Book-Value Wealth Taxation, Capital Income Taxation, and Innovation

Fatih Guvenen, Gueorgui Kambourov, Burhan Kuruscu, Sergio Ocampo

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This paper: Theoretical analysis of optimal combination of taxes

- Characterize ***(i)*** innovation + productivity ***(ii)*** welfare ***(iii)***optimal taxes
- Analytical model with workers, entrepreneurs, and innovation

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   - But models struggle to generate plausible wealth inequality. Pareto Tail vs. Models
   - Return heterogeneity $\longrightarrow$ concentration at very top + Pareto tail + fast wealth growth

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4. **Theoretical:** Interesting **new economic mechanisms** $\longrightarrow$ Example next

   Allais (1977), Guvenen, Kambourov, Kuruscu, Ocampo, Chen (2023)

Return Heterogeneity: A Simple Example

- One-period model.
- Government taxes to finance $G = \$50K$.
- Two brothers: Fredo and Mike, each with $1M of wealth.

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- **Objective:** illustrate key tradeoffs b/w capital income tax (τ_k) and wealth tax (τ_a)

Capital Income (τ_k) vs. Wealth Tax (τ_a)

	Capital Income Tax		
	$a_{i,\text{after-tax}} = a_i + (1 - \tau_k) r_i a_i$		
	Fredo ($r_f = 0\%$)	Mike ($r_m = 20\%$)	
Wealth	\$1M	\$1M	
Before-tax Income	\$0	\$200K	
Tax liability			
After-tax return			
After-tax wealth ratio			

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- Replacing τ_k with $\tau_a \rightarrow$ reallocates assets to high-return agents (**use it or lose it**) + increases dispersion in after-tax returns & wealth.

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3. Optimal Taxes: Depend on TFP pass-through to wages and K *(given by capital intensity, α)*

Low Pass-Through: $\alpha < \underline{\alpha}$		High Pass-Through: $\alpha > \overline{\alpha}$
$\tau_a^\star < 0$, $\tau_k^\star > 0$	$\tau_a^\star > 0$, $\tau_k^\star > 0$	$\tau_a^\star > 0$, $\tau_k^\star < 0$

$0 \qquad \underline{\alpha} \qquad \overline{\alpha} \qquad 1$

Outline

1. **Benchmark model with endogenous entrepreneurial productivity distribution**
2. Innovation and efficiency gains from wealth taxation
3. Welfare and optimal taxation
4. Extension to managerial effort
5. Quantitative results (time allowing!)

Perpetual Youth Model with Workers and Entrepreneurs

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   - Heterogeneity in productivity (z) and wealth (a)
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Common Preferences: Discount $\beta < 1$ and conditional survival probability $\delta < 1$

$$E_0 \sum_{t=0}^{\infty} (\beta\delta)^t \log(c_t)$$

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- Innovation requires costly effort, e, and can end with a high- or low-productivity idea

$$\Pr(z = z_h) = p(e) \qquad \Pr(z = z_\ell) = 1 - p(e), \qquad \text{where } z_h > z_\ell \geq 0$$

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Entrepreneurial technology:

$$y_i = (z_i k_i)^\alpha n_i^{1-\alpha}$$

- Key is constant-returns-to-scale

Financial Markets & Entrepreneurs' Problem

Financial markets:

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$$\Pi^\star(z,a) = \max_{\mathbf{k} \leq \lambda \mathbf{a}, n} \left\{ (zk)^\alpha n^{1-\alpha} - rk - wn \right\} \longrightarrow \Pi^\star(z,a) = \underbrace{\pi^\star(z)}_{\text{Excess return above } r} \times a$$

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$$\text{If} \quad \underbrace{(\lambda - 1)\,\mu A_h}_{K \text{ Demand from H-Type}} < \underbrace{(1-\mu)\,A_\ell}_{K \text{ Supply from L-Type}} \longleftrightarrow \underbrace{\lambda < \overline{\lambda}}_{\text{Bound on Leverage}} \longleftrightarrow \tau_a < \overline{\tau}_a$$

Entrepreneur's Dynamic Problem

$$V(a,z) = \max_{c,a'} \log(c) + \beta\delta V(a',z)$$

$$\texttt{s.t.} \quad c + a' = \underbrace{(1-\tau_a)\,a + (1-\tau_k)\,(r+\pi^\star(z))\,a}_{\texttt{After-tax Wealth}}.$$

- Define (after-tax) gross return as:

$$R_i \equiv (1-\tau_a) + (1-\tau_k)\,(r+\pi^\star(z_i)) \quad \text{for } i \in \{\ell, h\}$$

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Note: log utility $\longrightarrow$ No behavioral response to taxes.
$\longrightarrow$ All effects come from use-it-or-lose-it *(conservative lower bound)*

Entrepreneur's Innovation Effort Choice

Innovator's problem:

$$\max_{e}\ p(e)\,V_h(\bar{a}) + (1 - p(e))\,V_\ell(\bar{a}) - \frac{1}{(1-\beta\delta)^2}\Lambda(e)$$

- Simplification: $p(e) = e \longrightarrow \mu = e$

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Optimal innovation effort:

$$\underbrace{\Lambda'(e)}_{\text{Mrg. Cost of Effort}} = (1-\beta\delta)^2\,(\,V_h(\overline{a}) - V_\ell(\overline{a})\,) = \underbrace{\log R_h - \log R_\ell}_{\text{Mrg. Benefit: Return Gap}}$$

- Return dispersion incentivizes effort $\longrightarrow$ Return dispersion necessary for innovation!

Aggregate Output and Taxes

Aggregate output:

$$Y = \int y_i di = \int (z_i k_i)^{\alpha} n_i^{1-\alpha} di$$

- All output is produced by entrepreneurs
- Equivalent: Add corporate sector with $Y_c = (z_c K_c)^{\alpha} N_c^{1-\alpha}$ and $z_\ell \leq z_c < z_h$

Government: Finances exogenous expenditure G and transfers T with τ_k and τ_a

$$G + T = \tau_k \alpha Y + \tau_a K$$

Equilibrium Values: Aggregation

Key variables:

- $s_h = \frac{\mu A_h}{\mu\, A_h + (1-\mu)\, A_\ell}$: wealth share of high-productivity entrepreneurs.
- $z_\lambda \equiv z_h + (\lambda - 1)\,(z_h - z_\ell)$: effective productivity of high-productivity entrepreneurs.

