

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

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# Question and Motivation

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

Motivation:

- Growing interest in possible feedback loops between shifting income and wealth distributions and macro economy
  - Aggregate saving rate, debt level, interest rate,...
  - Transmission of monetary and fiscal policy
- Key model ingredient: saving behavior across wealth distribution
- How do saving rates actually vary with wealth 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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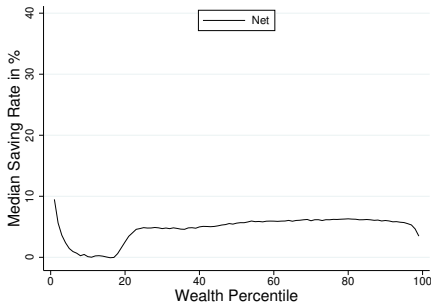
- (a) saving rates **net of capital gains** (“net” or “active saving”)
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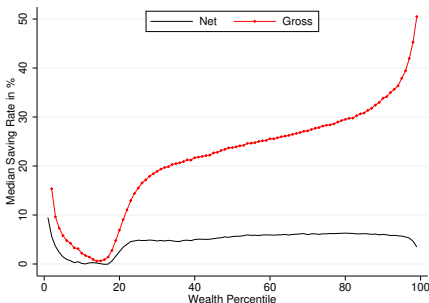


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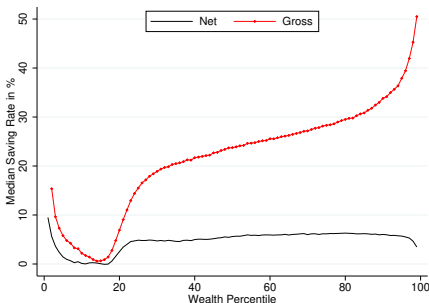


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No, rich people **don't** have higher saving rates in traditional sense. But, **yes**, they still accumulate more wealth through capital gains.

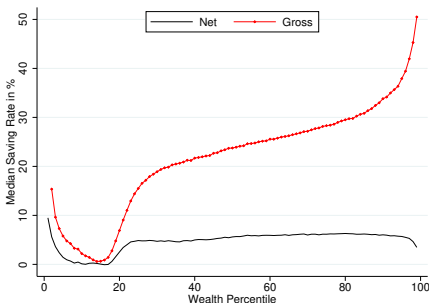


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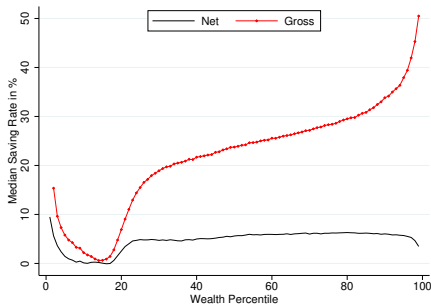
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Rich people hold assets that experience persistent capital gains, do not sell these to consume  $\Rightarrow$  “**saving by holding**”

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

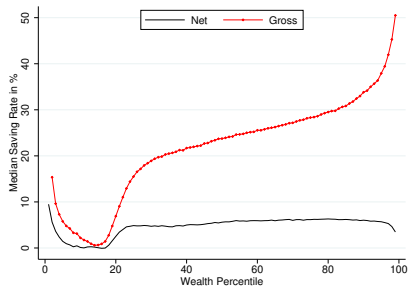


Back-of-envelope example to clarify:

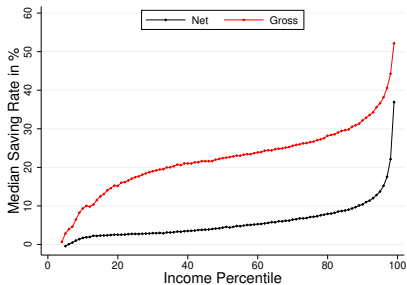
- assume net saving rate = 10%, capital gains on all assets = 2%
- **Paul:** income (excluding cap gains) = \$100,000, assets = \$0
- **Richie:** income (excluding cap gains) = \$100,000, assets = \$1,000,000
- gross savings are \$10,000 and \$10,000 + \$20,000 = \$30,000
- gross saving rates are 10% 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. A simple model (class) that fits the data with 2 key ingredients:
  1. homothetic preferences
  2. **rising asset prices** accompanied by **declining returns** (not rising cash flows)

