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

Andreas Fagereng
Martin Holm
Benjamin Moll
Gisle Natvik

NBER EFG Meeting, 13 July 2019

Motivation

- 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:

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

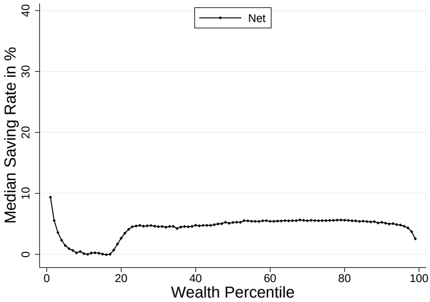
Our Findings

1. Capital gains are key to relation between saving and wealth
    (a) saving rates net of capital gains ("net saving")
    (b) saving rates including capital gains ("gross saving")

Our Findings

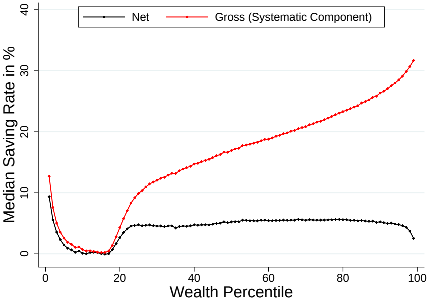
1. Capital gains are key to relation between saving and wealth

    (a) saving rates net of capital gains ("net saving")



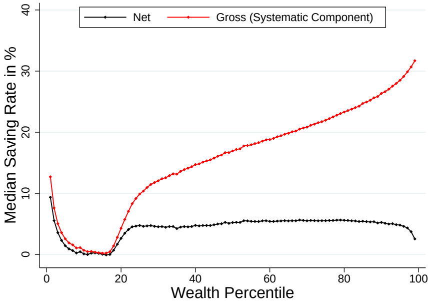
Our Findings

1. Capital gains are key to relation between saving and wealth
   (a) saving rates net of capital gains ("net saving")
   (b) saving rates including capital gains ("gross saving")



Our Findings

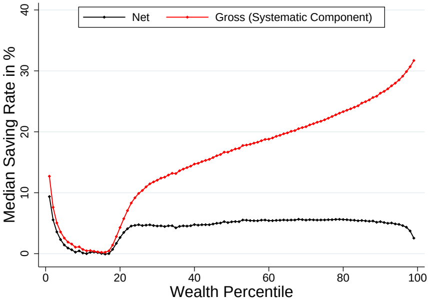
1. Capital gains are key to relation between saving and wealth
   (a) saving rates net of capital gains ("net saving")
   (b) saving rates including capital gains ("gross saving")



- rich people hold assets that experience persistent capital gains, do not sell these to consume ⇒ "saving by holding"

Our Findings

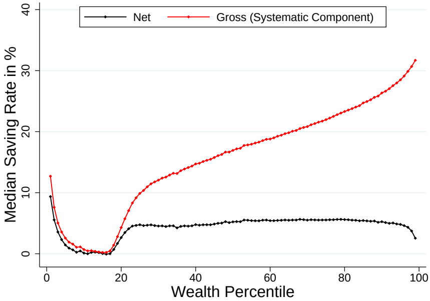
1. Capital gains are key to relation between saving and wealth
   (a) saving rates net of capital gains ("net saving")
   (b) saving rates including capital gains ("gross saving")



- note: rich people don't have higher saving rates in traditional sense, but still accumulate more wealth through capital gains

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

1. Capital gains are key to relation between saving and wealth



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 $\frac{30{,}000}{100{,}000+20{,}000} = 25\%$

Our Findings

2. Macro implication: "saving by holding" explains 60-100% of increase in wealth-to-income ratio since 1995

3. Implications for theory: patterns $\neq$ canonical models of hh saving

   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:

$$\max_{\{c(t)\}_{t\geq 0}} \int_0^\infty e^{-\rho t} \frac{c(t)^{1-\gamma}}{1-\gamma} dt \qquad \text{s.t.}$$