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Lemma: Aggregate output can be written as:

$$Y = (ZK)^\alpha L^{1-\alpha} \qquad (Z^\alpha \text{ is measured TFP})$$

where

$$K \equiv \mu A_h + (1-\mu) A_\ell \qquad K = \text{Aggregate capital}$$

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Note: Use it or lose it effect increases efficiency if $s_h \uparrow (\longrightarrow Z \uparrow)$

Steady State: Capital, Returns, and Taxes

Steady State K: Same as Neoclassical Growth Model... but endogenous Z (Moll, 2014)

$$(1-\tau_a) + (1-\tau_k)\overbrace{\alpha Z^{\alpha}\left({}^{K}\!/\!{}_{L}\right)^{\alpha-1}}^{\text{MPK}} = \frac{1}{\beta\delta}$$

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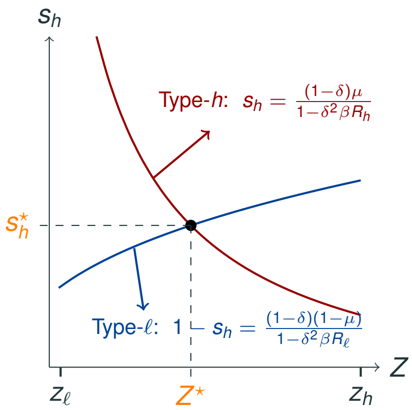
Steady State R: Returns reflect MPK + effective entrepreneurial productivity $z_i \in \{z_\ell, z_\lambda\}$

$$R_i = (1-\tau_a) + (1-\tau_k)\overbrace{\left(\alpha Z^{\alpha}\left({}^{K}/_{L}\right)^{\alpha-1}\right)}^{\text{MPK}}\frac{z_i}{Z} \quad \longrightarrow \quad R_i = (1-\tau_a) + \left(\frac{1}{\beta\delta} - (1-\tau_a)\right)\frac{z_i}{Z}$$

Steady State: Productivity and Returns



- Z consistent with wealth accumulation

$$Z = s_h z_\lambda + (1 - s_h)\, z_c$$

- Wealth distribution reflects returns

$$A_i' = \delta^2 \beta R_i A_i + (1-\delta)\,\overline{a} \longrightarrow \frac{A_i}{\overline{a}} = \frac{1-\delta}{1-\delta^2\beta R_i}$$

- Equilibrium: $Z \to \{R_h, R_\ell\} \to s_h \to Z$
  - Solution is quadratic!

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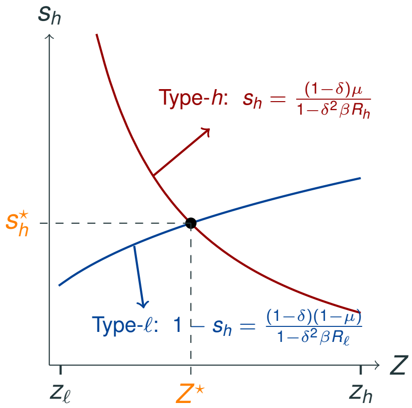

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- Wealth tax affects returns, productivity, and innovation. Capital income tax does not.
- Both taxes affect capital, output, wages...

Steady State: Innovation and Productivity Distribution

The stationary equilibrium share high-productivity entrepreneurs, μ, solves fixed point:

$$
\begin{tikzcd}
& \text{Innovation: } \mu \arrow[dr, "+"] & \\
\text{Effort: } e(R_h, R_\ell) \arrow[ur, "+"] & & \text{Productivity: } Z(\mu) \arrow[dl, "-"] \\
& \text{Returns: } R_i(Z) \arrow[ul, "+"] &
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$$
\begin{tikzcd}
& \text{Innovation: } \mu \arrow[dr, bend left, "+"] & \\
\text{Effort: } e(\boldsymbol{R_h}, \boldsymbol{R_\ell}) \arrow[ur, bend left, "+"] & & \text{Productivity: } Z(\mu) \arrow[dl, bend left, "-"] \\
& \text{Returns: } R_i(\boldsymbol{Z}) \arrow[ul, bend left, "+"] &
\end{tikzcd}
$$

We show: Existence and uniqueness of equilibrium with innovation.

(Cellina's fixed point theorem + Monotonicity)

Outline

1. Benchmark model with endogenous entrepreneurial productivity distribution
2. **Innovation and efficiency gains from wealth taxation**
3. Welfare and optimal taxation
4. Extension to managerial effort
5. Quantitative results (time allowing!)

Wealth Taxation and Returns

- Returns (R_h, R_ℓ) control ***(i)*** incentives for innovation, and ***(ii)*** distribution of wealth

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Lemma: Partial response of returns to productivity and innovation

$$\xi_Z^{R_h} \equiv \frac{d\log R_h}{d\log Z} > 0, \qquad \xi_Z^{R_\ell} \equiv \frac{d\log R_\ell}{d\log Z} > 0, \quad \& \quad \mu\xi_Z^{R_h} + (1-\mu)\,\xi_Z^{R_\ell} < 0 \qquad \text{(use-it-or-lose-it)}$$

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$$\xi_\mu^{R_h} \equiv \frac{d\log R_h}{d\mu} < 0, \qquad \xi_\mu^{R_\ell} \equiv \frac{d\log R_\ell}{d\mu} > 0, \quad \& \quad \mu\xi_\mu^{R_h} + (1-\mu)\,\xi_\mu^{R_\ell} > 0 \qquad \text{(innovation effect)}$$

Main Result 1: Innovation & Efficiency Gains from Wealth Taxation

Proposition:

Proof

For all $\tau_a < \overline{\tau}_a$, an increase in τ_a **increases** μ and **Z**

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- Result from fixed-point comparative statics $\longrightarrow$ Partial responses are key

Main Result 1: Innovation & Efficiency Gains from Wealth Taxation

Proposition:

Proof

For all $\tau_a < \overline{\tau}_a$, an increase in τ_a **increases μ and Z**

- Result from fixed-point comparative statics $\longrightarrow$ Partial responses are key
- Dispersion of after-tax returns rises (given μ)

$$\frac{dR_h}{d\tau_a} > \mathbf{0} \qquad \& \qquad \frac{dR_\ell}{d\tau_a} < \mathbf{0}$$

$\rightarrow$ Wealth concentration rises, $s_h \uparrow$, therefore $Z \uparrow$ $(= s_h z_\lambda + (1 - s_h)\, z_\ell)$

Distribution

$\rightarrow$ Higher incentives for innovation effort $\left(\Lambda'(e) = \log R_h - \log R_\ell\right)$

