Why are the Wealthiest So Wealthy?

An Empirical-Quantitative Investigation of Lifecycle Wealth Dynamics

Elin Halvorsen
Statistics Norway

Joachim Hubmer
U of Pennsylvania

Serdar Ozkan
Toronto and STL Fed

Sergio Salgado
Wharton

World Inequality Conference
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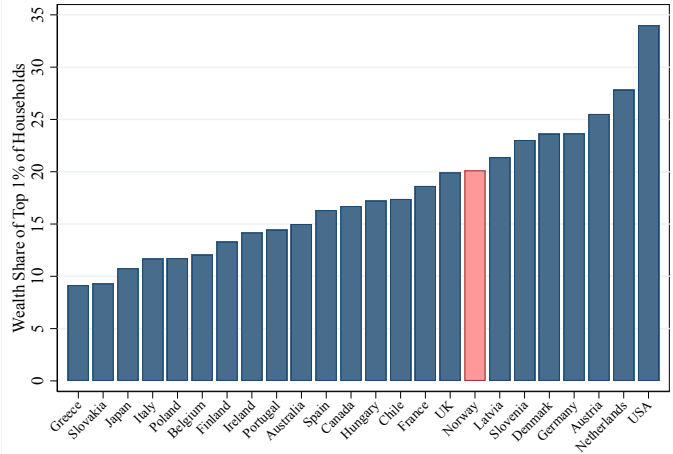
Introduction

Motivation: Wealth is concentrated at the top in many countries



Source: OECD and SCF using most updated data

- Household wealth is very concentrated
  (Picketty, 2014; Saez and Zucman, 2016; Bricker et al., 2018; Smith et al. 2020, ...)
- This concentration sparked debate if wealth should be taxed and by how much
- Critically, policy depends on economic forces behind wealth accumulation

Why are the wealthiest so wealthy?

- **Lifetime income heterogeneity:** high earnings or high income risk (w/positively skewed shocks)
  (Modigliani, 1988; Cataneda et al., 2003, De Nardi et al., 2010,...)
- **Inheritance heterogeneity:** receive larger inheritances and intervivos transfers
  (Kotlikoff and Summers 1981; Gale and Scholz, 1994, De Nardi, et al., 2015; Boserup et al. 2016;,...)
- **Rate of return heterogeneity:** or large and persistent heterogeneity in returns to wealth
  (Quadrini 2000, Bach et al., 2020; Cagetti and De Nardi, 2006; Fagereng et al., 2020; Benhabib et al, 2019,...)
- **Preference heterogeneity:** Rich households are thrifty or patient
  (Krusell and Smith, 1998; Guvenen, 2009, ...)

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Earlier literature studied these forces mostly using **cross-sectional** data and calibrated quantitative models
(Notable exceptions: Pugh, 2020; Fagereng et al., 2020, 2021)

- SCF (cross-sectional tri-annual), PSID (panel but miss the top), US tax data (strong assumptions)
- Data on the **dynamics** of wealth accumulation can help quantify the importance of these mechanisms

We study life-cycle wealth dynamics

Using Norwegian administrative data, we follow households to document their lifecycle wealth dynamics

- dynamic wealth profiles and portfolio shares
- components of lifetime resources (e.g. labor income, capital income, inheritances, etc.)
- rates of returns and saving rates

Then, we estimate an OLG model to quantify importance of different forces

- Labor income and entrepreneurial risk (rate of return heterogeneity), bequests
- Intergenerational transmission of labor and entrepreneurial ability

We use the model to

- Provide a unifying framework for different snapshots of the data
- Counterfactuals (e.g. capture interaction between inheritance and entrepreneurship—higher returns)

Data and Definitions

Data and Sample Selection

We use a high quality, administrative panel data for entire population of Norway from 1993 to 2015

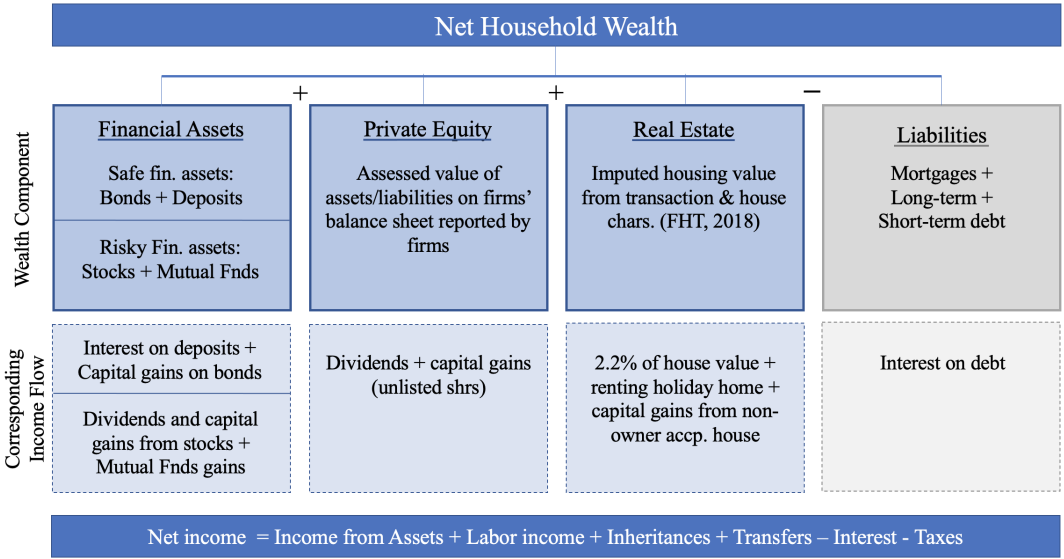
Fagereng-Guiso-Malacrino-Pistaferri (2020); Fagereng-Mogstad-Ronning (2020); Alstadsæter-Jacob-Kopczuk-Telle (2017)...

- Main advantages
  - Rich data on assets (domestic and abroad), liabilities, and income sources
  - No top-coding, limited misreporting (third-party reporting), and little attrition (death/migration)
- Few limitations
  - Excludes pension wealth, "hidden" offshore wealth, and assets that are difficult to value
  - The tax value of private businesses may differ from their market value

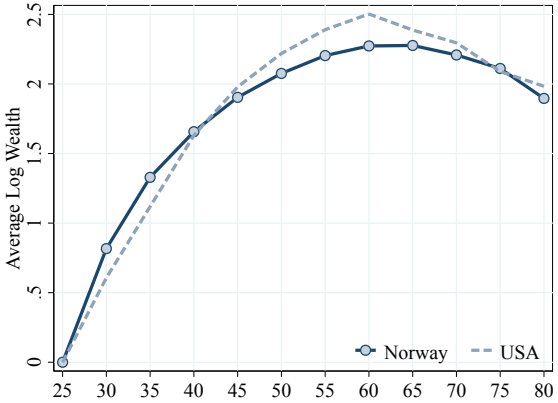
Minor sample selection and variables

- Measure all variables at the household level (natural decision-making unit)
- Include individuals who are 25 years or older with non-missing wealth
- Total sample of ~51 million hhs-year obs with an average of ~2.2 million hhs per year

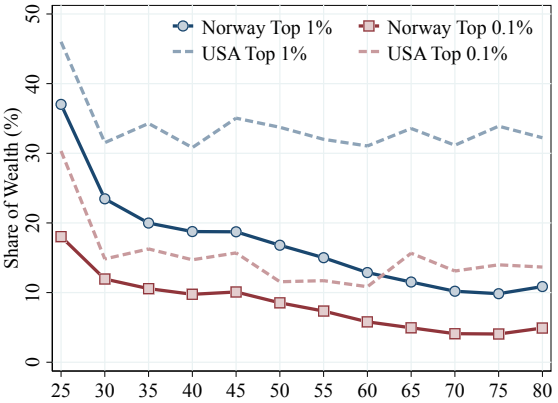
Wealth and Income Measures



Cross-Sectional View: Average Wealth and Concentration over the Lifecycle



(a) Average Wealth Profile

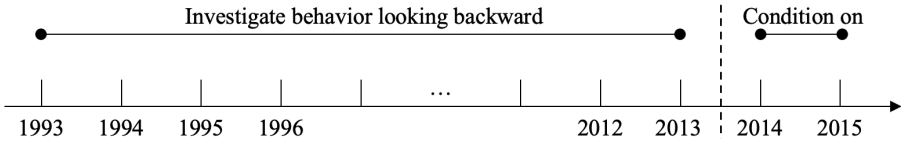


(b) Wealth Concentration

Average wealth is hump-shaped (↑~220 log points) while inequality decreases over lifecycle

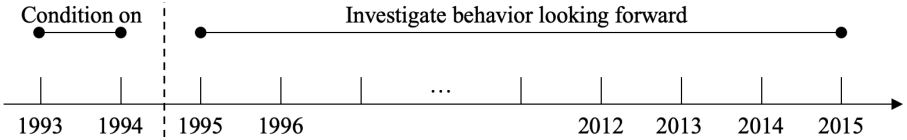
The Dynamics of Wealth Accumulation

Retrospective Approach: Where did the rich come from?



- Sort head of households by average net wealth in 2014-15 within 5-year age groups
- Wealth groups: (i) top 0.1%, (ii) P99.9/P99, (iii) P99/P95, (iv) P95/P90, (v) P90/P50, (vi) P50/≥0, (vii) < 0
- This rank becomes a **fixed characteristic** of the head of the household
- Follow these groups of individuals *retrospectively* for 21 years over 1993–2013 period
- Limitation: selecting on an endogenous variable ("survival bias")
  - We complement with **forward-looking approach** and quantitative model.

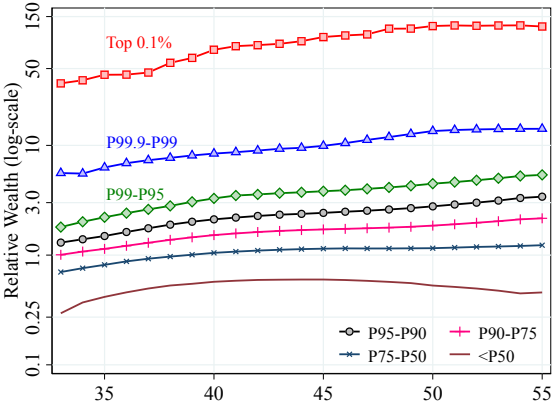
Forward looking approach: Where do the rich go?