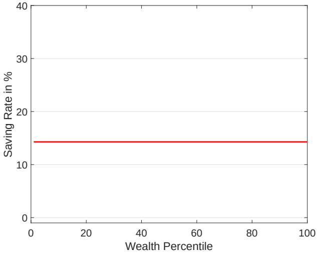
$$\dot{a} = w + ra - c, \qquad a \geq -w/r$$

- Saving policy function:

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

- Constant saving rate out of income

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

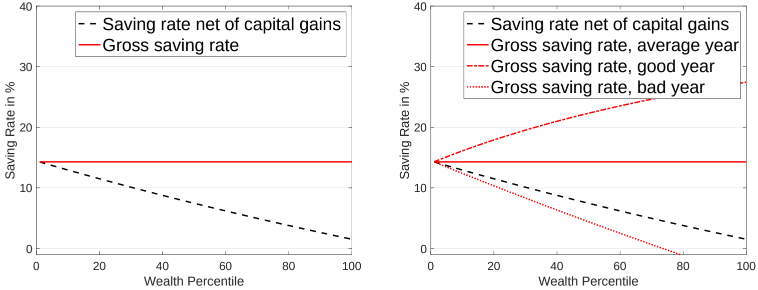


Changing Asset Prices (in partial equilibrium)

- Two sources of returns: dividends + capital gains

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

- Saving responses depend on type of capital gains:



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

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

1. net saving rate decreasing with wealth (if $\mu > 0$)
2. systematic component of gross saving rate independent of wealth

Extensions

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

- collapses to one-asset model with flat saving rate

(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:

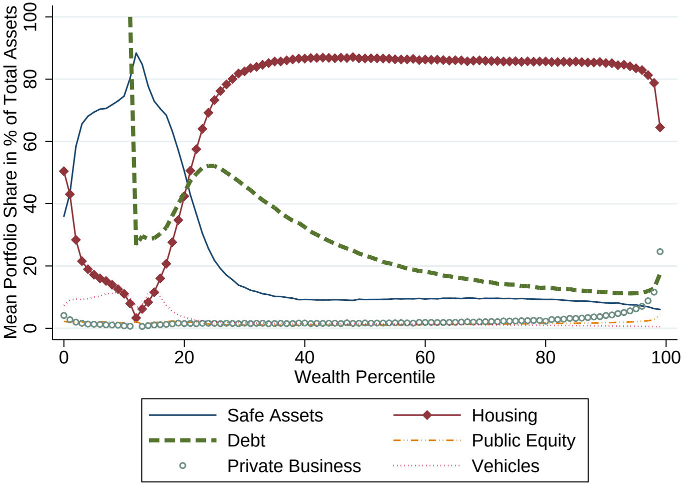
- flat saving rate conditional on discount rate

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

Data

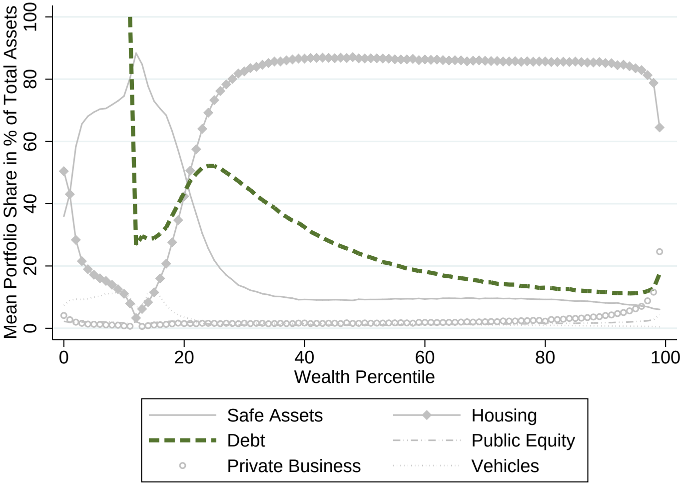
- Norwegian population tax record data with supplements
    - Panel, 2005 to 2015 (11 years)
    - $\approx$ 3.3M persons per year
- Tax records include (third-party reported):
    - asset holdings by broad asset class (e.g. deposits, housing)
    - income (labor, business, capital, and transfers)

