

# Saving Behavior Across the Wealth Distribution: The Importance of Capital Gains

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Andreas Fagereng  
Martin Holm  
Benjamin Moll  
Gisle Natvik

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# Question

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Do wealthier households save larger share of income than poorer ones?

Two reasons to care:

1. Interesting in its own right

- In both academia and media, frequent statements that “wealthier households have higher saving rates”
- **Is this actually true?**

2. Informative about theory

- Many theories of household wealth accumulation:  
$$\text{saving rate} = \frac{\text{saving}}{\text{income}} \approx \text{independent of wealth}$$
- **What does saving behavior look like in the data?**

# What We Do

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- Use Norwegian administrative data on income & wealth to examine saving behavior across the wealth distribution

# Our Findings

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1. Q: Do rich save larger share of income than poor? A: “No and Yes”

Answer depends on whether saving includes capital gains:

(a) saving rates **net of capital gains** (“net” or “active saving”)

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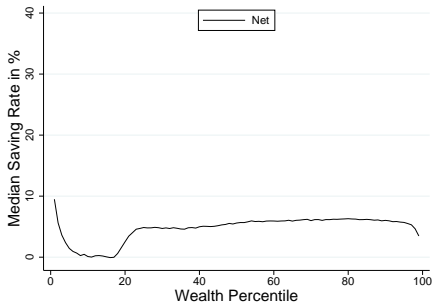
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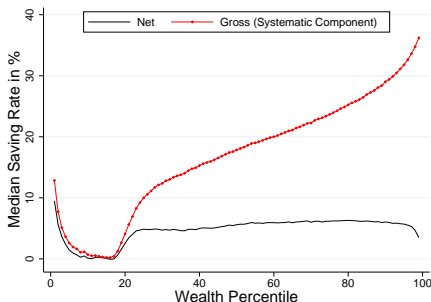


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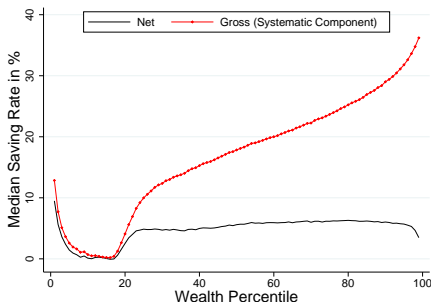


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No, rich people **don't** have higher saving rates in traditional sense. But, **yes**, they still accumulate more wealth through capital gains.

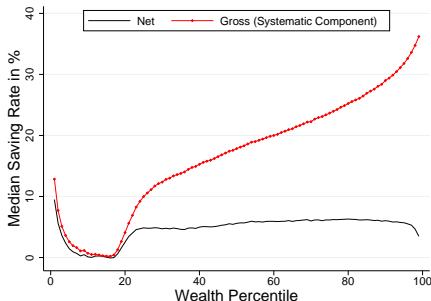


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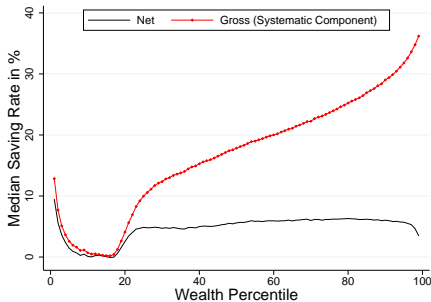
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Rich people hold assets that experience persistent capital gains, do not sell these to consume  $\Rightarrow$  “**saving by holding**”

# Our Findings: “Saving by Holding” – Back-of-Envelope

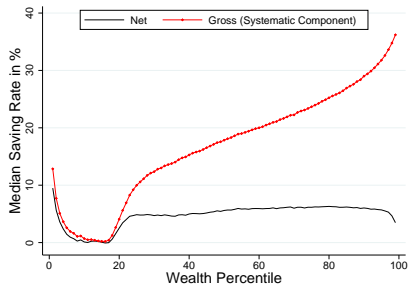


Back-of-envelope example to clarify:

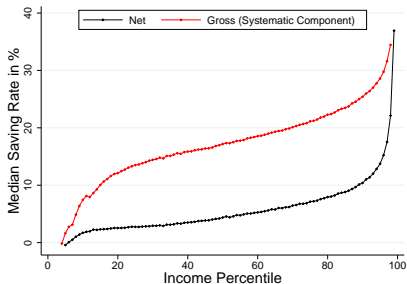
- assume net saving rate = 10%, capital gains on all assets = 2%
- **Paul:** income (excluding cap gains) = \$100,000, assets = \$0
- **Richie:** income (excluding cap gains) = \$100,000, assets = \$1,000,000
- gross savings are \$10,000 and \$10,000 + \$20,000 = \$30,000
- gross saving rates are 10% and  $\frac{30,000}{100,000+20,000} = 25\%$

To be clear: statement is about how saving rates vary with **wealth** and not **income**

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(a) Saving rates and wealth



(b) Saving rates and income

# Our Findings

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2. Macro implication: “saving by holding” explains up to 80% of increase in wealth-to-income ratio since 1995
3. Implications for theory: patterns  $\neq$  canonical models of hh saving which predict  $\approx$  flat gross saving rate

Potential explanations:

1. Demand-driven asset price changes
2. Multiple assets + portfolio adjustment frictions
3. ... (a few others – see paper)

# The Simplest Consumption-Saving Model

- Households solve:

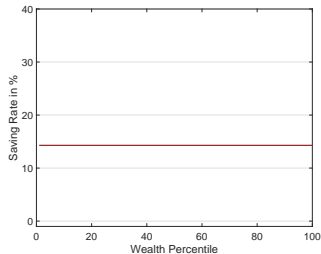
$$\max_{\{c(t)\}_{t \geq 0}} \int_0^{\infty} e^{-\rho t} \frac{c(t)^{1-\gamma}}{1-\gamma} dt \quad \text{s.t.}$$
$$\dot{a} = w + ra - c, \quad a \geq -w/r$$

- Saving policy function:

$$\dot{a} = s(a) = \frac{r - \rho}{\gamma} \left( \frac{w}{r} + a \right)$$

- Constant saving rate out of income

$$\frac{s}{y} = \frac{s}{w + ra} = \frac{r - \rho}{\gamma r}$$

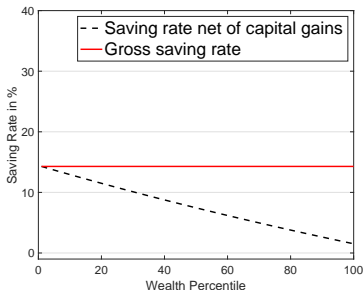


# Changing Asset Prices (in partial equilibrium)

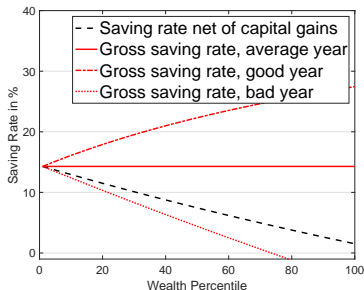
- Two sources of returns: dividends + capital gains

$$r = \theta + \frac{\dot{p}}{p}, \quad \frac{\dot{p}}{p} = \mu + \varepsilon, \quad \mu = \text{“persistent”}, \quad \varepsilon = \text{“transitory”}$$

- Mapping to previous slide: **wealth**  $a := pk$  where  $k$  = quantity
- Saving responses depend on type of capital gains:



(a) Only persistent:  $\mu > 0, \varepsilon = 0$



(b) Both:  $\mu > 0, \varepsilon \leq 0$

- net** saving rate **d**ecreasing with wealth (if  $\mu > 0$ )
- s**ystematic component of **g**ross saving rate **i**ndependent of wealth

# Extensions

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(a) Housing not just an asset, but also consumption good:

- collapses to one-asset model with flat saving rate [▶ details](#)

(b) Labor income risk and borrowing constraints:

- flat saving rate **conditional on labor income**

(c) More realistic life cycle:

- flat saving rate **conditional on age and income**

(d) Discount rate heterogeneity:

- flat saving rate **conditional on discount rate**

Overall:  $\approx$  constant saving rate **conditional on observables** (age, ...)

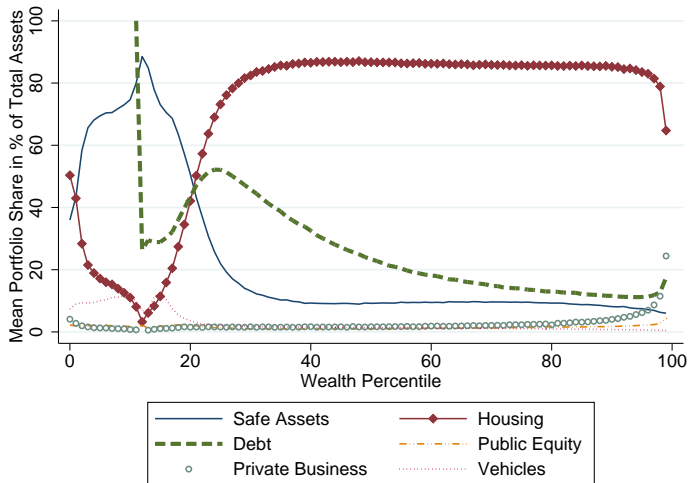
# Data

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- Norwegian population tax record data with supplements
  - Panel, 2005 to 2015 (11 years)
  - $\approx$  3.3M persons per year
- Tax records include (third-party reported):
  - asset holdings by broad asset class (e.g. deposits, housing)
  - income (labor, business, capital, and transfers)

