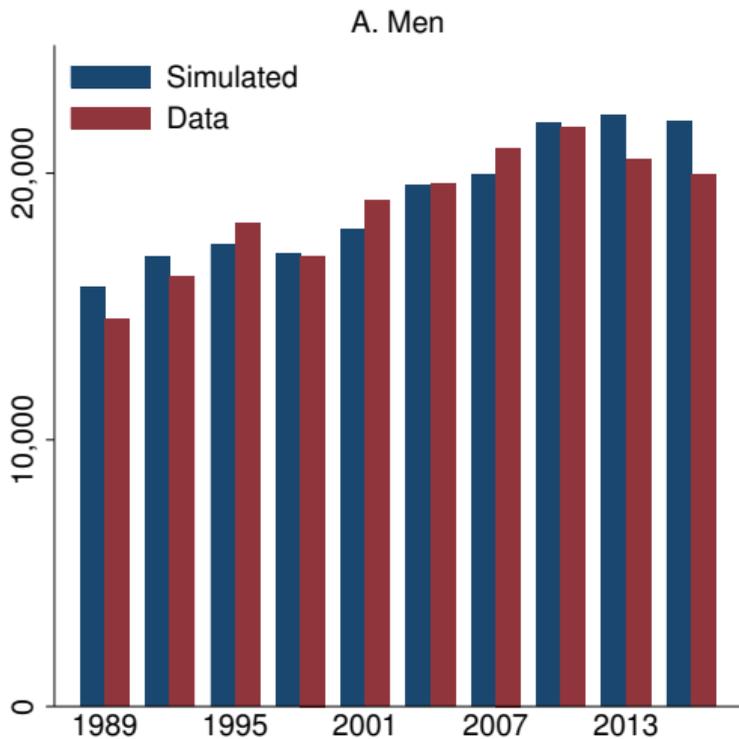
- **Macroeconomic assumptions**

- **Discount rates:** average nominal market yield curves (Fed Board)
- **Inflation projections:** historical SSA Annual Report
- **Real growth rate of wages:** historical SSA Annual Report

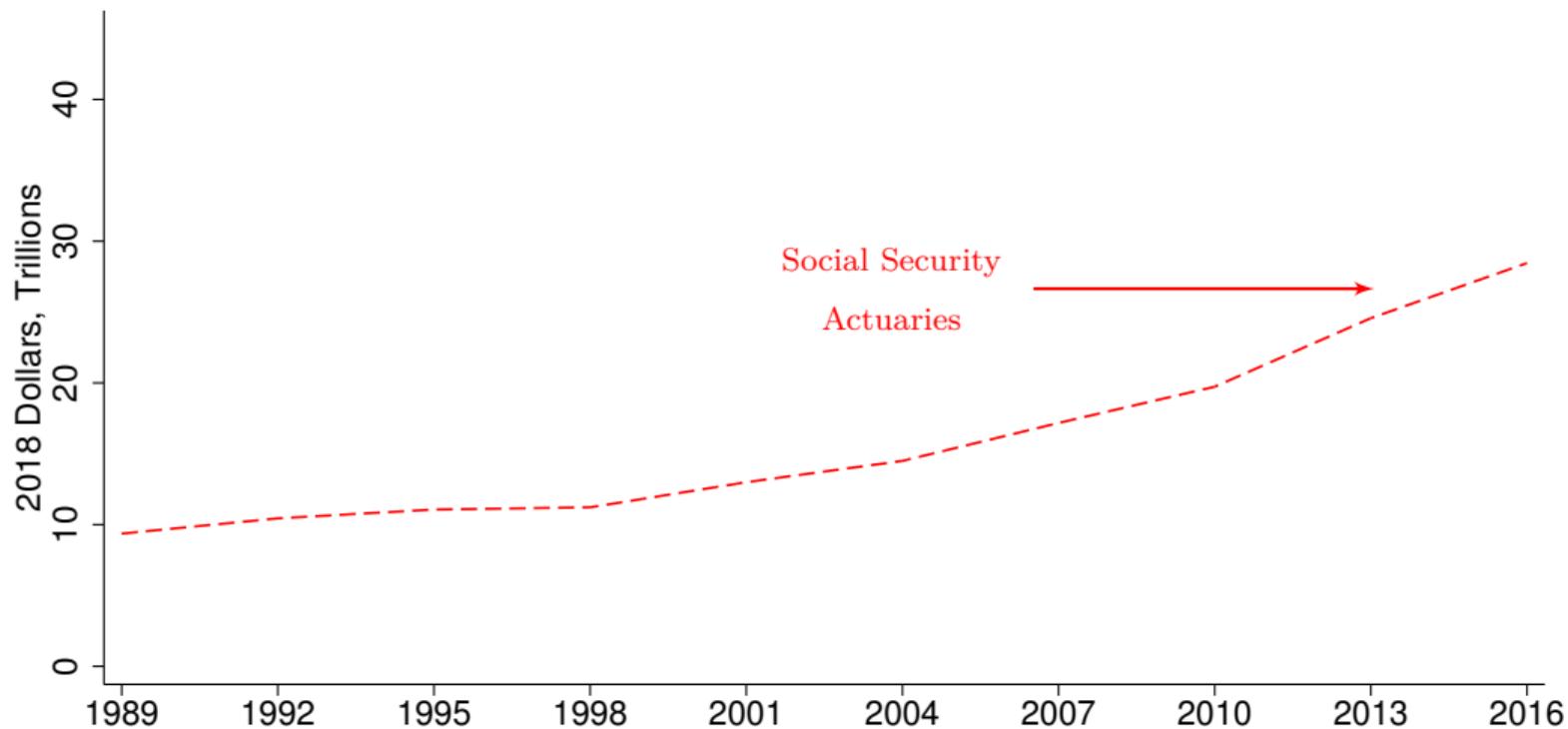
- **Aggregation:**

- We merge with the SCF the mean Social Security wealth by age×year×gender group
- We aggregate using SCF survey weight