Alternative explanations:

- **Multiple assets** + portfolio **adjustment frictions**
  - Non-homothetic preferences, behavioral,... (see paper)
3. Macro implication: **Capital gains have been important** for evolution of aggregate saving and inequality
    - ... net saving rate heterogeneity **not important**

# Related Literature

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## Empirics:

1. saving across **wealth** distribution Bach-Calvet-Sodini
2. saving across **permanent income** distribution Dynan-Skinner-Zeldes, Straub
3. **rates of return** across wealth distribution Fagereng et al, Bach-Calvet-Sodini

## Macro:

- aggregate implications of income & wealth heterogeneity  
Krusell-Smith, Krueger-Mitman-Perri, Quadrini-RiosRull, Kaplan-Violante, Auclert-Rognlie, Straub, Mian-Sufi-Straub,...
- consumption response to asset price changes Poterba, Paiella-Pistaferri  
Christelis-Georgarakos-Jappelli, Berger-Guerrieri-Lorenzoni-Vara, Kaplan-Mitman-Violante, Guren et al,...

## Inequality:

- theories of wealth inequality at point in time  
Benhabib-Bisin, DeNardi-Fella, Jones, Piketty-Zucman, ...
- wealth inequality dynamics, type/scale dependence?  
Gabaix-Lasry-Lions-Moll, Kaymak-Poschke, Hubmer-Krusell-Smith, Garbinti-GoupilleLebret-Piketty, Gomez, ...

## Other areas:

- public finance, particularly capital taxation Saez-Stantcheva, Jakobsen-Kleven-Zucman
- household finance Campbell, Calvet-Campbell-Sodini

# Plan

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1. Theoretical benchmark
2. Data
3. Results
4. Macroeconomic implications

# Theory

# Saving Decision with Constant Asset Prices

- Households solve:

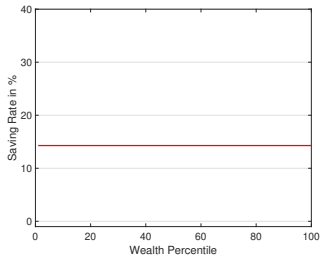
$$\max_{\{c_t\}_{t \geq 0}} \int_0^{\infty} e^{-\rho t} \frac{c_t^{1-\gamma}}{1-\gamma} dt \quad \text{s.t.}$$
$$\dot{a}_t = w + ra_t - c_t, \quad a_t \geq -w/r$$

- Saving policy function:

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

- Constant saving rate** out of income

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





# Saving Decision with Changing Asset Prices

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- Asset  $k_t$  with **time-varying price**  $p_t$  and dividend  $D_t$

$$c_t + p_t \dot{k}_t = w + D_t k_t$$

- Two sources of returns: dividends ( $D$ ) + capital gains ( $\dot{p}$ )

$$r_t := \frac{D_t + \dot{p}_t}{p_t}$$

- Two sources of price changes: dividends ( $D$ ) + return ( $r$ )

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

- Mapping to previous slide: **wealth**  $a := pk$  where  $k$  = quantity
  - Household problem as before, only time-varying  $r_t$

# Saving Decision with Changing Asset Prices

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Useful distinction when  $\dot{p}_t \neq 0$ : net vs gross saving

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

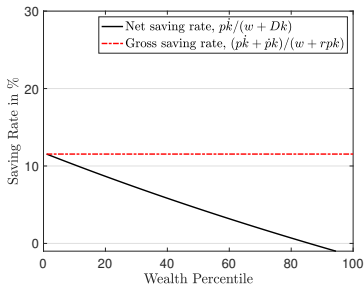
$$\begin{aligned} c + \overbrace{p\dot{k}}^{\text{net saving}} &= \overbrace{w + Dk}^{\text{disposable income}}, \\ c + \underbrace{p\dot{k} + \dot{p}k}_{\text{gross saving}} &= \underbrace{w + (D + \dot{p})k}_{\text{Haig-Simons income}}. \end{aligned}$$

- Net saving rate:  $\frac{p\dot{k}}{w + Dk}$
- Gross saving rate:  $\frac{p\dot{k} + \dot{p}k}{w + (D + \dot{p})k}$

