Wealth, Returns, and Taxation: A Tale of Two Dependencies

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Introduction

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- Whether/how taxing wealth: depends on the *origins* of the relation between returns and wealth.

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Interaction of **(1)** *and* **(2)** implies different motives for taxing wealth.

What We Find: Overview

In quantitative benchmark US economy with both type/scale-dependence:

A. If returns reflect purely MPK, welfare-max wealth tax is *positive* at 0.8%.
   - **scale-dependence** pushes toward a **small negative** wealth tax.
     behavioral response of high return investments.
   - **type-dependence** pushes toward a **high positive** wealth tax.
     reinforces *selection* of high return investors at the top.

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B. If returns reflect partially rents, wealth tax roughly unchanged at 0.8%,
   - wealth tax is **higher** under scale: limits rent-seeking behavior.
   - wealth tax is **lower** under type: avoids selecting rent-seekers.

   $\rightarrow$ both forces offset each other.

Related Literature

How does the literature compare to our paper?

- Many frameworks implicitly use **type** *or* **scale** dependence to generate high **wealth inequality** (and its dynamics).

  Gabaix et al. (2016), type: Cagetti & De Nardi (2006), Moll (2014), Herranz et al. (2015), Gomez (2017), Guvenen et al. (2019), scale: Galor & Zeira (1993), Kaplan et al. (2018), Kacperczyk et al. (2019), Hubmer et al. (2021), Meeuwis (2021)

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- **Wealth taxation** with return heterogeneity
  - type-dependence in macro: Guvenen et al. (2019), Boar & Midrigan (2021)
  - scale with fixed type in public econ: Gerritsen et al. (2020), Schulz (2021)
  - rent-seeking: Rothschild and Scheuer (2016), Scheuer & Slemrod (2021)

  $\Rightarrow$ unify results depending on the *sources* of return heterogeneity.

Roadmap

1. **A simple model**
   - isolate key statistics to study inequality – efficiency – tradeoff.
   - unify the literature on return heterogeneity and redistribution.

2. **A full-blown quantitative dynamic model calibrated to the US**
   - endogenous joint distribution of wealth and skill types.
   - characterization of optimal wealth taxation.

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  - **risky assets** with gross return R^{risky}, used in entrepreneurial sector.
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risky asset share: $\omega(a, \vartheta) \propto \vartheta a^{\gamma}$ Microfoundation

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$\rightarrow$ γ: wealth-dependent risk-taking elasticity.

$\rightarrow$ ϑ: "type"-specific shifter.

$\rightarrow$ reduced form generates **correlation** btw portfolio and wealth/type.

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Production: two technologies (risky/safe)

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$\rightarrow$ introduce wedge μ btw private returns R^{risky} and social returns MPK^{risky}

$$MPK^{risky} = \mu R^{risky} + (1 - \mu) MPK^{safe} ,$$

modeled as a zero-sum game: lower μ reduces overall returns. Equilibrium

Four Key Statistics

Efficiency/output is given by aggregating risky/safe investments

$$Y = F\Big(\int_{a,\vartheta} \text{capital}^{\textit{efficient}}\big(\underbrace{\omega(a,\vartheta)}_{\text{portfolio}}, \mu \big) \ \underbrace{d\mathcal{G}(a,\vartheta)}_{\text{joint density}}, \text{Labor} \Big) \ .$$

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Four key parameters to characterize $d\mathcal{G}(a,\vartheta)$ and $\text{capital}^{efficient}$:

η: shape of the wealth distribution, assuming $a \sim Pareto(\eta)$,

ϱ: **sorting of skilled-type** along the distribution, i.e. $cov(\vartheta, a)$,

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Efficiency-Inequality Decomposition

Proposition: *the marginal effect of a change in inequality on output can be decomposed as*