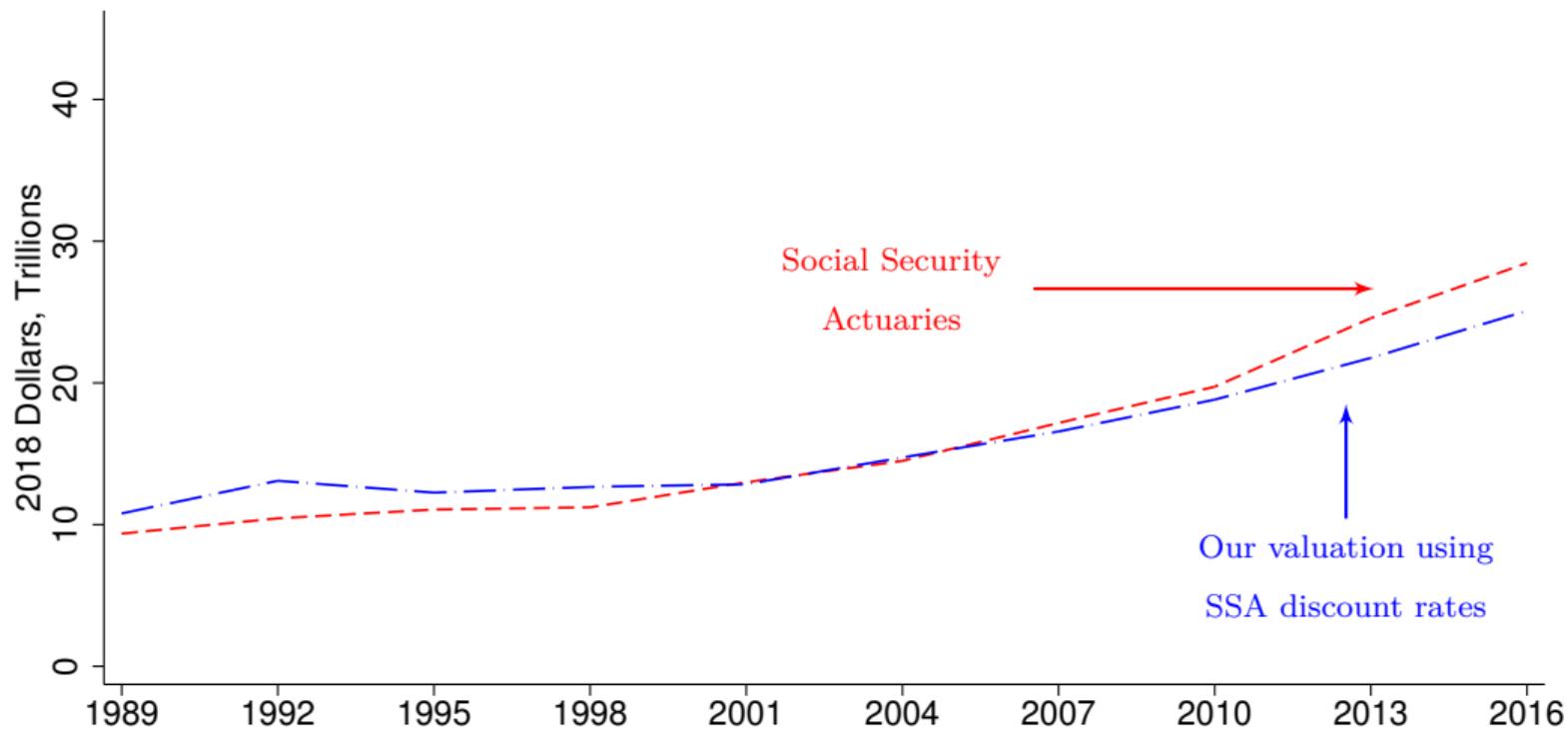
Validation – Simulated vs actual full-retirement-age benefits



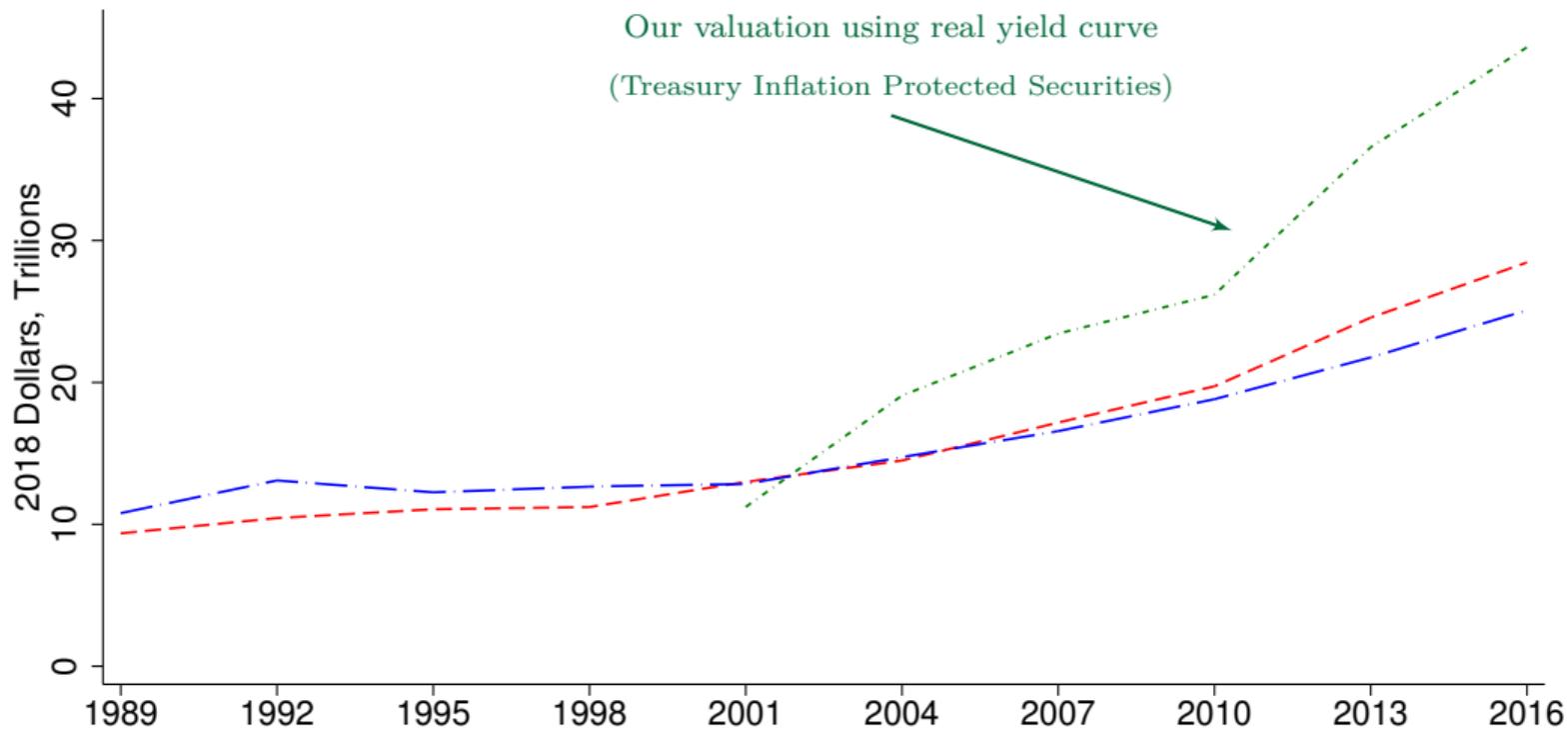
Validation – Aggregate Social Security wealth