- Innovation, on its own, increases productivity: $\frac{dZ}{d\mu} > 0$

Government Budget and Aggregate Variables

$$G + T = \tau_k \alpha Y + \tau_a K.$$

- In what follows, τ_k adjusts in the background when $\tau_a \uparrow$ so that $G + T = \theta \alpha Y$

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For all $\tau_a < \overline{\tau}_a$, an increase in $\boldsymbol{\tau_a}$ has the following effects on aggregates:

- **Increases** capital (K), output (Y), wage (w), & high-type wealth (A_h)

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- **Increases** capital (K), output (Y), wage (w), & high-type wealth (A_h)
- **Key:** Higher $\alpha \longrightarrow$ Larger pass-through of productivity to K, Y, w

$$\xi_Z^K = \xi_Z^Y = \xi_Z^w = \frac{\alpha}{1-\alpha} \qquad \xi_Z^x = \frac{d \log x}{d \log Z}$$

Outline

1. Benchmark model with endogenous entrepreneurial productivity distribution
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Main Result 3: Optimal Taxes

α thresholds

Objective: Choose taxes (τ_a, τ_k) to max newborn welfare ($n_w = {}^{L}/_{(1+L)}$ pop. share of workers)

$$\mathcal{W} \equiv n_w V_w(w) + (1 - n_w)\left(\mu V_h(\overline{a}) + (1-\mu) V_\ell(\overline{a}) - \frac{\Lambda(\mu)}{(1-\beta\delta)^2}\right)$$

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Key trade-off:

Welfare by type

1. Higher *levels* of worker income $(w+T)$ and wealth $(\bar{a} = K)$ — Depends on α!

   (higher welfare for workers and high-z entrepreneurs)

2. Lower *wealth growth* over lifetime from lower average return — Depends on τ_a

   (lower welfare for low-z entrepreneurs and entrepreneurs as a group)

Main Result 3: Optimal Taxes

▸ α thresholds ▸ $\tau_a^\star$ level

Proposition: There exists a unique optimal tax combination $(\tau_a^\star, \tau_k^\star)$ that maximizes $\mathcal{W}$.

An interior optimum $(\tau_a^\star < \bar{\tau}_a)$ is solution to:

$$0 = \Bigg(\underbrace{n_w \xi_Z^{w+T} + (1-n_w)\,\xi_Z^K}_{\text{Level Effect } = \frac{\alpha}{1-\alpha}\,(+)} + (1-n_w) \underbrace{\xi_Z^g}_{\text{Growth Effect } (-)} \Bigg) \frac{d\log Z}{d\tau_a} + (1-n_w) \underbrace{\xi_\mu^g}_{\text{Innovation Effect } (+)} \frac{d\mu}{d\tau_a}$$

where $\xi_Z^x \equiv \frac{d\log x}{d\log Z}$ is the elasticity of x with respect to Z.

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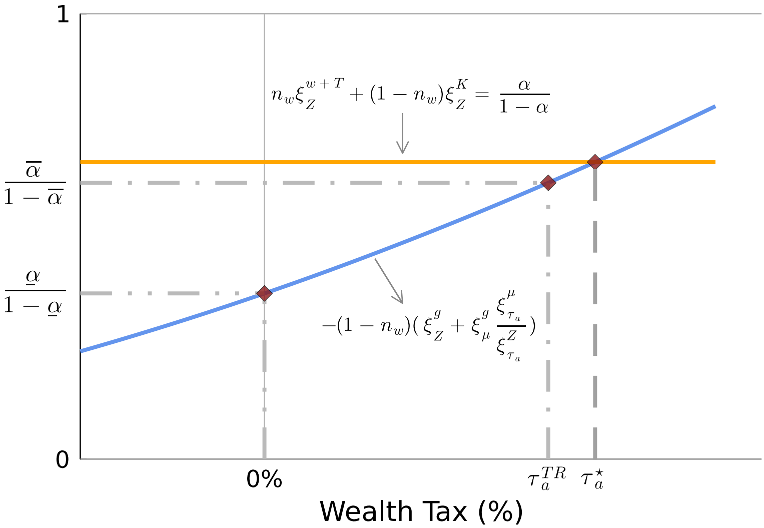
where $\xi_Z^x \equiv \frac{d \log x}{d \log Z}$ is the elasticity of x with respect to Z. **Furthermore**,

Low Pass-Through: $\alpha < \underline{\alpha}$		High Pass-Through: $\alpha > \overline{\alpha}$
$\tau_a^\star < 0$, $\tau_k^\star > 0$	$\tau_a^\star > 0$, $\tau_k^\star > 0$	$\tau_a^\star > 0$, $\tau_k^\star < 0$

$0 \qquad \underline{\alpha} \qquad \overline{\alpha} \qquad 1$

Optimal Tax and $\underline{\alpha}$ and $\overline{\alpha}$ Thresholds



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Managerial Effort

- Managerial effort in production: (maintain CRS)

$$y = (zk)^{\alpha}\, m^{\gamma} n^{1-\alpha-\gamma} \quad \longrightarrow \quad m : \text{managerial effort}$$

- Entrepreneurial preferences: (avoid income effects)

$$u(c, e) = \log(c - \psi m) \qquad \psi > 0$$

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Entrepreneurial problem becomes:

$$\hat{\pi}(z, k) \;=\; \max_{n,e} \left\{\; y - wn - rk - \underbrace{\frac{\psi}{1-\tau_k}}_{\text{Effective Cost of Effort}} m \;\right\}$$

- **Key:** Effective cost of effort *increases* with capital income tax τ_k but not with τ_a!

Managerial Effort: Results

1. Efficiency gains from wealth taxation go through
   - Neutrality holds $\Big((1-\tau_k)\,\mathrm{MPK} = \frac{1}{\beta\delta} - (1-\tau_a) \Big) \longrightarrow Z$, R_h, R_ℓ depend only on τ_a!