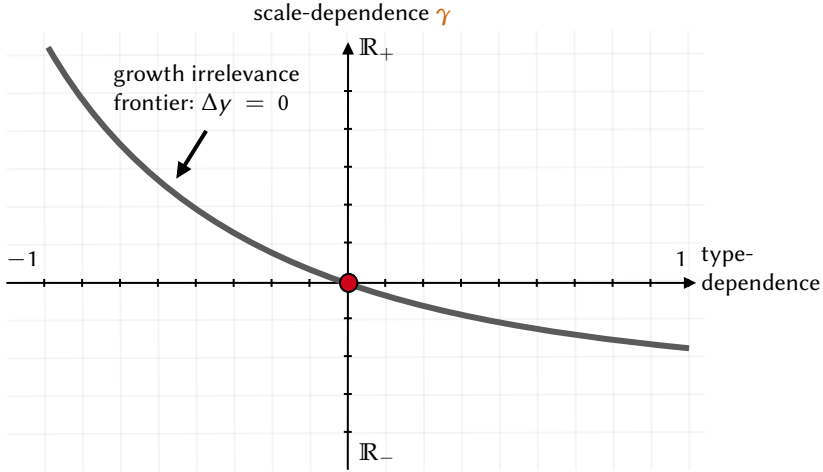
$$\Delta y \propto \underbrace{\mu}_{\substack{\text{pass-through} \\ \text{MPK–returns}}} \left(\underbrace{\Lambda^S(\eta) \cdot \gamma}_{\substack{\textbf{scale-dep} \\ \text{if } \gamma \neq 0}} + \underbrace{\Lambda^T(\eta) \cdot \varrho}_{\substack{\textbf{type-dep} \\ \text{if } \varrho \neq 0}} + \underbrace{\Lambda^{ST}(\eta) \cdot \varrho \cdot \gamma}_{\text{interaction}} \right),$$

where $\mathbf{\Lambda}$ is a vector of positive "model-specific" inequality multipliers.

A variation in the Pareto tail (e.g. through a wealth tax):

- $\gamma \neq 0$: changes investment *behavior* of a given household.
- $\varrho \neq 0$: changes allocation of wealth *between* skill-types.

Efficiency-Inequality Diagram



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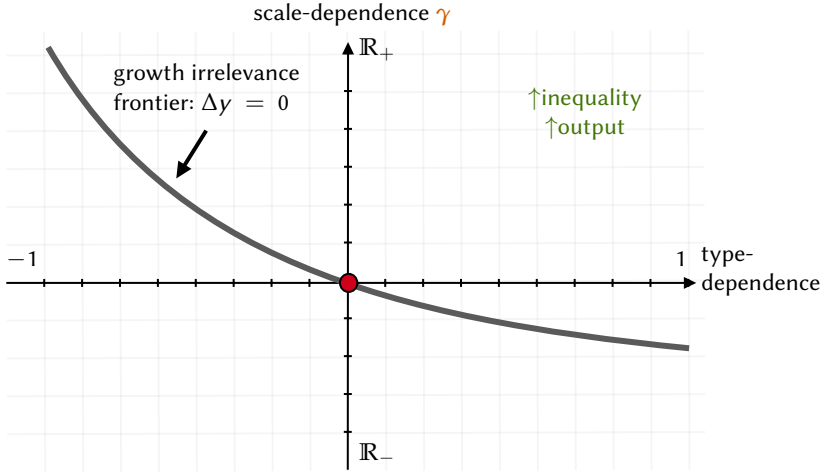