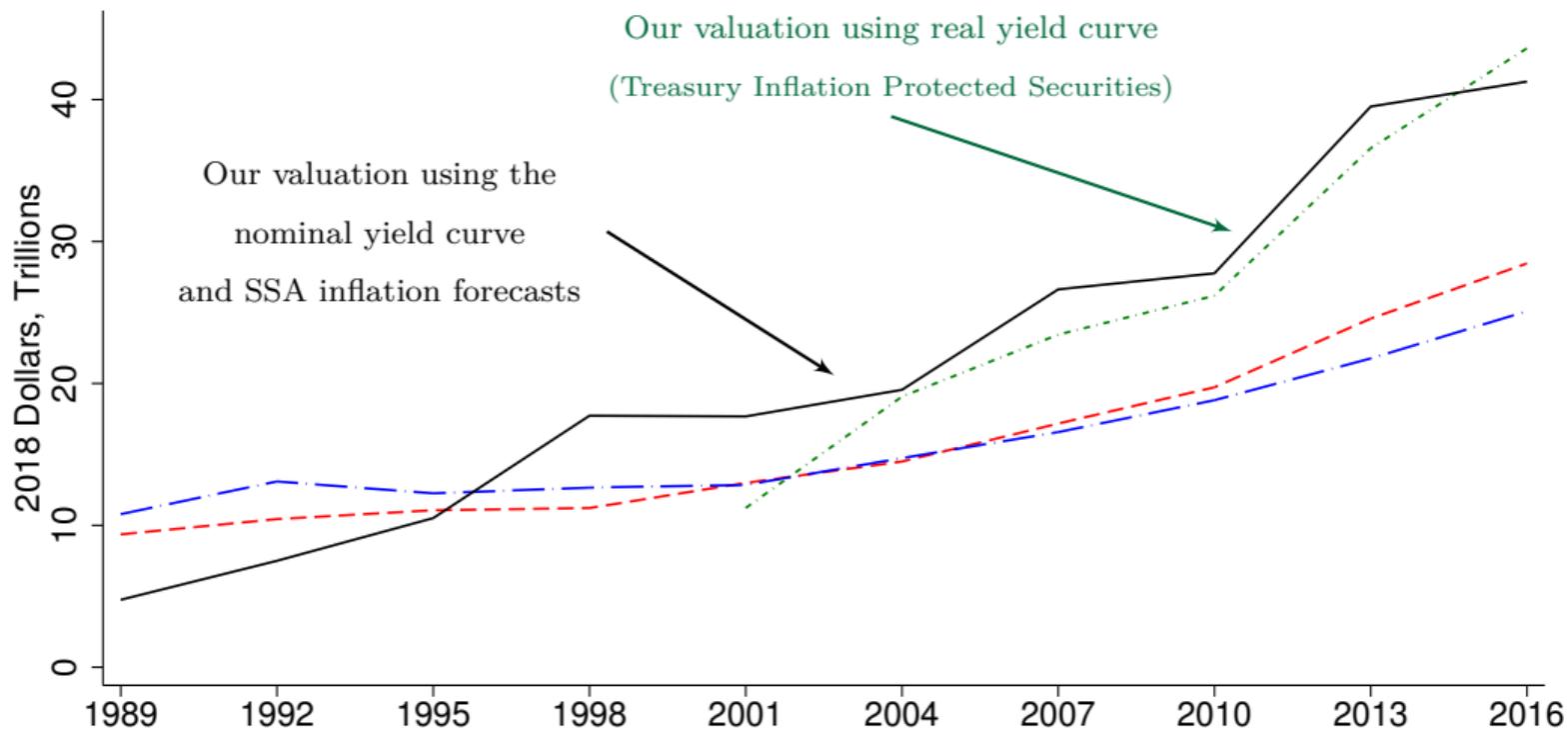
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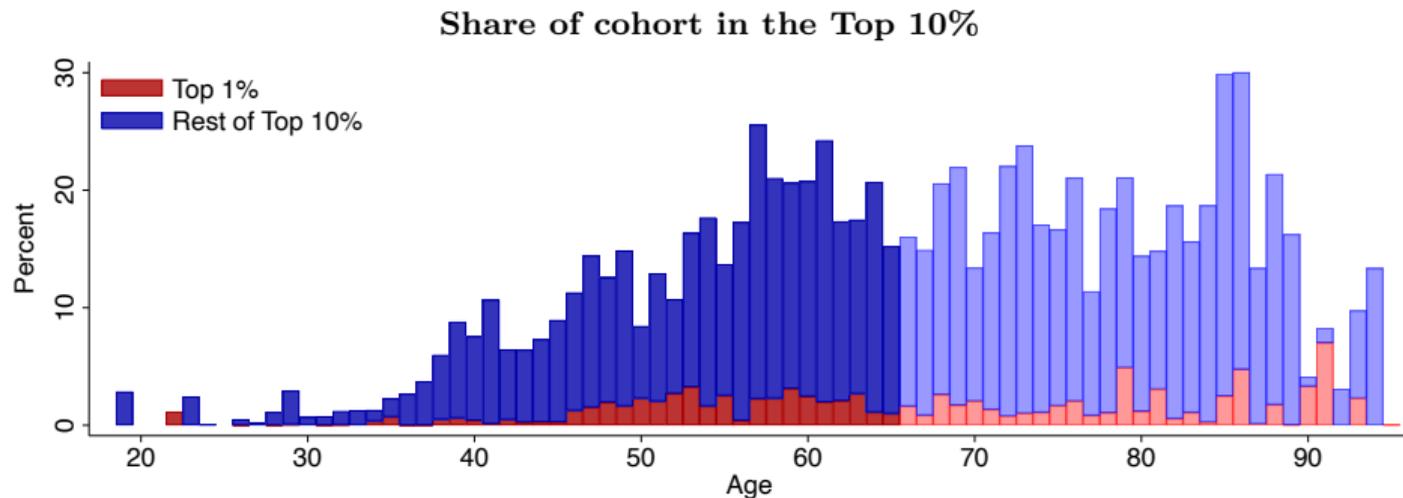
Assigning Social Security wealth



