USE IT OR LOSE IT: EFFICIENCY GAINS FROM WEALTH TAXATION

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Taxing Capital

- **Question:** How does taxing income flow from capital differ from taxing stock of capital?
  - **Capital income tax:** $a_{\text{after-tax}} = a + (1 - \tau_k) \times ra$
  - **Wealth tax:** $a_{\text{after-tax}} = (1 - \tau_a) \times a + (1 - \tau_a) \times ra$

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  - **Wealth tax:** $a_{\text{after-tax}} = (1 - \tau_a) \times a + (1 - \tau_a) \times ra$
- **Standard Answer:** The two taxes are equivalent with $\tau_a = \frac{r\tau_k}{1+r}$ ... assuming r is the same for all individuals.
- **This Paper:** Take heterogeneity in r seriously and compare the two ways of taxing capital.
  - **Short Answer:** The two taxes have very different—sometimes opposite—implications.

Two Motivations for "Heterogeneous Returns"

1. Increasing evidence of large and persistent differences in returns across households:
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   - Top 1% pay 44% of capital taxes. Top 10% pay 79% of capital taxes.
   - But generating features of this wealth distribution is hard:
     - Data: Top 1% hold 35–40% (Models: 8–10%)
     - Data: Top 10% hold 75–80% (Models: 35–40%)
     - US billionaires: 54% are self made.
     - In most models that match top 1% share: nobody with more than $10M wealth
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- Models with return heterogeneity can generate these facts.

Simple Example

Return Heterogeneity: Simple Example

- One-period model.
- Two brothers, Fredo and Mike, each with \$1000 of wealth.
- Government taxes to finance $G = \$50$.
  - Tax collected end of period.

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- Government taxes to finance $G = \$50$.
  - Tax collected end of period.
- Key heterogeneity: investment/entrepreneurial ability
  - (Fredo) Low ability: earns $r_f = 0\%$ net return
  - (Mike) High ability: earns $r_m = 20\%$ net return.

Capital Income vs. Wealth Tax

	Capital income tax	**Wealth tax**
	$W_{\text{after-tax}} = a + (1-\tau_k)ra$	$W_{\text{after-tax}} = (1-\tau_a)a + (1-\tau_a)ra$
Wealth Before-tax Income		
Tax liability		
After-tax return		
After-tax $\frac{W_m}{W_f}$		

Capital Income vs. Wealth Tax

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	Fredo ($r_f = 0\%$)	**Mike** ($r_m = 20\%$)	
Wealth	1000	1000	
Before-tax Income	0	200	
	$\tau_k = \frac{50}{200} = 25\%$		
Tax liability	0	50	
After-tax return	0%	$\frac{200-50}{1000} = 15\%$	
After-tax $\frac{W_m}{W_f}$	$1150/1000 = 1.15$		

Capital Income vs. Wealth Tax

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	Fredo ($r_f = 0\%$)	**Mike** ($r_m = 20\%$)	**Fredo** ($r_f = 0\%$)	**Mike** ($r_m = 20\%$)
Wealth	1000	1000	1000	1000
Before-tax Income	0	200	0	200
	$\tau_k = \frac{50}{200} = 25\%$		$\tau_a = \frac{50}{2200} \approx 2.27\%$	
Tax liability	0	50	$1000\tau_a = 22.7$	$1200\tau_a = 27.3$
After-tax return	0%	$\frac{200-50}{1000} = 15\%$	$-\frac{22.7}{1000} = -2.3\%$	$\frac{200-27}{1000} = 17.3\%$
After-tax $\frac{W_m}{W_f}$	$1150/1000 = 1.15$		$1173/977 \approx 1.20$	

Simple Example: Remarks

- Replacing capital income tax with wealth tax increases dispersion in after-tax returns.
- Potential effects:
  - Positive (+): Efficiency gain
    1. (Static): Wealth taxes alleviate misallocation - Capital is reallocated (mechanically) to more productive agents.
    2. (Dynamic): If savings rates respond to changes in returns, this could further increase reallocation of capital toward more productive agents.
  - Negative (-): Increased wealth inequality (but: ambiguous effect on consumption inequality when wage income present).

MODEL

HOUSEHOLDS

- OLG demographic structure.
- Individuals face mortality risk and can live up to H years (ϕ_h: unconditional probability of survival).
- Accidental bequests are inherited by (newborn) offspring.
- Each individual supplies labor in the market and produces a differentiated intermediate good using her capital (wealth) and borrowing from the credit market.
  - Labor market efficiency has a life-cycle, permanent, and a stochastic component.
- Individuals maximize $\mathbb{E}_0\left(\sum_{h=1}^{H}\beta^{h-1}\phi_h u(c_h,\ell_h)\right)$

Entrepreneurial Productivity

Key source of heterogeneity: in entrepreneurial ability z_i.