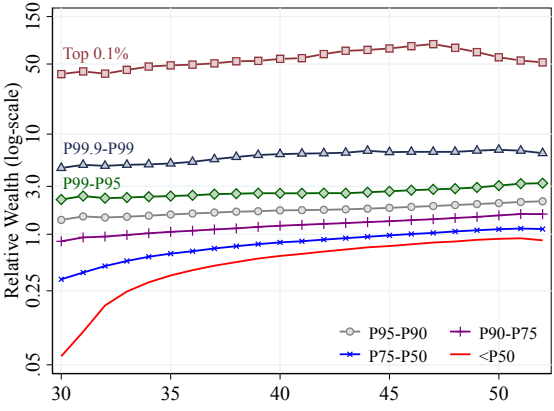
- Rank head of hhs by mean net wealth in 1993-94 (or 94-95, 95-96, etc.) within 5-year age groups
- In 9 wealth groups: (i) top 0.1%, (ii) P99.9/P99, (iii) P99/P95, (iv) P95/P90, (v) P90/P75, (vii) P50/≥0
- Follow these fixed groups of individuals forward for 21 years over 1995–2015 period

Next: average wealth, portfolio composition, sources of lifetime income, and returns

Dynamic Average Wealth Profiles



(a) Retrospective Wealth Profile

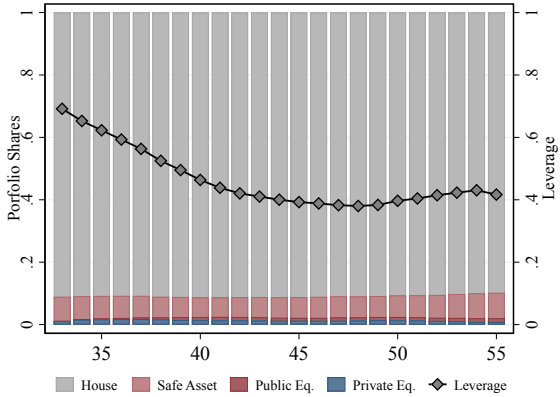


(b) Forward-Looking Wealth Profile

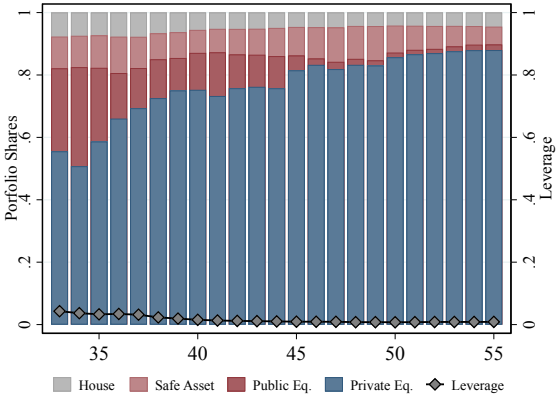
- Large dispersion in average wealth
- No convergence at the top: decline in lifetime inequality comes from the lower-half catching up

▸ Age

Retrospective Portfolio Shares of Bottom vs Top



(a) Households at bottom 50%



(b) Households at top 0.1%

Rich accumulate large share in private equity at age 25/29; Low-mid wealth have mostly housing

▸ Forward ▸ Age

Decomposing Lifetime Resources

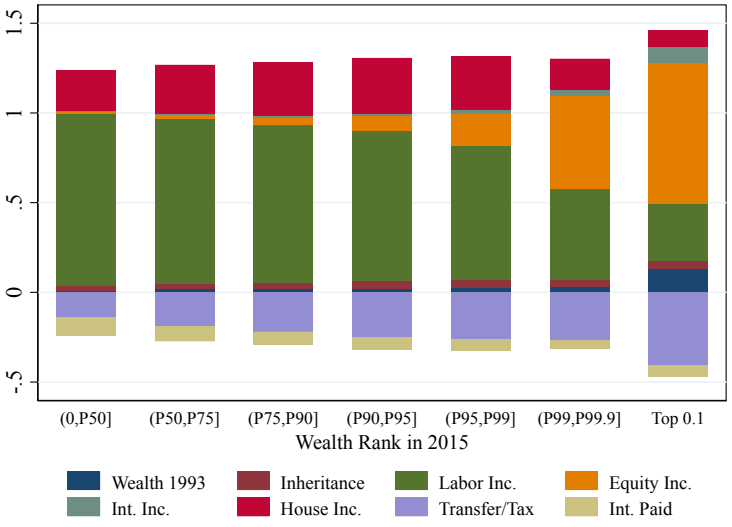
To understand the sources of wealth accumulation we can look at household budget constraint
(Similar to Black, Devereux, Landaud, Salvanes, 2020)

$$W_{i,2015} = \underbrace{W_{i,1994} + \sum_{t=1994}^{2014} L_{i,t} + \sum_{t=1994}^{2014} H_{i,t} + \sum_{t=1994}^{2014} RK_{i,t} + \sum_{t=1994}^{2014} CG_{i,t} + \sum_{t=1994}^{2014} T_{i,t} - \sum_{t=1994}^{2014} LB_{i,t}}_{\sum Y_{it}\text{=total lifetime resources}} - \sum_{t=1994}^{2014} C_{i,t}$$

- $W_{i,t}$ is net wealth of household i in $t \in \{1994, 2015\}$
- $L_{i,t}$ is labor income of i in year t
- $H_{i,t}$ is inheritances and intervivos
- RK_{it} is returns (interest, dividends, housing, etc.)
- CG_{it} is capital gains from housing/equity
- T_{it} taxes and transfers
- LB_{it} is interest paid for liabilities
- C_{it} is consumption

Next: normalize by total lifetime resources, $\sum Y_{it}$, and compare hhs across wealth distribution

Decomposition of Total Resources by Age 50



Wealthy: lifetime income mostly from **equity**

Middle income and the poor: lifetime incomes mainly from **labor**

Initial wealth and **inheritances** play small role (relatively bigger for the top 0.1%)

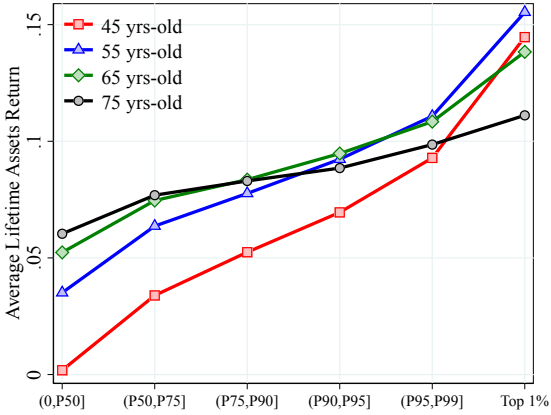
▸ Detailed ▸ Forward ▸ Heterogeneity

Fraction with Large Inheritance or Initial Wealth by Age 50

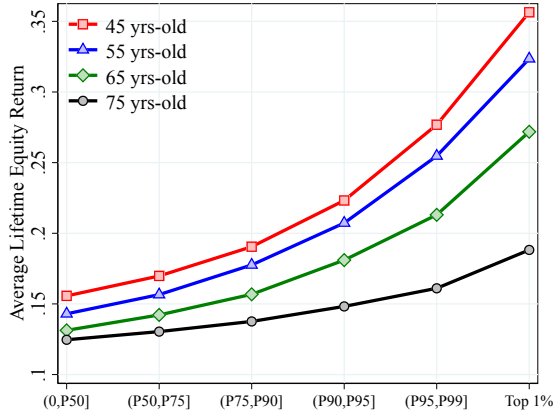
	Share out of lifetime resources							
	Top 0.1% Wealth Group				Top 1% Wealth Group			
	P50	P90	P95	P99	P50	P90	P95	P99
Inheritance	0%	4%	9%	34%	0%	5%	10%	32%
Initial Wealth	8%	74%	85%	99%	14%	55%	70%	86%
Inheritance+Init Wealth	10%	77%	86%	99%	16%	58%	71%	89%

- Previous decomposition shows average shares out of total resources—**masking heterogeneity**
- The table shows the percentiles of the share of inheritances and initial wealth out of total resources
- Initial wealth/inheritances: relatively small on average but some rich hhs get large estates

Lifetime Returns on Assets Across the Wealth Distribution



(a) Returns on Net Wealth

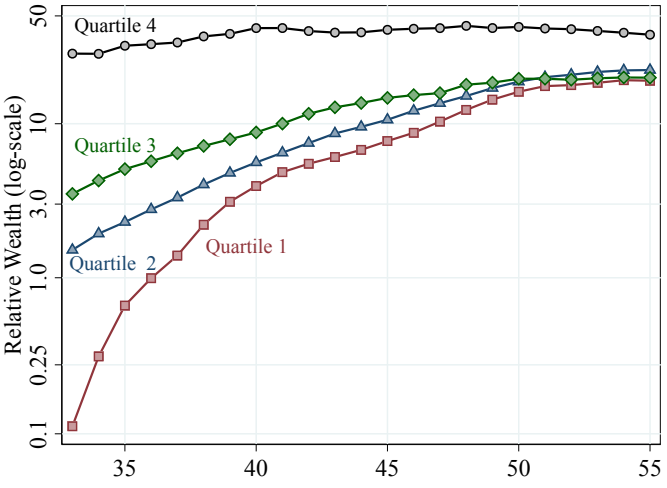


(b) Returns on Private Equity

- Calculate returns on assets (Fagereng et al., 2020) and calculate 20 yrs average ▸ Details ▸ Others
- HHs that reach the top experience higher average lifetime returns, mostly from equity ▸ Forward

▸ Savings

Average Wealth Profiles: “Old Money” versus “New Money”



Note: Log of relative average wealth within group. Hhs at top 1% of wealth distribution in 2015 ranked in quarterly of wealth in 1993. Sample of 2,005 hhs in 2015 (40K obs).

