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

Fatih Guvenen, Gueorgui Kambourov, Burhan Kuruscu, Sergio Ocampo

Pontificia Universidad Javeriana, March 2024

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This paper: Theoretical analysis of optimal combination of taxes

- Analytical model with workers, heterogeneous entrepreneurs, and innovation
- **Result:** characterize **(i)** productivity **(ii)** welfare **(iii)** optimal taxes **(iv)** innovation

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1. **Empirical:** A growing literature documents persistent return heterogeneity.

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2. **Technical:** Capital taxes paid by the very wealthy.

   - 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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3. **Practical:** Wealth taxation widely used by governments $\longrightarrow$ Need better guidance

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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After-tax wealth ratio	1.15 ($= {}^{1150}/_{1000}$)		

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After-tax wealth ratio	1.15 ($= 1150/1000$)		1.20 ($\approx 1175/975$)	

- 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.

Theoretical Results: Preview

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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: $\alpha > \overline{\alpha}$
$\tau_a^\star < 0$, $\tau_k^\star > 0$	$\tau_a^\star > 0$, $\tau_k^\star > 0$	$\tau_a^\star > 0$, $\tau_k^\star < 0$

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4. Endogenous innovation: increase effect of τ_a on TFP, leading to higher optimal wealth tax

Outline

1. **Benchmark model with exogenous entrepreneurial productivity process**
2. Efficiency gains from wealth taxation
3. Welfare effects of wealth taxation
4. Optimal taxation
5. Model with endogenous entrepreneurial productivity
6. Extensions
7. Quantitative Analysis

Benchmark Model with Exogenous Entrepreneurial Productivity

Perpetual Youth Model with Workers and Entrepreneurs

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   - Heterogeneity in productivity (z) and wealth (a)
   - Initial (inherited) wealth $\bar{a}$ common across entrepreneurs *($\bar{a}$ determined endogenously later)*

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Preferences (of workers and entrepreneurs):

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

where $\beta < 1$ and $\delta < 1$ is the conditional survival probability

Technology, Production, and Taxes

Entrepreneurial technology:

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

- Productivity $z_i \in \{z_\ell, z_h\}$, where $z_h > z_\ell \geq 0$
- Each entrepreneur draws z_i randomly at birth
  - μ fraction of entrepreneurs have $z_i = z_h$, $1 - \mu$ have $z_i = z_\ell$
  - Productivity constant over lifetime *(results robust to Markov productivity process)*

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

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

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Financial markets:

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Entrepreneurs' Production Decision:

details

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

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

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 → no behavioral response to taxes.
→All effects come from use-it-or-lose-it. Conservative lower bound.

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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 $\lambda = \overline{\lambda}$

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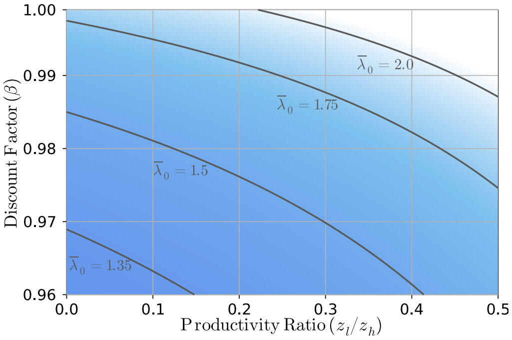
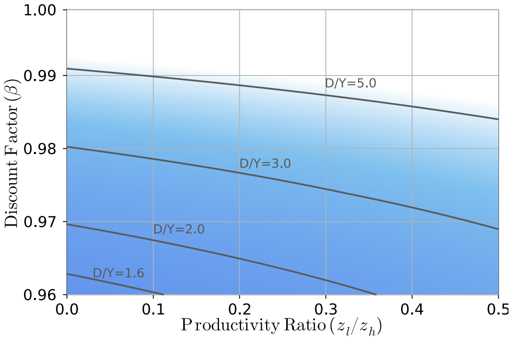
Condition implies an upper bound on wealth taxes:

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

Conditions for Steady State with Heterogeneous Returns

Returns





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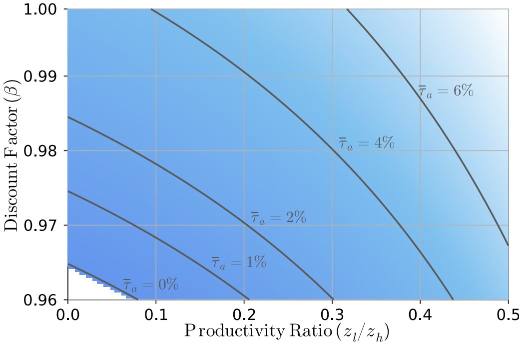

Equilibrium Values: Aggregation

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

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

$$Z \equiv s_h z_\lambda + (1 - s_h) z_\ell \qquad Z = \text{Wealth-weighted productivity}$$

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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 with 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 Z: Returns and evolution of assets imply this quadratic equation:

$$\left(1-\delta^2\beta\left(1-\tau_a\right)\right)Z^2 - \left[\left(1-\delta\right)\left(\mu z_\lambda + \left(1-\mu\right)z_\ell\right) + \delta\left(1-\delta\beta\left(1-\tau_a\right)\right)\left(z_\lambda + z_\ell\right)\right]Z$$
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- Z only depends on τ_a
- Wealth tax affects returns, wealth shares, productivity. Capital income tax does not.

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

- **Tax Neutrality:** τ_k does not affect steady state after-tax MPK; But τ_a does.

Steady State Z: Returns and evolution of assets imply this quadratic equation:

$$\left(1-\delta^2\beta\left(1-\tau_a\right)\right)Z^2 - \left[\left(1-\delta\right)\left(\mu z_\lambda + \left(1-\mu\right)z_\ell\right) + \delta\left(1-\delta\beta\left(1-\tau_a\right)\right)\left(z_\lambda + z_\ell\right)\right]Z$$
$$+\delta\left(1-\delta\beta\left(1-\tau_a\right)\right)z_\ell z_\lambda = 0$$

- Z only depends on τ_a
- Wealth tax affects returns, wealth shares, productivity. Capital income tax does not.
- Both taxes affect capital, output, wages...

Outline

1. Benchmark model with exogenous entrepreneurial productivity process
2. **Efficiency gains from wealth taxation**
3. Welfare effects of wealth taxation
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Main Result 1: Efficiency Gains from Wealth Taxation

Proposition:

Proof

For all $\mu \in (0,1)$ and $\tau_a < \bar{\tau}_a$, an increase in τ_a **increases Z**

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

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Distribution

- Dispersion of after-tax returns rises :

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

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  Distribution

- Dispersion of after-tax returns rises :

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

- Average return decreases:

$$\mu \frac{d \log R_h}{d\tau_a} + (1 - \mu)\, \frac{d \log R_\ell}{d\tau_a} < \mathbf{0}$$

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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- **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

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

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Main Result 2: Welfare Gains by Type

Proposition:

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 $\left(\frac{dV_h(\bar{a})}{d\tau_a} > 0\right)$ because $\xi_Z^K + \frac{1}{1-\beta\delta}\xi_Z^{R_h} > 0$
- Low-z entrepreneurs: Lower welfare $\left(\frac{dV_\ell(\bar{a})}{d\tau_a} < 0\right)$ iff $\xi_Z^K + \frac{1}{1-\beta\delta}\xi_Z^{R_\ell} < 0$
- Entrepreneurs: Lower average welfare iff $\xi_Z^K + \frac{1}{1-\beta\delta}\left(\mu\xi_Z^{R_h} + (1-\mu)\,\xi_Z^{R_\ell}\right) < 0$

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Note: These thresholds on α for welfare gains are very high in practice,
so average entrepreneur welfare typically falls when τ_a increases.