- Household i produces x_{ih} units of intermediate good i according to

$$x_{ih} = z_{ih} k_{ih},$$

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- z_{ih} has a permanent (z_i^p) and a stochastic $(\mathbb{I}_{ih})$ component:

$$z_{ih} = f(z_i^p, \mathbb{I}_{ih})$$

  - z_i^p is constant over the lifecycle and inherited imperfectly:

$$\log(z^p_{child}) = \rho_z \log(z^p_{parent}) + \varepsilon_z.$$

  - $\mathbb{I}_{ih}$ is governed by transition matrix Π_z.

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  - $\mathbb{I}_{ih}$ is governed by transition matrix Π_z.

- x_{ih} is sold to the competitive final good producer with technology

$$Y = Q^\alpha L^{1-\alpha} \text{ where } Q = \left(\int_i x_i^\mu di \right)^{1/\mu} \text{ and } L \text{ is aggregate labor.}$$

Entrepreneurial Ability: Stochastic Component

- The **lifecycle pattern of wealth accumulation** for the very rich matters greatly for the effects of wealth taxation:

  1. **steady accumulation of wealth:** the rich today have high expected returns tomorrow.
     - Distortion is smaller. But wealthy are also more in favor of wealth taxation.

  2. **extremely fast growth followed by stagnation**: rich today have low expected returns tomorrow.
     - Distortion is big. Wealthy are not supportive of wealth taxes.

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  2. **extremely fast growth followed by stagnation**: rich today have low expected returns tomorrow.
     - Distortion is big. Wealthy are not supportive of wealth taxes.
- So, we consider a process that can nests both scenarios.

Household's Problem

- Households choose consumption, labor and capital for production.
- Households can **borrow** up to a limit to finance their production: $k \leq \vartheta(z) \times a$
  - Borrowing capacity is nondecreasing in ability: $d\vartheta(z)/dz \geq 0$
- Households can **lend** at interest rate r, determined in equilibrium (zero net supply).

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- Household's budget is:

$$(1+\tau_c)c + a' = \Pi(a,z;\tau) + \begin{cases} (1-\tau_\ell)(wy_h n) & \text{working life} \\ y_R(\theta,\eta) & \text{retirement} \end{cases}$$

and $a' \geq 0$ at all ages.

  - **After-tax wealth:**

$$\Pi(a,z;\tau_k) = a + [ra + \pi^*(a,z)](1-\tau_k) \quad \text{under capital income tax}$$
$$\Pi(a,z;\tau_a) = [(1+r)a + \pi^*(a,z)](1-\tau_a) \quad \text{under wealth tax}$$

PARAMETRIZATION

Calibration: Entrepreneurial Productivity

- Permanent component (z^p) follows an AR(1):
  - $\rho_z = 0.1$ is set based on Fagereng et al (2016) for Norway. (We have also experimented with values up to 0.5)
  - $\sigma_{\varepsilon_z} = 0.072$ is chosen to match 36% wealth share of top 1% richest.