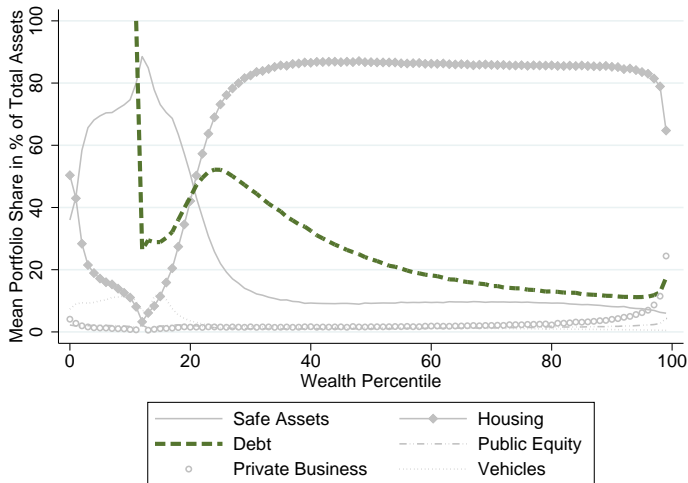


# Portfolio Shares



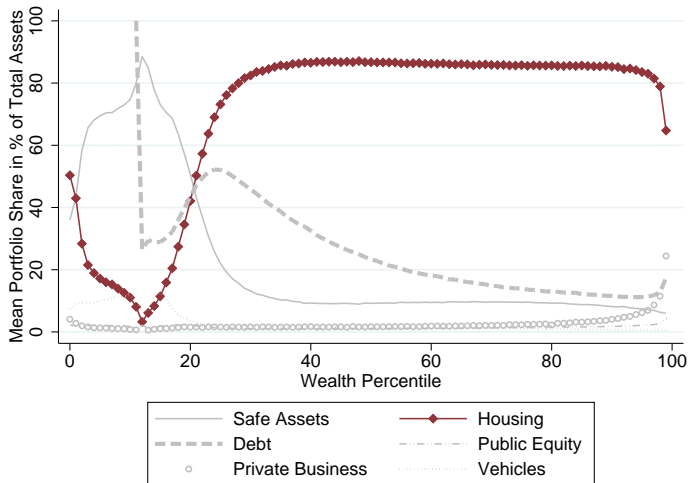
Notes: Wealth = assets – liabilities, pensions: not today (in appendix)  
12th pctile = 0 net worth

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# Net, Gross and “Recurrent” Saving

- Three ways of writing **consumption + saving = income**

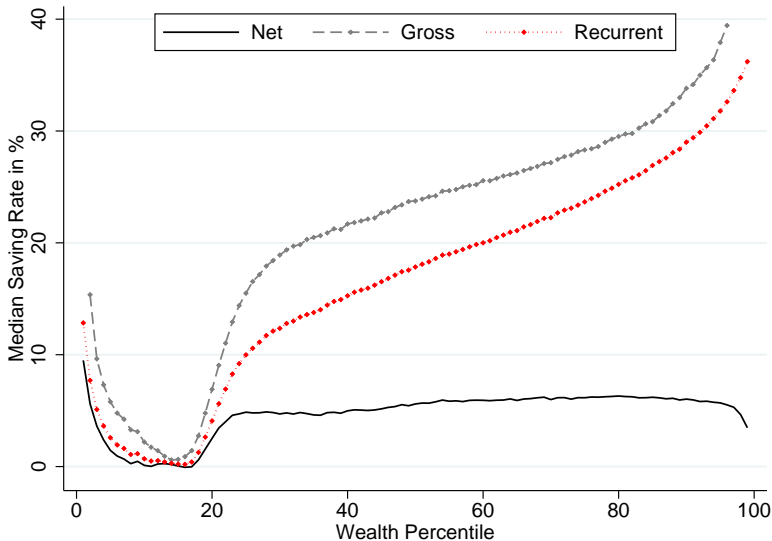
$$c + \underbrace{\dot{p}k}_{\text{net saving}} = \underbrace{w + \theta pk}_{\text{net income}} \quad (1)$$

$$c + \underbrace{\dot{p}k + \dot{p}k}_{\text{gross saving}} = \underbrace{w + (\theta + \dot{p}/p)pk}_{\text{Haig-Simons income}} \quad (2)$$

$$c + \underbrace{(\dot{k}/k + \mu)pk}_{\text{“recurrent saving”}} = \underbrace{w + (\theta + \mu)pk}_{\text{“recurrent income”}}, \quad \mu := \overline{\dot{p}/p} \quad (3)$$

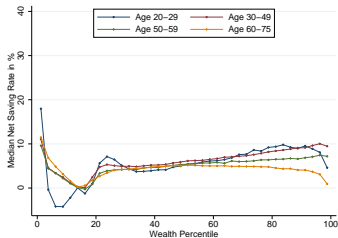
- Implementation:
  1. **Separate gross** saving into **net** saving and **capital gains** (use housing transaction data and shareholder registry)
  2. Estimate **persistent capital gains** ( $\mu$ ) (mean of realized capital gains as long as series go back)