Wealth profile for top 1% at age 50/55 by initial wealth quartile

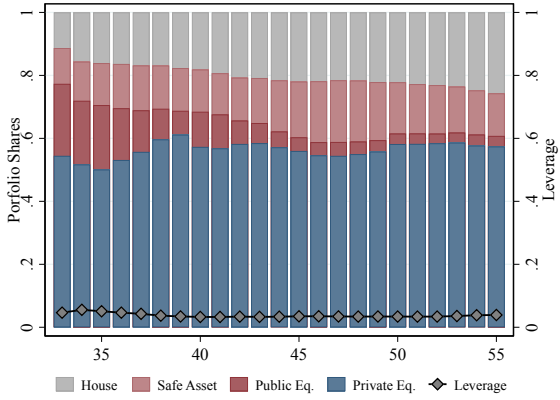
“New-Money” households: significant wealth growth (by construction)

Fast growth in few yrs and early in life

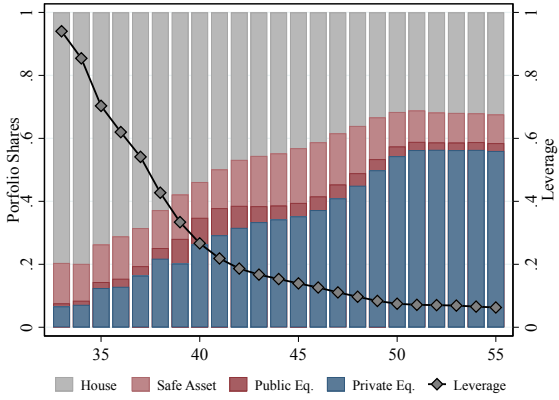
Similar results for top 0.1%

▸ Top 0.1 ▸ Forward

Old vs. New Money: Backward-Looking Portfolio Shares and Leverage



(a) Old Money Households (Qrtile 4 in 1993)



(b) New Money Households (Qrtile 1 in 1993)

Significant accumulation of Private Equity of "New-Money" Households ▸ Other Age ▸ Forward

Summary of the Empirical Findings

Those who end up at the top of the wealth distribution

- Are, on average, already wealthier at age 25 and invest increasingly more of their wealth in private equity
- Enjoy higher returns on investment, mostly from equity $\Rightarrow$ most income from equity
- and have higher saving rate (confirm findings of Fagereng-Holm-Moll-Natvik, 2021) ‣ Savings

We also find large heterogeneity within this group

- Large fraction of rich household start relatively poor, with little private equity
- Experience steep wealth growth early in life and in a few years
- This is driven by high rate of returns on private equity which in turn increases its share in portfolio

Quantitative Model

Model Overview

OG partial equilibrium model with finitely-lived households

Quadrini 2000, Cagetti and DeNardi 2006, Guvenen et al. 2020, Hubmer et al. 2020,...

- Worker/entrepreneurs who supply labor and invest in a risk-free asset, b
- Heterogeneity in labor market efficiency, y_{ih}, entrepreneurial ability, z_{ih} (and discount factor, β_i)

Population Dynamics

- Households live up to H years divided in work (workers/entrepreneurs) and retirement (entrepreneurs)
- Both accidental and voluntary bequest
- Replaced by offspring who inherits assets, as well as labor and entrepreneurial ability (imperfectly)

Production Technology

- Entrepreneurs produce differentiated good using capital, k, and are subject to a collateral constraint

▸ Problem ▸ Production ▸ Heterogeneity

Calibration and Estimation

Parameters obtained externally

- Estimate y_{ih} to match labor earnings levels and growth rates
- Others are standard values or Norway specific (taxes on income, wealth, bequest, replacement rates)

Parameters estimated internally—simulated method of moments (SMM)

- Target wealth level and inequality, return distribution, share of entrepreneurs, and bequests, etc. ▸ More

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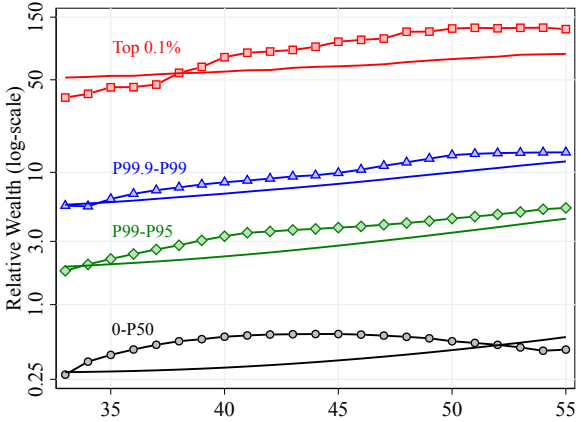
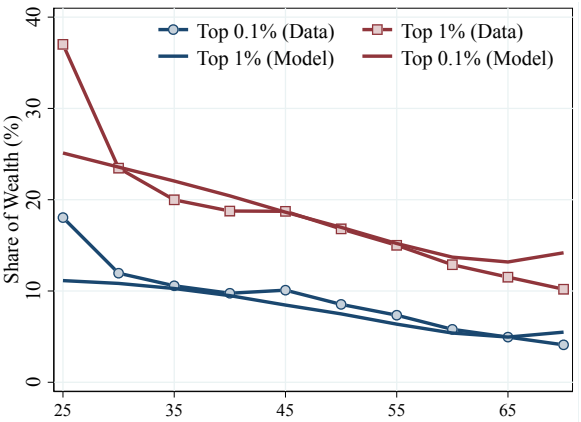
Why SMM? Example: Mapping empirical estimates to persistent returns heterogeneity

- Return heterogeneity and wealth inequality in Norway jointly matched
- Imposing Fagereng at al. (2020) fixed return over lifetime overstates wealth inequality
  (closer to US level, Benhabib-Bisin-Luo, 2019)
- Why? In data, transitory return variation not averaged out fully over 11 years

Model Fit: Wealth Profiles and Wealth Concentration



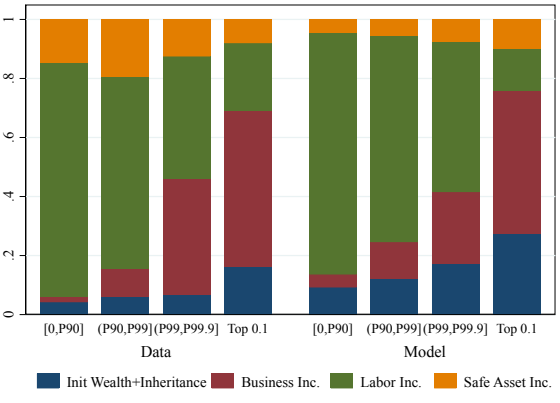
(a) Wealth Profiles



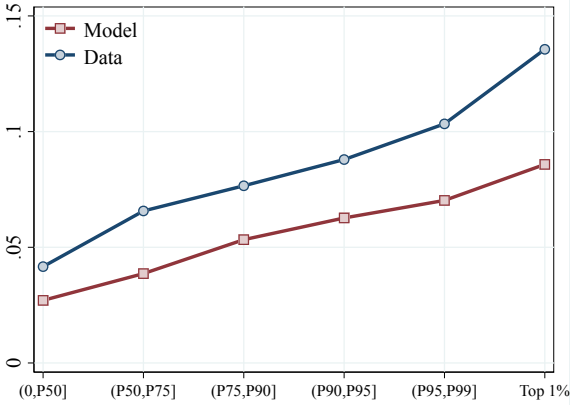
(b) Wealth Concentration over the Lifecycle

Model matches well wealth profiles, lifetime concentration, sources of income, and rate of returns

Model Fit: Sources of Income and Returns



(a) Sources of Lifetime Income



(b) Returns on Assets

Model matches well wealth profiles, lifetime concentration, sources of income, and rate of returns

Counterfactuals: Shutting Down Key Features of the Model

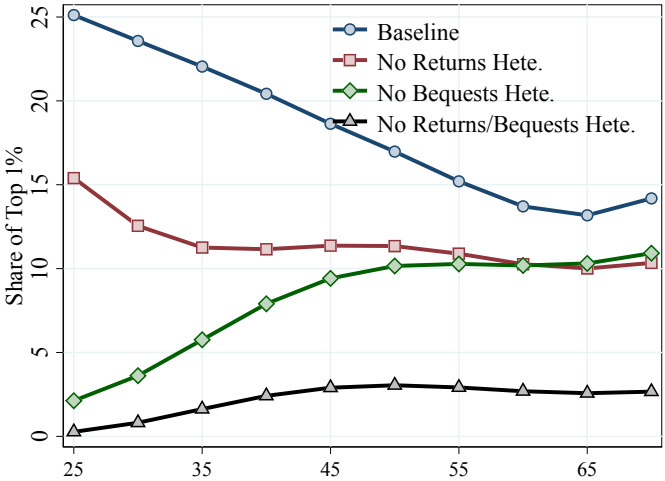
Shut down key features of the model one at a time

- Rate of return heterogeneity
- Bequests heterogeneity

Under counterfactual parameterizations, we ask

- Static Decomposition: What happens to the wealth concentration over the life cycle?
- Dynamic Decomposition: What fraction of the rich can still make it to the top wealth group?
  - Follow the same households under different parameterizations
  - This helps understanding the different forces why the wealthiest are so wealthy

Counterfactual I: Wealth Concentration over the Lifecycle



Note: Log of relative average wealth within group. Hhs at top 1% of wealth distribution in 2015 ranked in quarterly of wealth in 1993. Sample of 2,005 hhs in 2015 (40K obs).

Figure shows the share of wealth over the lifecycle

Returns heterogeneity affects level of inequality, but not profile

Bequests have a significant impact on lifecycle wealth concentration

Strong interaction between return and bequest heterogeneity

Counterfactual II
Why are the wealthiest so wealthy?

What if everybody had earned the same rate of return?

	Age 50				Age 70			
	Top 0.1%	99-99.9	95-99	<95	Top 0.1%	99-99.9	95-99	<95
Top 0.1%	47%	38%	11%	4%	31%	37%	12%	20%
P99-P99.9	1%	57%	31%	11%	1%	46%	35%	19%
P95-P99		2%	63%	35%		2%	51%	47%

- Consider those in top 0.1% in baseline model, investigate them under different parameterization
- Keep **baseline** percentile cutoffs: How many can still make it above the cutoff?
- Without returns heterogeneity: only 47% can reach the top 0.1% baseline cutoff
- Importance of returns heterogeneity increases with age

What if everybody had inherited the same wealth?