α Thresholds

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Main Result 3: Optimal Taxes

α thresholds

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

$$\mathcal{W} \equiv n_w V_w + (1 - n_w)\left(\mu V_h(\bar{a}) + (1-\mu) V_\ell(\bar{a})\right)$$

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$$\mathcal{W} = \frac{1}{1-\beta\delta}\left\{n_w \log\left(w+T\right) + (1-n_w)\left(\log \bar{a} + \frac{\mu \log R_h + (1-\mu)\log R_\ell}{1-\beta\delta}\right)\right\} + \text{Constant}$$

- An interior solution satisfies $d\mathcal{W}/d\tau_a = 0$.

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- An interior solution satisfies $d\mathcal{W}/d\tau_a = 0$.

Key trade-off:

1. Higher worker income $(w+T)$ and wealth $(\bar{a})$ (depends on α)
2. Lower log average return (higher return dispersion + negative GE effect)

Main Result 3: Optimal Taxes

α thresholds

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:

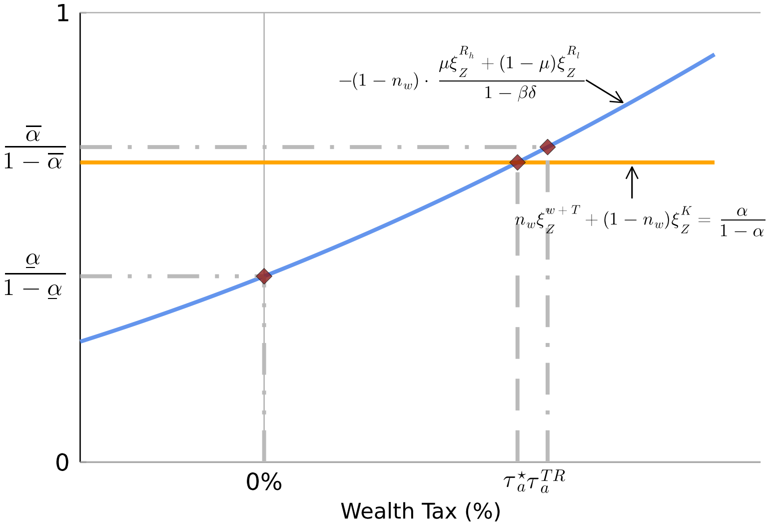
$$0 = \left(\underbrace{n_w \xi_Z^{w+T} + (1 - n_w)\, \xi_Z^K}_{\text{Level Effect } (+)} + \underbrace{\frac{1 - n_w}{1 - \beta\delta} \left(\mu \xi_Z^{R_h} + (1 - \mu)\, \xi_Z^{R_\ell} \right)}_{\text{Return Productivity Effect (-)}} \right) \frac{d \log Z}{d \tau_a}$$

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

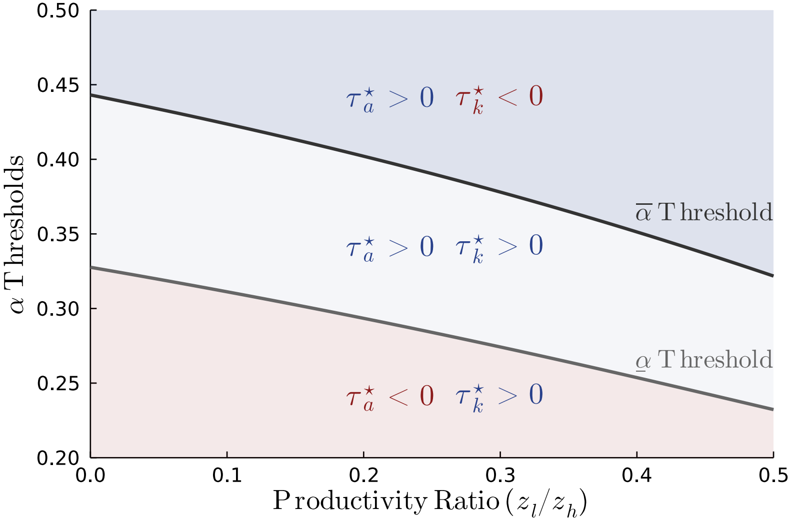
$$\begin{array}{llll} \tau_a^\star < 0 & \text{and} & \tau_k^\star > 0 & \text{if } \alpha < \underline{\alpha} \\ \tau_a^\star > 0 & \text{and} & \tau_k^\star > 0 & \text{if } \underline{\alpha} \leq \alpha \leq \bar{\alpha} \\ \tau_a^\star > 0 & \text{and} & \tau_k^\star < 0 & \text{if } \alpha > \bar{\alpha} \end{array}$$