Portfolio Shares



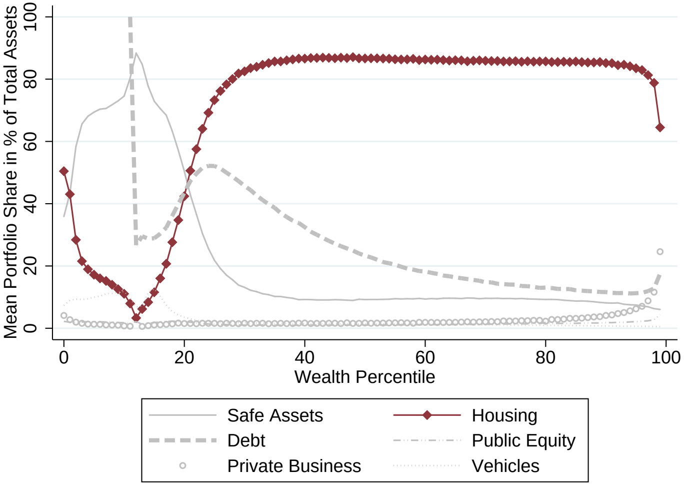
Notes: Wealth = assets − liabilities, pensions: not today (in appendix)
12th pctile = 0 net worth

Portfolio Shares



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

Portfolio Shares



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

Net, Gross and "Recurrent" Saving

- Three ways of writing consumption + saving = income

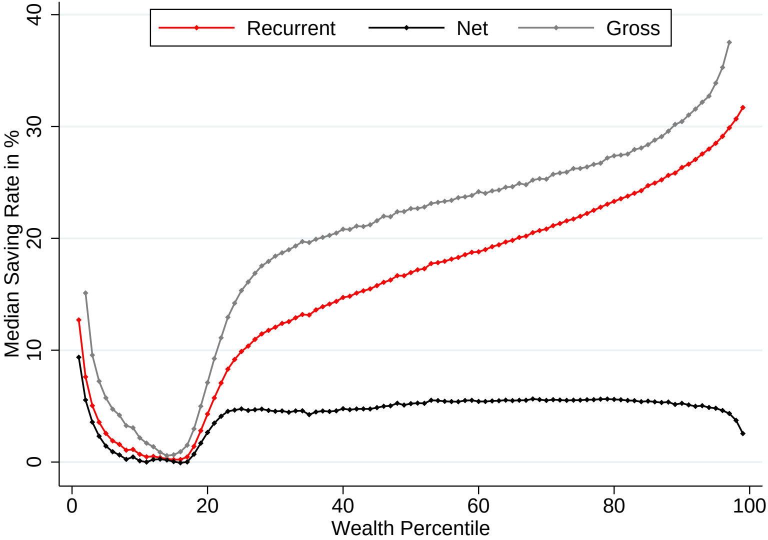
$$c + \underbrace{p\dot{k}}_{\text{net saving}} = \underbrace{w + \theta p k}_{\text{net income}} \tag{1}$$

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

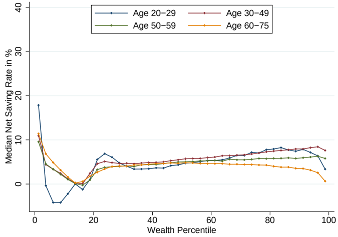
$$c + \underbrace{(\dot{k}/k + \mu)pk}_{\text{“recurrent saving”}} = \underbrace{w + (\theta + \mu)pk}_{\text{“recurrent income”}}, \quad \mu := \overline{\dot{p}/p} \tag{3}$$