	Age 50				Age 70			
	Top 0.1%	99-99.9	95-99	<95	Top 0.1%	99-99.9	95-99	<95
Top 0.1%	23%	3%	8%	66%	52%	6%	10%	32%
P99-P99.9		49%	6%	45%		80%	5%	14%
P95-P99			63%	37%			86%	14%

- Without inheritances heterogeneity: only 23% can still reach top 0.1% at age 50 (same cutoff)
- Importance of bequests heterogeneity declines with age
- Bequest more important than empirical lifetime resources decomposition suggests

What if everybody had inherited the same wealth and earned the same return?

	Age 50				Age 70			
	Top 0.1%	99-99.9	95-99	<95	Top 0.1%	99-99.9	95-99	<95
Top 0.1%	17%	6%	1%	76%	23%	24%	4%	49%
P99-P99.9		38%	13%	48%		43%	30%	26%
P95-P99		1%	48%	51%		2%	49%	49%

- The effect compounds: high returns individuals are also those that receive high bequest
- Because of positive returns correlation across generations
  - high-skill parents leave high bequests and have high-skill children

Conclusions

We document patterns of wealth, portfolio shares, returns, and income sources across wealth distribution

- We find that those that reach the wealth distribution at the end of their life (+55)
  - Start with significantly larger wealth levels at age 25
  - hold a significantly larger fraction of their wealth in private equity, and
  - extract most of their income from dividends from public and private firms
- Large fraction of rich household start relatively poor, with little private equity (New-Money)
  - Experience steep wealth growth early in life and in a few years
  - This is driven by high rate of returns on private equity which in turn increases its share in portfolio

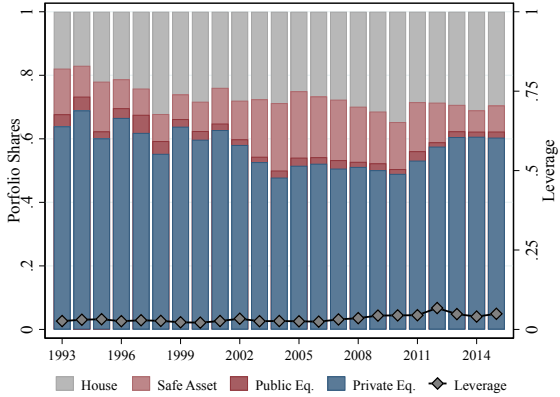
We then estimate a quantitative model to quantify importance of different forces

- We find that inheritances play an important role in explaining wealth inequality especially earlier in life
- Rate of return heterogeneity becomes increasingly more important over-lifetime

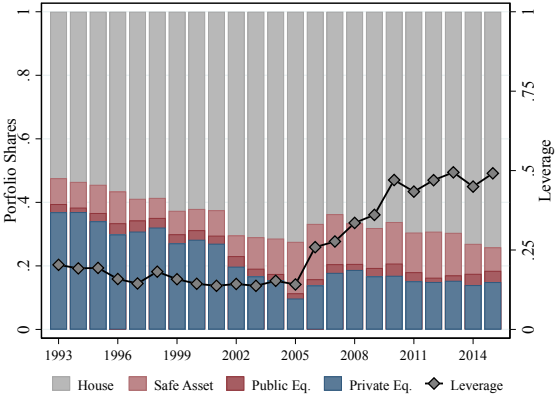
Appendix

Forward-Looking Portfolio Shares and Leverage

Back



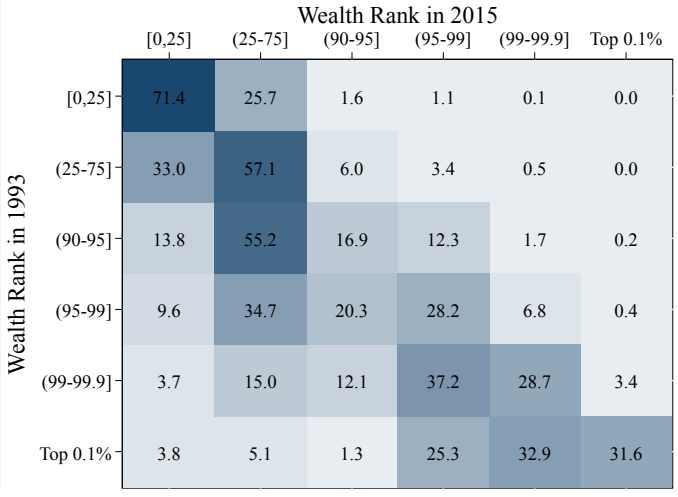
(a) Top-to-Top Transition (Q4)



(b) Top-to-Bottom Transition (Q1)

- Those that start and remain at the top maintain high share of risky assets
- Households start at the top but fall to the bottom quartile reduce their share in risky assets

Intragenerational Transition Matrix (Forward)



The figure shows intragenerational transition matrix between 25 and 55 years old (Forward)

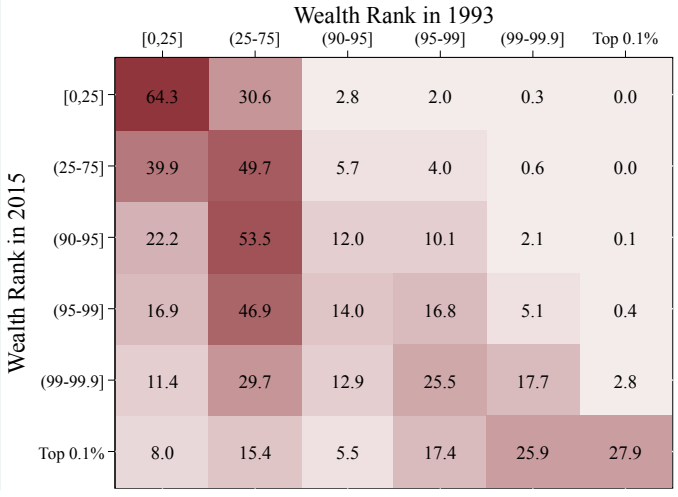
Similar results to backward looking

There is significant persistence at the top

But there is a significant fraction of household going bottom-to-top

▸ Back

Intragenerational Transition Matrix (Backward)



The figure shows intragenerational transition matrix between 25 and 55 years old (Backward)

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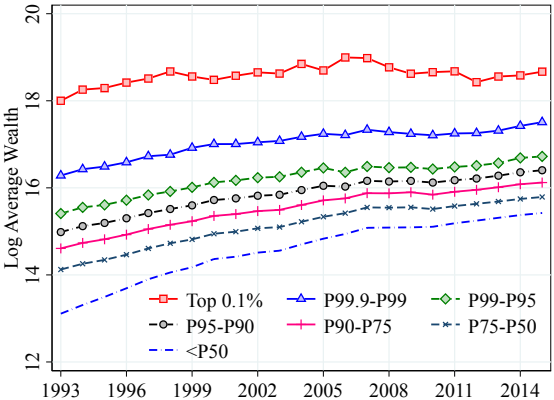
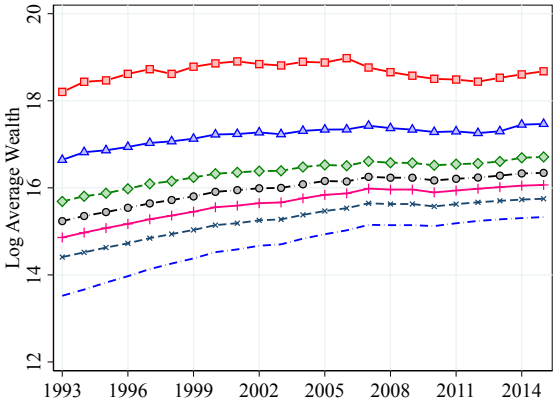
But there is a significant fraction of household going bottom-to-top

Forward-Looking: Average Wealth Profile for Different Age Groups

Back



(a) Forward Looking: 40/45 yrs old in 1993

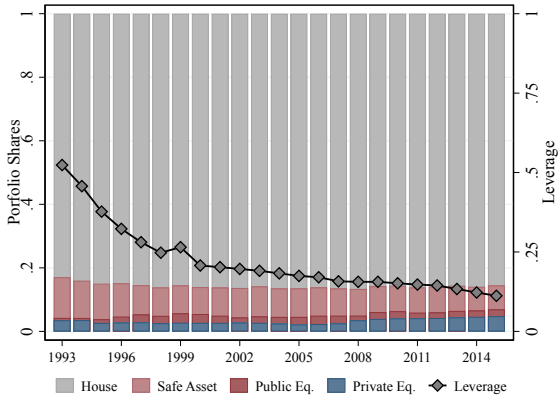


(b) Forward Looking: 50/55 yrs old in 1993

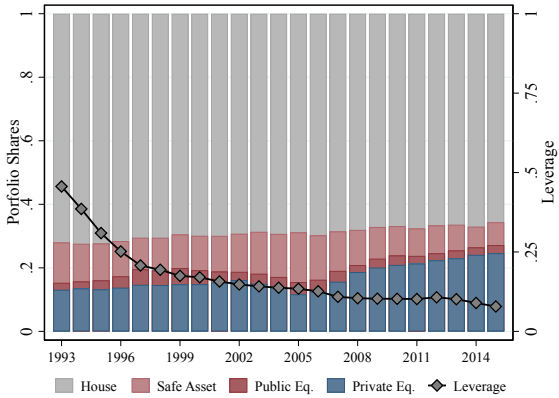
- The figures show the average wealth profile for different age groups
- Persistence of wealth level increases with age

