

Wealth Distribution: The State of the Art

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Econ721

April 13, 2026

Introduction

Now we have half a dozen explanations for why the top 1% are so rich:

1. **Bequests**
2. **Entrepreneurship**
3. **Rate of return** heterogeneity.
Rich households own mostly equity with high returns.
4. **Preference heterogeneity** Krusell and Smith (1998); Carroll et al. (2017).
Even tiny heterogeneity in patience generates lots of wealth inequality.
5. Rare **high-income states** Castaneda et al. (2003).

Plus a few less common stories, such as health or old age expenditure risk.

What Comes Next?

Each explanation supposedly accounts for more than half of the high top 1% wealth holdings.

- ▶ Clearly, they cannot all be as important as the authors claim.

The final step: Horse races.

- ▶ Put several of the explanations into a single model.
- ▶ Quantify their relative importance.

Empirical Progress

New administrative data

- ▶ large sample sizes
- ▶ include the very richest households
- ▶ long panels

We can measure

- ▶ incomes and wealth of the very rich
(US tax returns) Alvaredo et al. (2013)
- ▶ income sources of the rich
(Register data for Norway and Sweden) Fagereng et al. (2020)
- ▶ time series changes in top wealth and income shares

Top Income Shares

Top 1 Percent Income Share in the United States

Alvaredo et al. (2013), fig 1



Source: Source is Piketty and Saez (2003) and the World Top Incomes Database.

Top Wealth Shares

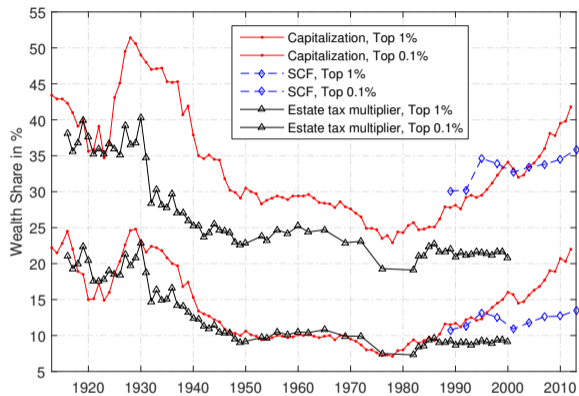
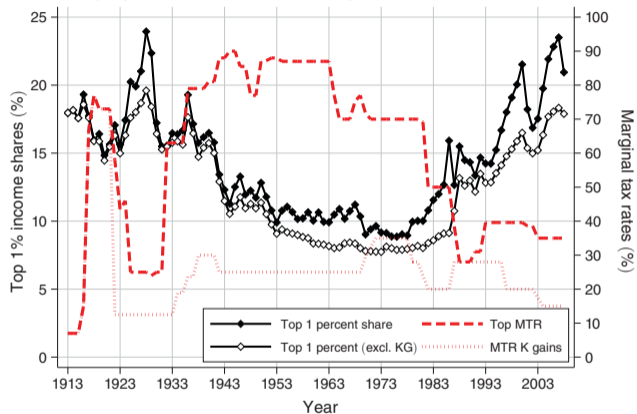


Figure 1: Top wealth share measurements over time

Hubmer et al. (2020)

Top Marginal Tax Rates

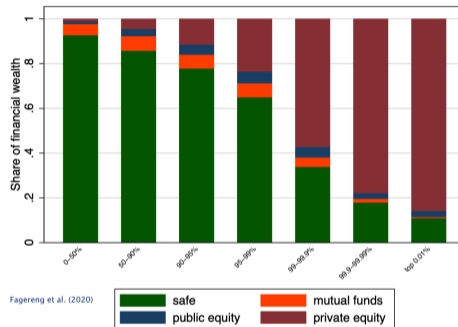
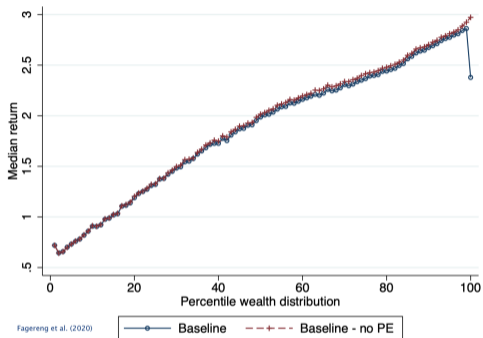
Panel A. Top 1 percent income shares and Top MTR



Piketty et al. (2014)

Obvious hypothesis: Taxes drive top wealth shares.