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

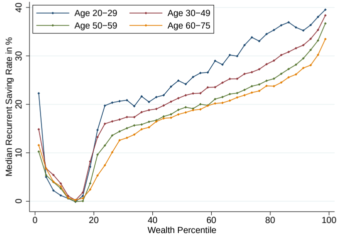
Median Saving Rates



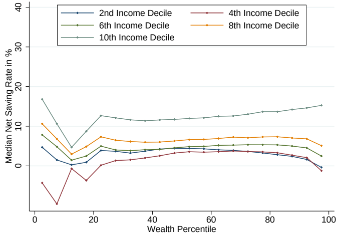
Controlling for Age, Earnings ...



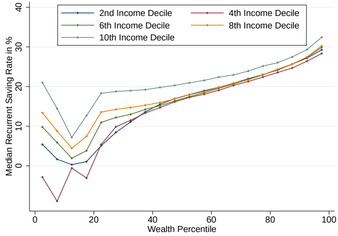
(a) Age, net saving rate



(b) Age, recurrent saving rate



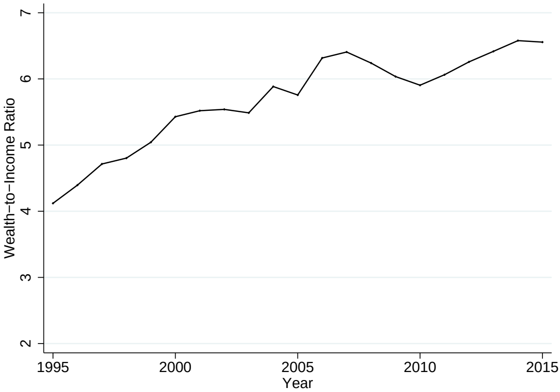
(c) Earnings, net saving rate



(d) Earnings, recurrent saving rate

Importance for Aggregate Wealth

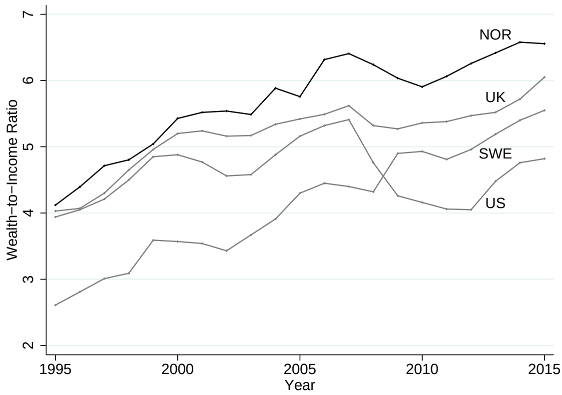
Counterfactuals: what if recurrent saving rates were flat as in the models?



"Saving by holding" explains 60-100% of increase in wealth-to-income

Importance for Aggregate Wealth

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



Source: WID.world “Saving by holding” explains 60-100% of increase in wealth-to-income

Importance for Aggregate Wealth

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

“Saving by holding” explains 60-100% of increase in wealth-to-income

What Explains Our Results?

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?

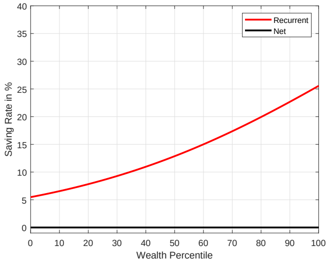
Reduced form of all our explanations

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

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



What Explains Our Results?

Reduced form of all our explanations

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

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

What Explains Our Results?