Backward-Looking: Retrospective Portfolio Shares for 50/55 year-olds in 2015

Back



(a) Households in 90/95 pcts

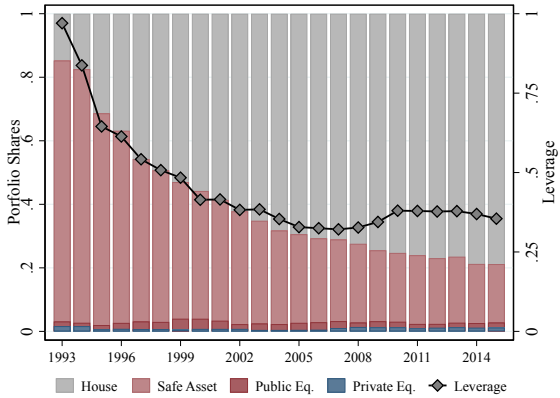


(b) Households in 99/99.9 pcts

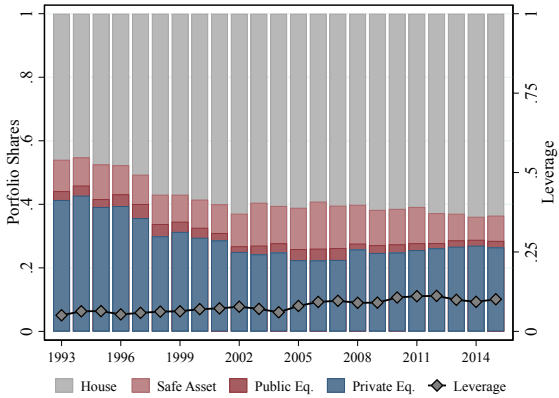
- Figure shows the portfolio shares over the life cycle conditional on wealth rank at age 55 in 2015
- As we look at higher percentiles, there is an increase in share of private equity across all ages

Those at top hold a large share of wealth in private equity (Forward Looking)

Back



(a) Household at bottom 50%



(b) Household at top 0.1%

- Figure shows the portfolio composition over the life cycle conditional in the wealth rank at age 25 in 1993
- Rich hhs invest in private equity even at age 25; Low/middle wealth hhs increase housing

Wealth Tax System in Norway

Back

Wealth Tax is taxed at 0.7% at municipality level and 0.15% at national level

- The tax applies to the value of wealth above NOK 1.5 million (180,000 USD) for single/not married taxpayers and NOK 3 million (360,000 USD) for married couples
- Hence, wealth tax kicks-in around the 55th percentile of the wealth distribution for individuals and households
- Capital income taxes have been flat at 28% from 1992-2012, thereafter gradually reduced to 22% today

Wealth Tax over time

- In 1994 tax was more progressive (max rate of 1.5%) with much lower threshold (NOK 120,000/$15,000 USD)
- The threshold has been adjusted up mainly in the last 10 years, together with a reduction in tax rates
- Different asset classes had varying degrees of rebates; Housing has always been taxed at 25% of its value

Inheritance Tax: Abolished in 2014

- Before abolition, inheritance and gift tax had a zero rate below NOK 470,000/$56,000 USD
- After that, rates were 6% to 15% depending on status of beneficiary and amount

Income Tax System in Norway

Back

Dual income tax system

- Proportional tax on all net income (23% in 2018)
  - Includes wages, pension, business, capital income less losses and interest paid.
  - Is split between local, regional, and central governments
- Progressive tax on gross labour and pension income
  - Starting at 174 000 NOK, rates from 1.9% to 16.2%
- 2 main deduction applied: Minimum standard deduction, Personal allowance

Shareholder model

- Dividends exceeding the risk-free rate are taxed as ordinary income
- The remainder is only taxed at the corporate tax rate (23%) with a marginal tax rate of (46.6%)

How do we calculate the profiles

To calculate the BWD profiles we proceed as follows

- Select individuals that in 2014 are, let say, between 50 and 54
- Calculate average wealth as the average between year 2014 and 2015, $\overline{W}_{it}$
- Identify those individuals that belong to the top 1% of the $\overline{W}_{it}$ distribution, those that belong to the 95 to 99th percentiles, and so on
    - Calculate the average wealth those at the top 1% across all years in the sample

Household Heterogeneity

Back

- Income risk (match income profiles, income risk, and intergenerational income correlation)

$$
\begin{aligned}
\log y_{ih} &= \underbrace{\lambda_i}_{\text{permanent}} + \underbrace{\kappa_h}_{\text{lifecycle}} + \underbrace{e_{ih}}_{\text{AR(1)}}, \\
e_{ih} &= \rho_e e_{i,h-1} + \epsilon_e \\
\lambda_{child} &= \rho_\lambda \lambda_{parent} + \epsilon_\lambda
\end{aligned}
$$

- Returns heterogeneity (intergenerational wealth correlation and returns)

$$
\begin{aligned}
x_{ih} &= z_{ih} k_{ih}, \\
\log z_{ih} &= \underbrace{\overline{z}_i}_{\text{permanent}} + \underbrace{\zeta_{ih}}_{\text{AR(1)}} \\
\zeta_{ih} &= \rho_\zeta \zeta_{i,h-1} + \epsilon_\zeta \\
\overline{z}_{child} &= \rho_z \overline{z}_{parent} + \epsilon_z
\end{aligned}
$$

Production Technology

Back

- Final goods producer buys intermediate goods and combines with labor to produce the final given by

$$Y = Q^{\alpha} L^{1-\alpha} \text{ with } Q = \left(\int_i x_i^{\mu} \right)^{1/\mu}$$

- The problem of the final good producer can be written as

$$\max_{\{x_i\}, L} \left(\int_i x_i^{\mu} \right)^{\alpha/\mu} L^{1-\alpha} - \int_i p_i x_i - wL,$$

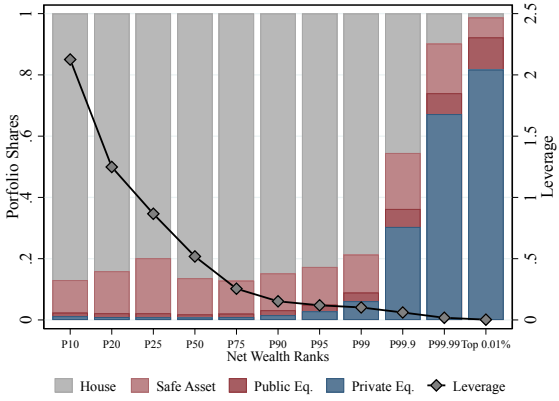
  where p_i is the price of the intermediate good i and w is the wage rate

- The entrepreneurs/household produce intermediate goods using capital k and ability z

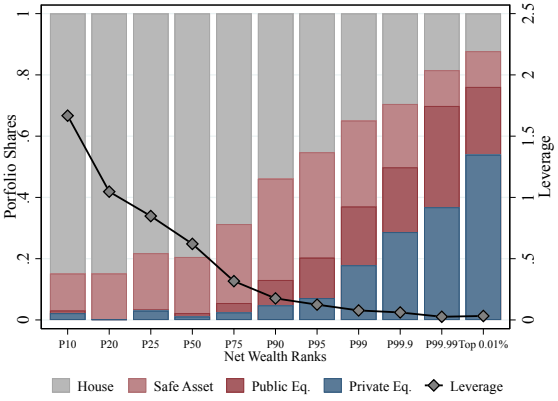
$$\begin{aligned} \pi(k,z) &= p(kz)kz - \delta k = \alpha (kz)^{\mu} Q^{\alpha-\mu} L^{1-\alpha} - \delta k \\ k &\leq \vartheta a \text{ with } \vartheta \geq 1 \end{aligned}$$

Cross-Sectional View: Portfolio Composition

Back



(a) Norway

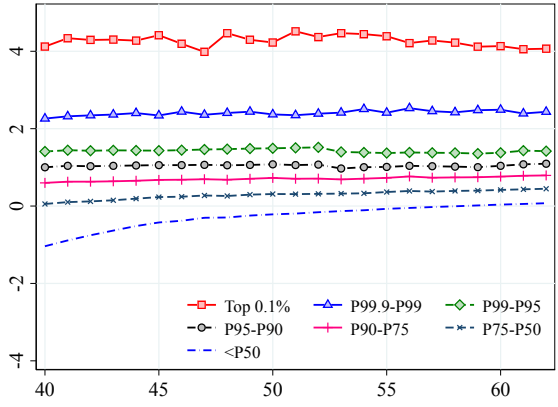


(b) United States (SCF)

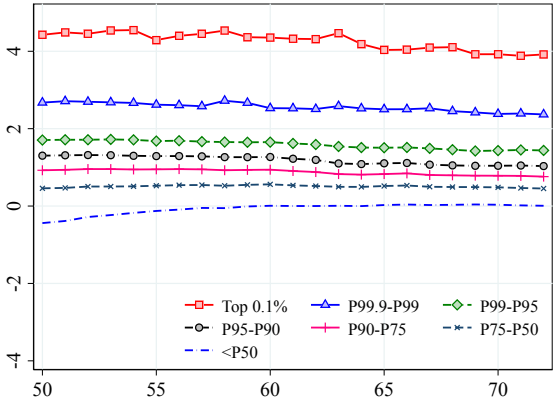
- Significant fraction of private + public equity at the top of the distribution: ~80% in Norway and ~60% in the United States
- Significant difference in public equity: stock market in Norway (~0.65 GDP as of 2017) is smaller than in the United States (~1.5 GDP as of 2017)

Forward-Looking Wealth Profiles for Other Age Groups

Back



(a) Forward-Looking Profile (40/44)



(b) Backward-Looking Profile (50/54)

- Figure shows forward-looking profiles for different age groups ranked by wealth in 1993
- We find little convergence at top percentiles of the distribution

A Flexible Income Process

We estimate an econometric process that has the following features: (i) an AR(1) process (z_t^j) with innovations drawn from a mixture of normals, whose mixture probability can vary with age; and (ii) an i.i.d. normal mixture transitory shock (ε_t^j), whose mixture probability can again vary with age:

$$\text{Level of log earnings:} \quad y_t^j = g(t) + \alpha^j + z_t^j + \varepsilon_t^j \tag{1}$$

$$\text{Persistent component:} \quad z_t^j = \rho z_{t-1}^j + \eta_t^j, \tag{2}$$