CALIBRATION: ENTREPRENEURIAL PRODUCTIVITY

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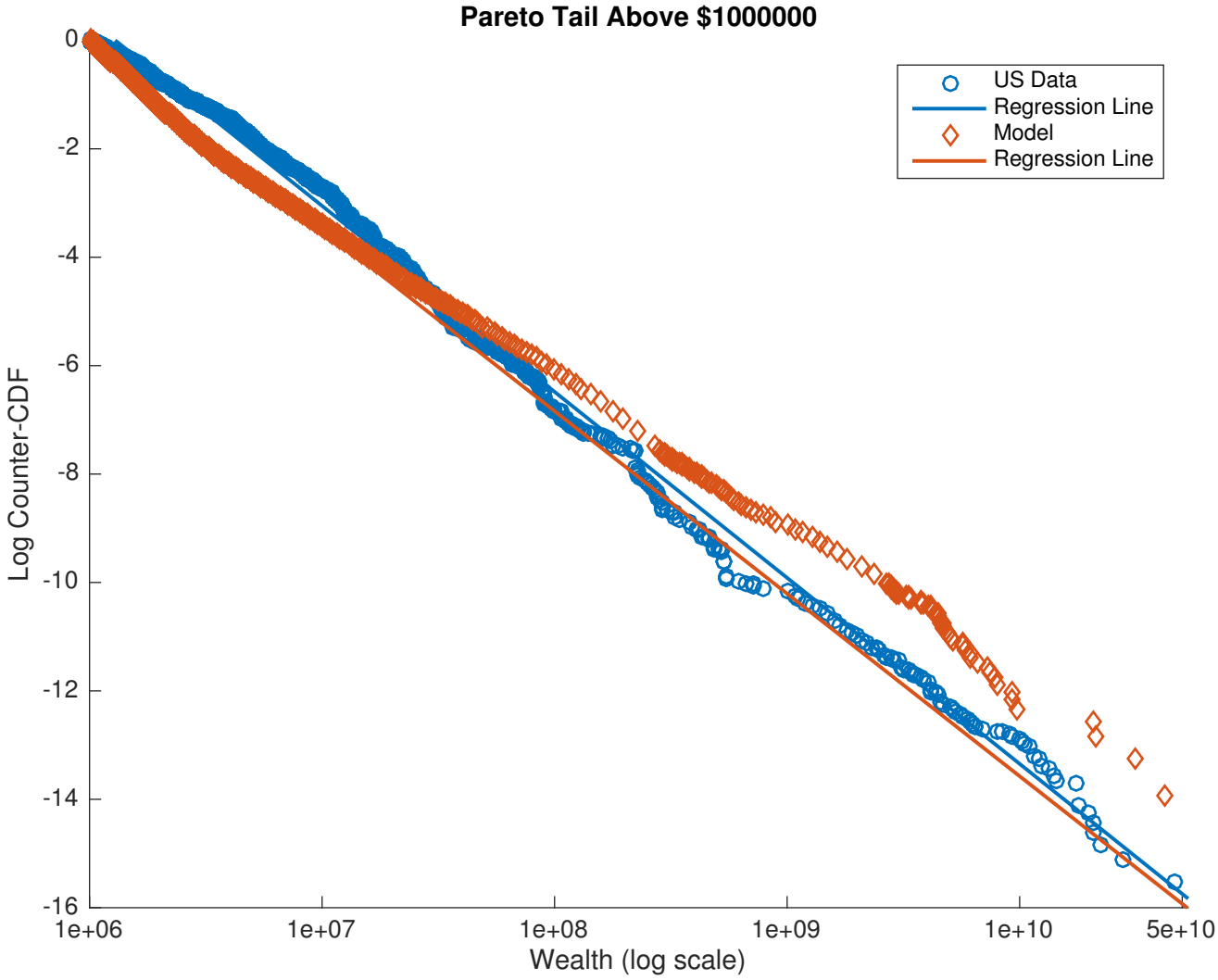
  - $\sigma_{\varepsilon_z} = 0.072$ is chosen to match 36% wealth share of top 1% richest.
- Stochastic component ($\mathbb{I}_{ih}$) is chosen to match:
  1. The fraction of Forbes 400 rich that are self-made (54%, we get 50%)
  2. The life cycle pattern of wealth accumulation for Forbes 400 (still in progress). FORBES 400 - (CIVALE AND DÍEZ-CATALÁN (2016))
  - The calibrated process allows entrepreneurs to have extremely fast wealth growth followed by stagnation. DETAILS

Pareto Tail ($\mu = 0.9$)



Quantitative Results

1. Tax Reform

- Replace capital income taxes with wealth taxes so as to keep government revenue constant.

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	Benchmark	Wealth Tax
τ_k	25.0%	0.00
τ_a	0.00	1.13%

Note:

- In all experiments, we keep the **pension benefits fixed** at the baseline values.

Tax Reform: Wealth Distribution

Table: Benchmark vs. Wealth Tax Economy

	US Data	Benchmark	Wealth Tax
Top 1%	0.36*	0.36	**0.46**
Capital/Output	3.00*	3.00	**3.25**
Bequest/Wealth	1–2%	0.99%	1.07%
$\sigma(\log(\text{Earnings}))$	0.80*	0.80	0.80
Avg. Hours	0.40*	0.40	0.41

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Avg. Hours	0.40*	0.40	0.41

	$\overline{k}$	Q	w	Y	L	C
% Change	19.4	24.8	8.7	10.1	1.3	10.0

Rate of Return Heterogeneity

TABLE: Benchmark vs. Wealth Tax Economy

	Percentiles of Return Distribution (%)				
	P10	P50	P90	P95	P99
			Before-tax		
Benchmark	2.00	2.00	17.28	22.35	42.36
Wealth tax	1.74	1.74	14.62	19.04	36.91
			After-tax		
Benchmark	**1.50**	**1.50**	**12.96**	**16.76**	**31.77**
Wealth tax	**0.59**	**0.59**	**13.32**	**17.69**	**35.35**

Welfare Analysis: Two Measures

- CE_1: Compute individual specific consumption equivalent welfare and integrate.
- CE_2: Fixed proportional consumption transfer to all individuals in the benchmark economy.