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

$\tau_a^\star$ level



α Thresholds



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Model with Endogenous Productivity through Innovation

Model with Innovation Effort

- Interpret productivity z_i as the outcome of a risky innovation process
- Innovation requires costly effort, e, and can end with a high- or low-productivity idea

Innovator's problem:

$$\max_e \mu(e) V_h(\bar{a}) + (1 - \mu(e)) V_\ell(\bar{a}) - \frac{1}{(1-\beta\delta)^2} \Lambda(e); \quad \Lambda(e) \text{ convex} + C^2; \; \mu(e) = e$$

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We show:

- Unique equilibrium with innovation.

$$\uparrow \tau_a \longrightarrow \uparrow \text{Productivity } (Z) \longrightarrow \uparrow \text{Innovation effort } (e) \longrightarrow \uparrow \text{High prod } (\mu) \longrightarrow \uparrow\uparrow Z$$

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- Endogenizing innovation implies higher optimal wealth taxes.

Equilibrium with Innovation

Steady State: For $\tau_a \leq \overline{\tau}_a$, the share $\mu^\star$ of high-productivity entrepreneurs is the solution to

$$\mu^\star = e(Z(\mu^\star)), \text{ where}$$

i. $Z(\mu)$ gives the steady state productivity given μ.

ii. $e(Z)$ gives the optimal innovation effort given steady state productivity Z.

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Corollary (productivity gains from wealth taxation):

The equilibrium $Z^\star$ is increasing in τ_a (+ Both $\mu^\star$ and $Z^\star$ are independent of τ_k).

Optimal Taxes with Innovation

Objective: Choose $(\tau_a^\star, \tau_k^\star)$ to maximize newborn welfare net of innovation costs

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

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$$+ \underbrace{\frac{1-n_w}{1-\beta\delta}\left(\mu \xi_\mu^{R_h} + (1-\mu)\,\xi_\mu^{R_\ell}\right)\frac{d\mu}{d\tau_a}}_{\text{New! Return Innovation Effect } (+)} = 0$$

Extensions

Extension: Entrepreneurial Effort

- Entrepreneurial effort in production:

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

  Production functions is CRS $\longrightarrow$ Aggregation

- Entrepreneurial preferences:

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

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Entrepreneurial problem becomes:

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

- **Key:** Effective cost of effort depends on capital income tax τ_k!

Extension: Entrepreneurial Effort

Results:

1. Efficiency gains from wealth taxation go through
2. Effect on aggregates is stronger if capital income taxes go down
3. Optimal taxes: higher wealth tax and lower capital income tax

Extensions

- Stochastic Productivity: Follows Markov process with persistence ρ
  - All results hold as long as $\rho > 0$
- Corporate sector that faces no borrowing constraint

  Details
  - If $z_\ell < z_C < z_h$, then low-productivity agents invest in the corporate sector.
- Rents: Return $\neq$ Marginal productivity.

  Details
  - Introduce zero-sum return wedges so that $R_h <> R_\ell$.
  - Efficiency gains from $\tau_a \uparrow$ if $R_h > R_\ell$.

Conclusions

Increasing τ_a (& reducing τ_k):

- Use it or Lose it Effect: Reallocates capital from less to more productive agents.
  - Higher TFP, output, and wages;
  - Higher dispersion in returns and wealth and lower average returns
- Equilibrium innovation increases (when innovation is endogenous)

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Optimal taxes:

- Combination of taxes depends on pass-through of TFP to wages and wealth
- Optimal wealth tax is higher with endogenous innovation.