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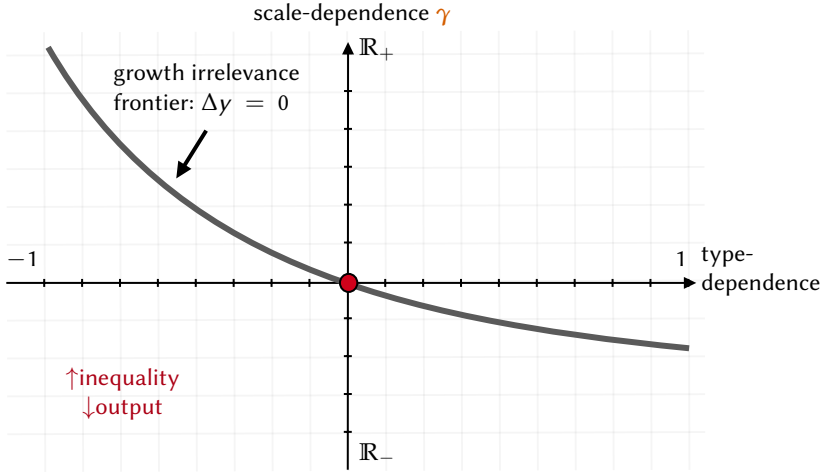

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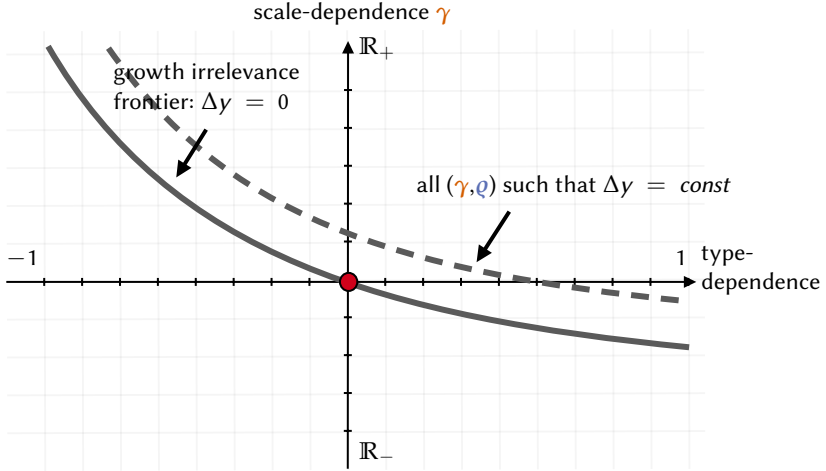

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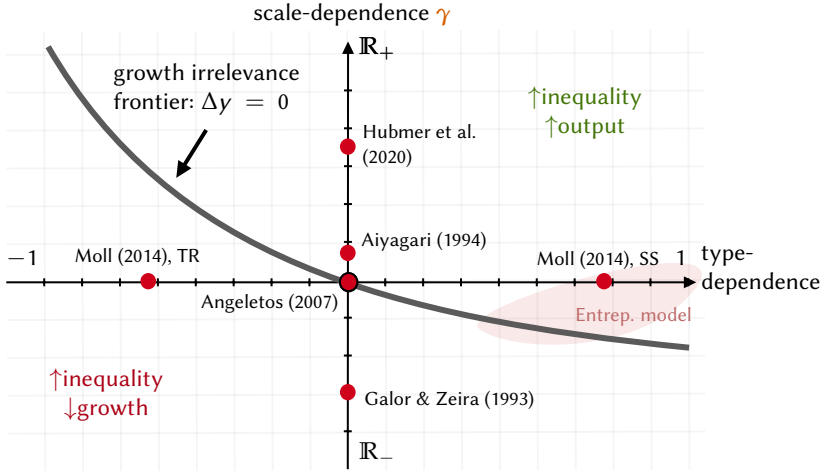

- Some models boil down to a particular representation of weights $\Lambda(\eta)$

  ex: many type/scale mechanisms used to generate high wealth inequality

  $\rightarrow$ important when it comes to redistribution.

From Efficiency to Welfare

Wealth redistribution trade-offs: Equilibrium Conditions

1. **inequality-efficiency** (Δy): affects equilibrium wages, trickle down.
2. **rents** ($\mu < 1$): reduce efficiency link, lower overall returns.
3. **equity**: equalizing marginal utility across households.

Static model: elasticity of response to wealth tax depend on type/scale dep.

$\rightarrow$ additional behavioral response under scale-dependence.