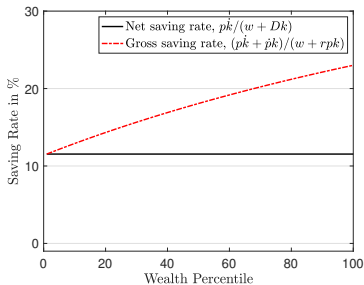
# Saving Decision with Changing Asset Prices

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

- Saving response to rising asset price depends on whether
  - $\dot{p}$  associated with growing  $D$  (and  $r$  constant)
- or
- $\dot{p}$  associated with declining  $r$  (and  $D$  constant)

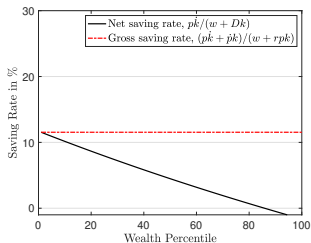


(a) Growing  $D$  (constant  $r$ )

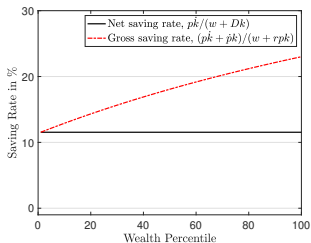


(b) Declining  $r$  (constant  $D$ )

# Saving Decision with Changing Asset Prices



(a) Growing  $D$  (constant  $r$ ):



(b) Declining  $r$  (constant  $D$ ):

Intuition: sell off assets to enjoy additional future  $k$ -income

- ... but only if there actually is additional income
  - only if  $\dot{p}_t$  comes with extra cash flows, there are income effects
- declining  $r$  might trigger substitution effects, but these are unrelated to wealth

Income effects from  $D$  vary with wealth, substitution effects from  $r$  don't

# Extensions

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- (a) Housing not just an asset, but also consumption good:
    - flat net saving rate if rising house prices associated with declining returns (implied rent = constant)
  - (b) Asset price risk
    - flat net saving rate if *persistent*  $p$  changes due to declining  $r$
  - (c) Income risk and borrowing constraints:
    - elevated saving rates close to borrowing constraints
    - approximately flat saving rate **conditional on labor income**
  - (d) Realistic life cycle earnings profile:
    - flat saving rate **conditional on age and income**
  - (e) Discount rate or return heterogeneity:
    - flat saving rate **conditional on individual inclination to save**
- $\approx$  flat net saving rate if price growth comes with declining returns**

# Data

# 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)

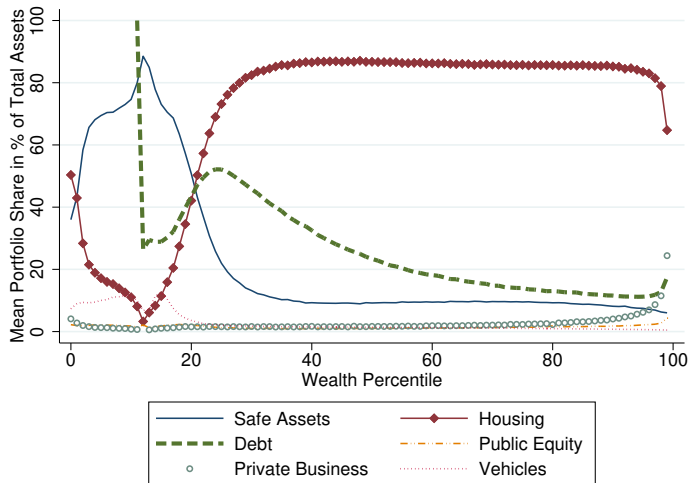
# Definition of Wealth and Asset Categories

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- Wealth = deposits + stocks + stock funds + informal loans + bonds + housing + privately-held firms + vehicles/boats – liabilities
- For most categories: tax value = market value
- Privately-held firms: individuals get share of firm balance sheet
- Housing: use transaction data and house characteristics to estimate market values
- Pensions: not today (in appendix)
  - Baseline: excluded from wealth and saving
  - Extension: estimated from earnings history and public pension code