Extra

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Entrepreneur's Problem

Financial Markets & Entrepreneurs' Production Problem

Entrepreneurs' Production Decision:

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

Financial Markets & Entrepreneurs' Production Problem

Entrepreneurs' Production Decision:

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

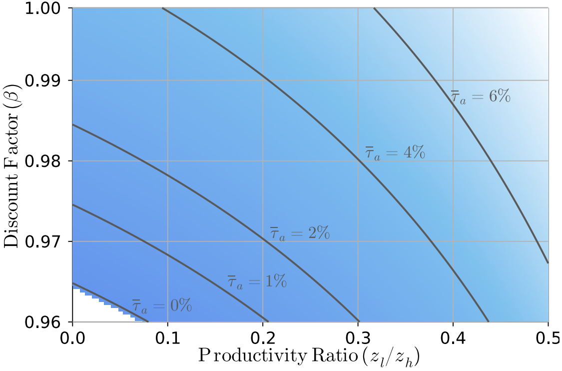
$$\pi^{\star}(z) = \begin{cases} (MPK(z) - r)\lambda & \text{if } MPK(z) > r \\ 0 & \text{otherwise.} \end{cases} \qquad k^{\star}(z) \begin{cases} = \lambda a & \text{if } MPK(z) > r \\ \in [0, \lambda a] & \text{if } MPK(z) = r \\ = 0 & \text{if } MPK(z) < r \end{cases}$$

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

back

FIGURES

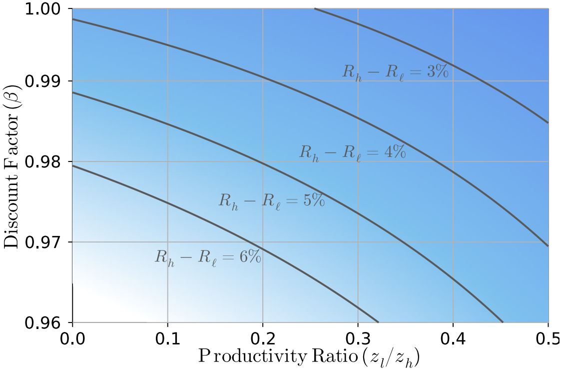
Condition for Steady State with Heterogeneous Returns



Note: *The figure reports the upper bound on wealth taxes 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* $\alpha = 0.4$*.* λ *is such that the debt-to-output ratio in our baseline calibration is 1.5.*

Return Dispersion in Steady State of the Benchmark Economy

back



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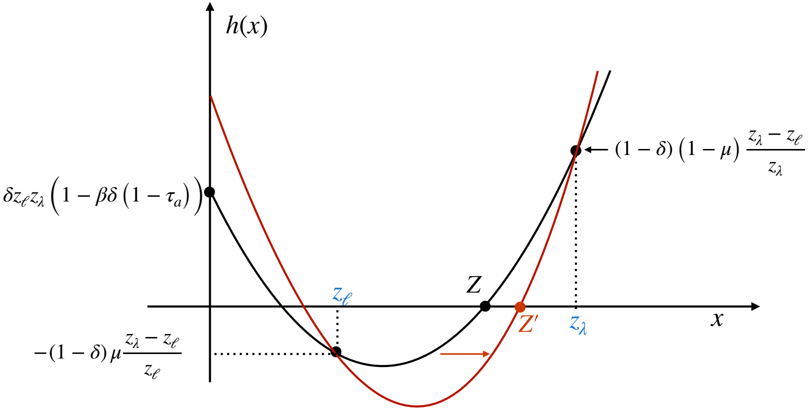
What happens to Z if $\tau_a \uparrow$?