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	Baseline		Baseline + SS	
	$\overline{CE}_1$	$\overline{CE}_2$	$\overline{CE}_1$	$\overline{CE}_2$
Av. CE for newborns	7.49%	**7.86%**	5.58%	**4.71%**
Av. CE (all population)	3.14%	5.14%	4.95%	4.10%
% in favor of reform		**67.8%**		**94.8%**

Tax Reform: Who Gains? Who Loses?

	Productivity group								
Age	z_1	z_2	z_3	z_4	z_5	z_6	z_7	z_8	z_9
20–25	**7.3**	**7.2**	**6.8**	**6.8**	**7.4**	**8.8**	**10.5**	**11.1**	**10.7**
25–34	7.0	6.9	6.4	6.0	5.9	6.0	5.9	3.7	1.2
35–44	6.1	6.0	5.4	4.9	4.3	3.3	1.4	–1.7	–4.3
45–54	4.6	4.5	4.1	3.5	2.8	1.7	–0.5	–3.1	–5.2
55–64	1.9	1.9	1.6	1.3	0.9	0.0	–1.6	–3.5	–5.3
65–74	–0.3	–0.3	–0.4	–0.5	–0.6	–1.0	–2.1	–3.4	–4.7
75+	–0.1	–0.1	–0.1	–0.1	–0.1	–0.4	–1.0	–1.9	–2.7

Note: Each cell reports the average of $CE_1(\theta, z, a, h) \times 100$ *within each age and productivity group*

2. Optimal Taxation

Two Optimal Tax Problems

Compare:

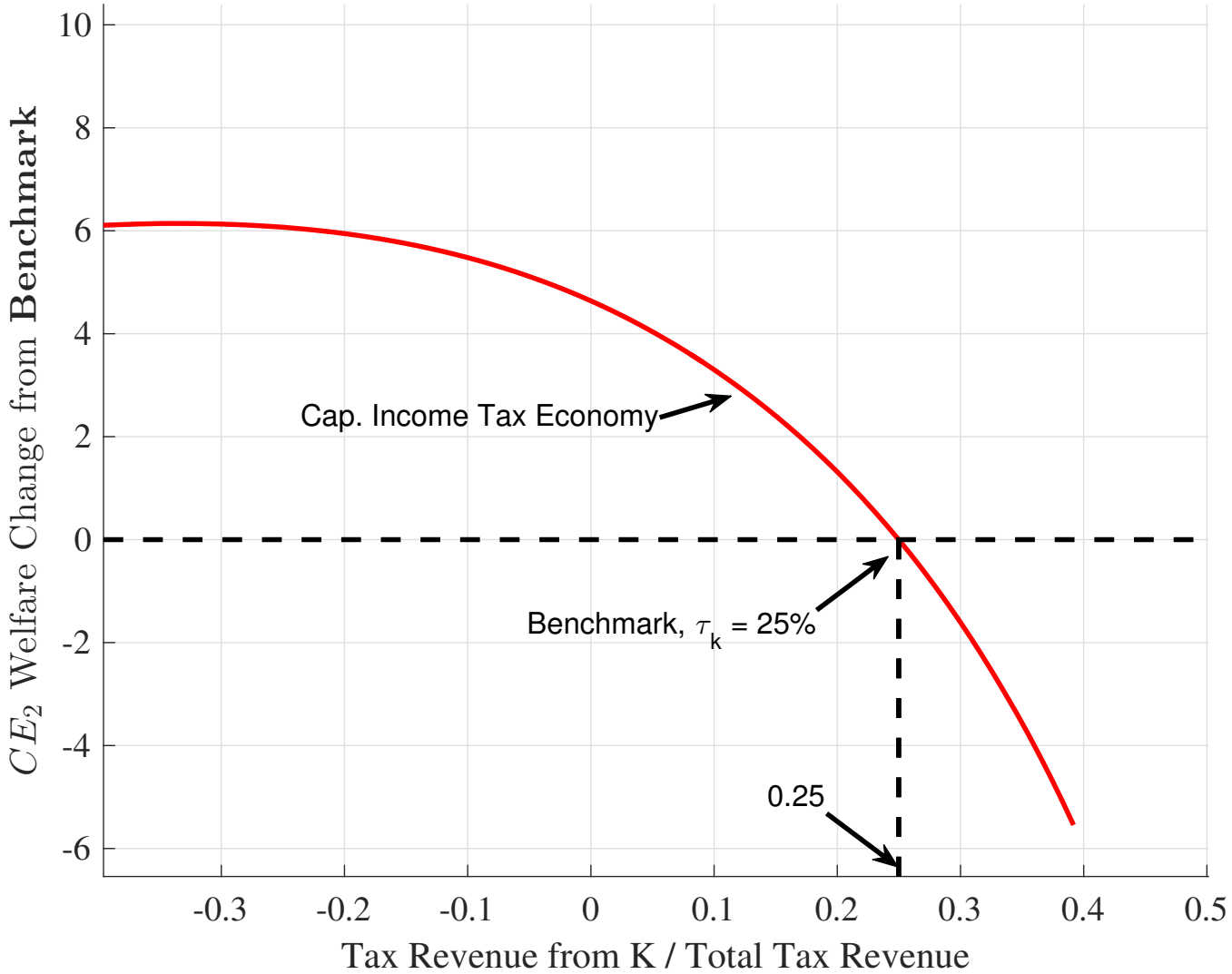
1. (linear) labor taxes and capital income taxes
2. (linear) labor taxes and wealth taxes.