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2. Effect on aggregates is stronger if capital income taxes go down
   - Aggregate effort increases, increasing output, capital, wages, etc.

$$E = \left(\frac{(1-\tau_k)\,\gamma}{\psi}\right)^{\frac{1}{1-\gamma}} (ZK)^{\frac{\alpha}{1-\gamma}}\, L^{\frac{1-\alpha-\gamma}{1-\gamma}}$$

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3. Optimal taxes: higher wealth tax and lower capital income tax

Outline

1. Benchmark model with endogenous entrepreneurial productivity distribution
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5. **Quantitative results** (Is there any time left? Yes No)

Conclusions

Increasing τ_a (& reducing τ_k):

- Innovation Effect: Provides incentives for innovation shaping productivity distribution
- Use it or Lose it Effect: Reallocates capital from less to more productive agents.
  - Higher innovation, productivity, output, and wages;
  - Higher dispersion in returns and wealth and lower average returns

Optimal tax mix:

- Combination of taxes depends on pass-through of TFP to wages and wealth

Extra

Entrepreneur's Problem

Financial Markets & Entrepreneurs' Production Problem

back

Entrepreneurs' Production Decision:

$$\Pi^{\star}(z,a) = \max_{\mathbf{k} \leq \lambda \mathbf{a}, n} (zk)^{\alpha} n^{1-\alpha} - rk - wn.$$

back

Entrepreneurs' Production Decision:

$$\textbf{Solution:} \quad \Pi^{\star}(z,a) = \underbrace{\pi^{\star}(z)}_{\text{Excess return above } r} \times a$$

$$\pi^{\star}(z) = \begin{cases} (MPK(z) - r)\,\lambda & \text{if } MPK(z) > r \\ 0 & \text{otherwise.} \end{cases} \qquad k^{\star}(z) \begin{cases} = \lambda a & \text{if } MPK(z) > r \\ \in [0, \lambda a] & \text{if } MPK(z) = r \\ = 0 & \text{if } MPK(z) < r \end{cases}$$

- $(\lambda - 1)\,a$: amount of external funds used by type-z if $MPK(z) > r$.

Financial Market Equilibrium with Heterogenous Returns

back

Three types of equilibria can arise depending on parameter values.

Financial Market Equilibrium with Heterogenous Returns

back

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We focus on "interesting one": if $\underbrace{(\lambda - 1)\,\mu A_h}_{K \text{ Demand from H-Type}} < \underbrace{(1-\mu)\,A_\ell}_{K \text{ Supply from L-Type}} \longleftrightarrow \underbrace{\lambda < \overline{\lambda}}_{\text{Bound on Leverage}}$

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- Low-productivity entrepreneurs bid down interest rate, $r = \text{MPK}\,(z_\ell)$
- **Unique steady state** with:
  return heterogeneity, capital misallocation, wealth tax $\neq$ capital inc tax
- **Empirically relevant:** $R_h > R_l$ and $\frac{\text{Debt}}{\text{GDP}} \gg 1.5$ when $\lambda = \bar{\lambda}$

details

Financial Market Equilibrium with Heterogenous Returns

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details

Condition implies an upper bound on wealth taxes:

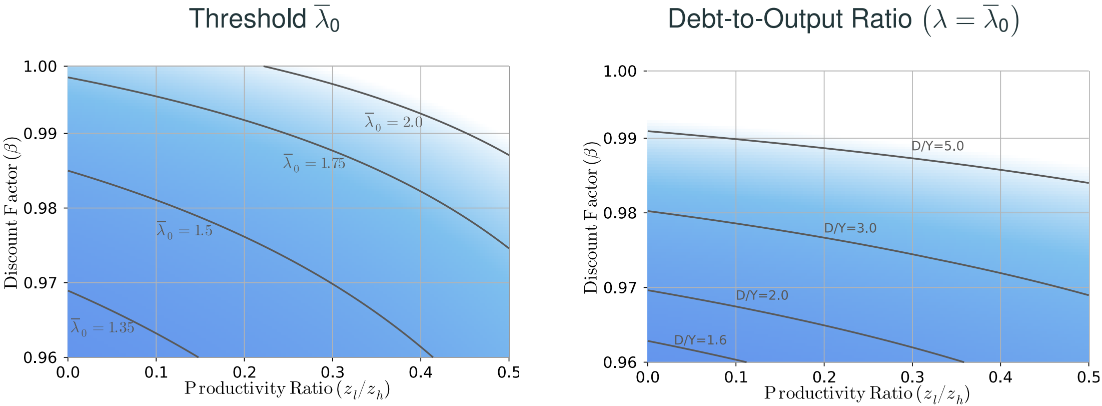
Upper Bound on τ_a

$$(\lambda-1)\,\mu A_h < (1-\mu)\,A_\ell \longleftrightarrow \tau_a < \overline{\tau}_a = 1 - \frac{1}{\beta\delta}\left(1 - \frac{1-\delta}{\delta}\,\frac{1-\lambda\mu}{(\lambda-1)\left(1-\frac{z_\ell}{z_h}\right)}\right)$$

FIGURES

Conditions for Steady State with Heterogeneous Returns

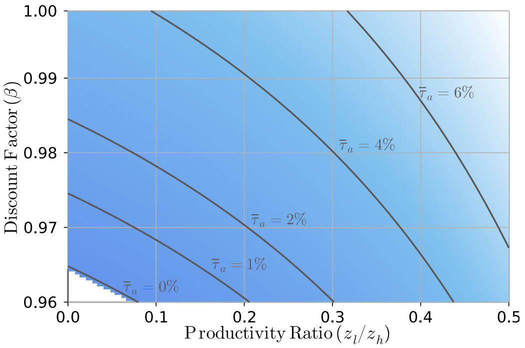
Returns back



Condition for Steady State with Heterogeneous Returns

▸ Returns ◂ back

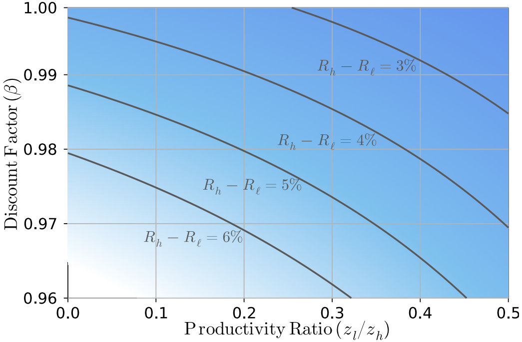
Upper Bound on Wealth Tax $\overline{\tau}_a$



Return Dispersion in Steady State of the Benchmark Economy

back

Dispersion of Returns in Equilibrium, $R_h - R_\ell$

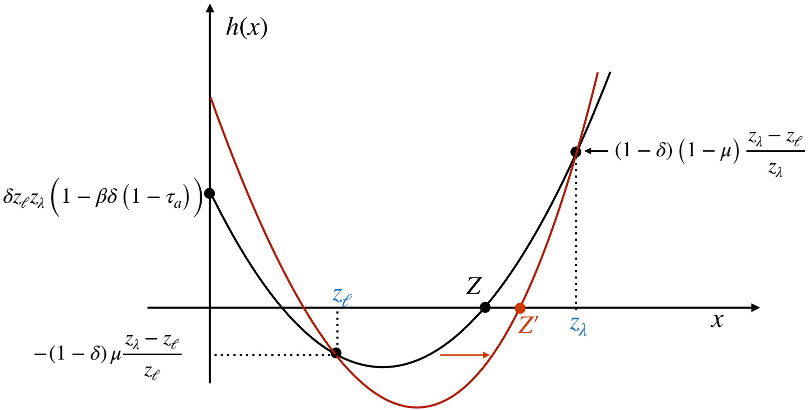


Note: *The figure reports the value return dispersion in steady state for combinations of the discount factor* (β) *and productivity dispersion* (z_ℓ/z_h)*. We set the remaining parameters as follows:* $\delta = 49/50$, $\beta\delta = 0.96$, $\mu = 0.10$, $z_h = 1$, $\tau_k = 25\%$, *and* $\alpha = 0.4$.