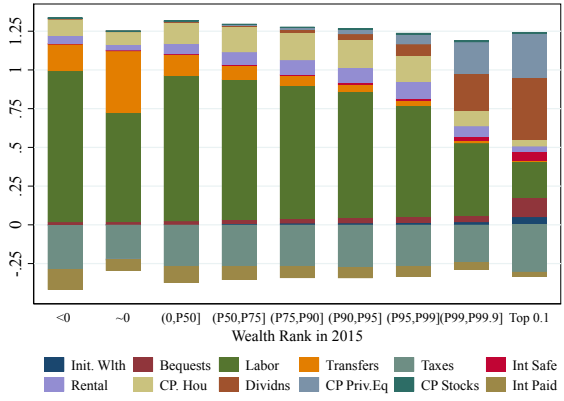
$$\text{Innovations to AR(1):} \quad \eta_t^j \sim \begin{cases} \mathcal{N}(\mu_{\eta,1}, \sigma_{\eta,1}) & \text{with prob. } p_{z,t} \\ \mathcal{N}(\mu_{\eta,2}, \sigma_{\eta,2}) & \text{with prob. } 1 - p_{z,t} \end{cases} \tag{3}$$

$$\text{Initial condition of } z_t^j\text{:} \quad z_0^j \sim \mathcal{N}(0, \sigma_{z_0}) \tag{4}$$

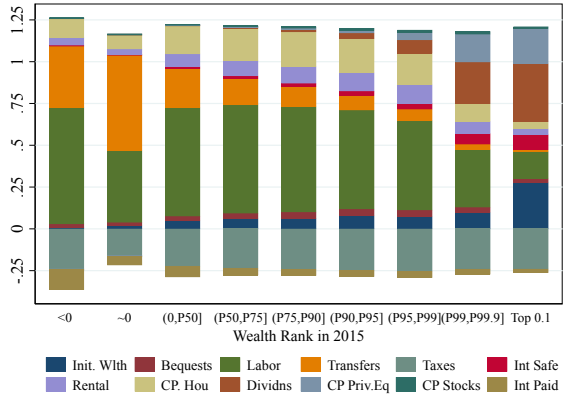
$$\text{Transitory shock:} \quad \varepsilon_t^j \sim \begin{cases} \mathcal{N}(\mu_{\varepsilon,1}, \sigma_{\varepsilon,1}) & \text{with prob. } p_{\varepsilon,t} \\ \mathcal{N}(\mu_{\varepsilon,2}, \sigma_{\varepsilon,2}) & \text{with prob. } 1 - p_{\varepsilon,t} \end{cases} \tag{5}$$

Backward-Looking Decomposing: Total Resources Between 1993-2015

Back



(a) Heads of HHs of 45/49 yrs old

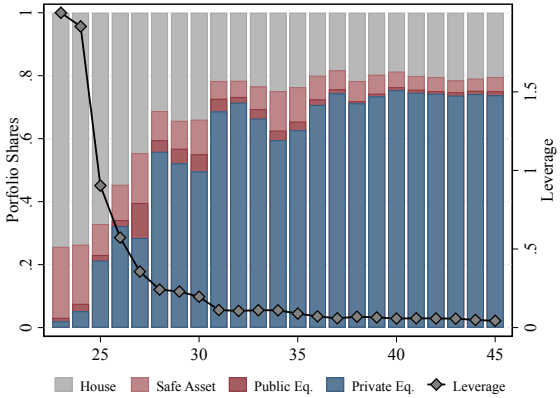


(b) Heads of HHs of 65/69 yrs old

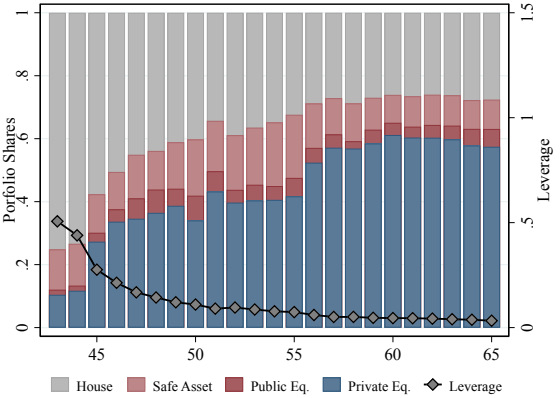
- Figure shows the share of cumulative resources for households between 1993/2015 for two age groups
- The share of initial wealth increases with age as individuals had more time accumulate resources

Backward-Looking Portfolio Shares and Leverage

Back



(a) New Money (Q1 in 1993 and 45/49 yrs old in 2015)

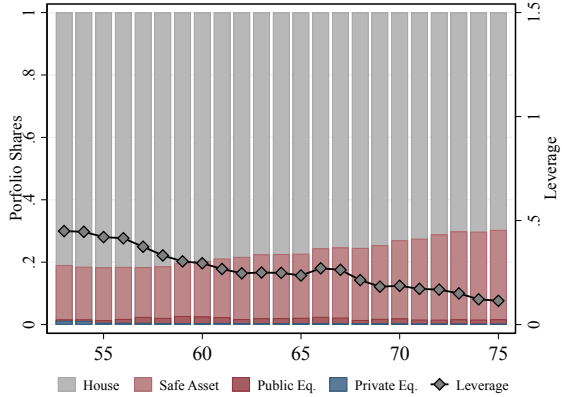


(b) New Money (Q1 in 1993 and 65/69 yrs old in 2015)

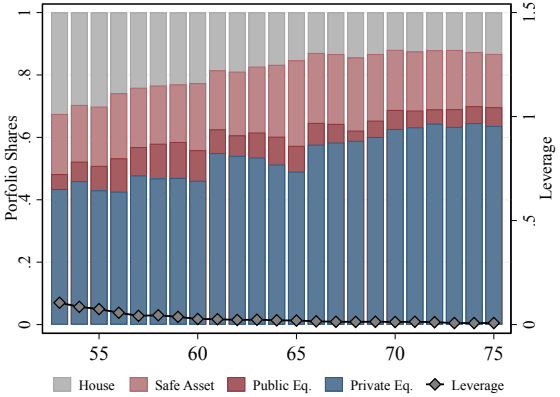
- Similar results for other age groups: those that reach the top of the wealth distribution do so by accumulating private equity
- and taking leveraged positions against their assets (mostly housing at early stages)

Backward-Looking: Retrospective Portfolio Shares for 75/79 years-old in 2015

Back



(a) Households at bottom 50%



(b) Households at top 0.1%

- Figure shows the lifecycle portfolio shares conditional on wealth rank at age 75/79 in 2014/15
- Rich have larger share of wealth on private equity than mid-wealth households over their lifetime

Calculation of Returns on Assets

Back

We follow Fagereng et al. 2020 and calculate returns on assets as

$$r_{it}^{n} = \frac{y_{it}^{s} + y_{it}^{e} + y_{it}^{h} - y_{it}^{b}}{w_{it}^{g} + F_{it}^{g}/2},$$

- y_{it}^{s}, y_{it}^{e}, and y_{it}^{h} are income from financial assets (e.g. bonds), equity (e.g. stock and private equity), and housing
- y_{it}^{b} is the sum of interest paid in all forms of debt
- w_{it}^{g} is the stock of wealth at the beginning of the period
- F_{it}^{g} is net flows of gross wealth during period (assets yields happens during year and hhs add/subtract from assets)

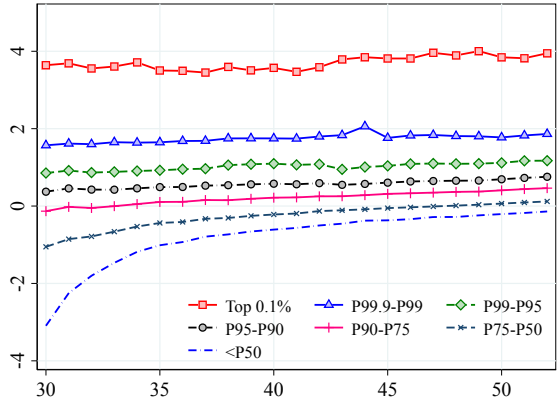
We calculate similar returns for safe assets, equity, and housing, which income flows are calculated as follows

- y_{it}^{s}: interest income
- y_{it}^{e}: dividend income + capital gains from stock + capital gains from stocks
- y_{it}^{h}: income from non occupied house + capital gains from housing

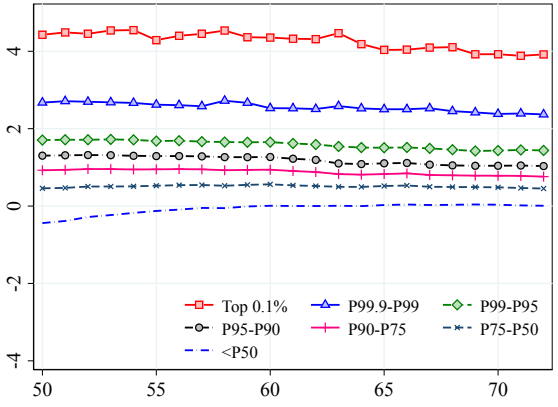
We calculate returns for household with assets above \$500 USD and winsorize top and bottom 0.5% in each year

Forward-Looking Wealth Profiles for Different Age Groups

Back



(a) Wealth Profile for 30/34 yrs old in 1993

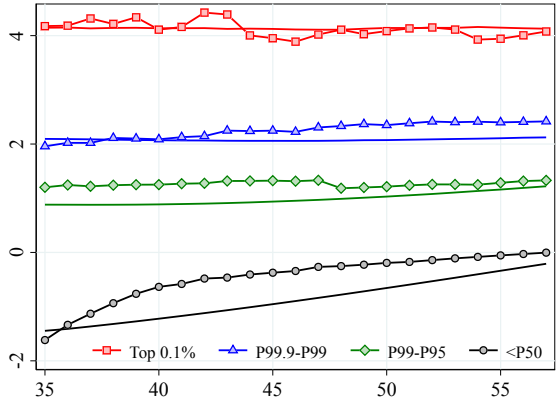


(b) Wealth Profile for 50/54 yrs old in 1993

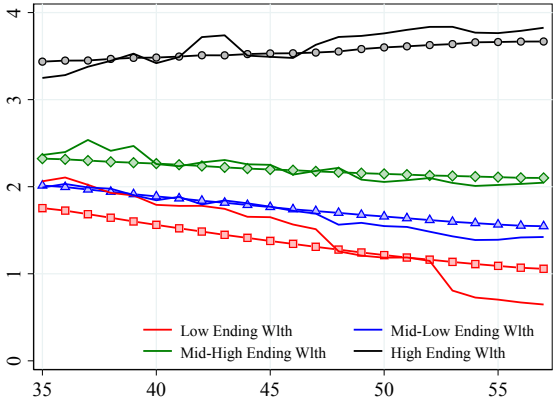
- Wealth differences persist later in life as workers move into retirement (right plot)
- with little catch-up from households at bottom half of the distribution