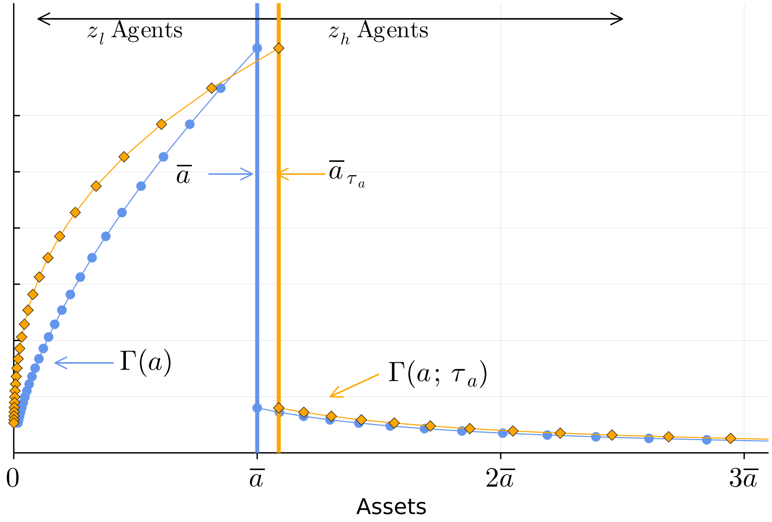
Back to eff. gain

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



Stationary wealth distribution and wealth taxes

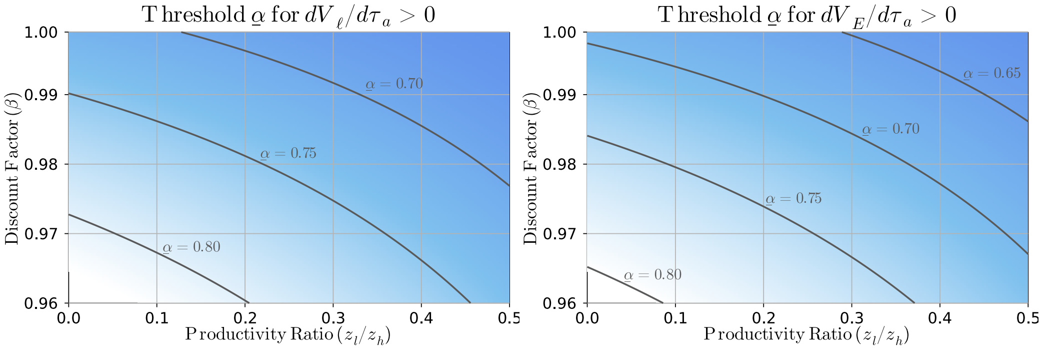
back



Welfare Gains

Conditions for Entrepreneurial Welfare Gain

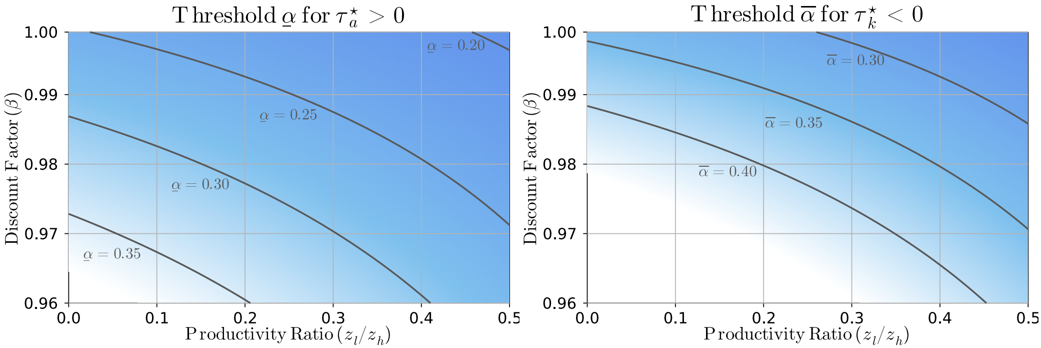
back



Note: *The figures report the threshold value of α above which entrepreneurial welfare increases after an increase in wealth taxes 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* $\alpha = 0.4$.