1. Simulation: aggregate Social Security wealth of 45 year-olds in 2016

- \$555 billion

Assigning Social Security wealth

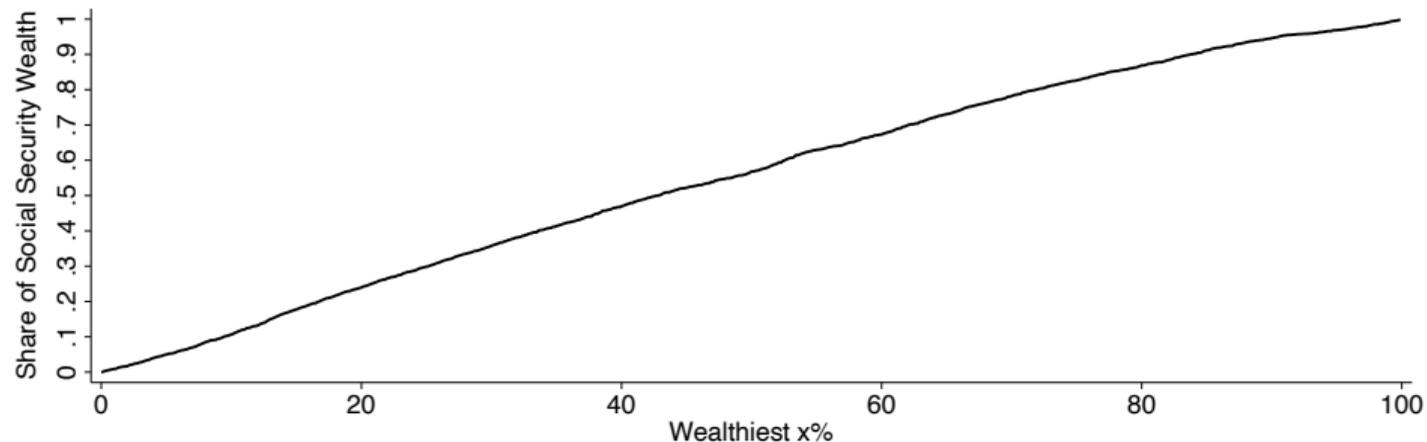


2. SCF: To be in Top 10% overall, a 45 year-old need to be in the

- Top 5% of his cohort

Assigning Social Security wealth

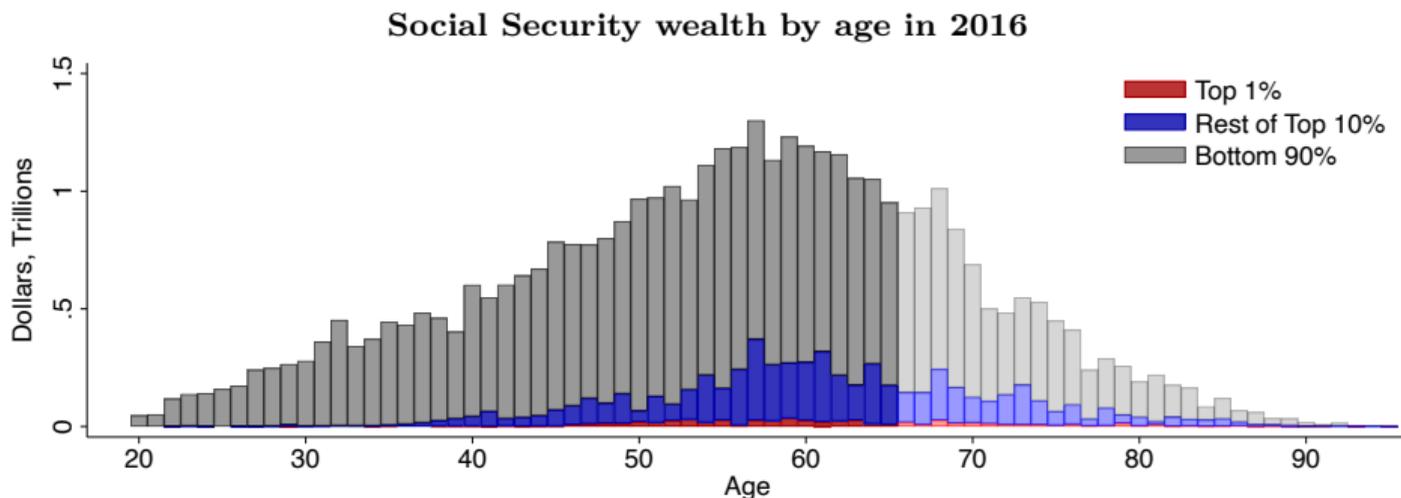
Wealthiest retirees' share of Social Security wealth $\phi_t(x)$



3. SCF: for young retirees, share of Social Security wealth of top 5%

- 6.5%

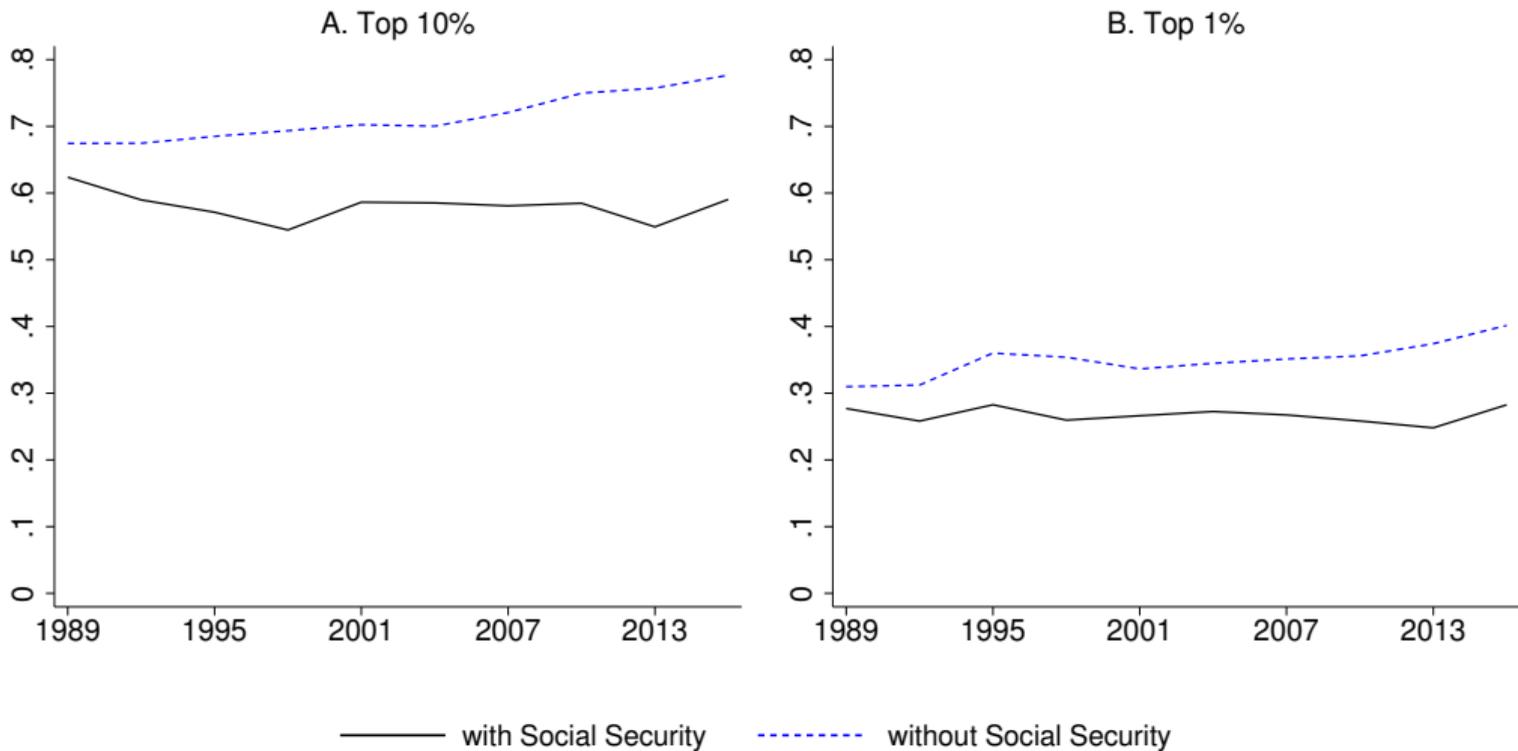
Assigning Social Security wealth



4. Split of Social Security wealth at age 45 in 2016

- $6.5\% \times \$555 \text{ billion} = \36 billion for top 10%
- $93.5\% \times \$555 \text{ billion} = \519 billion for bottom 90%