# Median Saving Rates

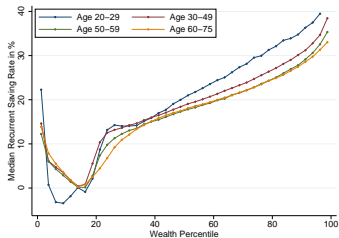


# Controlling for Age, Earnings ...

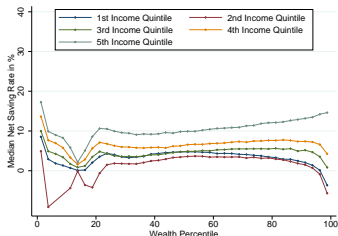
▶ within-group percentiles



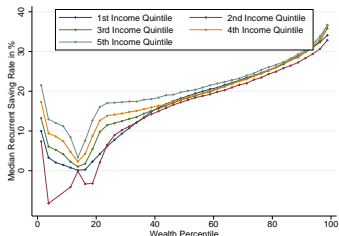
(a) Age, net saving rate



(b) Age, recurrent saving rate

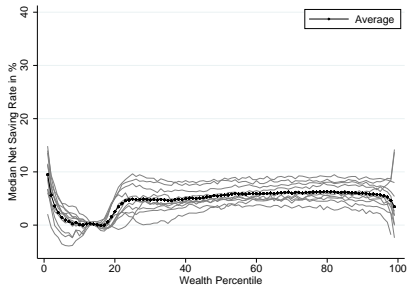


(c) Earnings, net saving rate

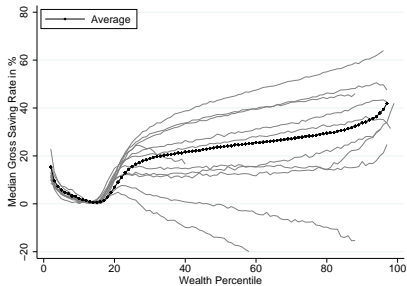


(d) Earnings, recurrent saving rate

# Saving Rates by Year

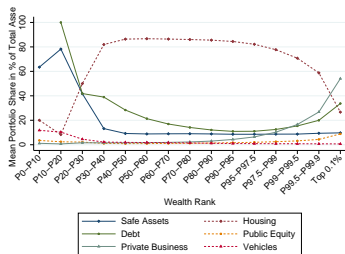


(a) Net saving rates across years

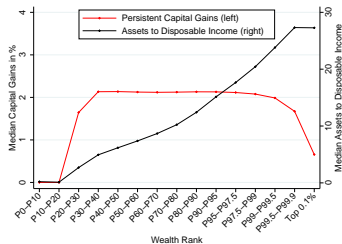


(b) Gross saving rates across years

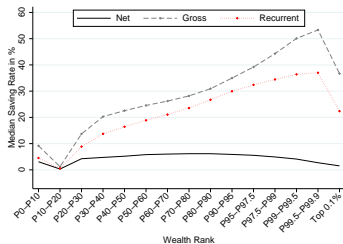
# Zooming in on right tail of wealth distribution



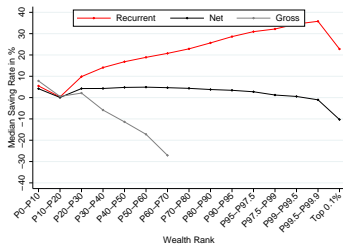
(a) Mean portfolio shares



(c) Capital gains, asset-to-income



(b) Saving rates



(d) Saving rates in 2008



# Is this exclusively a story about housing? No

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Question: what if “take out” housing?

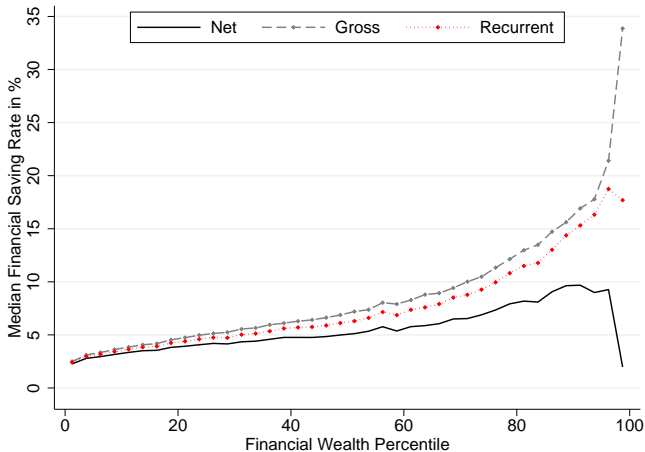
- similar patterns for net and gross saving rates?
- how do households treat capital gains on other assets?

Challenge: Norwegians hold few other assets with capital gains ▶ portfolios

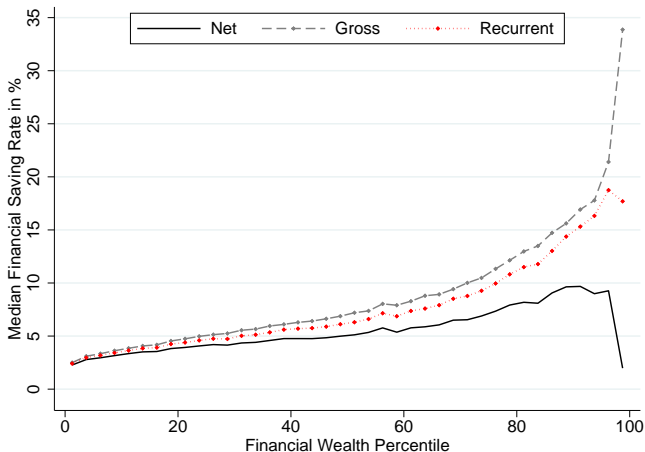
Solution: restrict to households with stocks  $> 25\%$  of financial wealth