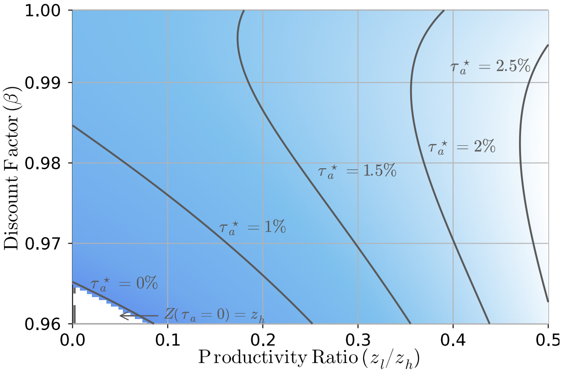
Optimal Taxes

α-thresholds for Optimal Wealth Taxes



Note: *The figures report the threshold value of α for the optimal wealth taxes to be positive (left) and capital income taxes to be positive (right) 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* $\alpha = 0.4$.

How the Optimal Wealth Tax Varies with β and productivity dispersion



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* $\alpha = 0.4$.

back

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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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

Extension: Entrepreneurial Effort

Back to extensions

- Entrepreneurial production:

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

  - Production functions is CRS $\longrightarrow$ Aggregation

- Entrepreneurial preferences:

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

  - GHH preferences with no income effects $\longrightarrow$ Aggregation
  - ψ plays an important role: Cost of effort in consumption units

Extension: Entrepreneurial Effort

Back to extensions

Problem is isomorphic to having preferences

$$u(\hat{c}) = \log \hat{c} \qquad \text{where } \hat{c} = c - \psi e$$

and modifying entrepreneurial problem to:

$$\hat{\pi}(z, k) = \max_{n,e} y - wn - rk - \underbrace{\frac{\psi}{1-\tau_k}}_{\text{Effecive cost of effort}} e$$

- Solution is just as before (linear policy functions a', n, **and e**)
- **Key:** Effective cost of effort depends on capital income tax τ_k!
  - Effort affects entrepreneurial income
  - Income subject to capital income taxes but not to **book value** wealth taxes

Extension: Entrepreneurial Effort

Back to extensions

- Aggregate effort:

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

  - Comparative statics: $K\uparrow$, $Z\uparrow$, and $\tau_k\downarrow$

- New wedge from capital income taxes on aggregate output and wages!
- Effort affects marginal product of capital $\longrightarrow$ Affects K_{ss}

A neutrality result:

- **No changes to steady state productivity!**
- Steady state capital adjusts in background to satisfy:

$$(1-\tau_k)\,\text{MPK} - \tau_a = \frac{1}{\beta} - 1$$

Extension: Entrepreneurial Effort

Back to extensions

Results:

1. Efficiency gains from wealth taxation remain
2. Effect on aggregates is stronger if capital income taxes go down
   - **Effort increases with wealth taxes:**

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

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

Quantitative Framework with New Results

Model: Households

Back

- **OLG** demographic structure.
- **Uncertain lifetimes:** individuals face mortality risk every period.
- **Bequest motive**, inheritance goes to (newborn) offspring.

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Individuals:

- Have preferences over consumption, **leisure** and bequests
- Make three decisions:

  consumption-savings ‖ **labor supply** ‖ portfolio choice

- Two exogenous characteristics:

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

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Entrepreneurs: monopolistic competition → **decreasing returns to scale**

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

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
- Entrepreneurial productivity, z_{ih}, varies
  1. permanently across individuals
     - imperfectly correlated across generations
  2. stochastically over the life cycle

Government

Back

Government budget balances:

- **Outlays:** Expenditure (G) + Social Security pensions
- **Revenues:** tax on consumption (τ_c), labor income (τ_ℓ), bequests (τ_b) plus:

1. tax on capital income (τ_k), or
2. tax on wealth (τ_a).