Top wealth shares



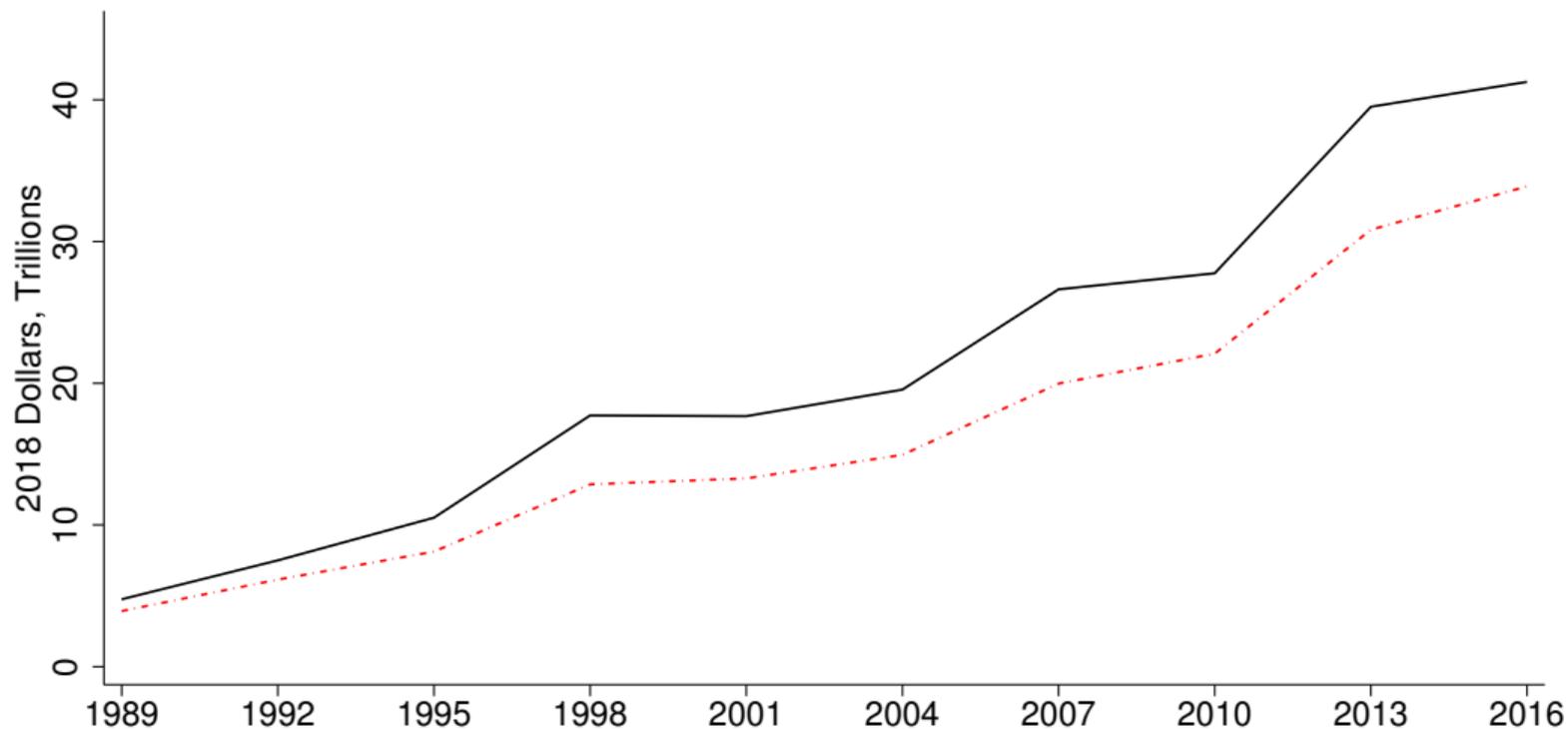
RISK-ADJUSTED VALUATION

Systematic risk of Social Security (1)

- Returns on PAYG contributions depend on growth rate of population and per-capita earnings (Samuelson (1958))
- For US Social Security, wage-indexation explicitly ties returns to the performance of the labor market
 - Tax cap follows wage index
 - Parameters of benefit function (bend points) scale up with the wage index

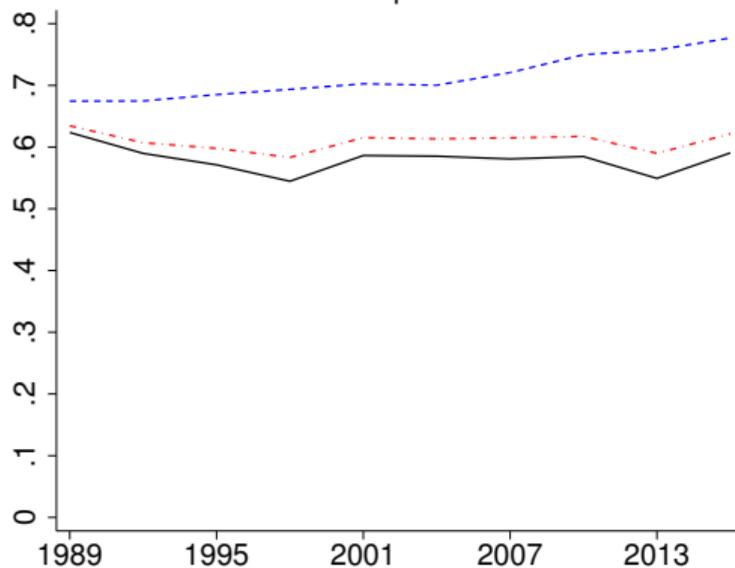
→ Before age 60, +1% to wage-index \Rightarrow +1% to all Social Security cash flows
- Long-run relationship between the labor and stock markets implies that Social Security participants are exposed to long-run systematic risk of the market portfolio (Geanakoplos and Zeldes (2010) and Catherine (2019))

Aggregate risk-adjusted valuation

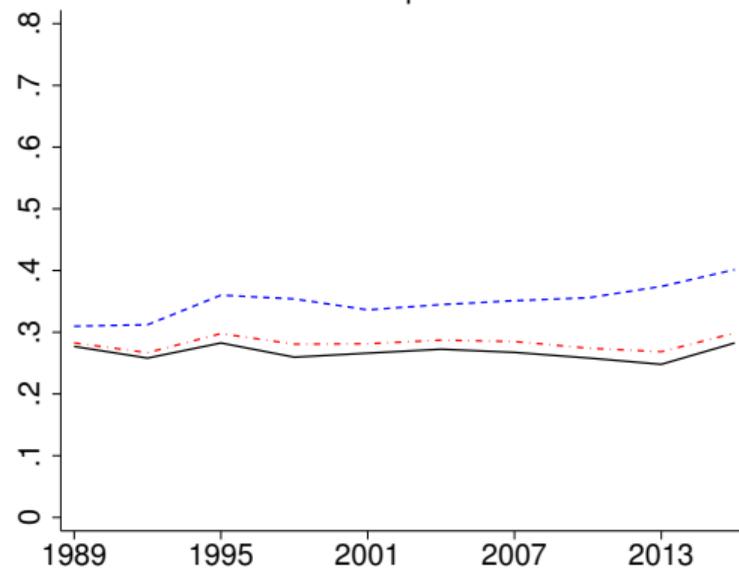


Top wealth shares

A. Top 10%



B. Top 1%



— Risk-free valuation - - - Risk-adjusted valuation
- - - No Social Security

Risk-adjusted valuation: Wealth composition over time

DISCUSSION

- **Role of interest rates**
- **Robustness**
 - Funding gap
 - Life expectancy inequality
 - Adjusting previous studies