Rates of Return



The rich hold risky, high return assets.

Obvious hypothesis: high returns explain high wealth of the rich.

The Horse Race

Now we are getting to the state of the art: Hubmer et al. (2020)

Two contributions:

1. Quantify the sources of wealth inequality.
Horse race with earnings shocks, preference heterogeneity, and rate of return heterogeneity.
2. Use the model to quantify why the wealth distribution changed over time.

The Story

Why are the rich so rich?

- ▶ They have high rates of return (exogenous).
- ▶ So they save a lot.

Why do the rich get richer over time?

- ▶ Taxes become less progressive.

Key innovation:

Model how rates of return differ across households and over time.

The Model

Demographics: There is a unit mass of infinitely lived households.

- ▶ Note: Cannot quantify the role of bequests (or get them right).

Preferences:

$$u(c_0) + \mathbb{E} \sum_{t=1}^{\infty} D_t u(c_t) \quad (1)$$

- ▶ Stochastic discount factor: $D_t = \prod_{s=0}^{t-1} \beta_s = \beta_0 \times \dots \times \beta_{t-1}$.
- ▶ The period discount factors β_t are random.
 - ▶ a la Krusell and Smith (1998)

Endowments

Discount factors: β_t (Markov)

Labor supply in efficiency units: $l(p, v)$

- ▶ p : persistent shock (Markov)
- ▶ v : transitory shock (i.i.d.)

So far, this is a version of Krusell and Smith (1998)

Technology and Markets

Technology: $F(K, L) + (1 - \delta)K = C + K'$

Markets: Competitive markets for

- ▶ goods (numeraire)
- ▶ labor rental (w)
- ▶ capital rental (complicated...)

Rate of Return Heterogeneity

The household's individual rate of return depends on wealth:

$$\underline{r}_t + r_t^X(a_t) + \sigma_t^X(a_t) \eta_t \quad (2)$$

where

- ▶ \underline{r}_t : common aggregate return
- ▶ $r_t^X(a_t)$: time-varying rich/poor gradient in mean returns
- ▶ η_t : i.i.d. shock
- ▶ $\sigma_t^X(a_t)$: time-varying shock variance

Motivation

Why these model ingredients?

Rate of return heterogeneity

- ▶ Empirical estimates for Nordic countries (good data!)
- ▶ Clear evidence that mean and variance of returns are higher for richer households.

Preference heterogeneity

- ▶ A mop-up factor
- ▶ Unmodeled heterogeneity that allows the model to match data.

Everything else is standard (as it should be!)

Household Problem

Cash on hand (current period resources):

$$x_t \equiv a_t + y_t - \tau_t(y_t) + (1 - \tilde{\tau}_t)\tilde{y}_t + T_t \quad (3)$$

where

- ▶ a = assets
- ▶ y = income subject to income tax τ

$$y_t = (\underline{r}_t + r_t^X(a_t)) a_t + w_t l(p_t, v_t) \quad (4)$$

- ▶ \tilde{y} = income subject to capital income tax $\tilde{\tau}$

$$\tilde{y}_t = \sigma_t^X(a_t) \eta_t a_t \quad (5)$$

Household Problem

Budget constraint: $c_t = x_t - a_{t+1}$.

$$V_t(x, p, \beta) = \max_{a' \geq \underline{a}} u(x - a') + \beta \mathbb{E} V_{t+1}(x', p', \beta') \quad (6)$$

Notes:

- ▶ β_t is a state
- ▶ t is a state

Steady State Equilibrium

Objects:

- ▶ $K, \underline{r}, w, r, T$
- ▶ household value functions and decision rules.
- ▶ $\Gamma(a, p, \beta, v, \eta)$: distribution of households.

Equilibrium conditions:

1. Household: as usual.
2. Firms: w, r are marginal products.
3. Government budget constraint: T equals total tax revenues.
4. Capital market clears: $K = \int a \times d\Gamma(a, p, \beta, v, \eta)$
5. Capital income identity

$$rK = \int (\underline{r} + r^X(a) + \sigma^X(a)\eta) \times d\Gamma(a, p, \beta, v, \eta) \quad (7)$$

Calibration

Base parameters: 1967 steady state.

