

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

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Question and Motivation

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

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

Our Findings

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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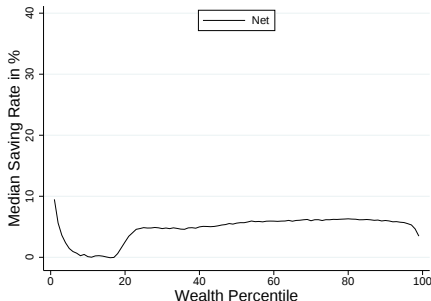
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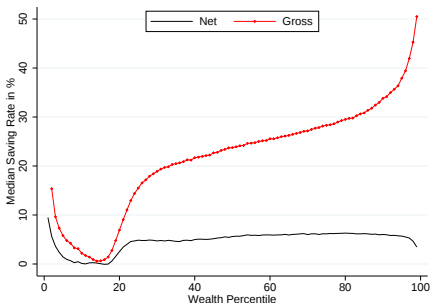


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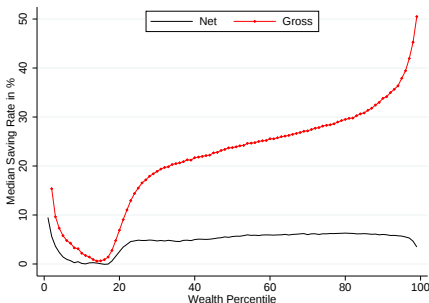


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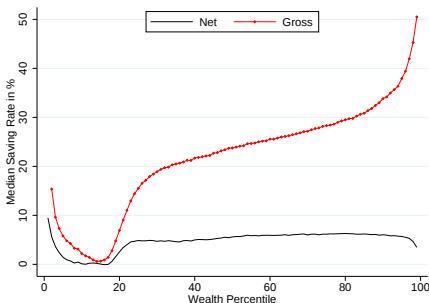
No, rich people **don't** have higher saving rates in traditional sense. But, **yes**, they still accumulate more wealth through capital gains.

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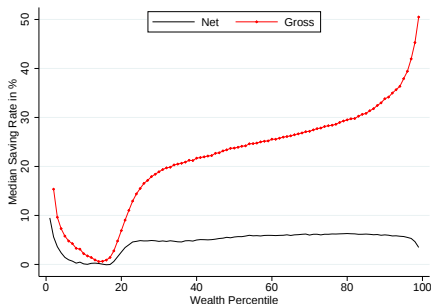
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Rich people hold assets that experience persistent capital gains, do not sell these to consume $\Rightarrow$ “**saving by holding**”

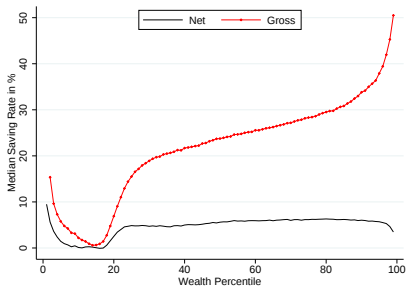
Our Findings: “Saving by Holding” – Back-of-Envelope



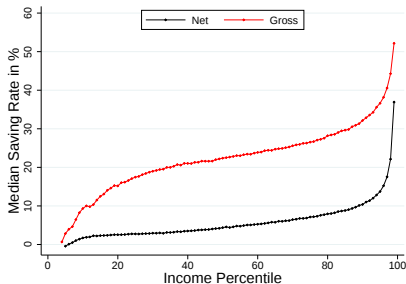
Back-of-envelope example to clarify:

- 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**, not **income**



(a) Saving rates and wealth



(b) Saving rates and income

Our Findings

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

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

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

Theory

Saving Decision with Constant Asset Prices

- Households solve:

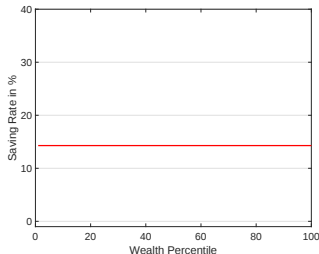
$$\begin{aligned} \max_{\{c_t\}_{t \geq 0}} \int_0^{\infty} e^{-\rho t} \frac{c_t^{1-\gamma}}{1-\gamma} dt \quad \text{s.t.} \\ \dot{a}_t = w + r a_t - c_t, \quad a_t \geq -w/r \end{aligned}$$