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 (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

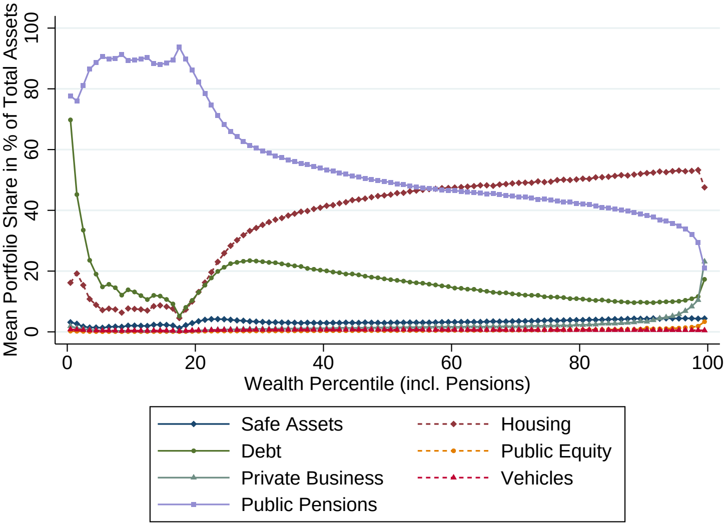
We provide evidence on how saving rates vary across wealth distribution using population tax records from Norway

1. Capital gains are key to relation between saving and wealth
    - net saving rate $\approx$ flat across wealth distribution
    - gross saving rate increasing with wealth
2. Saving by holding explains 60-100% 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

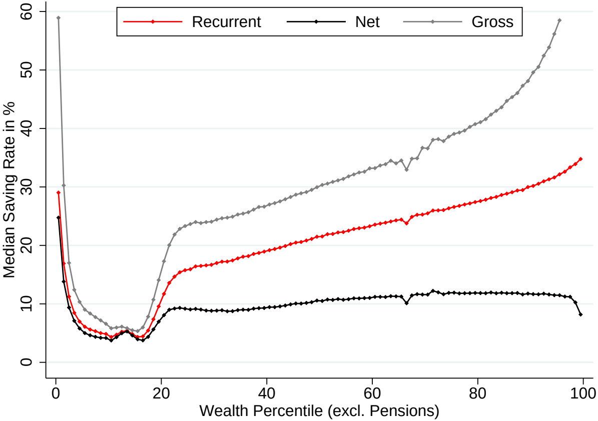
Theories of wealth accumulation need to include changing asset prices!

Q&A Slides

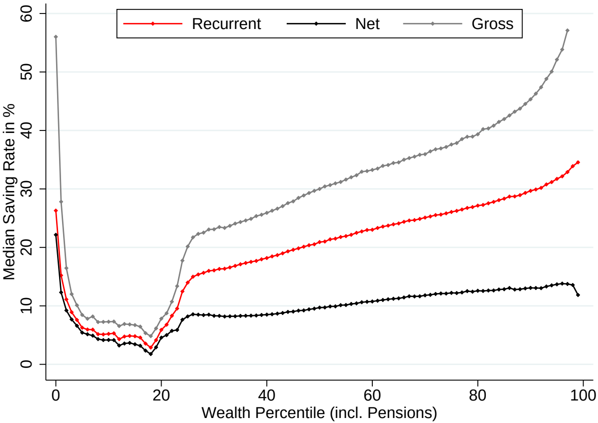
Portfolio Shares with Public Pensions



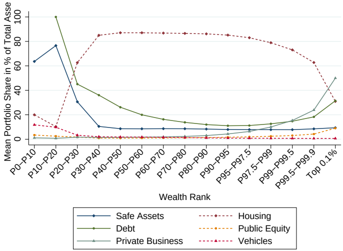
Saving Rates with Public Pensions



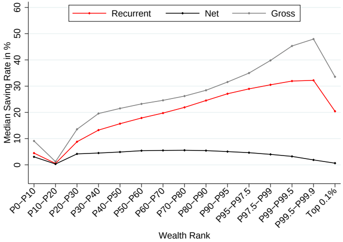
Saving Rates with Public Pensions



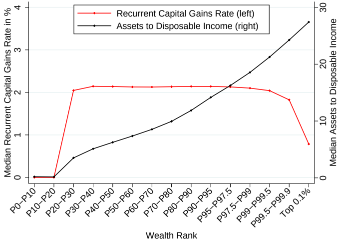
Zooming in on right tail of wealth distribution