What happens to Z if $\tau_a \uparrow$?

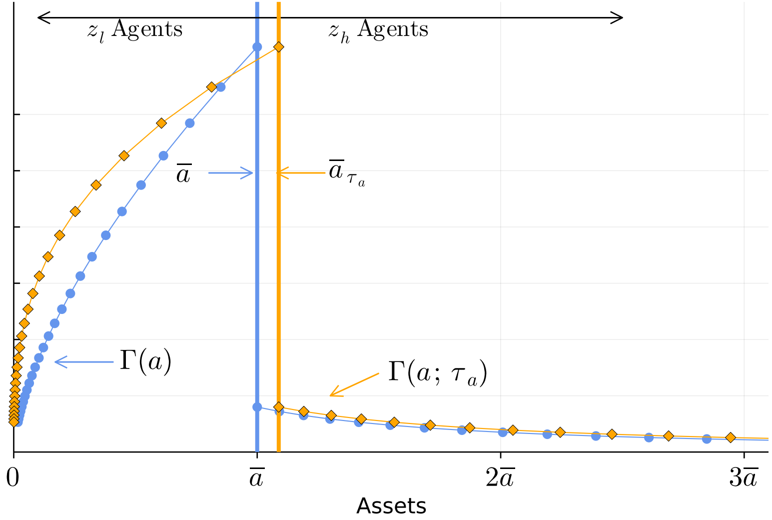
Back to eff. gain

$$\frac{dh(x)}{d\tau_a} = \beta\delta^2 (1-\tau_a)(x - z_\ell)(z_\lambda - x) < 0 \text{ iff } z_\ell < x < z_\lambda$$



Stationary wealth distribution and wealth taxes

back



Welfare Gains

Main Result 2: Welfare Gains by Type

back

Proposition:

α Thresholds

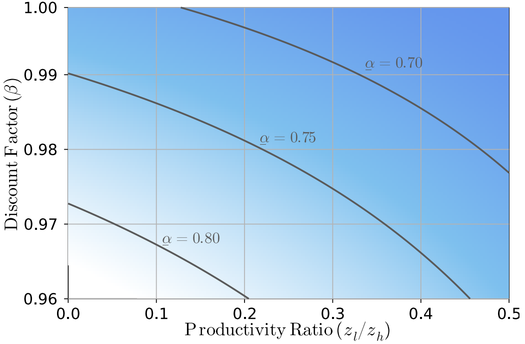
For all $\tau_a < \overline{\tau}_a$, a higher $\boldsymbol{\tau_a}$ changes welfare as follows:

- Workers: Higher welfare: $\frac{dV_{workers}}{d\tau_a} > 0$
- High-z entrepreneurs: Higher welfare $\left(\frac{dV_h(\overline{a})}{d\tau_a} > 0\right)$ because $\xi_Z^K + \frac{1}{1-\beta\delta}\xi_Z^{R_h} > 0$
- Low-z entrepreneurs: Lower welfare $\left(\frac{dV_\ell(\overline{a})}{d\tau_a} < 0\right)$ iff $\xi_Z^K + \frac{1}{1-\beta\delta}\xi_Z^{R_\ell} < 0; \alpha < \underline{\alpha}_\ell$
- Entrepreneurs: Lower average welfare iff $\xi_Z^K + \frac{1}{1-\beta\delta}\left(\mu\xi_Z^{R_h} + (1-\mu)\,\xi_Z^{R_\ell}\right) < 0; \alpha < \underline{\alpha}_E$

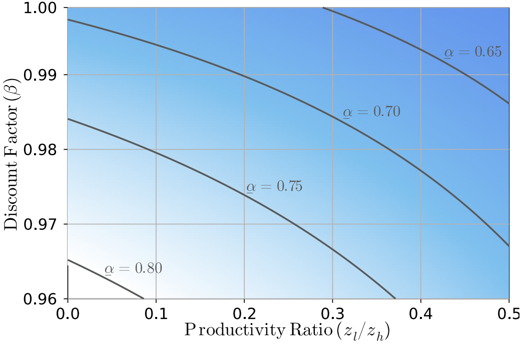
Conditions for Entrepreneurial Welfare Gain

back

Low-Productivity Entrepreneurs: ${}^{dV_\ell}/_{d\tau_a} > 0$



Average Entrepreneur: ${}^{dV_E}/_{d\tau_a} > 0$

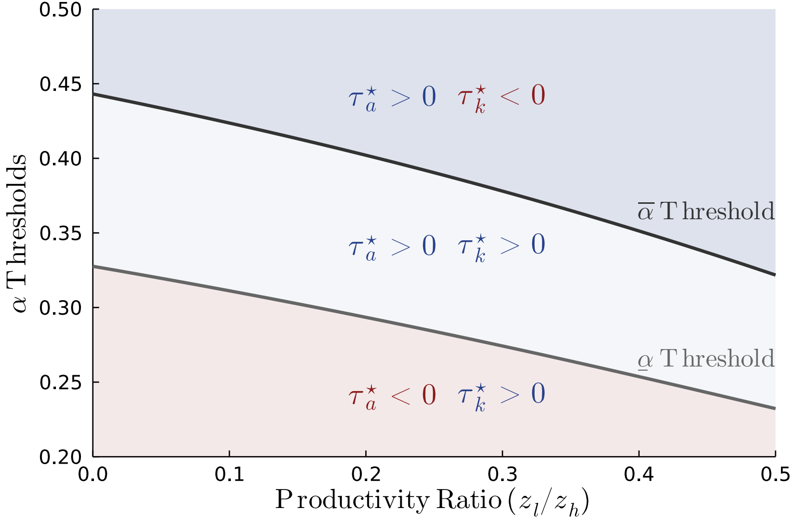


Note: *The figures report the threshold value of $\underline{\alpha}$ above which entrepreneurial welfare increases after an increase in wealth taxes for combinations of the discount factor (β) and productivity dispersion (${}^{z_\ell}/_{z_h}$). We set the remaining parameters as follows: $\delta = {}^{49}/_{50}$, $\beta\delta = 0.96$, $\mu = 0.10$, $z_h = 1$, $\tau_k = 25\%$, and $\alpha = 0.4$.*