Model Fit: Forward-Looking Profiles by Wealth Ranks

Back



(a) Mean Wealth by Wealth Rank (2015)

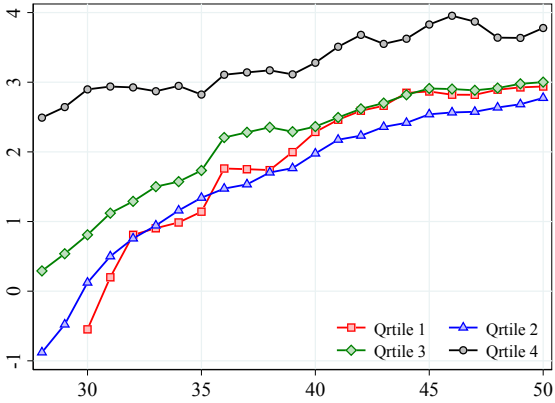


(b) Top 1% Mean Wealth (1995) by Qtiles of Wealth (2015)

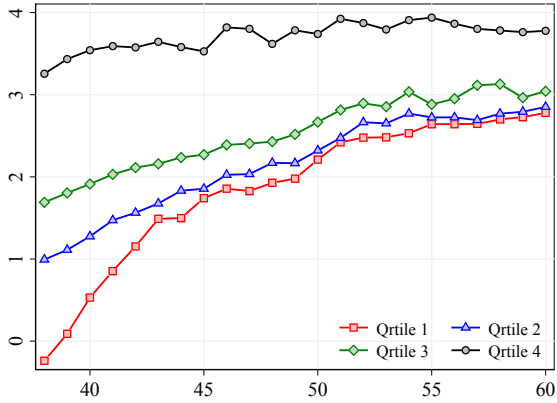
- Model matches wealth accumulation for rich hhs looking forward
- It fails in accounting for the rapid increase in wealth experienced by those that start poor

Backward-Looking: Average Wealth for those at top 1% in 2015 for Age Groups

▸ Back



(a) Relative wealth for 45/49 yrs old in 2015

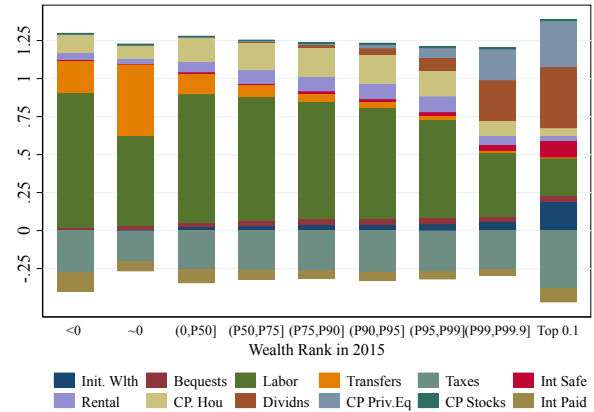


(b) Relative wealth for 65/69 yrs old in 2015

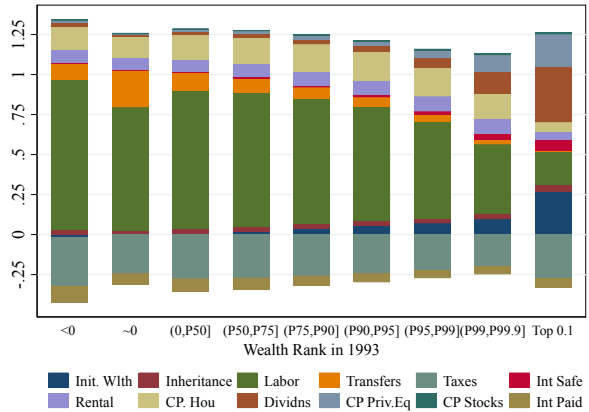
- Evolution of log-wealth conditional on last-period wealth rank (top 1% in 15) and by starting wealth quartile (in 93)

Total Resources Between: Details and Forward

Back



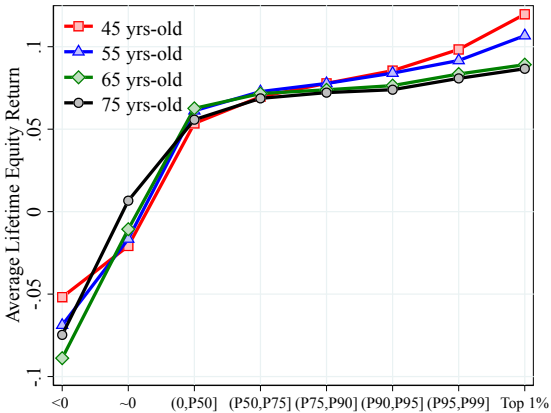
(a) Backward-Looking (Ranked in 2015)



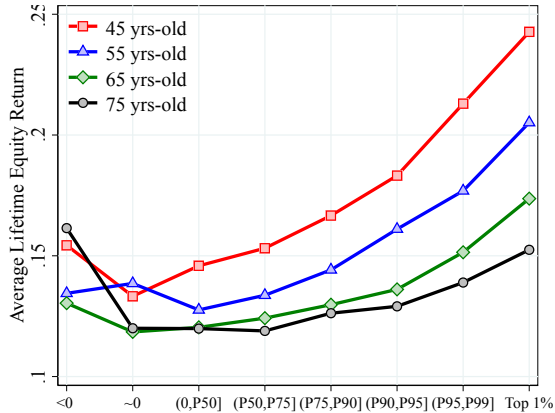
(b) Forward-Looking (Ranked in 1993)

Forward-Looking Lifetime Returns on Assets,

Back



(a) Returns on Total Assets

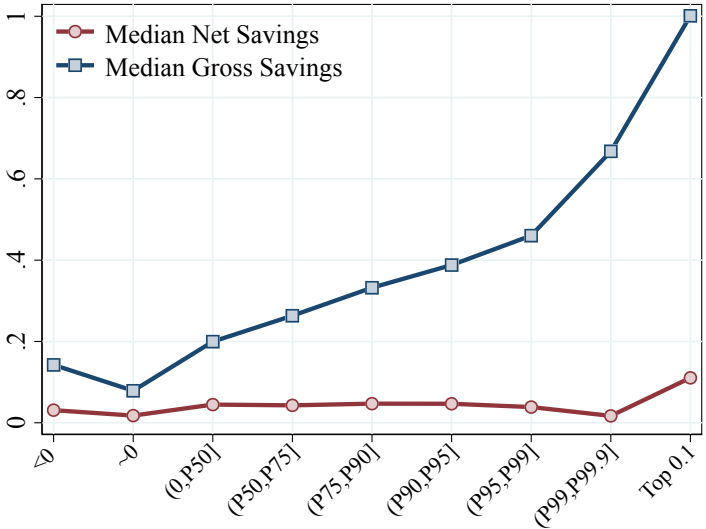


(b) Returns on Private Equity

- We rank individuals in 1993 and we look returns on assets looking forward
- Hhs at the top experience larger lifetime returns, mostly from equity;

Forward Looking Saving Rate Across the Distribution

Back



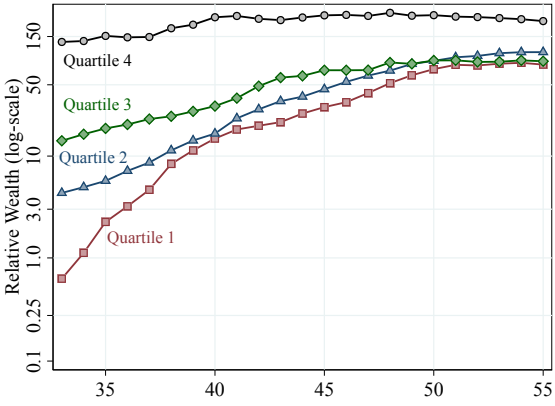
Average saving rate over lifetime
Fagereng-Blomhoff-Moll-Natvik (2020)

Households ranked with respect to wealth in 1993

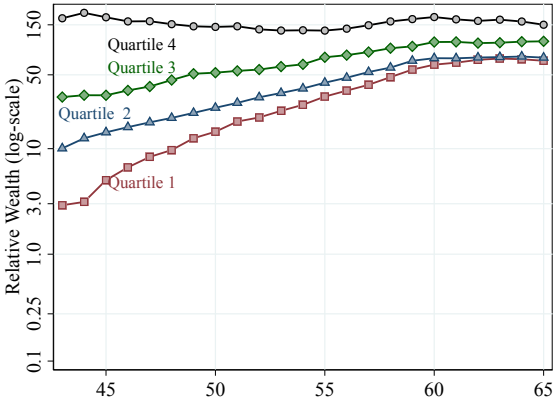
Rich household have higher saving rates over lifetime