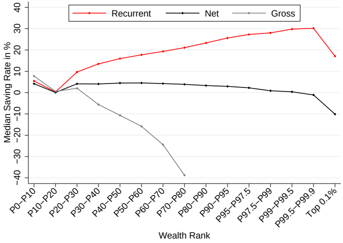
(a) Mean portfolio shares



(b) Saving rates

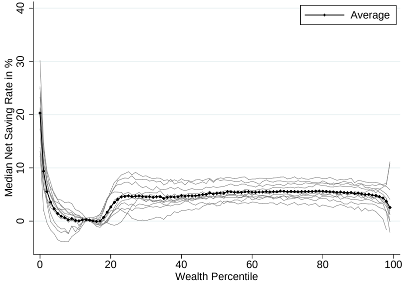


(c) Capital gains, asset-to-income

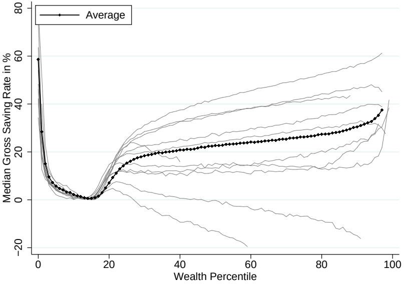


(d) Saving rates in 2008

Saving Rates by Year

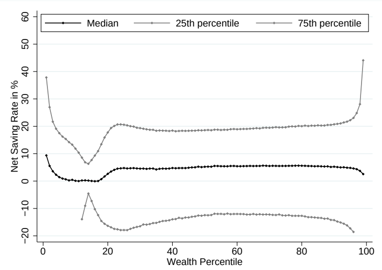


(a) Net saving rates across years

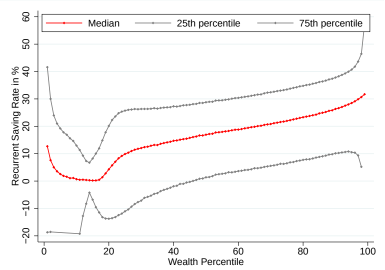


(b) Gross saving rates across years

Dispersion in Saving Rates



(a) Net saving rate

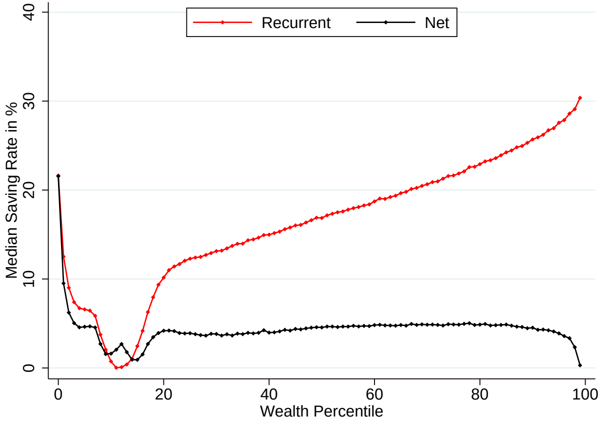


(b) Recurrent saving rate

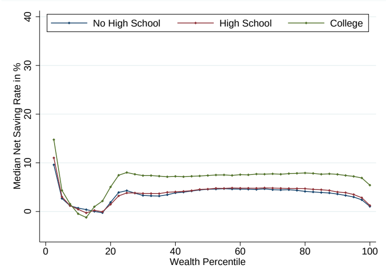
Controlling for the usual suspects

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

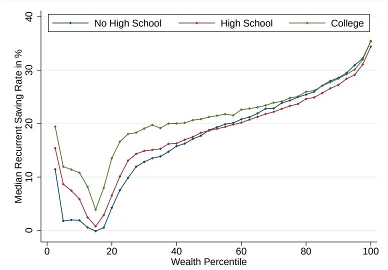
$$\frac{s_{it}}{y_{it}} = \phi_1 + \sum_{p=2}^{100} \phi_p D_{it,p} + f(\mathbf{x}_{it}) + \mu_t + \varepsilon_{it}$$