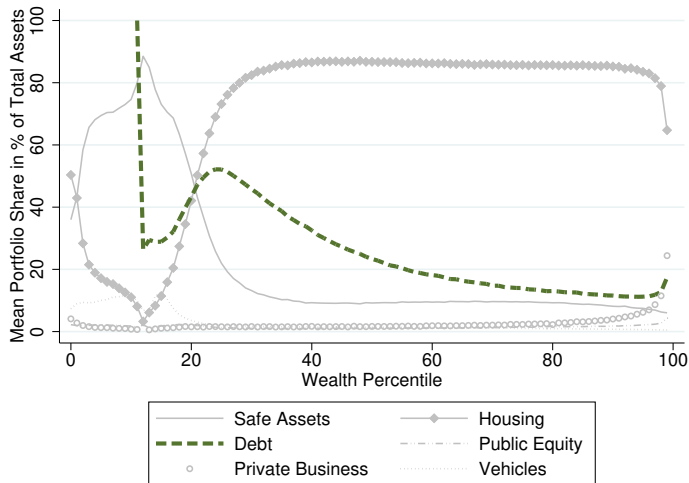


# Portfolio Shares



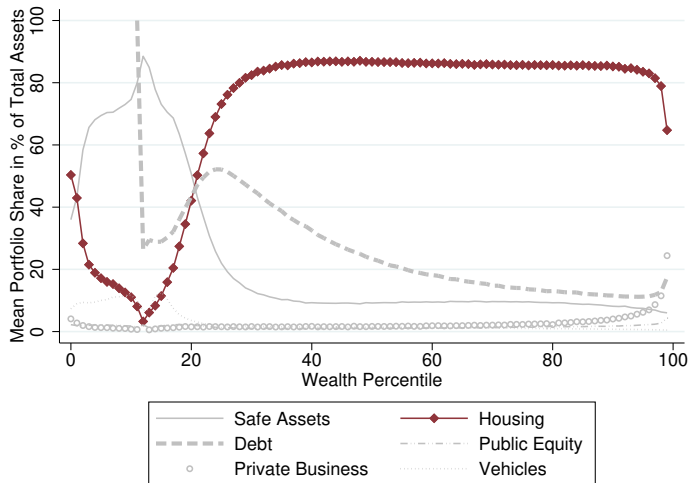
Notes: Wealth = assets – liabilities, pensions: not today (in appendix)  
12th pctile = 0 net worth

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# Net and Gross Saving

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

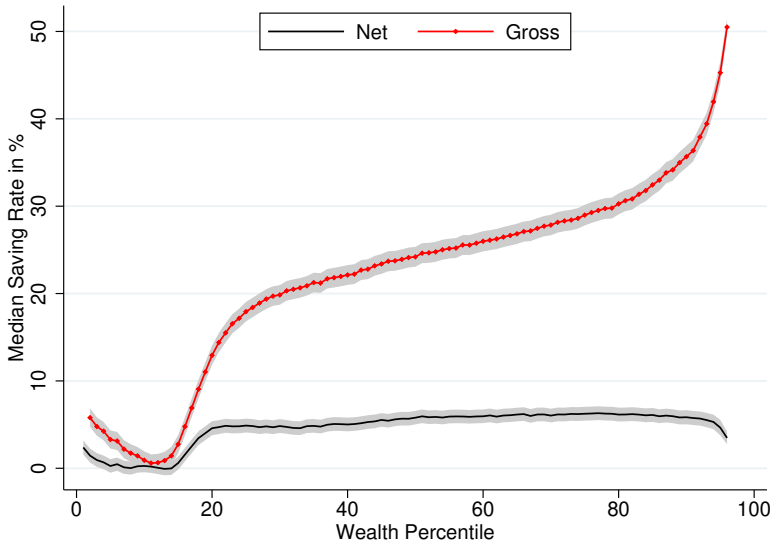
$$c + \overbrace{pk}^{\text{net saving}} = \overbrace{w + Dk}^{\text{disposable income}}, \quad (1)$$

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

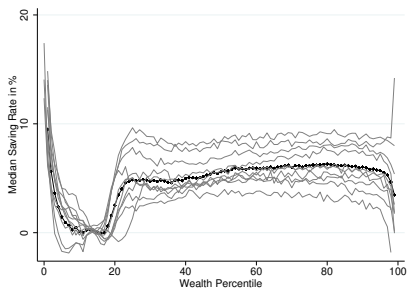
- Neither net nor gross saving rates are *directly* observable
  - Separate **gross saving** into **net saving** and **capital gains** (use housing transaction data and shareholder registry)
  - Construct Haig-Simons income using estimated capital gains