Optimal Taxes

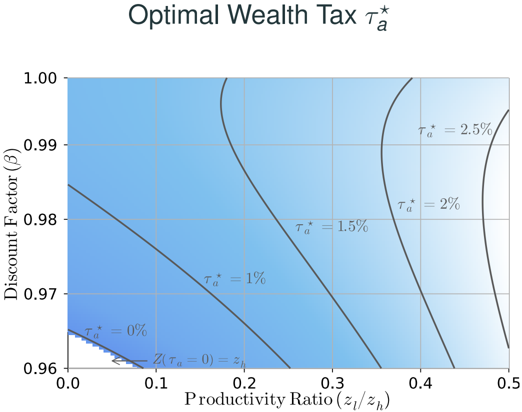
α Thresholds

back



Optimal Wealth Tax: β & Productivity Dispersion

back



Note: *The figure reports the value of the optimal wealth tax for combinations of the discount factor (β) and productivity dispersion (z_ℓ/z_h). We set the remaining parameters as follows: $\delta = 49/50$, $\beta\delta = 0.96$, $\mu = 0.10$, $z_h = 1$, $\tau_k = 25\%$, and $\alpha = 0.4$.*

Extensions

Extension: Corporate sector

Back to extensions

- Technology: $Y_c = (z_c K_c)^{\alpha} L_c^{1-\alpha}$
  - No financial constraints!
- Corporate sector imposes lower bound on r:

$$r \geq \alpha z_c \left(\frac{1-\alpha}{w}\right)^{\frac{1-\alpha}{\alpha}}.$$

Interesting case: $z_\ell < z_c < z_h$

- Corporate sector and high-productivity entrepreneurs produce
- Low-productivity entrepreneurs lend all of their funds.
- No real changes in the aggregates of the economy! z_c takes the place of z_ℓ

$$Y = (ZK)^{\alpha} L^{1-\alpha}$$

but now $Z = s_h z_\lambda + s_l \mathbf{z_c}$, where $z_\lambda = z_h + (\lambda - 1)(z_h - \mathbf{z_c})$.

Extension: Rents

Back to extensions

- Introduce wedge for returns above/below productivity:

$$R_i = (1 - \tau_a) + (1 - \tau_k) \underbrace{(1 + \omega_i)}_{\text{Return Wedge}} \alpha \left({}^{ZK}/_{L} \right)^{\alpha - 1} z_i$$

- Zero-sum condition on wedges: $\omega_l z_\ell A_\ell + \omega_h z_\lambda A_h = 0$
- Characterization of eq. in terms of “effective productivity” $\tilde{z}_i = (1 + \omega_i) z_i$

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- Characterization of eq. in terms of "effective productivity" $\tilde{z}_i = (1+\omega_i)\, z_i$

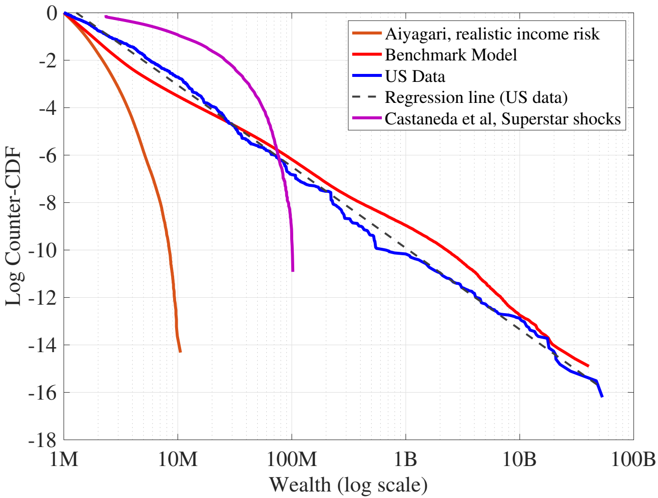
Proposition:

For all $\tau_a < \overline{\tau}_a$, a marginal increase in wealth taxes (τ_a) increases Z, $\frac{dZ}{d\tau_a} > 0$, **iff**

1. $\rho > 0$ and $R_h > R_\ell \longrightarrow$ Same mechanism as before
2. $\rho < 0$ and $R_h < R \longrightarrow$ Reallocates wealth to the true high types next period

Pareto Tail of Wealth Distribution: Model vs. Data

Back



Note: *Both axes are in natural logs.*

Policy Implications

Quantitative Model

Tail Fit Return Fit back

Individuals: OLG demographic structure *(retirement, mortality risk)*

- Preferences over consumption, leisure and bequests *(inheritances go to newborn offspring)*
- Make three decisions:

  consumption-savings ‖ labor supply ‖ portfolio choice

- Two exogenous characteristics:

Details

  y_{ih} (labor market productivity) ‖ z_{ih} (entrepreneurial productivity)

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- Preferences over consumption, leisure and bequests *(inheritances go to newborn offspring)*
- Make three decisions:

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- Two exogenous characteristics: Details

  y_{ih} (labor market productivity) || z_{ih} (entrepreneurial productivity)

Markets: monopolistic competition $\rightarrow$ decreasing returns to scale

Government: Expenditures: G + SS pensions || Taxes: Consumption (τ_c), Labor income (τ_ℓ), Bequests (τ_b) + τ_k or τ_a

Main Results

back

With return heterogeneity:

1. Capital income taxes much more distorting than what we believed.

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Main Results

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1. Capital income taxes much more distorting than what we believed.

2. Switch to τ_a reallocates $K \longrightarrow$ Higher productivity, output, wages, and welfare.

3. Due to higher wages, most people benefit from switch to wealth tax.
   - Optimal wealth tax delivers both efficiency and distributional gains.
   - No equity-efficiency trade-off.

Main Results

back

With return heterogeneity:

1. Capital income taxes much more distorting than what we believed.

2. Switch to τ_a reallocates $K \longrightarrow$ Higher productivity, output, wages, and welfare.

3. Due to higher wages, most people benefit from switch to wealth tax.
   - Optimal wealth tax delivers both efficiency and distributional gains.
   - No equity-efficiency trade-off.