▶ Alternative exercise: drop all home owners

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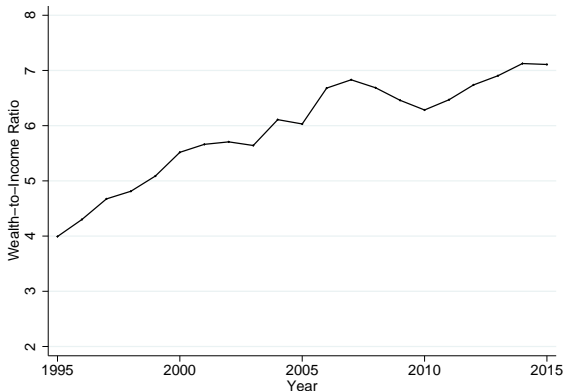
- Caveat: cannot use shareholder registry for stock fund holdings, use aggregate index  $\Rightarrow$  net saving biased if  $\text{Cov}(a_i, \dot{p}_i) \neq 0$ .
- **Not just about housing. But smaller capital gains for other assets.**

# Macro Implications

# Importance for Aggregate Wealth

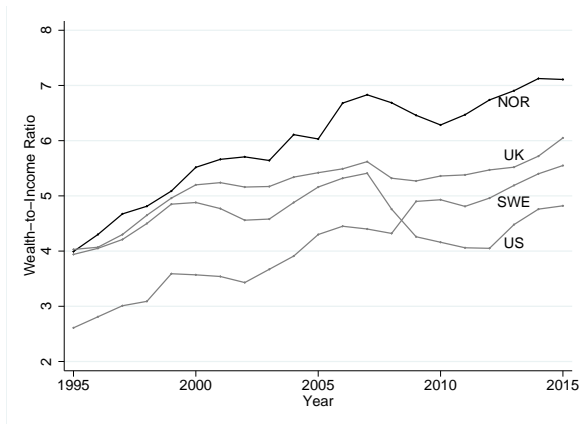
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**Counterfactuals:** what if recurrent saving rates were flat as in the models?



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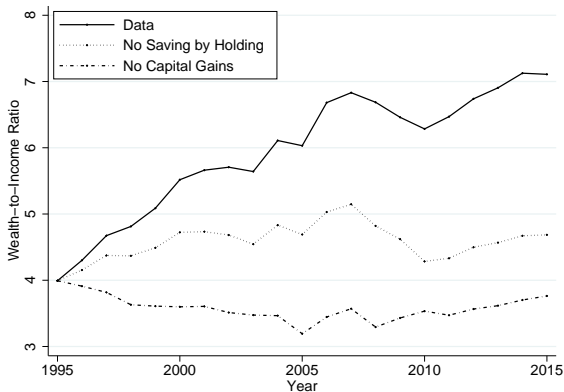
**Counterfactuals:** what if recurrent saving rates were flat as in the models?



Source: WID.world

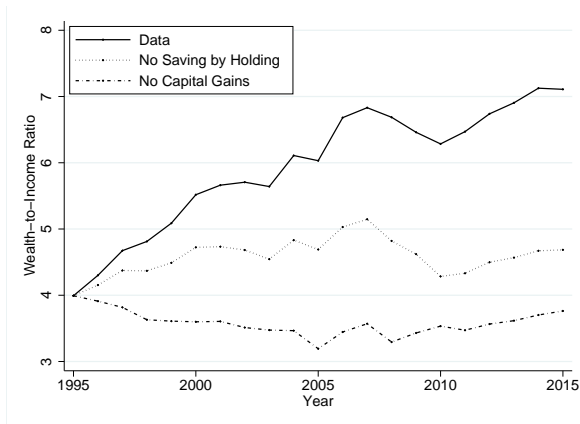
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“Saving by holding” explains up to 80% of increase in wealth-to-income



What Explains Our Results?

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Reduced form of all our explanations

$$\text{gross saving} = s_d(\text{net income}) + s_c(\text{cap gains}) \quad s_d \ll s_c \approx 100\%$$

Potential explanations

1. demand-driven asset price changes
2. multiple assets + portfolio adjustment “frictions”

# What Explains Our Results?

▶ long version

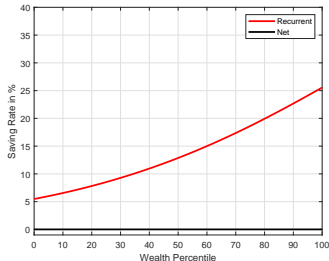
Reduced form of all our explanations

$$\text{gross saving} = s_d(\text{net income}) + s_c(\text{cap gains}) \quad s_d \ll s_c \approx 100\%$$

Potential explanations

## 1. demand-driven asset price changes

- same as benchmark model but with **time-varying discount rate**
- two sources of capital gains:
  - (a) dividend growth (“supply”)
  - (b) discount rates (“demand”)
- if only (b): consume constant dividend stream but not cap gains



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Reduced form of all our explanations

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Potential explanations

1. demand-driven asset price changes
2. multiple assets + portfolio adjustment “frictions”
  - two assets: ‘consumption asset,’ ‘investment asset’ (e.g. housing)
  - investment asset experiences capital gains but is costly to liquidate

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Reduced form of all our explanations

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Potential explanations (see paper for 3.-5.)