# Results

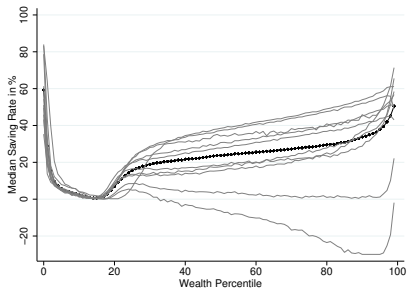
# Median Saving Rates



# Saving Rates by Year



(a) Net saving rates across years



(b) Gross saving rates across years

## Saving by holding

- Slope of net saving rate: flat every year (only level shifts)
- Slope of gross saving rate: varies with capital gains
  - Upward when  $\dot{p}_t > 0$
  - Downward when  $\dot{p}_t < 0$  (2008/09)

# Controlling for the usual suspects from theory

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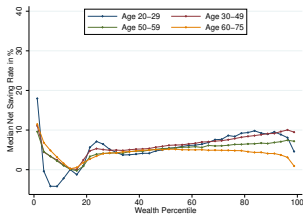
How important is it that saving & wealth are correlated with:

1. **Age:**  
“old people have high saving rates & high wealth”
2. **Current income:**  
“high-income people have high saving rates & high wealth”
3. **Education:**  
“educated people have high saving rates & high wealth”
4. **Past saving rates:**  
“savers have high current saving rates & are rich”

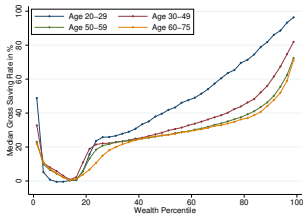


# 3 approaches to deal with the usual suspects

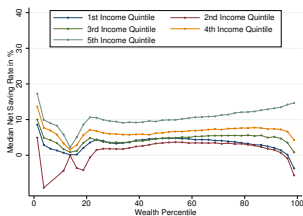
## 1. Saving rates within groups



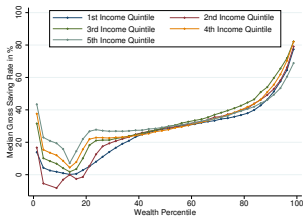
(a) Age, net saving rate



(b) Age, gross saving rate



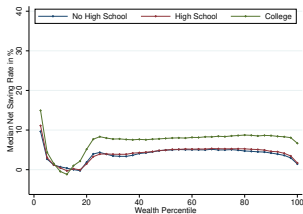
(c) Earnings, net saving rate



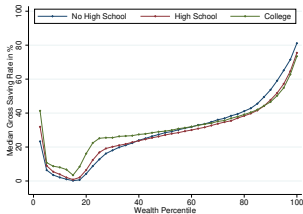
(d) Earnings, gross saving rate

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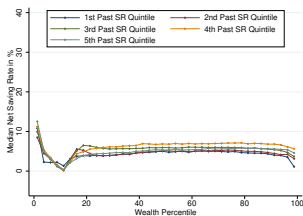
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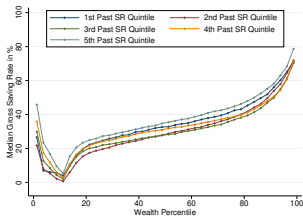
(a) Education, net saving rate