Dynamic model: endogenize joint distribution wealth and skill types.

$\rightarrow$ quantitative structure on inequality weights $\mathbf{\Lambda}(\eta)$.

$\rightarrow$ type/scale dependence generate opposite results for wealth taxation.

Quantitative Dynamic Model: Overview

Extended Aiyagari – Bewley – Huggett economy à la Conesa et al. (2019). Model

- **Households**
  - decide how much to consume and save given prices.
  - earnings: life-cycle, retirement, persistent and transitory component.
  - portfolio $\omega(a, \vartheta)$ driven by skill-types ϑ and wealth a, κ is idio. shock.

$$\text{return:} \quad r(a, \vartheta) = \underline{r} + r_F \cdot (1 - \omega(a, \vartheta)) + r_R \cdot \kappa \cdot \omega(a, \vartheta)$$

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- **Production**
  - final good $F(X, L)$ combines intermediate goods x and labor.
  - x produced with risky/safe assets with different MPKs.

$$x(a, \vartheta) = \Big((1 - \omega(a, \vartheta)) A_F + \omega(a, \vartheta)(\mu A_R + A_F(1 - \mu)) \Big) a$$

Closing the Model

Equilibrium prices: Definition

- wage rate equalizes marginal product of labor.
- $r_F = \underbrace{A_F F_X(X, L)}_{MPK_F}, \quad r_R = A_R F_X(X, L) \geq \underbrace{(\mu A_R + A_F(1-\mu))F_X(X, L)}_{MPK_R(\mu)}$
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Government: implements a wealth tax

$$t_a(a; \tau_a, \underline{a}_{max}) = \mathbb{1}_{a \geq \underline{a}_{max}} \tau_a (a - \underline{a}_{max})$$

- balanced with labor income tax: $T_{labor} + T_a = \overline{G}$.
- **Welfare criterion:** utilitarian consumption equivalent variation Δ^{CEV}, steady-state comparison. Criterion

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  - $\lambda(a)$ matches wealth dependent entry into equity investment in PSID Data
  - $\underline{\pi}_\vartheta$ and $\overline{\pi}_\vartheta$ match fraction of investors and exit.

$\rightarrow$ suppose $\lambda(a) = 0$, *type-dependence* arises if $\underline{\pi}_\vartheta < 1/2$.

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- Parameters $\{\beta, A_R\}$: pin down K/Y ratio, *top wealth inequality* Other Parameters

Wealth Inequality

Different models generate consistent wealth and return distributions.

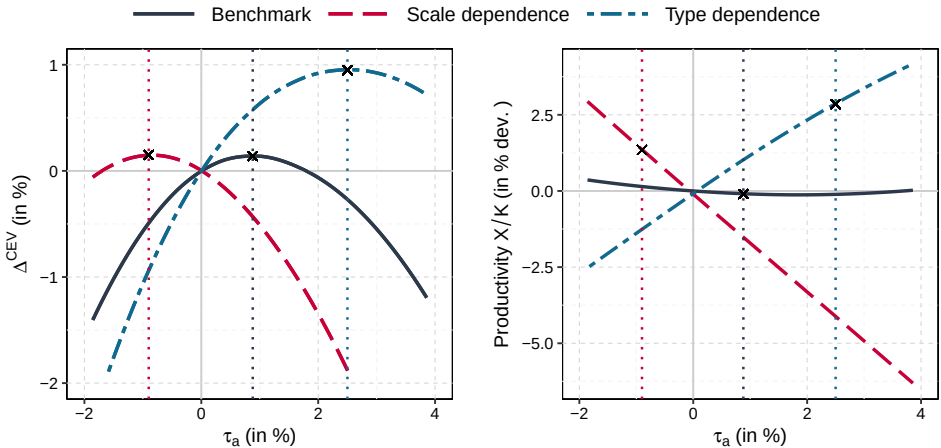
- benchmark: coexistence of type/scale.
- pure scale-model: cross-sectional return heterogeneity from scale only.
- pure type-model: cross-sectional return heterogeneity from types only.