The government maximizes ex ante (expected) lifetime utility of newborns.

Then analyze:

- Benchmark vs. Optimal tax (either capital income or wealth)

Welfare Change: Optimal Taxes



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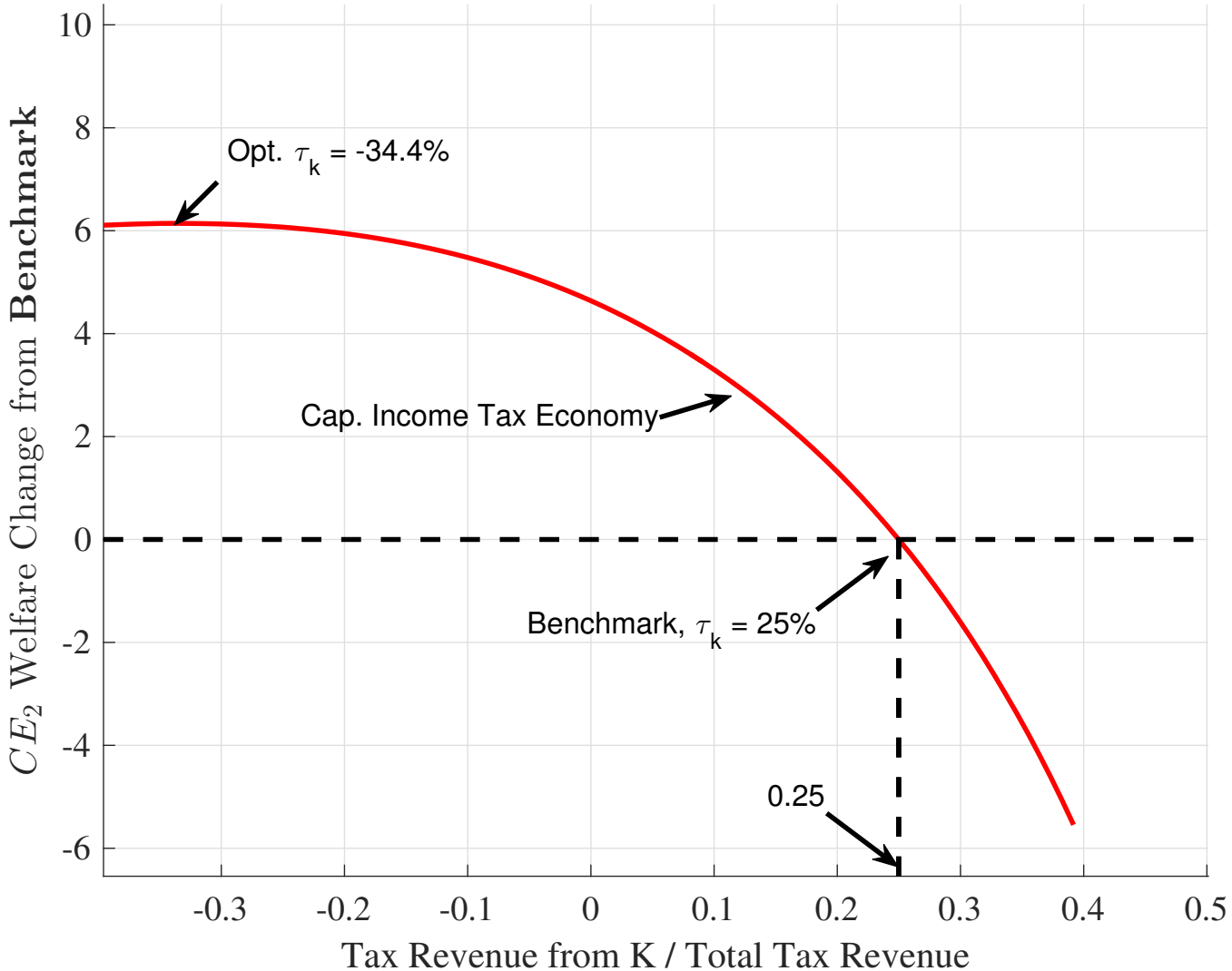