- Saving policy function:

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

- Constant saving rate out of income

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



Saving Decision with Changing Asset Prices

- 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** $a := p k$ where k = quantity
 - Household problem as before, only time-varying r_t

Saving Decision with Changing Asset Prices

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

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

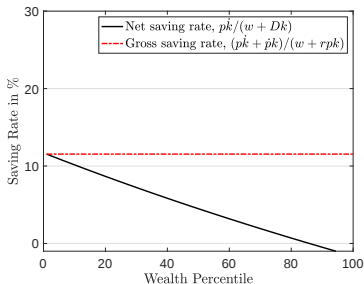
$$\begin{array}{ccc} \text{net saving} & & \text{disposable income} \\ c + \overbrace{p\dot{k}} & = & \overbrace{w + Dk} \quad , \\ c + \underbrace{p\dot{k} + \dot{p}k}_{\text{gross saving}} & = & \underbrace{w + (D + \dot{p})k}_{\text{Haig-Simons income}} . \end{array}$$

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

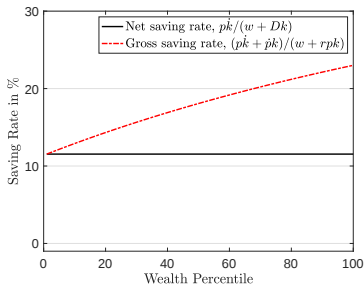
Saving Decision with Changing Asset Prices

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

- 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)

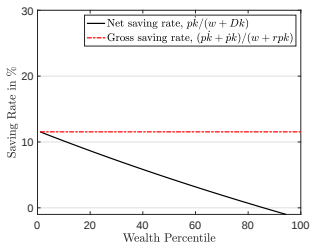


(a) Growing D (constant r)

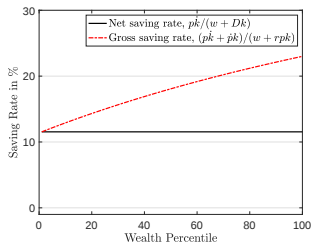


(b) Declining r (constant D)

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

(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

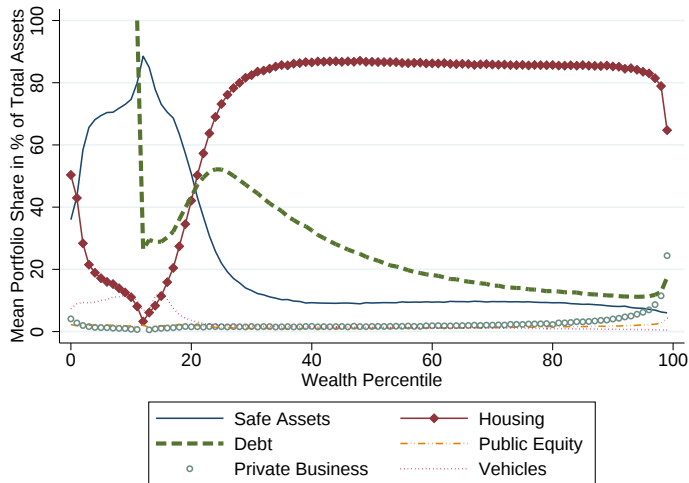
Data

- Norwegian population tax record data with supplements
 - Panel, 2005 to 2015 (11 years)
 - $\approx 3.3\text{M}$ 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

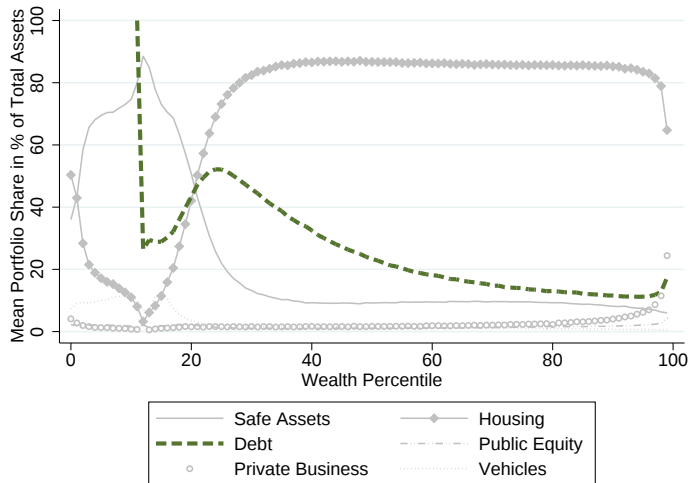
- Wealth = deposits + stocks + stock funds + informal loans + bonds + housing + privately-held firms + vehicles/boats – liabilities
- For most categories: tax value = market value
- Privately-held firms: individuals get share of firm balance sheet
- Housing: use transaction data and house characteristics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