Table 1: Wealth distribution in the data and models.[a]

	Gini [c]	Share of wealth (in %) held by the top x%					
		20	10	5	1	0.1	0.01
US data	0.82	86.4	72.7	59.7	37.2	17.8	7.3
benchmark model	0.80	84.2	71.9	59.3	35.4	18.2	8.9
pure scale model – recalibrated[a]	0.82	85.7	73.6	60.3	35.2	20.7	11.7
pure type model – recalibrated[a]	0.78	82.0	67.1	56.2	35.7	20.2	10.9

[a] recalibrated to match the top 1% wealth share and K/Y ratio.

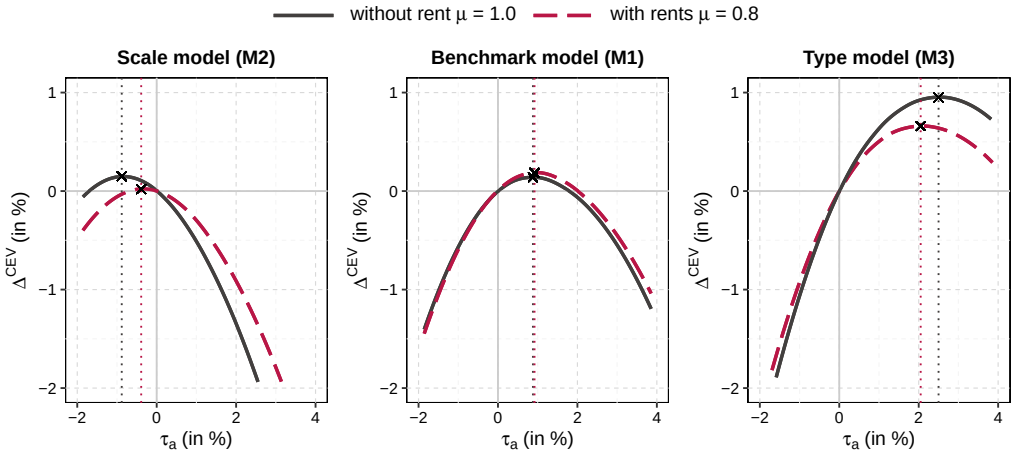
Result A: Positive Wealth Tax



- scale dep: *snowball effect* which amplifies productivity response to tax.
- type dep: *only the fittest survive at the top* → productivity increases. Show

Result B: Effects of Rents

What if returns reflect rents instead of MPK?



- scale dependence: wealth tax **increases** to limit rent-extraction.
- type dependence: wealth tax **decreases** to avoid selecting renters.
- benchmark: both effects offset each other.

Conclusion

To understand how/whether we should tax wealth

- key to distinguishing between **type** and **scale** dependence:

  F. Scott Fitzgerald: *"You know, the rich are different from you and me."*

  Ernest Hemingway: *"Yes. They've got more money."*

- together with whether returns reflect **MPK** or **rents**.

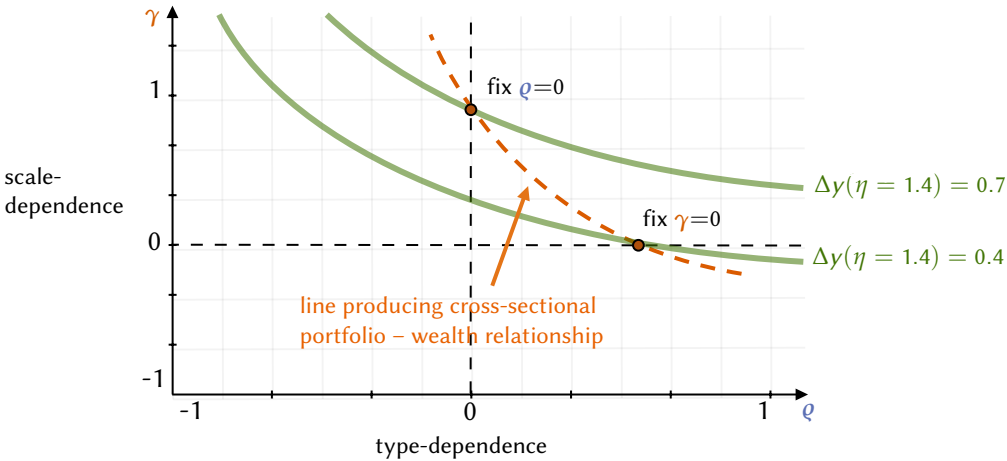
Two quantitative results: welfare maximizing wealth tax in the US is