1. demand-driven asset price changes
2. multiple assets + portfolio adjustment “frictions”
3. non-homothetic preferences
4. misperceptions about asset price process
5. inattention and behavioral explanations

# Conclusions

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We provide evidence on how saving rates vary across wealth distribution using population tax records from Norway

1. **Capital gains are key** to relation between saving and wealth
  - rich people **don't** have higher saving rates in traditional sense (net saving rates  $\approx$  flat across wealth distribution)
  - but they still accumulate more wealth through capital gains (gross saving rates increasing with wealth)
2. **Saving by holding explains  $\approx$  80% of wealth-to-income increase**
3. Joint pattern for net & gross saving rates  $\neq$  canonical models
  - demand-driven asset price changes
  - multiple assets + portfolio adjustment frictions

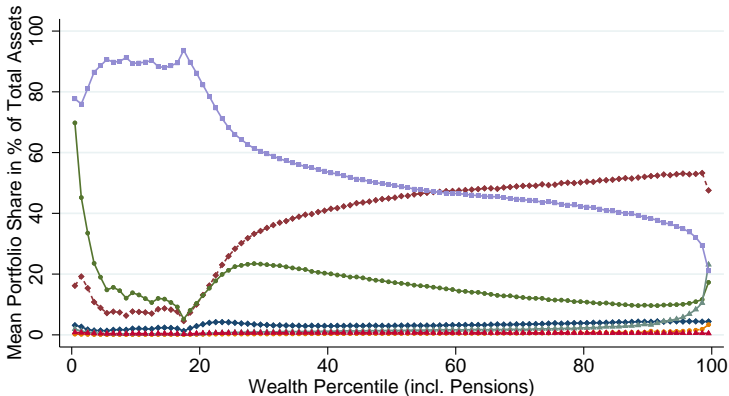
**Theories of wealth accumulation need to include changing asset prices!**



# Q&A Slides



# Portfolio Shares with Public Pensions



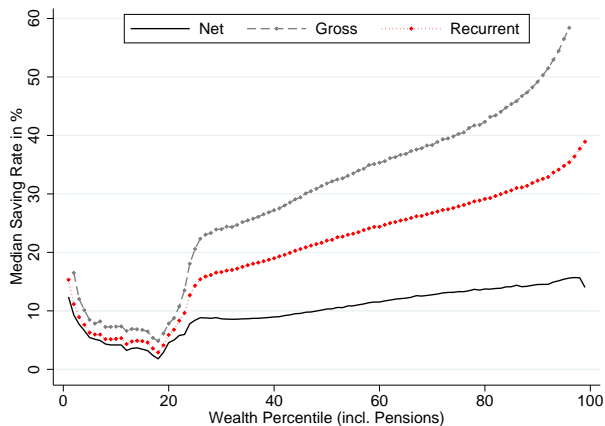
# Saving Rates with Public Pensions

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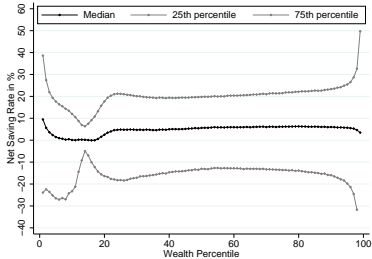


# Saving Rates with Public Pensions

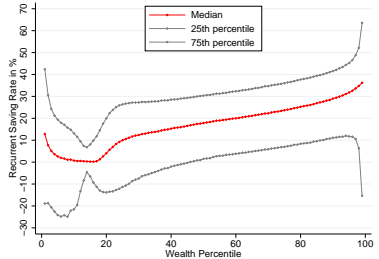
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# Dispersion in Saving Rates



(a) Net saving rate

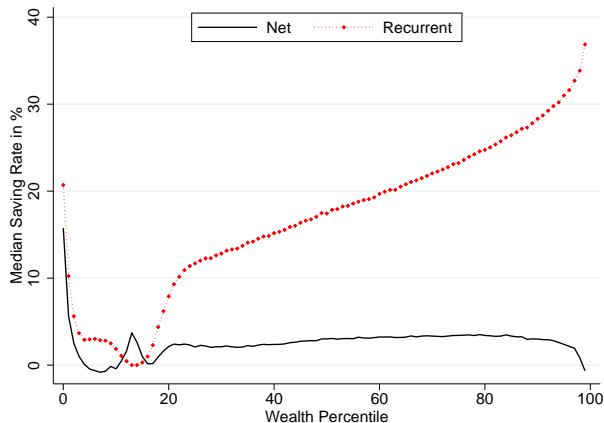


(b) Recurrent saving rate

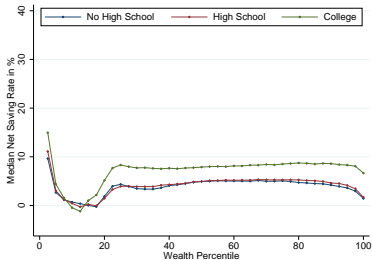
# Controlling for the usual suspects

Median regression with controls  $\mathbf{x}_{it}$  = age, earnings, education

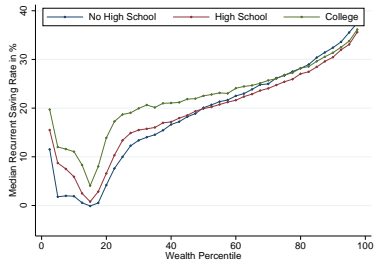
$$\frac{S_{it}}{y_{it}} = \phi_1 + \sum_{p=2}^{100} \phi_p D_{it,p} + f(\mathbf{x}_{it}) + \mu_t + \varepsilon_{it}$$