- ▶ standard parameters for technology (Cobb-Douglas)
- ▶ risk aversion

Time-varying + observable:

1. Tax schedules.
2. Earnings process.
3. Asset returns (below)

Fixed and unobservable:

- ▶ Discount rate heterogeneity
- ▶ Matches 1967 wealth distribution

Calibration: Asset Returns

Take as given and fixed:

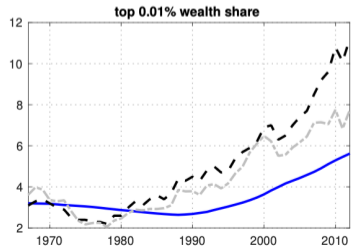
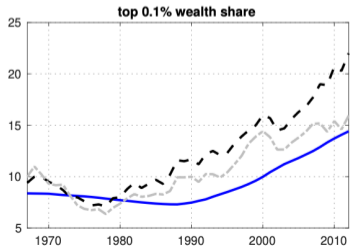
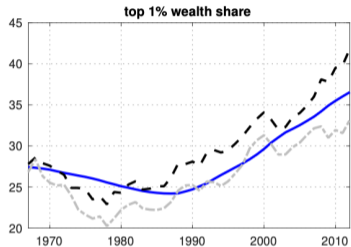
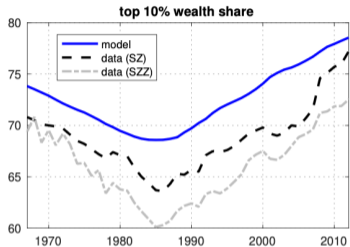
- ▶ portfolio shares by wealth $w_c(a)$
- ▶ richer household hold more equity
- ▶ mean excess returns by asset class and wealth $\tilde{r}_c^X(a)$
- ▶ variance of excess returns by asset class and wealth $\sigma_c^X(a)$
- ▶ Swedish data: Fagereng et al. (2020)

Time-varying (observable)

- ▶ mean excess return of each asset class $\bar{r}_{c,t}$

Model Fit

Figure 8: Top wealth shares in %, 1967–2012 Hubmer et al. (2020)



Wealth Distribution 1967

#	Hubmer et al. (2020), Tb 2	top 10%	top 1%	top 0.1%	top 0.01%	Gini
1	β -heterogeneity	8.8%	7.7%	3.8%	2.0%	0.050
2	earnings heterogeneity	-27.5%	-17.8%	-9.5%	-6.4%	-0.173
3	persistent	-5.0%	-7.5%	-4.2%	-2.9%	0.009
4	transitory	-11.6%	-4.3%	-1.7%	-0.9%	-0.109
5	tax progressivity	-21.3%	-61.8%	-71.2%	-67.1%	-0.148
6	return heterogeneity	29.5%	18.4%	6.6%	2.8%	0.192
7	mean differences	25.8%	16.7%	6.0%	2.6%	0.174
8	return risk	0.7%	2.2%	3.3%	2.5%	0.004

Contribution of each channel.

Example: Tax progressivity **lowers** top 1% share by 62%

Key points

Rate of return heterogeneity is important.

- ▶ Without it, top 1% share falls from 27% to 9%
- ▶ We would be back to Huggett (1996)

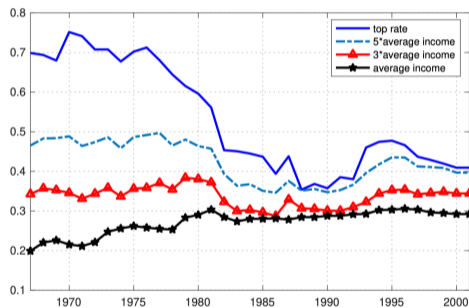
Preference heterogeneity also important.

Tax progressivity is key for limiting wealth inequality.

Time Series Experiment

Solve the model forward (perfect foresight equilibrium).

Main finding: Tax progressivity is the main driver of rising top wealth shares.



Data source: Piketty & Saez (2007).

An Empirical Alternative

Hubmer et al. (2020) used a structural model to run a horse race between channels.