Portfolio Shares



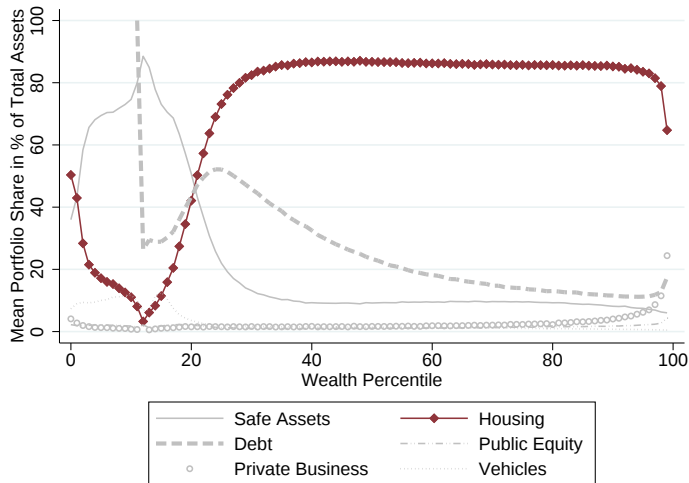
Notes: Wealth = assets – liabilities, pensions: not today (in appendix)
12th pctile = 0 net worth

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Net and Gross Saving

- Two ways of writing $\text{consumption} + \text{saving} = \text{income}$

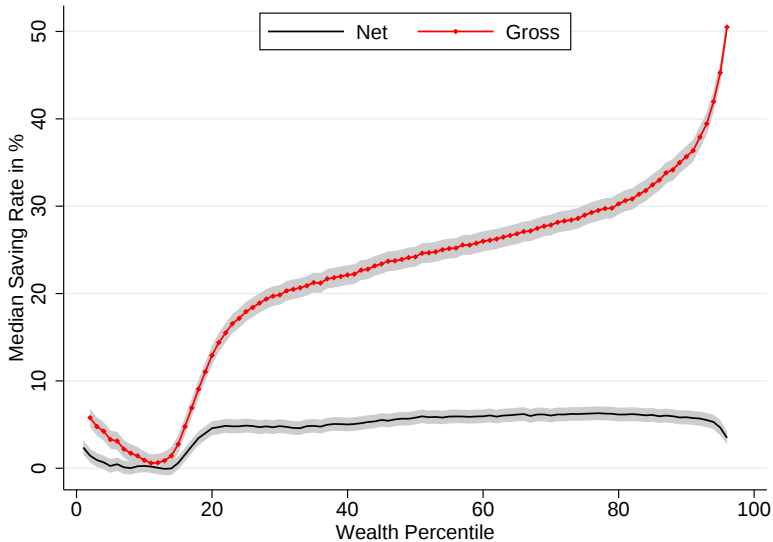
$$c + \overbrace{pk}^{\text{net saving}} = \overbrace{w + Dk}^{\text{disposable income}}, \quad (1)$$

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

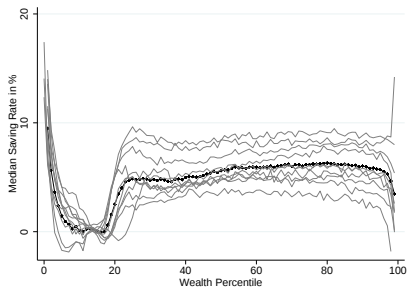
- Neither net nor gross saving rates are directly observable
 - Separate gross saving into net saving and capital gains (use housing transaction data and shareholder registry)
 - Construct Haig-Simons income using estimated capital gains

Results

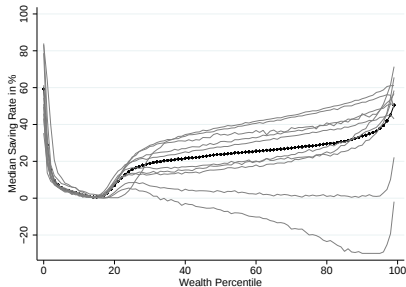
Median Saving Rates



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)