A. **positive** due to type-dependence,

B. **unresponsive** to size of **rents**.

Efficiency-inequality diagram

Back



Model: Households

Back

- labor productivity z depends on age j, persistent/transitory component,
- heterogeneous **rate of returns** (due to type ϑ and scale (wealth) a).

$$(\textit{return}) \qquad r(a,\vartheta) = \underline{r} + r_F \cdot (1-\omega(a,\vartheta)) + r_R\kappa \cdot \omega(a,\vartheta)$$

  $\omega(a,\vartheta)$ drives high return investments, with κ an idiosyncratic shock.

- decide how much to consume, work, and save,
- take prices $\{w, r_F, r_R, \underline{r}\}$, taxes and transfers as given.

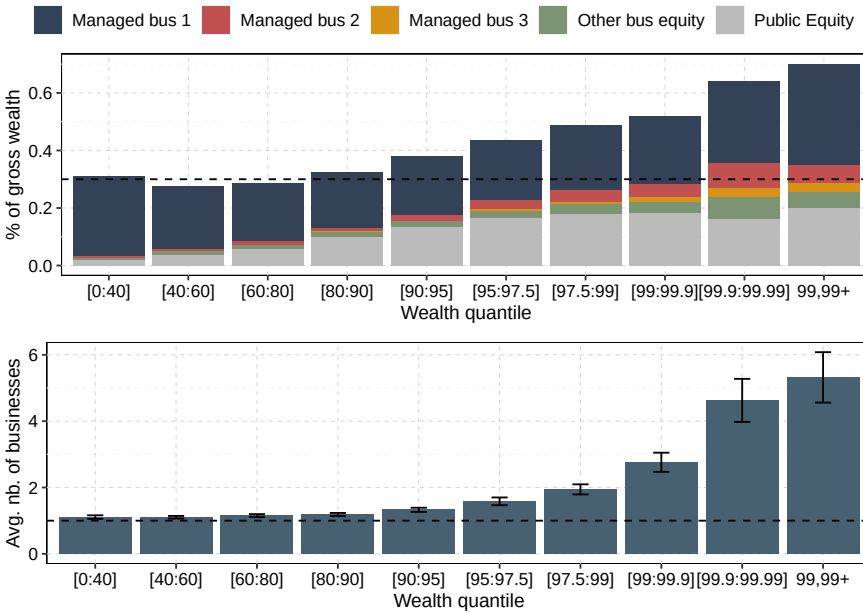
$$V(a,\vartheta,\kappa,z,j) = \max_{c,\ell,a'\geq 0} u(c,\ell) + \beta(1-d_j)\mathbb{E}\left[V(a',\vartheta,\kappa',z',j')\right]$$

$$\text{s.t.} \qquad c + a' = w\ell z(1-\tau_w) + (1+r(a,\vartheta)(1-\tau_k))a - \underbrace{t_a(a)}_{\text{wealth tax}}$$