Role of interest rates

- **Falling rates redistribute wealth from holders of short-duration assets to those with long-term investments (Auclert (2019))**

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- **Long duration bonds have performed exceptionally well over the last few decades (Binsbergen (2020))**

Role of interest rates

- Falling rates redistribute wealth from holders of short-duration assets to those with long-term investments ([Auclert \(2019\)](#))
- Long duration bonds have performed exceptionally well over the last few decades ([Binsbergen \(2020\)](#))
- Social Security is a leveraged position

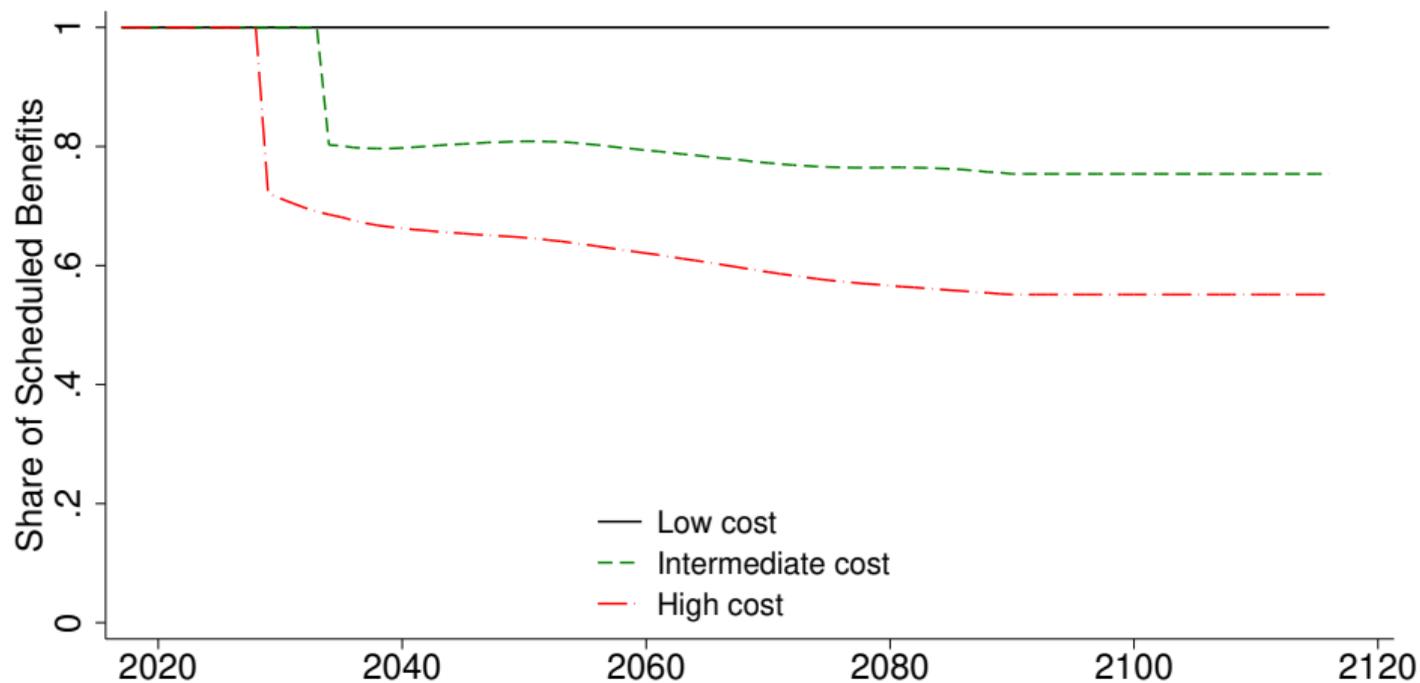
Replicating portfolio:

- Sell short and medium maturity bonds
- Buy very long maturity bonds

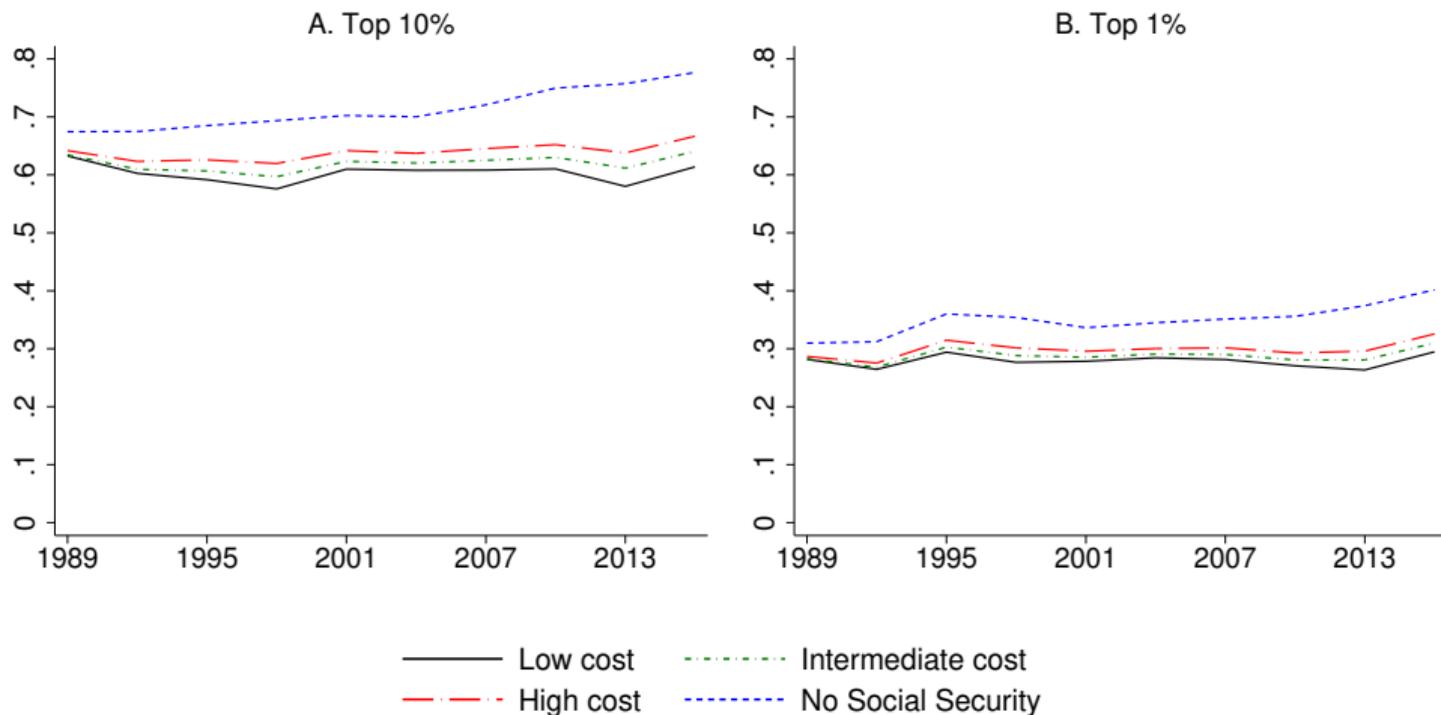
	Share of Social Security wealth in 1989		Change since 1989		
	Benefits (a)	Taxes (b)	Benefits (c)	Taxes (d)	NPV (a)·(c)+(b)·(d)
Bottom 99%	229%	-129%	+407%	+118%	+780%
Top 1%	123%	-23%	+303%	+282%	+308%
Entire population	225%	-125%	+405%	+119%	+763%