Calibration summary

Back

Choose parameters of

- Bequest motive $\rightarrow$
  - level and concentration of bequests

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  - top wealth concentration (overall and in the hands of entrepreneurs)
  - shares of entrepreneurs and self-made billionaires

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- Bequest motive $\rightarrow$
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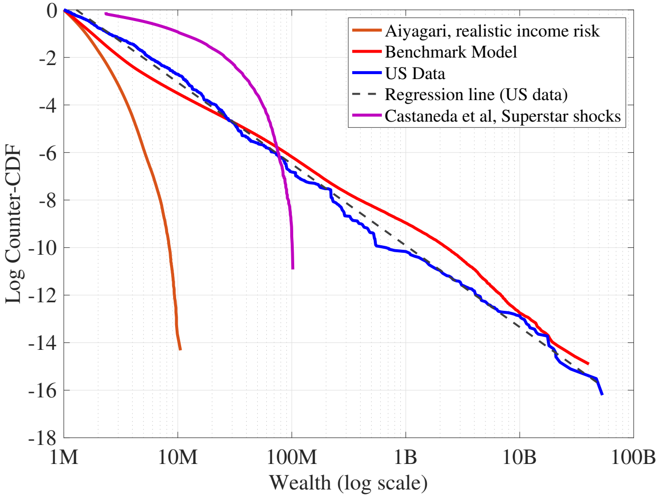
- Entrepreneurial productivity $\rightarrow$
  - top wealth concentration (overall and in the hands of entrepreneurs)
  - shares of entrepreneurs and self-made billionaires
- Entrepreneurs' collateral constraint $\rightarrow$
  - Business debt plus external funds/GDP

Details

Pareto Tail of Wealth Distribution: Model vs. Data

Back



Note: *Both axes are in natural logs.*

Performance of the benchmark model: return heterogeneity

Back

	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

Note: *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 and Optimal Taxes

Back

	τ_k	τ_ℓ	τ_a	ΔWelfare
Benchmark	25%	22.4%	–	–
RN Tax reform	–	22.4%	1.19%	7.2
Opt. τ_a				
Opt. τ_k				

Change in aggregate variables

Back

% change	K	Q	TFP	L	Y	w	w (net)
Tax reform	16.4	22.6	2.1	1.2	9.2	8.0	8.0
Optimal τ_a		.		.	.	.	.
Optimal τ_k		.		.	.	.	.

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

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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

BB tax reform turns welfare losses of retirees to gains, ranging from 2.3% to 6.5%.

Tax Reform and Optimal Taxes

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Opt. τ_a	–	**15.4%**	**3.03%**	8.7
Opt. τ_k				

Tax Reform and Optimal Taxes

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	τ_k	τ_ℓ	τ_a	ΔWelfare
Benchmark	25%	22.4%	–	–
RN Tax reform	–	22.4%	1.19%	7.2
Opt. τ_a	–	**15.4%**	**3.03%**	8.7
Opt. τ_k	**–13.6%**	**31.2%**	–	5.1

Change in aggregate variables

Back

% change	K	Q	TFP	L	Y	w	w (net)
Tax reform	16.4	22.6	2.1	1.2	9.2	8.0	8.0
Optimal τ_a	**2.6**	10.5	3.1	3.3	6.1	2.8	**12.0**
Optimal τ_k							

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% change	K	Q	TFP	L	Y	w	w (net)
Tax reform	16.4	22.6	2.1	1.2	9.2	8.0	8.0
Optimal τ_a	**2.6**	10.5	3.1	3.3	6.1	2.8	**12.0**
Optimal τ_k	**38.6**	46.1	2.2	–1.0	15.7	16.8	**3.6**

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?

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

Welfare: Levels vs Redistribution

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Level $\left(\bar{c}, \bar{\ell}\right)$	8.9	14.7	
Dist. $\left(c, \ell\right)$	-1.5	**−8.3**	

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

Optimal taxes with transition

Optimal Tax Equilibrium with Transition

Back

- Fix opt. tax level (τ_k or τ_a) and solve transition to new steady state
- Use labor income tax (τ_ℓ) to finance debt from deficits during transition

Optimal Tax Equilibrium with Transition

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	$\boldsymbol{\tau_k}$ Transition	$\boldsymbol{\tau_a}$ Transition
τ_k	-13.6^*	0.00
τ_a	0.00	3.03^*
τ_ℓ	39.90	17.01
$\overline{CE}_2$ (newborn)	**–8.4** (5.1)	**6.0** (8.7)
$\overline{CE}_2$ (all)	–6.1 (4.5)	3.5 (4.3)