# Education Controls

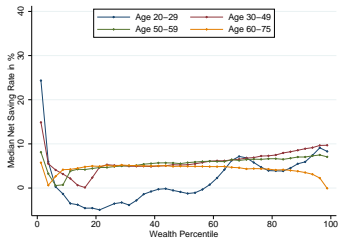


(a) Education, net saving rate

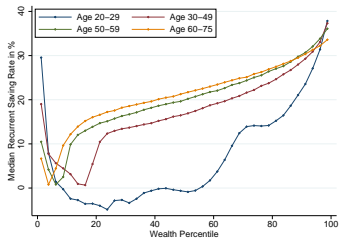


(b) Education, recurrent saving rate

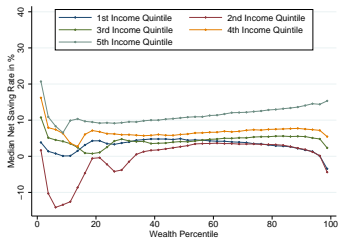
# Controlling for Age, Earnings ... [▶ back](#)



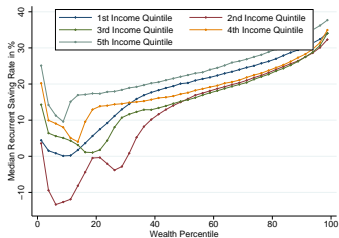
(a) Age, net saving rate



(b) Age, recurrent saving rate

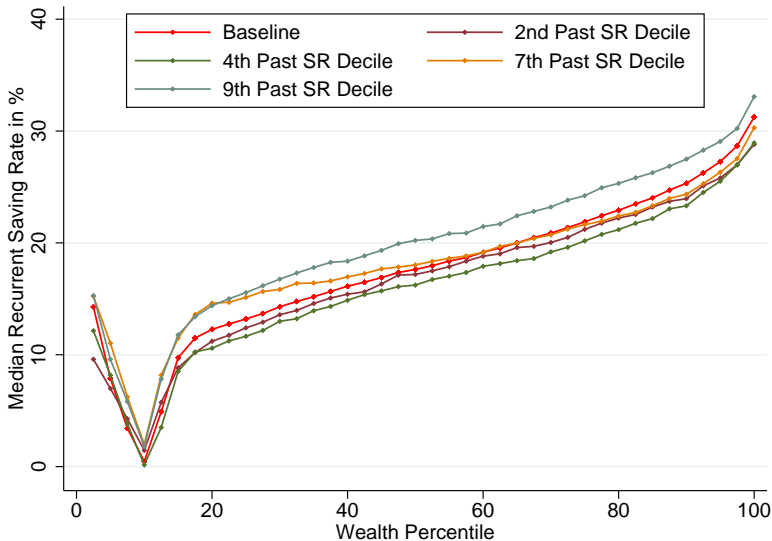


(c) Earnings, net saving rate



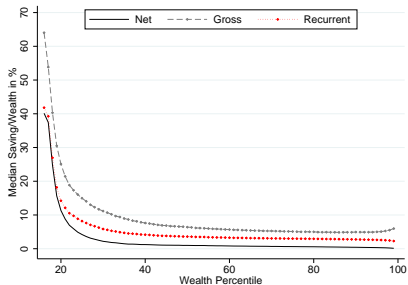
(d) Earnings, recurrent saving rate

# Simply High Saving Rate $\Rightarrow$ High Wealth?

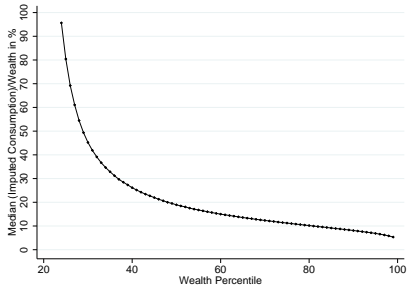




# Saving as Fraction of Wealth (Bach-Calvet-Sodini)



(a) Saving rates as fraction of wealth



(b) Imputed cons as fraction of wealth

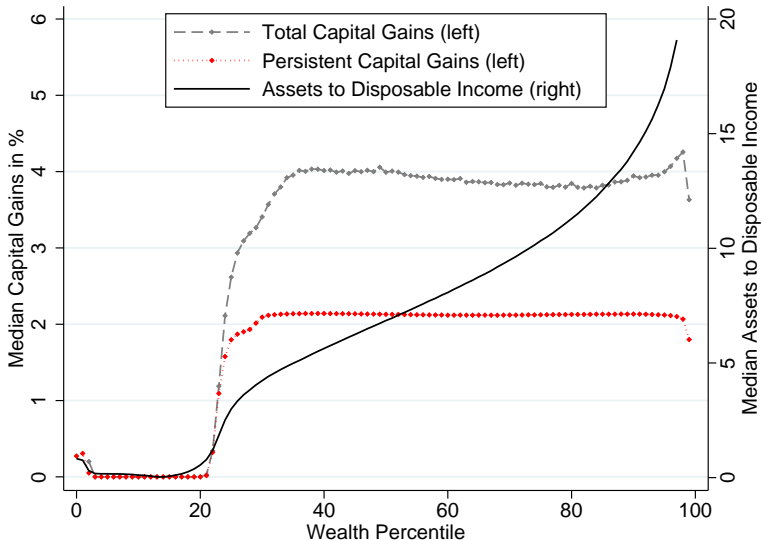
$$\dot{a} = \frac{r - \rho}{\gamma} \left( \frac{W}{r} + a \right),$$