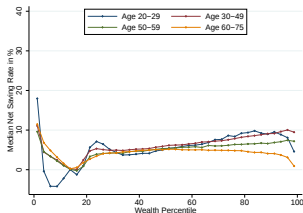
Controlling for the usual suspects from theory

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

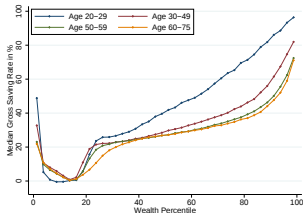
1. **Age:**
“old people have high saving rates & high wealth”
2. **Current income:**
“high-income people have high saving rates & high wealth”
3. **Education:**
“educated people have high saving rates & high wealth”
4. **Past saving rates:**
“savers have high current saving rates & are rich”

3 approaches to deal with the usual suspects

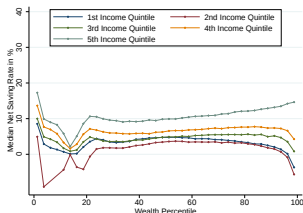
1. Saving rates within groups



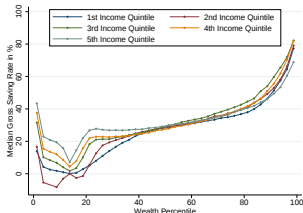
(a) Age, net saving rate



(b) Age, gross saving rate



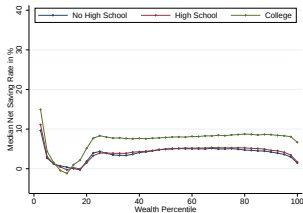
(c) Earnings, net saving rate



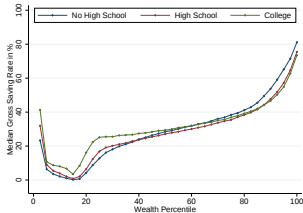
(d) Earnings, gross saving rate

3 approaches to deal with the usual suspects

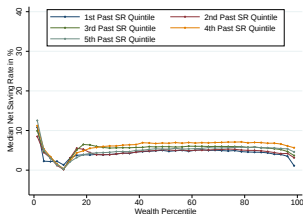
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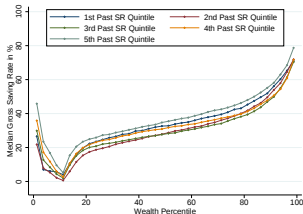
(a) Education, net saving rate



(b) Education, gross s-rate



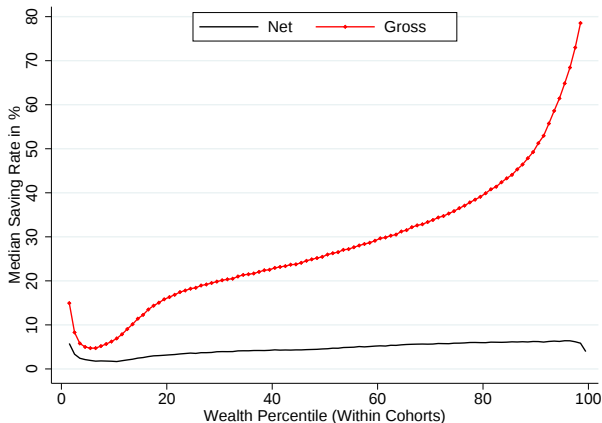
(c) Past saving, net saving rate



(d) Past saving, gross s-rate

3 approaches to deal with the usual suspects

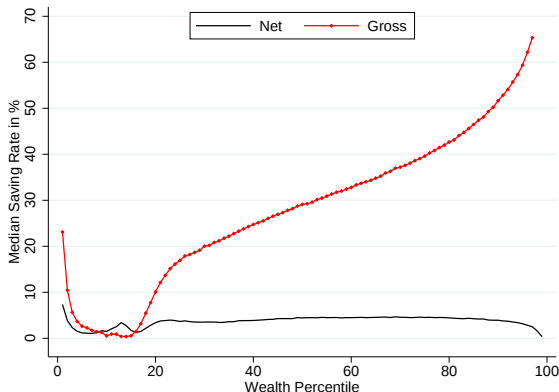
1. Saving rates within groups
2. Saving rates across within-cohort wealth percentiles