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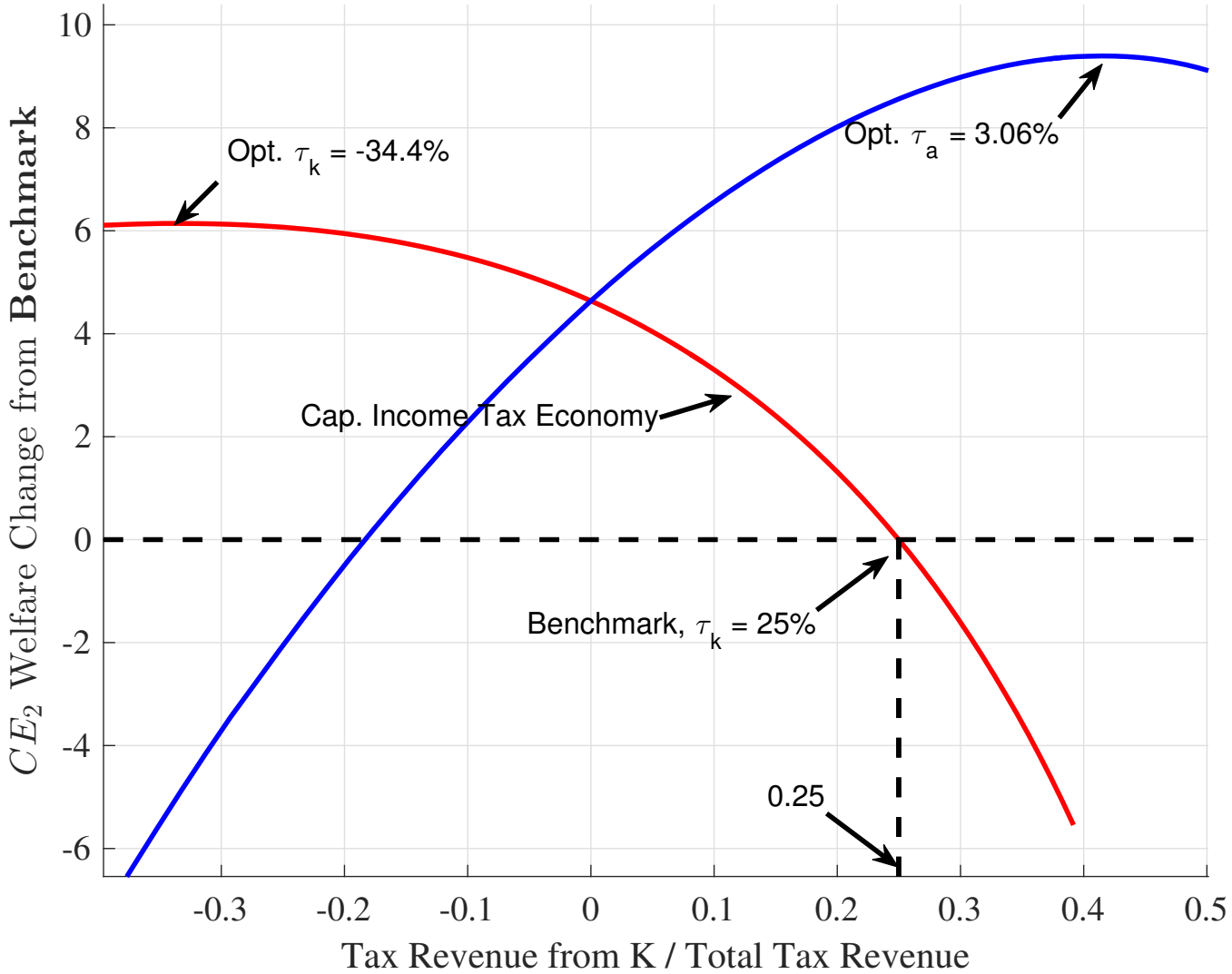