Funding gap

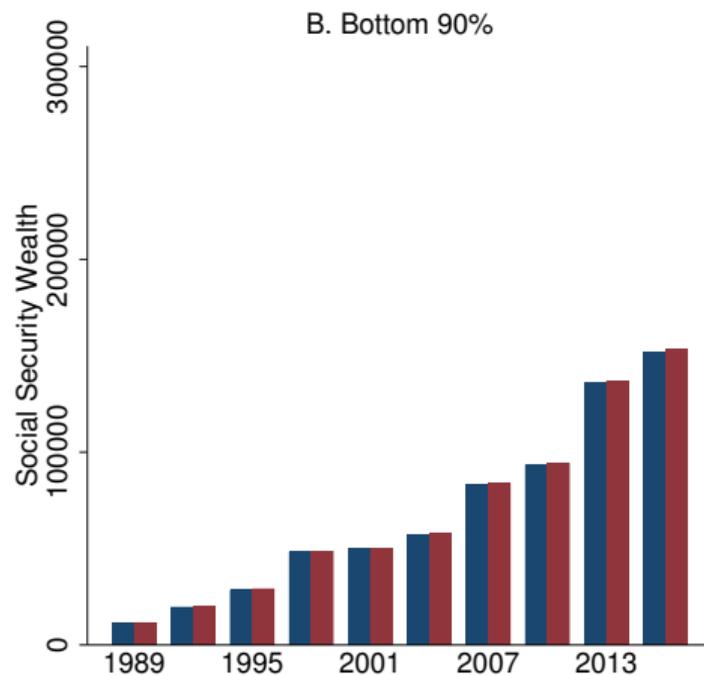
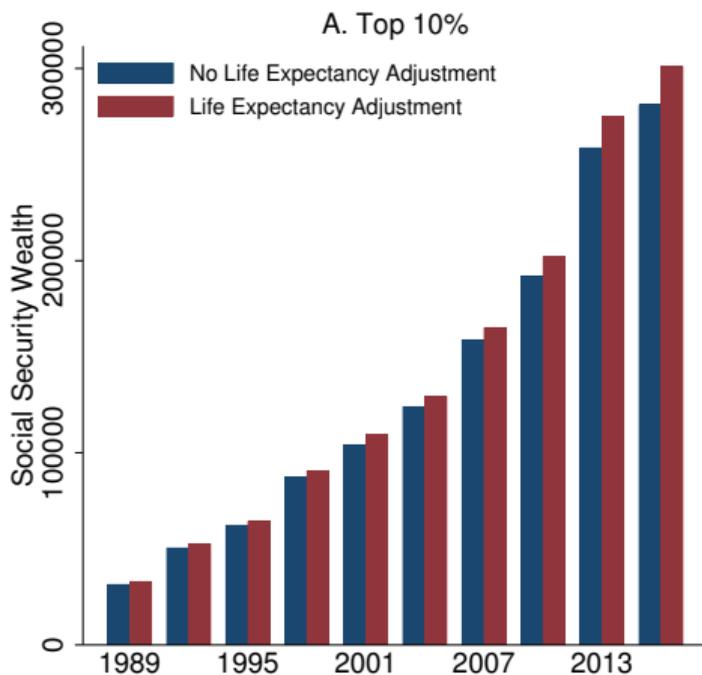
Projected funding gap in 2016 SSA Annual Report



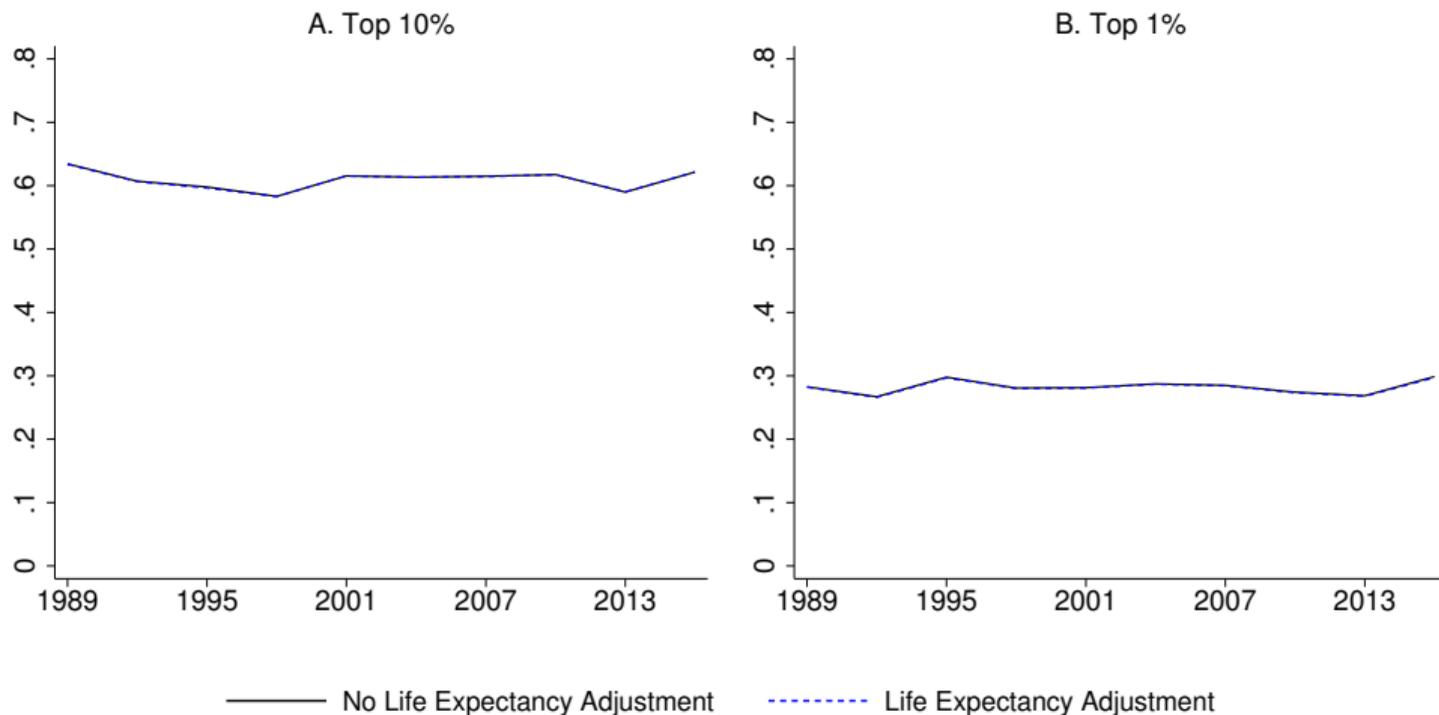
Funding gap: Top shares (risk-adjusted)