SCF – Portfolio Increase at Top

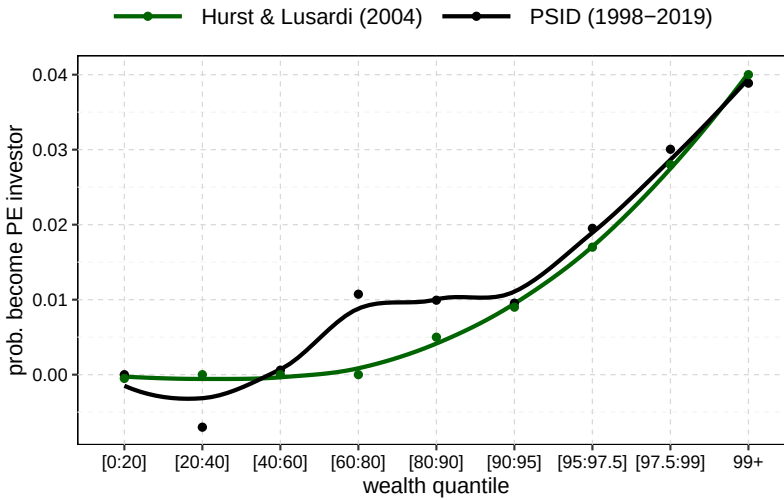
Back

Figure 1: Decomposition into multiple priv. equity business investments, SCF



PSID – Participation Increase at Top

Back



Utility: Micro Foundation

Back

Households

- initial **wealth** a_i, and innate **type** ϑ_i
- CARA utility $u_i = -\frac{\mathbb{E}[e^{-\alpha_i c_i}]}{\alpha_i}$
- with innate risk-aversion correlates with ***type***/***wealth***: $\boldsymbol{\alpha_i} = \frac{\overline{\vartheta}}{\vartheta_i a_i^{\gamma+1}}$

Budget constraint

$$conso_i = wage_i + k_i R_r^i + (a_i - k_i) R_f \qquad \text{with} \quad R_r^i \sim \mathcal{N}(\mathbb{E}[R_r^i], \sigma_r^2)$$

Optimal risky asset demand k_i and portfolio share $\omega(a_i, \vartheta_i)$

$$k_i \propto \varpi \underbrace{\mathcal{T}(a_i, \vartheta_i)}_{\text{risk tolerance}} = \varpi \cdot \frac{\vartheta_i}{\overline{\vartheta}} \cdot a_i^{\gamma+1}, \qquad \omega(a_i, \vartheta_i) \propto \varpi \cdot \frac{\vartheta_i}{\overline{\vartheta}} \cdot a_i^{\gamma}$$

Generally: demand for risky assets for arbitrary utility: $k_i \approx \frac{\mu_k^p}{var_k} \mathcal{T}(a_i \mathbb{E}[R_r])$

- we generalize the risk-tolerance shape with scale/type dependence.

A Simple Model: Equilibrium

Rents

Lemma 1

Given the joint distribution of types and wealth $\mathcal{G}(\vartheta, a)$, aggregate risky capital K_I, output Y, productivity Z, the wage rate w and the rent component satisfy:

$$
\begin{aligned}
K_I &= \int_{(a,\vartheta)} \omega(a,\vartheta)\, d\mathcal{G}(a,\vartheta) \\
Y &= Z\mathbb{E}[a] \\
Z &= \mu(MPK^{risky} - MPK^{safe})\frac{K_I}{\mathbb{E}[a]} + A \\
w &= \varphi Y, \\
\underline{r} &= (\mu - 1)(MPK^{risky} - MPK^{safe})(1-\varphi)\frac{K_I}{\mathbb{E}[a]}\,.
\end{aligned}
$$

where the return component of individuals is given by:

$$
r(a,\vartheta) = \underline{r} + R^{safe}(1 - \omega(a,\vartheta)) + R^{risky} \underbrace{\kappa}_{\text{idio. shock}} \omega(a,\vartheta)
$$