3 approaches to deal with the usual suspects

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

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



Is this exclusively a story about housing? No

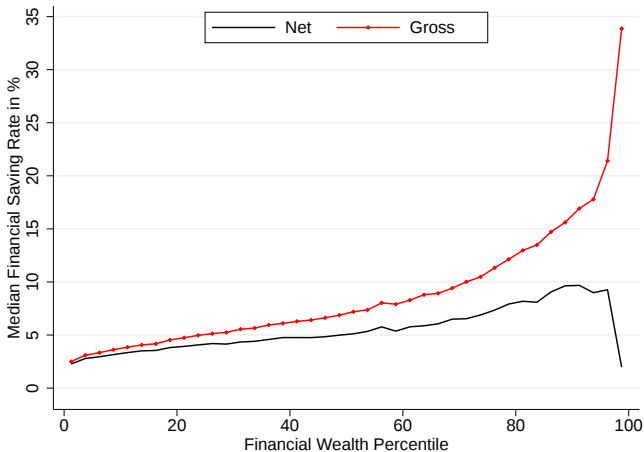
Question: what if we “take out” housing?

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

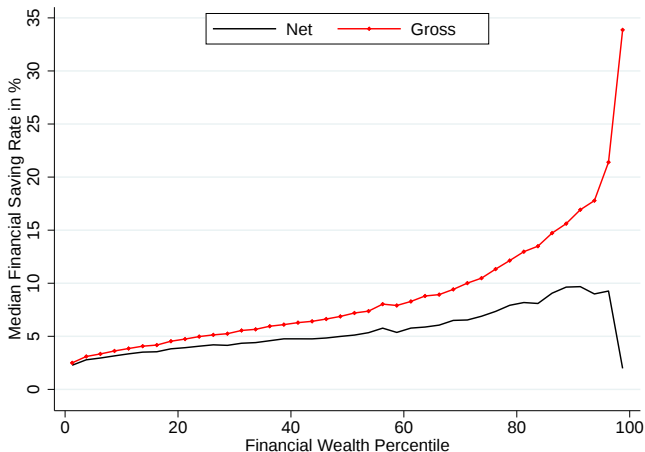
Challenge: Norwegians hold few other assets with capital gains ▶ portfolios

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

Is this exclusively a story about housing? No



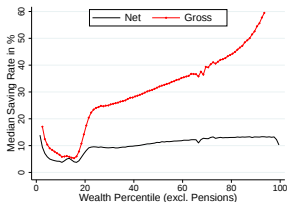
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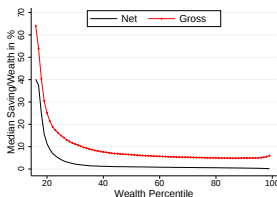
- Caveat: cannot use shareholder registry for stock fund holdings, use aggregate index $\Rightarrow$ net saving biased if $\text{Cov}(a_i, \dot{p}_i) \neq 0$.
- Not just about housing. But smaller capital gains for other assets.

Additional exercises

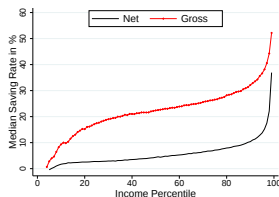
- Impute pensions and include in household wealth
- Saving as share of wealth instead of income,
- Saving rates across income distribution



(a) Including public pensions



(b) as fraction of wealth



(c) Saving rates by income

Saving Rates by Capital Gains

To what extent do households “save by holding”?

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

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

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

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

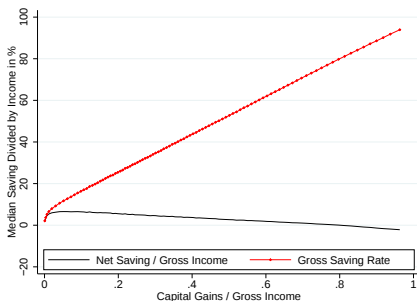
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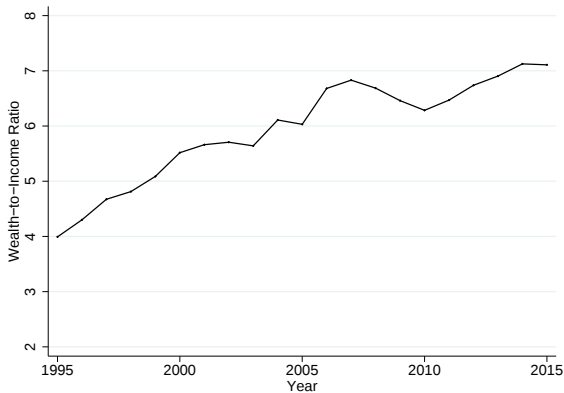
Dependent variable: $\frac{\text{Net saving}}{\text{Gross income}}$