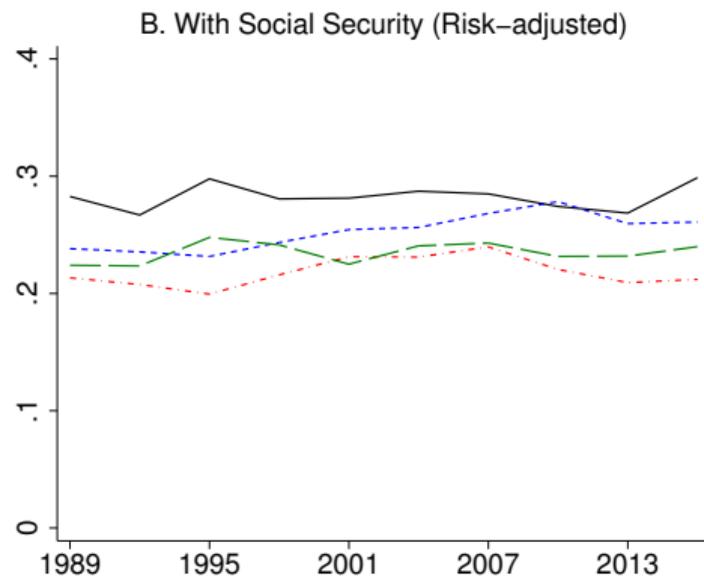
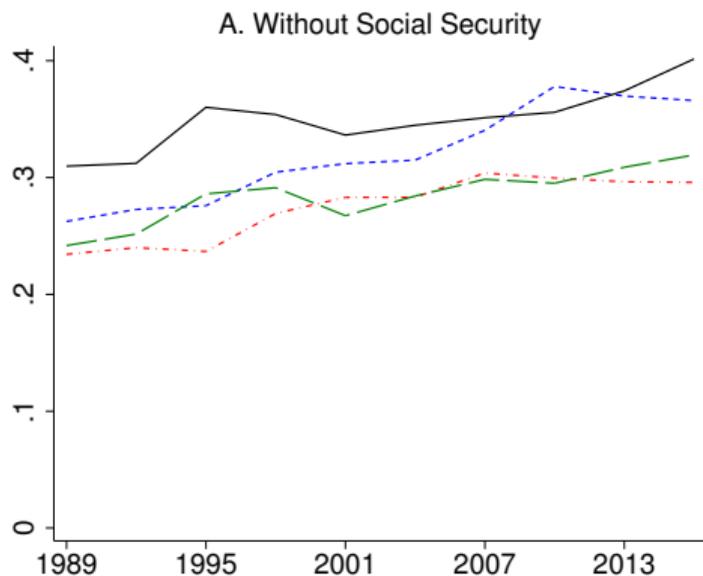
Adjusting for differences in life expectancy



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Adjusting other studies



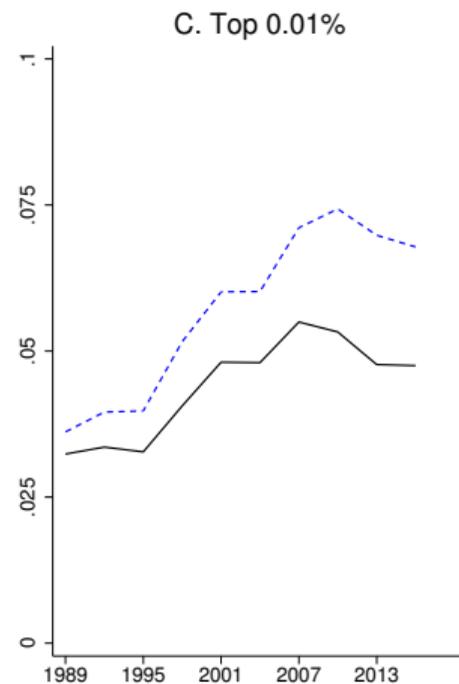
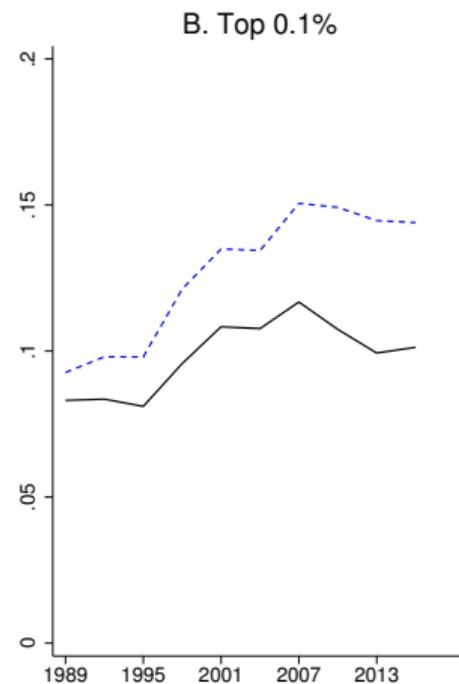
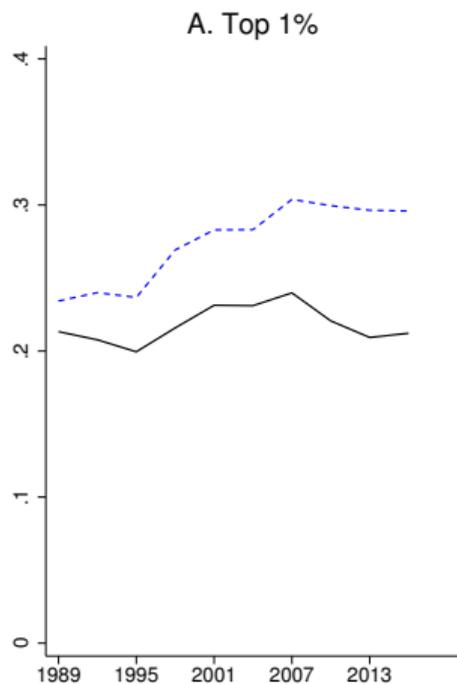
— SCF

- - - Smith, Zidar & Zwick (2020)

- - - Saez & Zucman (2016)

- - - Batty et al. (2019)

Adding Social Security to Smith, Zidar, and Zwick (2020)



Conclusion

- [Saez and Zucman \(2016\)](#) argue that Social Security should not be taken into account because it would call for the inclusion of other programs that reduce private savings and it would “not be clear where to stop”
- We argue that narrowly defined marketable wealth is not the right place to stop
 - Social Security is 57% of the wealth of the bottom 90%
 - Social programs can make marketable wealth inequality look worse
 - Current wealth inequality measures cannot be used for policy evaluation
- Top wealth shares have not increased since 1989 when Social Security wealth is taken into account