Education Controls

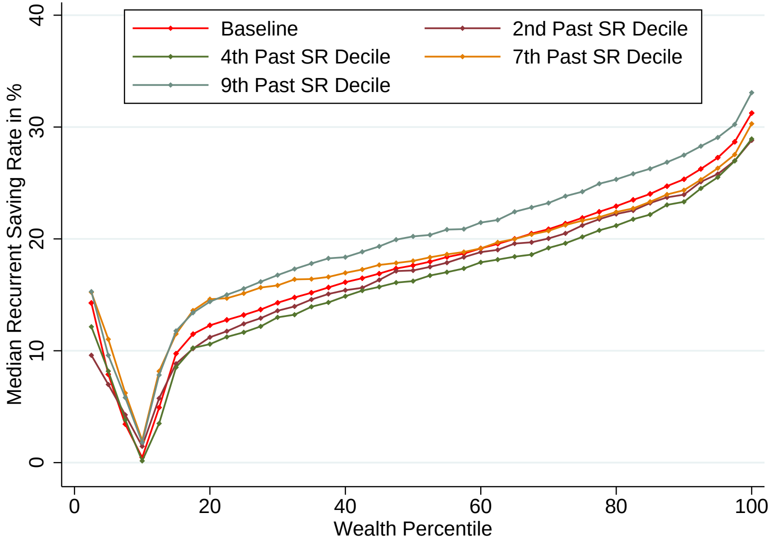


(a) Education, net saving rate



(b) Education, recurrent saving rate

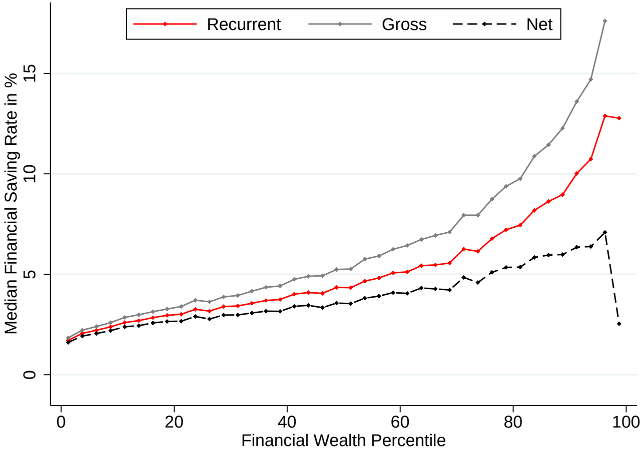
Simply High Saving Rate ⇒ High Wealth?



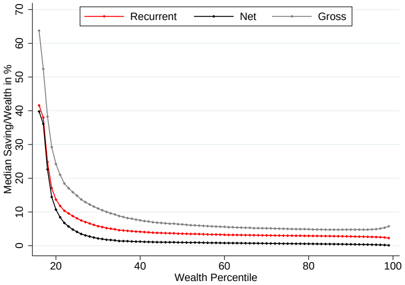
Exclusively a Story About Housing?