(b) Education, gross s-rate



(c) Past saving, net saving rate

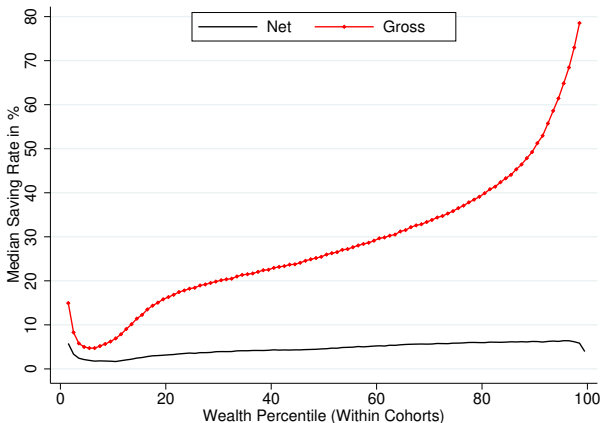


(d) Past saving, gross s-rate

### 3 approaches to deal with the usual suspects

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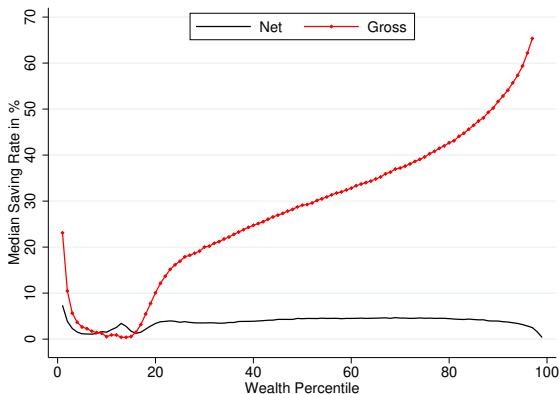
1. Saving rates within groups
2. Saving rates across *within-cohort* wealth percentiles



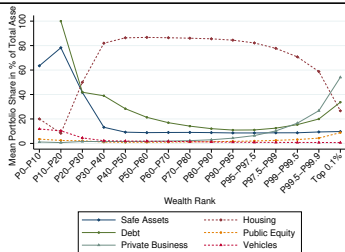
### 3 approaches to deal with the usual suspects

1. Saving rates within groups
2. Median regression with controls  $\mathbf{x}_{it}$  = age, earnings, education

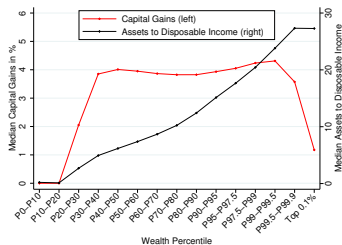
$$\frac{S_{it}}{y_{it}} = \sum_{p=1}^{100} \phi_p D_{it,p} + f(\mathbf{x}_{it}) + \mu_t + \varepsilon_{it}$$



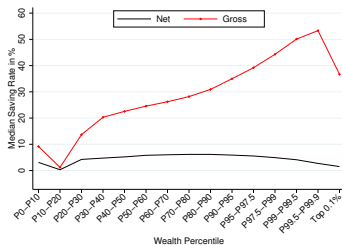
# Zooming in on right tail of wealth distribution



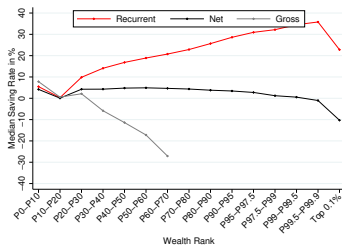
(a) Mean portfolio shares



(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 we “take out” housing?

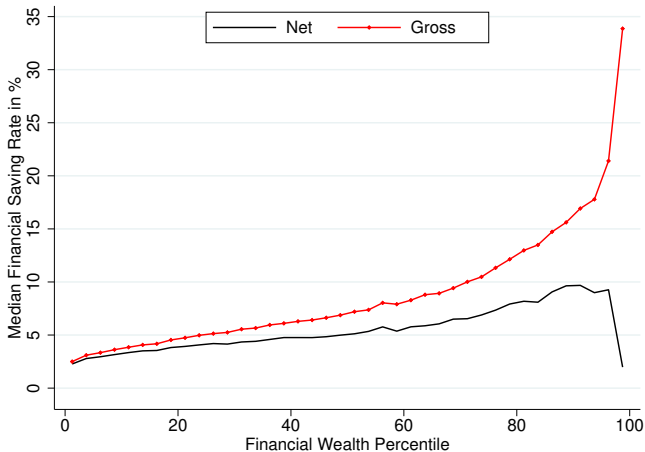
- similar patterns for net and gross saving rates?
- how do households treat capital gains on other assets?