4. Gains from optimal wealth tax come from reallocation, not capital accumulation.
   - Hence, gains remain even after taking the transition into account.

Tax Reform

back

- **Model the current US tax system with four taxes on:**

1. Capital income
2. Labor income
3. Consumption
4. Bequests.

Tax Reform

back

- **Model the current US tax system with four taxes on:**
  1. Capital income
  2. Labor income
  3. Consumption
  4. Bequests.

- **Wealth Tax Reform:** Replace τ_k with τ_a so as to keep government revenue constant.
  - First: Compare across steady states.
  - Then: Compare with transition after reform.

Tax Reform: Aggregate Variables

Welfare Dist. back

Taxes and welfare:

	τ_k	τ_ℓ	τ_a	ΔWelfare
Benchmark	25%	22.4%	–	–
Tax reform	–	22.4%	**1.19%**	7.2

Tax Reform: Aggregate Variables

Welfare Dist. back

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	τ_k	τ_ℓ	τ_a	ΔWelfare
Benchmark	25%	22.4%	–	–
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Aggregate variables: (% change)

	K	$Q = ZK$	TFP	L	Y	w
Tax reform	16.4	22.6	2.1	1.2	9.2	8.0

Tax Reform: Aggregate Variables

Welfare Dist. back

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Key: Tax reform **replaces** τ_k with τ_a. This is $\neq$ from adding wealth taxes.

- Adding wealth taxes reduces welfare by –6% to –9%

Optimal Tax Structure and Outcomes

	Benchmark US Economy	Tax Reform		
		Comparison Across Steady-States		Full Transition Equilibrium
Tax Rates				
τ_k	25.0	—	—	
τ_a	—	1.19		
τ_ℓ	22.4	22.4		
Δ Welfare	—	**7.2**		

Note: *Percentage changes are computed with respect to the US benchmark*

Optimal Tax Structure and Outcomes

Welfare back

	Benchmark US Economy	Tax Reform	Opt τ_a	
		Comparison Across Steady-States		Full Transition Equilibrium
Tax Rates				
τ_k	25.0	—	—	
τ_a	—	1.19	3.03	
τ_ℓ	22.4	22.4	15.4	
Δ *Welfare*	—	**7.2**	**8.7**	

Note: *Percentage changes are computed with respect to the US benchmark*

Optimal Tax Structure and Outcomes

Welfare back

	Benchmark US Economy	Tax Reform	Opt τ_a	Opt τ_k	
		Comparison Across Steady-States			Full Transition Equilibrium
Tax Rates					
τ_k	25.0	—	—	–13.6%	
τ_a	—	1.19	3.03	—	
τ_ℓ	22.4	22.4	15.4	31.2	
Δ *Welfare*	—	**7.2**	**8.7**	5.1	

Note: *Percentage changes are computed with respect to the US benchmark*

Optimal Tax Structure and Outcomes

Welfare back

	Benchmark US Economy	Tax Reform	Opt τ_a	Opt τ_k	Opt τ_a Transition
		Comparison Across Steady-States			Full Transition Equilibrium
Tax Rates					
τ_k	25.0	—	—	–13.6%	—
τ_a	—	1.19	3.03	—	3.80
τ_ℓ	22.4	22.4	15.4	31.2	14.4
Δ *Welfare*	—	**7.2**	**8.7**	5.1	**6.0**

Note: *Percentage changes are computed with respect to the US benchmark*

Optimal Tax Structure and Outcomes

▸ Welfare back

	Benchmark US Economy	Tax Reform	Opt τ_a	Opt τ_k	Opt τ_a Transition	Opt τ_k Transition
		Comparison Across Steady-States			Full Transition Equilibrium	
Tax Rates						
τ_k	25.0	—	—	–13.6%	—	–13.6%
τ_a	—	1.19	3.03	—	3.80	—
τ_ℓ	22.4	22.4	15.4	31.2	14.4	31.2
Δ *Welfare*	—	**7.2**	**8.7**	5.1	**6.0**	**–8.4**

Note: *Percentage changes are computed with respect to the US benchmark*

Policy Implications - Extra

Entrepreneurial Productivity z_{ih}: Key Source of Heterogeneity

back

Idiosyncratic wage risk:

- Modeled in a rich way, but does not turn out to be critical. Details

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back

Idiosyncratic wage risk:

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Entrepreneurial productivity, z_{ih}, varies

1. permanently across individuals: z_i^p *(imperfectly correlated across generations)*
2. stochastically over the life cycle

$$z_{ih} = f(z_i^p, \mathbb{I}_{ih}) = \begin{cases} \left(z_i^p\right)^{\lambda} & \text{if } \mathbb{I}_{ih} = H \qquad \text{where } \lambda > 1 \\ z_i^p & \text{if } \mathbb{I}_{ih} = L \\ z_{min} & \text{if } \mathbb{I}_{ih} = \mathbf{0} \end{cases}$$

λ: degree of superstar productivity *(consistent w/ Halvorsen, Hubmer, Ozkan, Salgado, 2024)*.

Labor Market Productivity y_{ih}

back

- Labor market efficiency of household i at age h is

$$\log y_{ih} = \underbrace{\kappa_h}_{\text{life cycle}} + \underbrace{\theta_i}_{\text{permanent}} + \underbrace{\eta_{ih}}_{\text{AR(1)}}$$

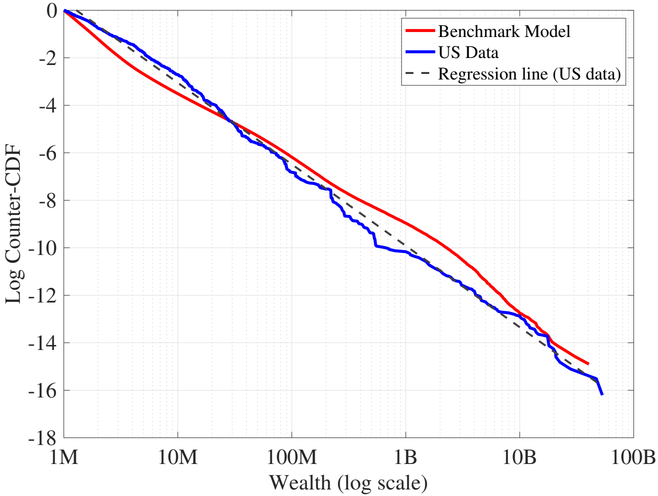
- Permanent component θ_i is imperfectly inherited from parents:

$$\theta_i^{child} = \rho_\theta \theta_i^{parent} + \varepsilon_\theta$$

Back to Households

Pareto Tail of Wealth Distribution: Model vs. Data

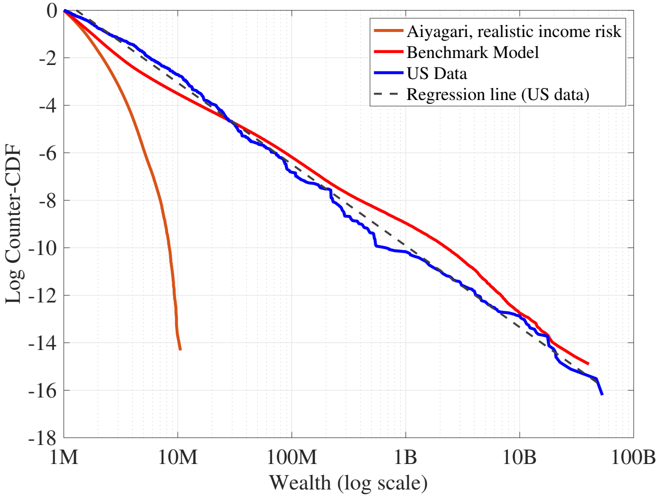
back



Note: Both axes are in natural logs.

Pareto Tail of Wealth Distribution: Model vs. Data

back



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Pareto Tail of Wealth Distribution: Model vs. Data

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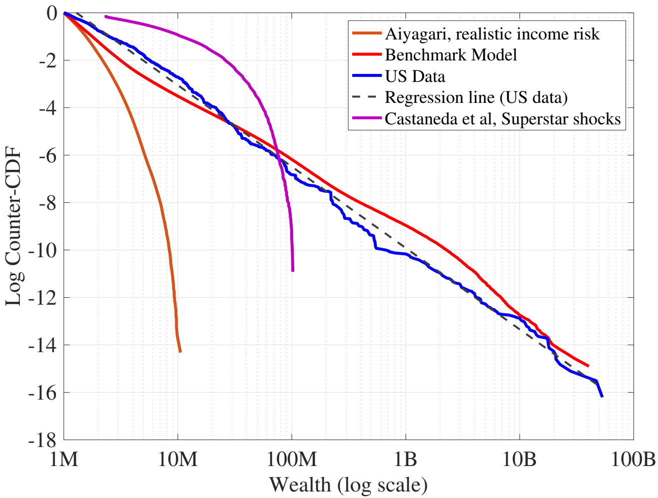

Note: Both axes are in natural logs.

Return heterogeneity

back

Table 1: Distribution of Rates of Return (Untargeted) in the Model and the Data

	Annual Returns			Persistent Component of Returns					
	Std dev	P90-P10	Kurtosis	Std dev	P90-P10	Kurtosis	P90	P99	P99.9
Data (Norway)	8.6	14.2	47.8	6.0	7.7	78.4	4.3	11.6*	23.4*
Data (Norway, bus. own.)	–	–	–	4.8	10.9	14.2	10.1	–	–
Data (US, private firms)	17.7	33.8	8.3	–	–	–	–	–	–
Benchmark Model	8.4	17.1	7.6	4.1	9.2	6.1	5.8	13.9	19.7
L-INEQ Calibration	6.7	13.1	9.2	3.8	9.2	4.3	5.6	11.2	15.8

*Notes: Returns on wealth in percentage points. All cross-sectional returns are value weighted. *The statistics for Norway are for individual returns on wealth (net worth) taken from Fagereng, Guiso, Malacrino, and Pistaferri (2020). The US statistics are from Smith, Zidar, and Zwick (2021) and are for S-corps' returns on investment; they also report statistics for partnerships, which are very similar (std dev of 17.8% and P90-P10 of 27.9). For each individual, the persistent component of returns is calculated following Fagereng et al as the unweighted average of annual, before-tax, returns between ages 25 and 75, after taking out the average return by age.*

Tax Reform: Who Gains? Who Loses?

back

Average (consumption equivalent) **welfare gain** by age-productivity groups:

	Productivity group (Percentile)					
Age	0-40	40-80	80-90	90-99	99-99.9	99.9+
20	**6.7**	**6.3**	**6.8**	**8.5**	**11.5**	**13.4**
21-34						
35-49						
50-64						
65+						

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21-34	6.3	5.5	5.5	6.5	8.5	9.7
35-49	4.9	3.8	3.3	3.3	3.1	2.8
50-64	2.2	1.5	1.1	0.9	0.4	-0.2
65+	-0.2	-0.3	-0.4	-0.4	-0.7	-1.0

Tax Reform: Who Gains? Who Loses?

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50-64	2.2	1.5	1.1	0.9	0.4	-0.2
65+	-0.2	-0.3	-0.4	-0.4	-0.7	-1.0

Adjusting pensions turns welfare losses of retirees to gains, ranging from 2.3% to 6.5%.

Welfare: Levels vs Redistribution

back

Welfare gain comes from changes in consumption (c) and leisure(ℓ).

- How much comes from changes in the **level** vs **distribution** of c and ℓ?

Welfare: Levels vs Redistribution

back

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- How much comes from changes in the **level** vs **distribution** of c and ℓ?

	Tax Reform	Opt.τ_a	Opt.τ_k
CE_2 (NB)	7.2	8.7	5.1
Level $(\overline{c}, \overline{\ell})$	8.9		
Dist. (c, ℓ)	-1.5		

Welfare: Levels vs Redistribution

back

Welfare gain comes from changes in consumption (c) and leisure(ℓ).

- How much comes from changes in the **level** vs **distribution** of c and ℓ?

	Tax Reform	Opt.τ_a	Opt.τ_k
CE_2 (NB)	7.2	8.7	5.1
Level $(\bar{c}, \bar{\ell})$	8.9	5.9	
Dist. (c, ℓ)	-1.5	**2.6**	

Welfare: Levels vs Redistribution

back

Welfare gain comes from changes in consumption (c) and leisure(ℓ).

- How much comes from changes in the **level** vs **distribution** of c and ℓ?

	Tax Reform	Opt.τ_a	Opt.τ_k
CE_2 (NB)	7.2	8.7	5.1
Level $(\bar{c}, \bar{\ell})$	8.9	5.9	14.7
Dist. (c, ℓ)	-1.5	**2.6**	**–8.3**