Ozkan et al. (2023): same question, but **purely empirical**.

With good enough data, you can go a long way without a model.

Norwegian Administrative Data

Population-level panel, 1993–2015.

- ▶ Assets, liabilities, all income sources, taxes, transfers, inheritances.
- ▶ Every component of the household budget constraint is observed.

Advantages over US data:

- ▶ SCF is cross-sectional. PSID misses the top 1%.
- ▶ Long panel \Rightarrow lifecycle wealth dynamics.
- ▶ Large sample \Rightarrow precise estimates even for the top 0.1%.

How the Rich Differ

Focus: **top 0.1%** of households aged 50–54.

- ▶ **Start rich:** at age ~ 28 , they already own $20\times$ average wealth.
- ▶ **Portfolio:** 80–90% in equity (mostly private businesses).
 - ▶ Bottom 50%: $\sim 90\%$ in housing.
- ▶ **Returns:** long-run average return on net wealth $\approx 10\%$
 - ▶ $\approx 1.5\%$ for bottom 50%.
 - ▶ Driven by portfolio composition, not within-asset-class differences.
- ▶ **Income:** 83% of lifetime income from equity (dividends + capital gains).
 - ▶ Bottom 90%: 80–90% from labor.
- ▶ **Saving rates:** $\sim 70\%$ for top 0.1%
 - ▶ $\sim 10\%$ for bottom half.

Counterfactual Decomposition: Method

Start from the yearly budget constraint:

$$W_t = W_{t-1} + \left(\tilde{L}_t + \tilde{H}_t + \tilde{R}_t W_{t-1} \right) \times S_t$$

where

- ▶ \tilde{L} = after-tax labor income,
- ▶ \tilde{H} = inheritances,
- ▶ \tilde{R} = after-tax return,
- ▶ S = saving rate.

Decomposition Method

Counterfactual:

- ▶ Replace one variable at a time with the average for mid-wealth households (P25–P75).
- ▶ Simulate the wealth path forward.

Problem:

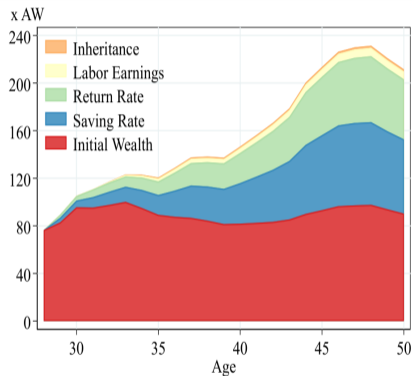
- ▶ The marginal effects depend on the order of replacement and
- ▶ they do not add up to 100%.

Solution: Shapley-Owen decomposition.

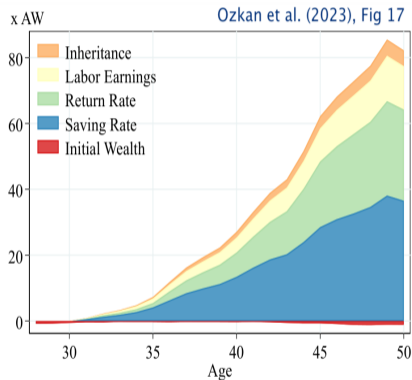
- ▶ Average the marginal contribution of each factor across all $5! = 120$ permutations.
- ▶ Result: an exact, additive decomposition of the wealth gap.
- ▶ Caveat: ignores behavioral responses (first-order effects only).

Main Result

(A) Old Money



(B) New Money



How much does each “endowment” change the wealth of the rich?

Saving rates and initial wealth are most important for the rich.

But 1/4 is “New Money” (no initial wealth).

Main Result

The top three channels each account for $\approx \frac{1}{3}$ each

1. initial wealth
2. rates of return
3. saving rates

Saving rate heterogeneity is as important as return heterogeneity.

- ▶ Now we do need a structural model.

Takeaways

With comprehensive administrative data, a transparent empirical decomposition can quantify the importance of each channel.

1. Saving rate heterogeneity is **at least as important** as return heterogeneity.
 - ▶ A challenge for models that focus only on returns.
2. But: saving rates may be a *proximate* cause, enabled by high returns and high labor income.

A structural model is still needed.

- ▶ But now we have data to discipline it much better.

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