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

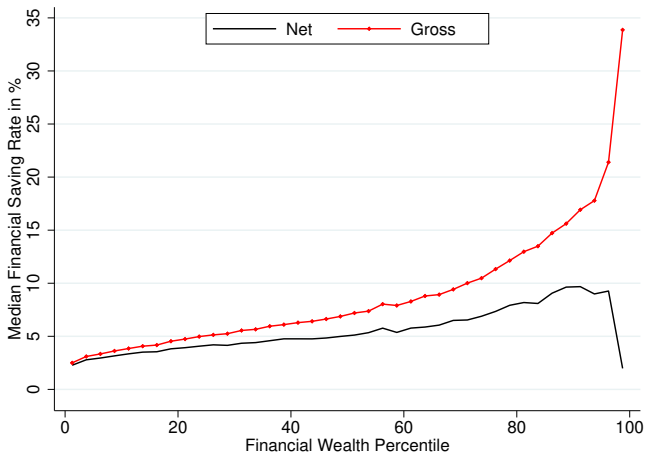
Solution: restrict to households with stocks  $> 25\%$  of financial wealth

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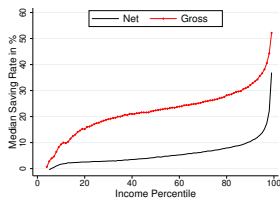
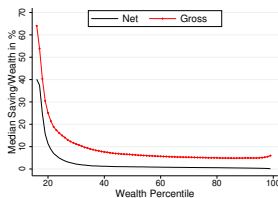
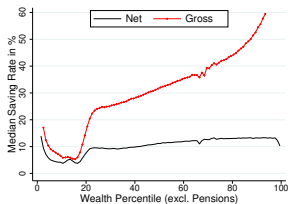


- Caveat: cannot use shareholder registry for stock fund holdings, use aggregate index  $\Rightarrow$  net saving biased if  $\text{Cov}(a_i, \dot{p}_i) \neq 0$ .
- Not just about housing. But smaller capital gains for other assets.



# Additional exercises

- Impute pensions and include in household wealth
- Saving as share of wealth instead of income,
- Saving rates across income distribution



(a) Including public pensions

(b) as fraction of wealth

(c) Saving rates by income

# Saving Rates by Capital Gains

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To what extent do households “save by holding”?

- In theory, if asset price changes come with changing returns:

$$\frac{p_t \dot{k}_t}{w + r_t p_t k_t} = \phi_t - \phi_t \frac{\dot{p}_t k_t}{w + r_t p_t k_t}$$
$$\frac{p_t \dot{k}_t + \dot{p}_t k_t}{w + r_t p_t k_t} = \phi_t + (1 - \phi_t) \frac{\dot{p}_t k_t}{w + r_t p_t k_t}$$

... where  $\phi$  is the net saving rate (expected to be ca 0.05 – 0.1)

- Predictions for net and gross saving relative to gross income!

# Saving Rates by Capital Gains

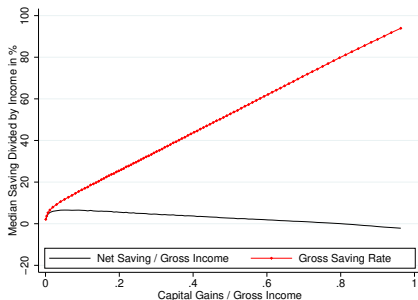
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... where  $\phi$  is the net saving rate (expected to be ca 0.05 – 0.1)

Dependent variable:  $\frac{\text{Net saving}}{\text{Gross income}}$

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Constant	0.070	
	(0.00008)	
$\frac{\text{Capital gains}}{\text{Gross income}}$	-0.088	-0.090
	(0.00013)	(0.00013)

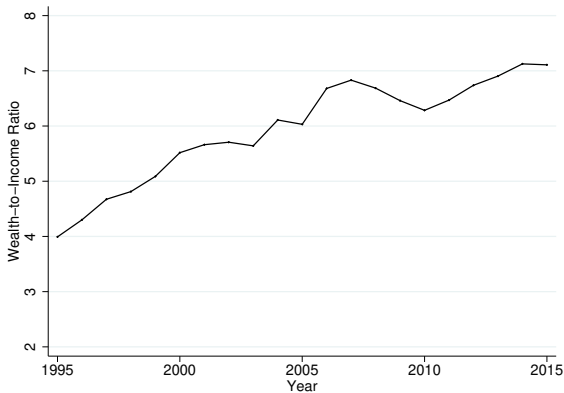
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Controls X