Portfolio, Returns, and Wealth

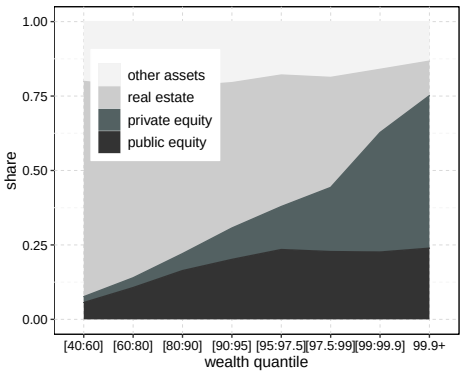
Intro

- **Average returns to wealth** are positively **correlated** with **wealth** more

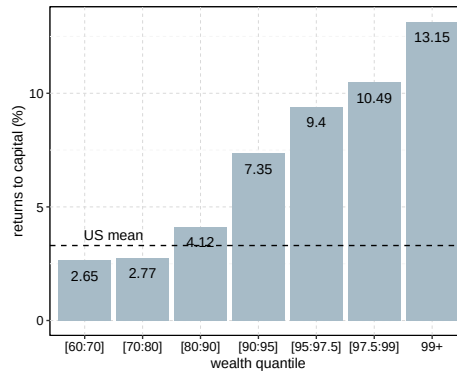
  → ***high*** and ***persistent*** at the top, Fagereng et al. (2020), Bach et al. (2020).

- Large part driven by heterogeneity in equity portfolio allocation.

(a) portfolio shares, SCF (1998-2019)



(b) average wealth returns, PSID (2000-2018)



Welfare Measure

Back

$$\int_{\mathbf{s}} \mathbb{E}_0 \left[\sum_{t=0}^{\infty} \widetilde{\beta}^t u\Big(c_t^{post}(\mathbf{s}), \ell_t^{post}(\mathbf{s}) \Big) \right] d\mathcal{G}^{post}(\mathbf{s}) = \int_{\mathbf{s}} \mathbb{E}_0 \left[\sum_{t=0}^{\infty} \widetilde{\beta}^t u\Big(\big(1+\Delta^{CEV}\big) c_t^{pre}(\mathbf{s}), \ell_t^{pre}(\mathbf{s}) \Big) \right] d\mathcal{G}^{pre}(\mathbf{s})$$

Parameterization

Back

	Symbol	Value	Source
A. Various external parameters			
preferences $u(c,\ell) = \frac{c^{1-\sigma_1}}{1-\sigma_1} - \chi\frac{\ell^{1+\sigma_2}}{1+\sigma_2}$	$\{\sigma_1, \sigma_2\}$	$\{2.5, 1.7\}$	Brüggemann (2021)
persistent process h with Pareto tail	$\{\sigma_h, \rho_h, \eta_h, q_h\}$	$\{0.22, 0.95, 2.1, 0.9\}$	Hubmer et al. (2021)
stochastic aging part for h process	*in paper*	*in paper*	Sommer et Sullivan (2018)
inheritance of h skills	ρ_h	0.65	Chetty (2014)
transitory process labor y	σ_y	0.15	Hubmer et al. (2021)
production	$\{\alpha, \delta, A_F\}$	$\{0.33, 0.05, 1.0\}$	standard values
tax rates	$\{\tau_w, \tau_k, \tau_b\}$	$\{0.22, 0.25, 0.4\}$	standard values
B. Return-heterogeneity parameters			
riskiness of equity investment	σ_κ	0.51	estimates PSID table
return wedge	μ	1.0	benchmark value
inheritance of ϑ skills	ρ_ϑ	0.15	Fagereng et al. (2020)

Parameters internally calibrated:

- $\{\beta, A_R - A_F\}$, match $\frac{K}{Y}$ and top 1% wealth share.
- disutility of labor χ: matches 1/3 time on market work.
- high return investment: match investment decisions in SCF/PSID.

Result A: Positive Wealth Tax

Back

Under type-dependence: a wealth tax changes the sorting of skilled investors along the wealth distribution.

→ At the top: more Elon Musk ("new" money), less Albert de Monaco ("old" money).

Figure 3: Change in the fraction of skilled investors along the wealth distribution.