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

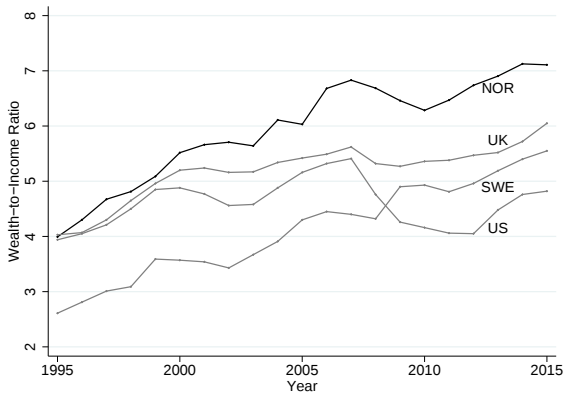
Controls		X
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Macro Implications

Importance for Evolution of Aggregate Wealth



Importance for Evolution of Aggregate Wealth

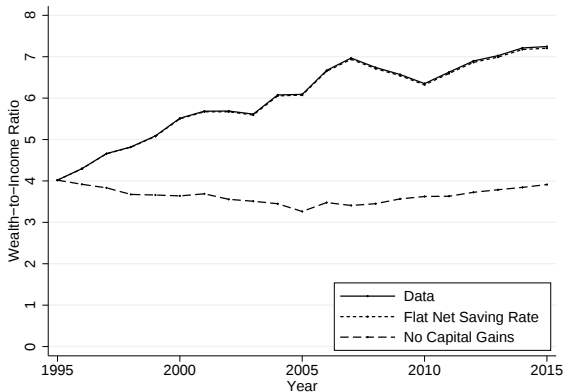


Source: WID.world

Importance for Evolution of Aggregate Wealth

Counterfactuals:

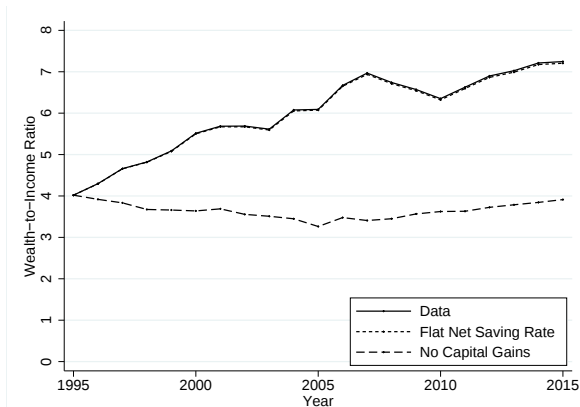
- what if net saving rates were homogenous?
- what if there were no capital gains?



Importance for Evolution of Aggregate Wealth

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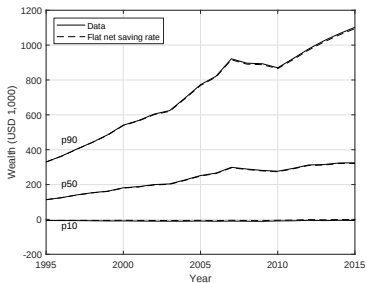


Saving-by-holding matters, heterogeneity in net saving rates does not

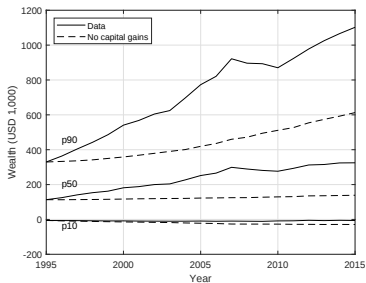
Importance for Evolution of the Wealth Distribution

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

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

Conclusions

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**

Theories of wealth accumulation should include changing asset prices! 31