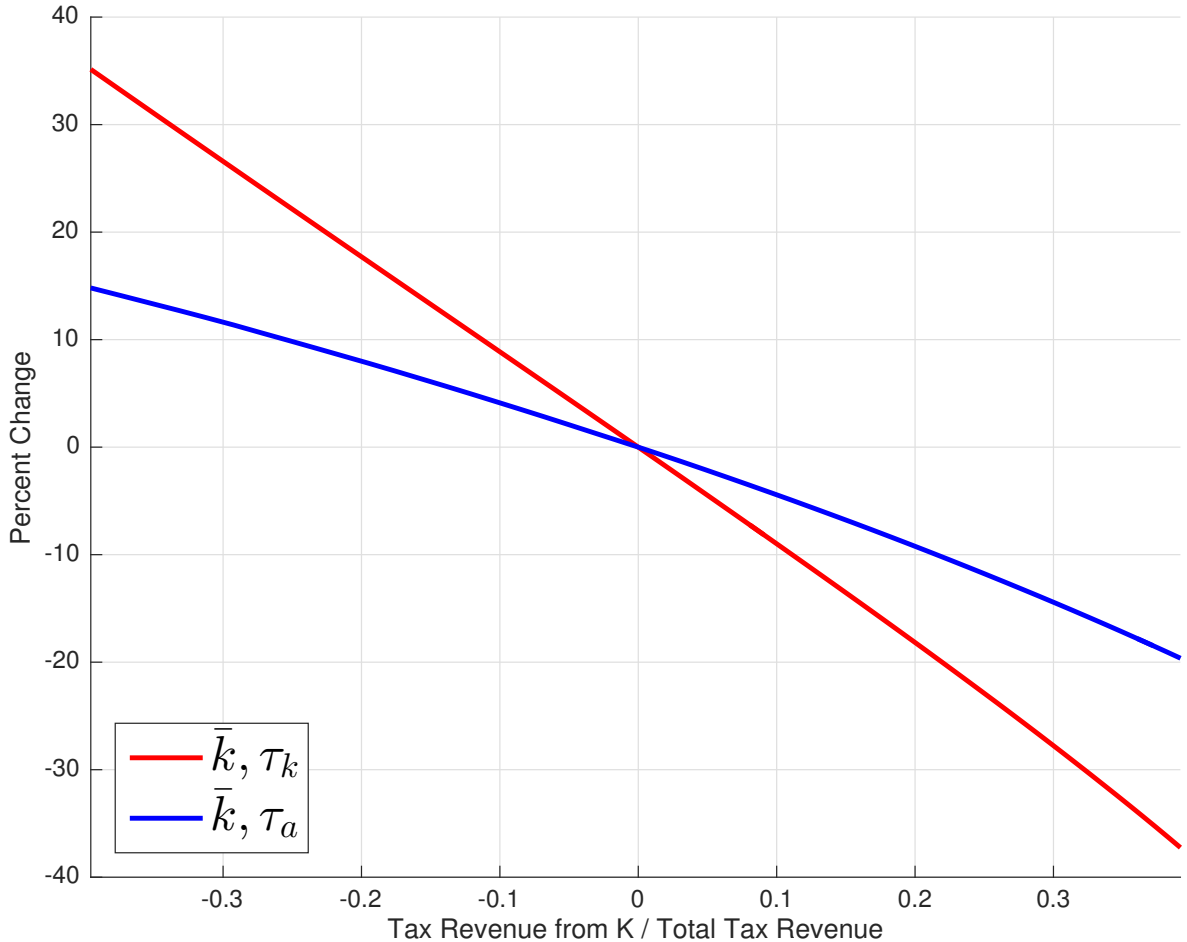
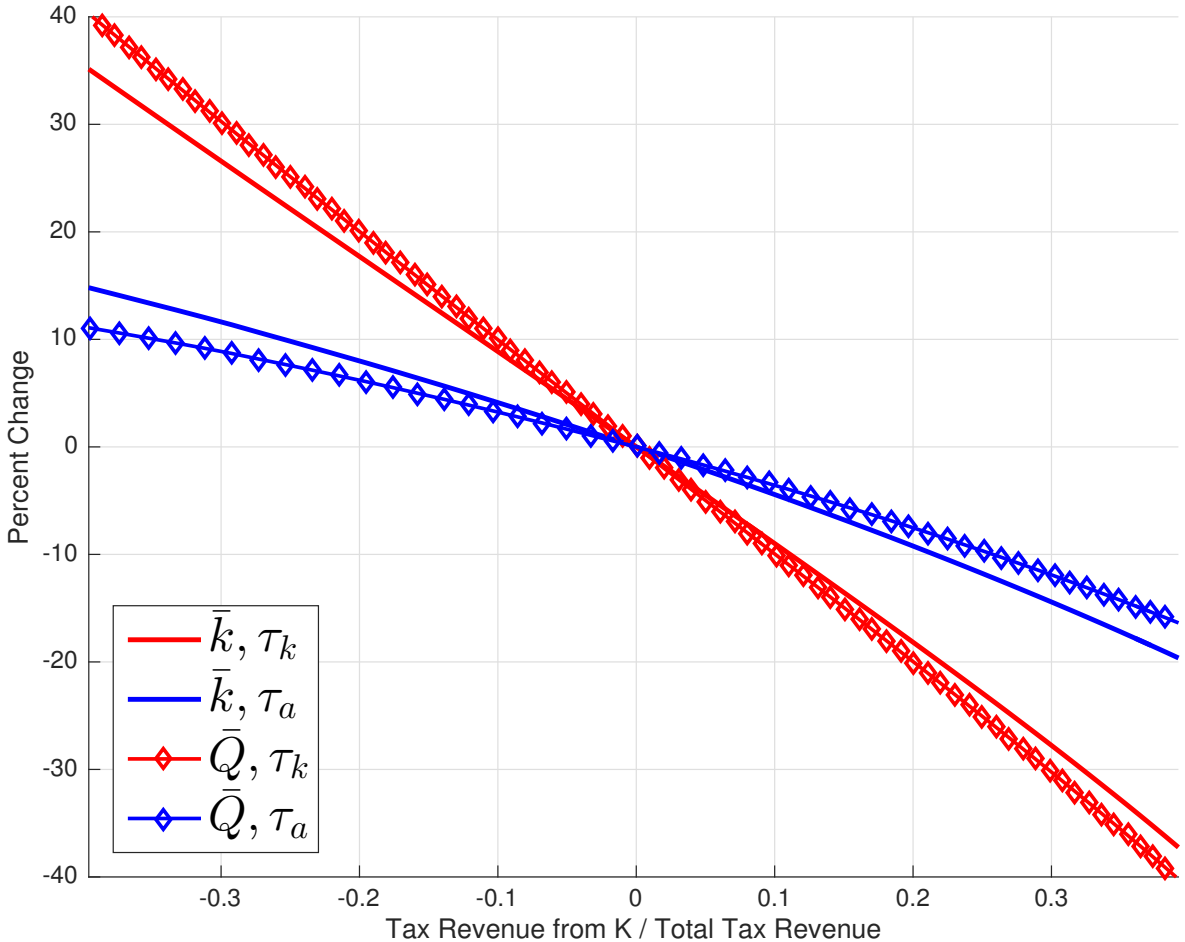