Restrict to households with stocks > 25% of financial wealth (≈ 10%)

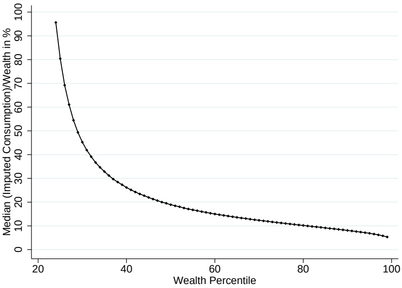
- Challenge: Norwegians hold few other assets with capital gains



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



(a) Saving rates as fraction of wealth

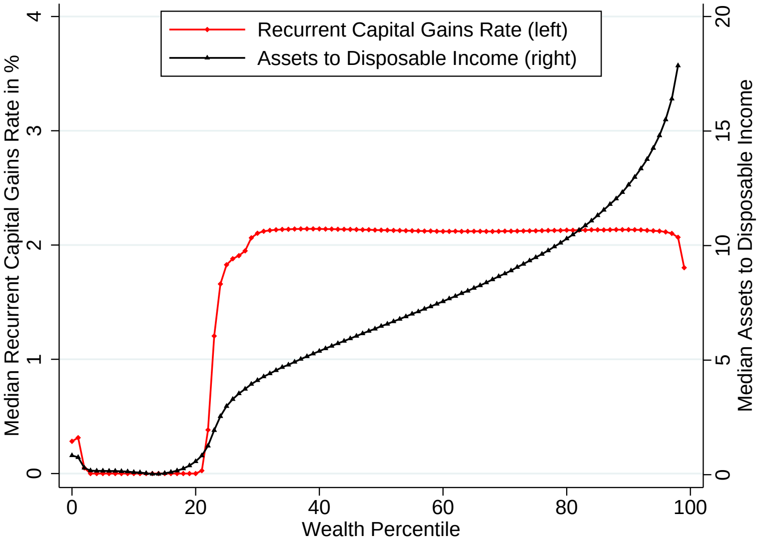


(b) Imputed cons as fraction of wealth

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

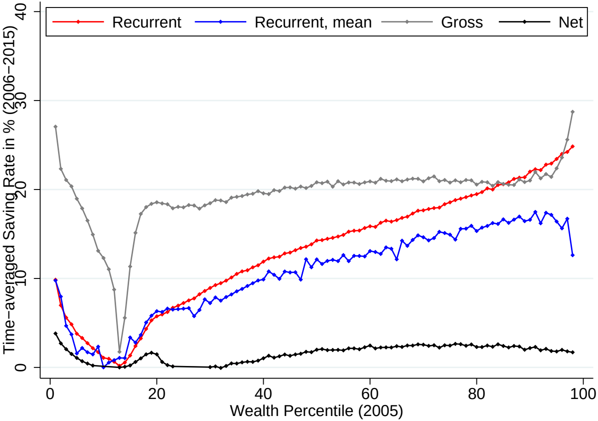
$$\frac{\dot{a}}{a} = \frac{\rho-r}{\gamma}\left(\frac{w}{ra}+1\right), \qquad \frac{c}{a} = \left(r - \frac{r-\rho}{\gamma}\right)\left(\frac{w}{ra}+1\right)$$

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)

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

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

Now endogenize asset price. Viewing return r_t as primitive:

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

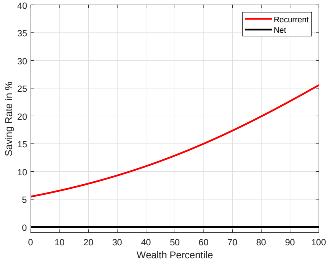
Case I: capital gains due dividend growth ("supply-driven")

- 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

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



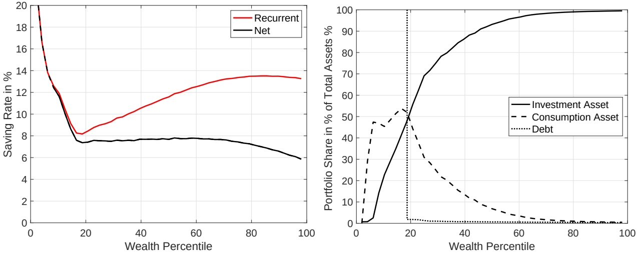
2. Multiple Assets + Portfolio Adjustment "Frictions"

- 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