$$\frac{\dot{a}}{a} = \frac{\rho - r}{\gamma} \left( \frac{W}{ra} + 1 \right),$$

$$c = \left( r - \frac{r - \rho}{\gamma} \right) \left( \frac{W}{r} + a \right)$$

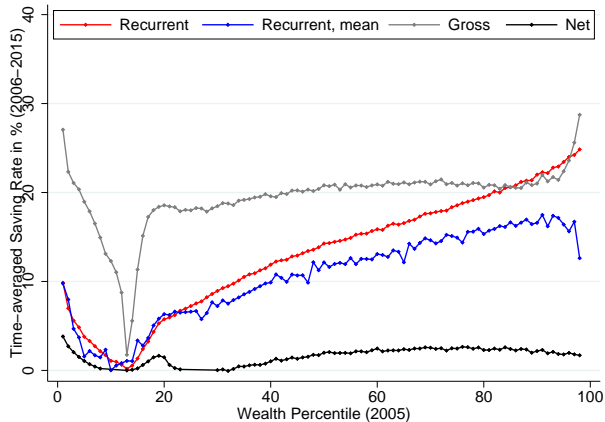
$$\frac{c}{a} = \left( r - \frac{r - \rho}{\gamma} \right) \left( \frac{W}{ra} + 1 \right)$$

# Average Capital Gains and Asset-to-Income Ratio



# Saving Rates with Time Averaging

- Concern: medians of year-to-year saving rates may get it wrong if expenditure is “lumpy”
- Our solution: **time-average** saving rates **within individuals**



# Housing (in partial equilibrium) [▶ back](#)

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Housing differs from other assets:

1. not just an asset, but also a consumption good
2. indivisibilities, transaction costs

Common intuition: (1) by itself  $\Rightarrow$  should save  $\dot{p} > 0$

- $p \uparrow$  means housing more expensive = bad for you

We show: intuition ignores **intertemporal substitution in housing**

- $\dot{p} > 0 \Rightarrow$  buy bigger house now, then **sell off over time**
- collapses to one-asset model with  $\approx$  **constant gross saving rate**

Takeaway: housing is different, but due to (2), not (1)

# 1. Demand-driven Asset Price Changes ▶ back

$$\max_{\{c_t\}_{t \geq 0}} \int_0^{\infty} e^{-\int_0^t \rho_s ds} \frac{c_t^{1-\gamma}}{1-\gamma} dt \quad \text{s.t.} \quad c_t + p_t \dot{k}_t = w + \Theta_t k_t$$

Now endogenize asset price. Viewing return  $r_t$  as primitive:

$$p_t = \int_t^{\infty} e^{-\int_t^s r_\tau d\tau} \Theta_s ds$$

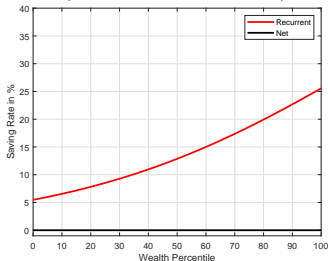
Case I: capital gains due **dividend growth** (“supply-driven”)

- equivalent to earlier model: consume out of persistent capital gains

Case II: capital gains due to **time-varying returns** (“demand-driven”)

- if  $\rho_t = r_t$ , then consume constant dividend stream but not cap gains

$$c_t = w + \Theta k_t, \quad p_t \dot{k}_t = 0$$



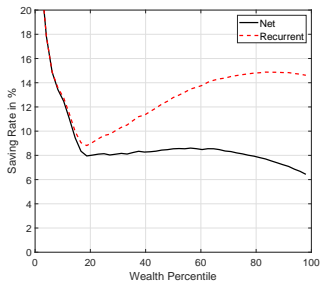
## 2. Multiple Assets + Portfolio Adjustment “Frictions”

- Two assets: consumption asset  $b$  and investment asset  $k$

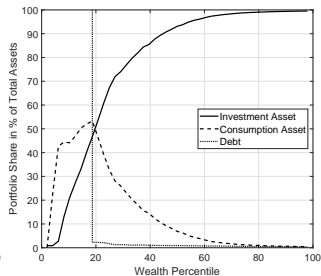
$$\dot{b} = w + r^b b + \theta p k - p d - c$$

$$\dot{k} = d, \quad \frac{\dot{p}}{p} = \mu + \varepsilon$$

- + some reason for  $d = 0$  most of the time



(a) Saving Rates



(b) Portfolio Shares