Backward-Looking: Average Wealth for those at top 0.1% in 2015

Back



(a) Households of 55 yrs old

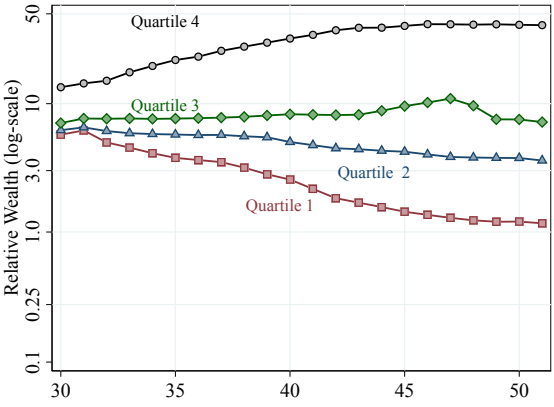


(b) Households of 65 yrs old

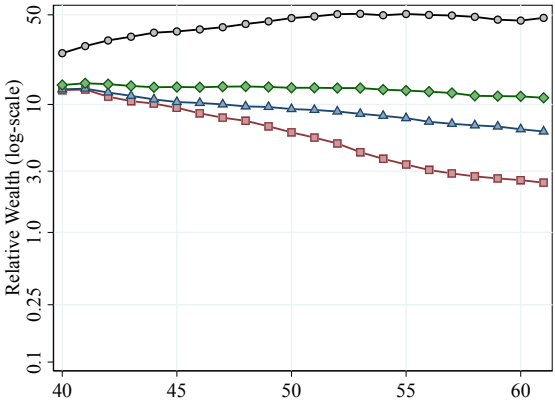
Households that reach the Top 0.1% experience rapid wealth growth early in life

Forward-Looking: Average Wealth for those at top 1% in 2013

Back



(a) Households of 30 yrs old in 1993

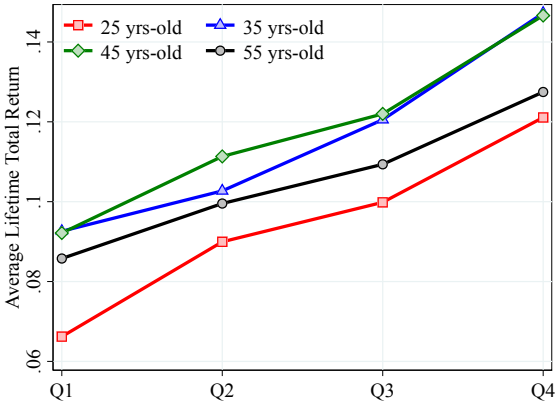


(b) Households of 65 yrs old

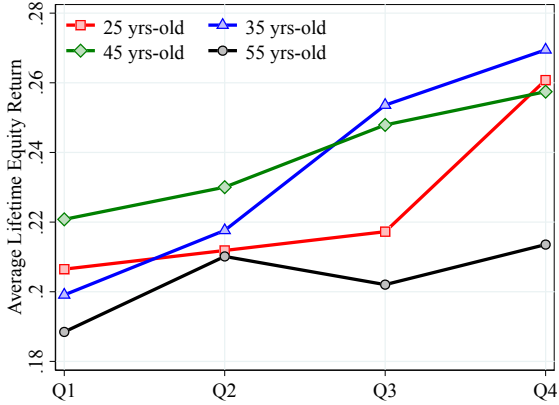
Those households that drop from top 1% do by slowly reducing their wealth

Forward-Looking: Lifetime Returns on Assets

Back



(a) Returns on Total Assets

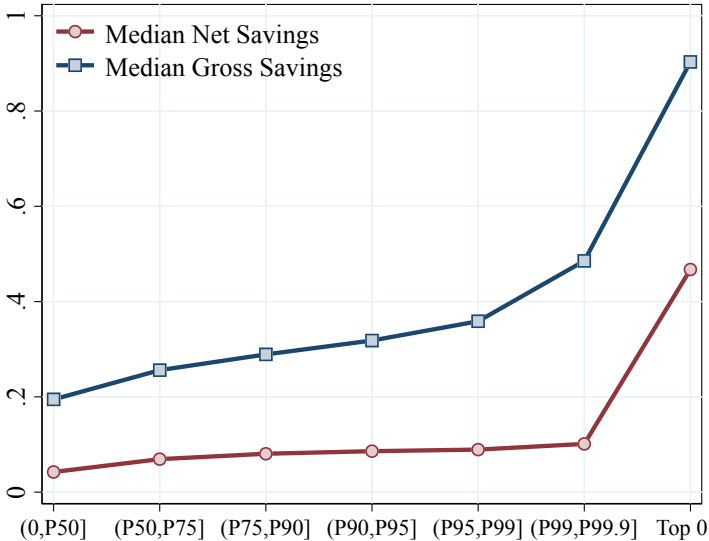


(b) Returns on Equity

- Average lifetime return for Top 1ers in 1993 by 2015 wealth quartile
- Those that fall to the bottom of the distribution, experience lower returns that those that remain at the top

Saving Rate Across the Wealth Distribution

Back



Average saving rate over lifetime
Fagereng-Blomhoff-Moll-Natvik (2020)

Rich household have higher saving rates over lifetime

Forward

Lifetime Returns on Assets Across the Wealth Distribution

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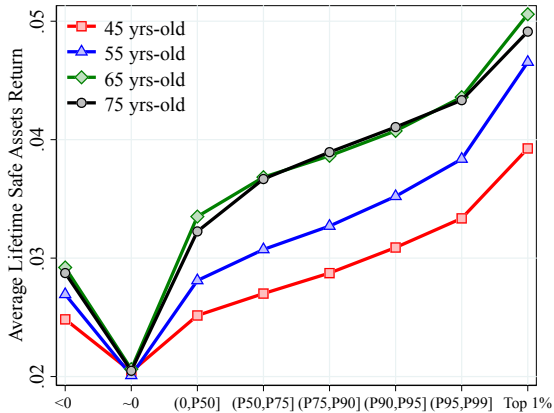
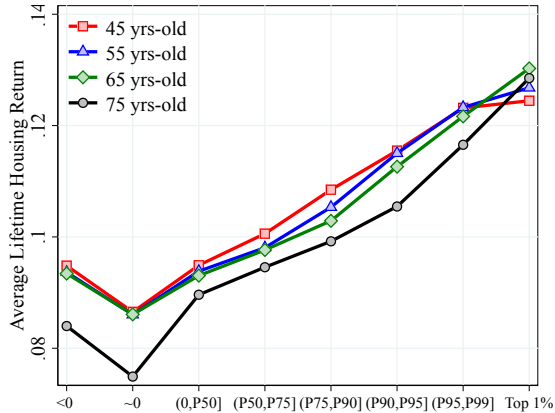


(a) Returns on Safe Assets



(b) Returns on Housing

- Calculate returns on assets (Fagereng et al., 2020) and calculate 20 yrs average ▸ Details
- Rich households experience higher returns on housing and safe assets

Household Problem

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Working Periods: define $a = k + b$, then for a given state vector $\mathbf{S} = \{y_{ih}, z_{ih}\}$

$$\begin{aligned} V_h(a,\mathbf{S}) &= \max_{c,a'} \left\{ u(c) + s_{h+1}\phi\left(a'\right) + \beta s_{h+1} E\left[V_{h+1}(a',\mathbf{S}') \mid x \right] \right\} \\ \text{s.t.} \quad & c + a' = a + \max\{\pi(a,z) - c_f, 0\} + wy_h - T\left(wy_h, a, \pi(a,z)\right) \\ & a' \geq 0 \text{ and } k \leq \vartheta a \end{aligned}$$

Retirement Periods: individuals retire in period R and get retirement income y_R

$$\begin{aligned} V_h(a,\mathbf{S}) &= \max_{c,a'} \left\{ u(c) + s_{h+1}\phi\left(a'\right) + \beta s_{h+1} E\left[V_{h+1}(a',\mathbf{S}) \mid x \right] \right\} \\ \text{s.t.} \quad & c + a' = a + \max\{\pi(a,z) - c_f, 0\} + y_R - T\left(y_R, a, \pi(a,z)\right) \\ & a' \geq 0 \text{ and } k \leq \vartheta a \end{aligned}$$

- $T\left(wy_h, a, \pi(a,z)\right)$ includes Norway taxes on income, wealth, and inheritances
- Retirement income, $y_R \equiv y_R(\lambda_i, e)$, following Norway replacement rate

Estimation and Calibration

▸ Back

Moment	*Data*	*Model*	*Parameter*		*Value*
Top 1% wealth share	0.200	0.183	discount factor	$\bar{\beta}$	0.892
Wealth-labor income ratio	6.368	6.845	entrepr. ability fixed, mean	$\bar{z}$	-0.606
Mean return (weighted, pp)	5.500	4.916	entrepr. ability fixed, inter-gen. persistence	ρ_z	0.362
Return fixed effect (pp), inter-gen. correlation	0.094	0.096	entrepr. ability fixed, st. dev.	σ_{ϵ_z}	0.268
Return fixed effect (pp), st. dev.	3.600	3.548	entrepr. ability transitory, st. dev.	σ_{ϵ_ζ}	0.966
Residual return (pp), st. dev.	8.600	9.216	decreasing returns to scale	μ	0.988
Mean return P99+ vs. P50-75 by wealth (pp)	2.000	2.243	fixed cost business	c_f	1.639
Fraction business owners	0.072	0.075	bequest utility, weight	χ_1	100.181
Annual bequest flow over wealth (pp)	0.896	0.917	bequest utility, shifter	χ_2	43.579
P99.9 bequest flow over wealth	0.850	1.731			
Intermediate goods market clearing	0.000	-0.215	intermediate good aggregator	Q	29.393

Source: FGMP (returns), own computation using Norwegian admin data (wealth inequality, business owners, bequests).

Parameters obtained externally

- Estimate y_h to match dynamics labor earnings lvls and growth rates
- Other from standard values or Norway specific (e.g. risk aversion, taxes on income and wealth, etc.)

Parameters estimated internally: Target return heterogeneity, share of entrepreneurs, etc.

- We do not match any of profiles → use profiles to validate model fit

Fraction with Large Inheritance or Initial Wealth by Age 50

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	Share out of Total Lifetime Resources							
	Top 0.1% Wealth Group				Top 1% Wealth Group			
	P50	P90	P95	P99	P50	P90	P95	P99
Inheritance	0%	4%	9%	34%	0%	5%	10%	32%
Initial Wealth	8%	74%	85%	99%	14%	55%	70%	86%
Inheritance+Init. Wealth	10%	77%	86%	99%	16%	58%	71%	89%

- Previous decomposition shows average shares out of average total resources—masking heterogeneity
- Table shows pctiles of the share of inheritances and initial wealth out of total resources by wealth level
- Initial wealth/inheritances: relatively small on average but some rich hhs get large estates