# Macro Implications

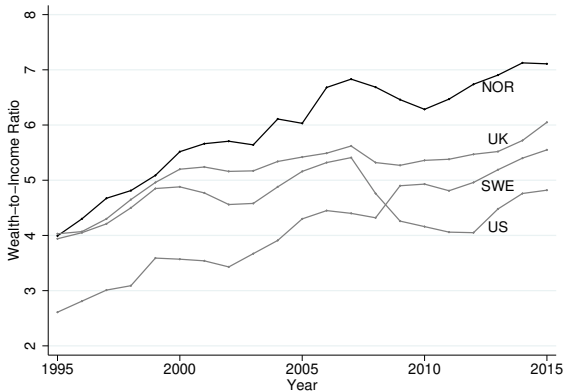
# Importance for Evolution of Aggregate Wealth

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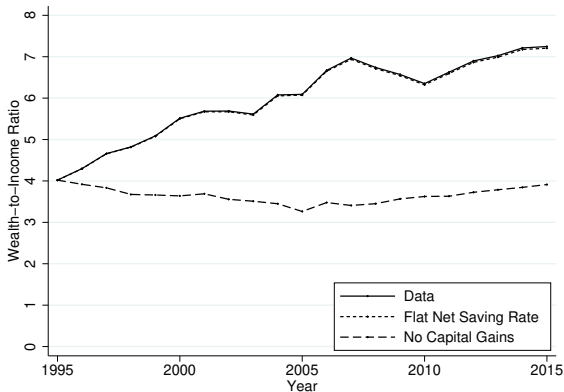


Source: WID.world

# Importance for Evolution of Aggregate Wealth

## Counterfactuals:

- what if net saving rates were homogenous?
- what if there were no capital gains?

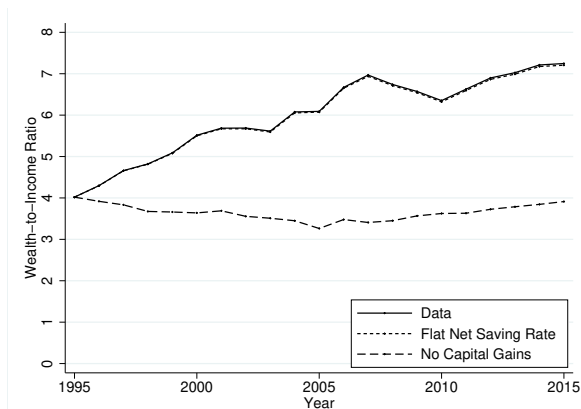




# Importance for Evolution of Aggregate Wealth

## Counterfactuals:

- what if net saving rates were homogenous?
- what if there were no capital gains?

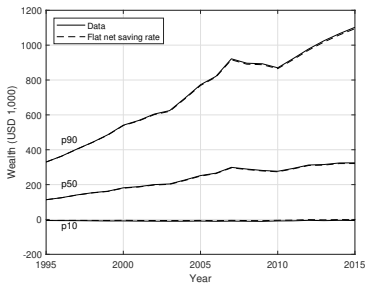


Saving-by-holding matters, heterogeneity in net saving rates does not

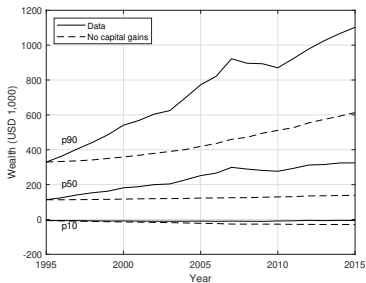
# Importance for Evolution of the Wealth Distribution

## Counterfactuals:

- what if net saving rates were homogenous?
- what if there were no capital gains?



(a) Flat net saving rate



(b) No capital gains

Saving-by-holding matters, heterogeneity in net saving rates does not

# Importance of Capital Gains for the Wealth Distribution

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	<b>1995 Data</b>	<b>2015 No capital gains</b>	<b>2015 Data</b>
<b>Wealth Ratios</b>			
P99/P90	2.08	3.33	2.24
P90/P50	2.91	4.42	3.42
P50/P25	3.93	11.26	4.08
<b>Wealth Differences (\$1,000)</b>			
P99 - P90	357	1,427	1,337
P90 - P50	216	474	765
P50 - P25	84	127	239

# Conclusions

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We provide evidence on how saving rates vary across the 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 rates pattern consistent with simple model where
  - preferences are homothetic
  - asset prices rise while returns fall (not dividends increase)
3. **Saving by holding on to capital gains important for aggregate saving and wealth distribution**