Wealth Taxes – Distortions and Misallocation



- Wealth tax reduces $\bar{k}$ **less** than capital income tax.

Wealth Taxes – Distortions and Misallocation



- $\overline{Q}$, declines **less** than $\overline{k}$ under wealth taxes. Opposite under capital income taxes.

Optimal Tax Structure and Outcomes

Baseline

	τ_k	τ_ℓ	τ_a	$\overline{k}/Y$	$\overline{CE}_2$ (%)	Vote (%)
Benchmark	25%	22.4%	–	3.0	–	–
Tax reform	–	22.4%	1.13%	3.25	7.86	67.8
Opt. τ_k						
Opt. τ_a						
Opt. τ_a Threshold						

Who Gains? Levels vs Redistribution

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Opt. τ_a	–	14.1%	3.06%	**2.90**	**9.61**	60.7
Opt. τ_a Threshold						

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Opt. τ_a	–	14.2%	3.30%	2.86	9.83	**78.9**
Threshold	$\frac{Threshold}{\overline{E}} = 25\%$			percent taxed = 63%		

Who Gains? Levels vs Redistribution

Comparison To Earlier Work

- Conesa et al (AER, 2009) study optimal capital income taxes in incomplete markets OLG model
  - with idiosyncratic labor risk
  - without return heterogeneity
  - and find optimal $\tau_k = 36\%$
  - increase in welfare of CE = 1.33%.

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  - with idiosyncratic labor risk
  - without return heterogeneity
  - and find optimal $\tau_k = 36\%$
  - increase in welfare of CE = 1.33%.
- Why do we find optimal smaller τ_k or negative (but a large τ_w)?
  - In both Conesa et al and in our model, higher τ_k reduces capital accumulation and leads to lower output.
  - However, in our model, higher τ_k hurts productive agents disproportionately, leading to more misallocation, and further reductions in output.
  - With wealth tax, the tax burden is shared between productive and unproductive agents, leading to smaller misallocation and lower declines in output with τ_a.

Preview of Extensions We Have Studied

1. Progressive labor income taxes (Reform & Optimal)
2. Progressive wealth taxes–flat tax, single threshold (Optimal)
3. Unlimited borrowing (Reform & Optimal)
4. Unlimited borrowing, with $R^{\text{borrow}} \gg R^{\text{save}}$ (Optimal)
5. Log utility (Reform and Optimal)
6. $z_{ih} = z_i^p$ at all ages (Reform & Optimal)
7. $\mu = 0.8$ (Reform & Optimal)
8. Estate taxes, calibrated (Reform & Optimal in progress)
9. Consumption taxes (Optimal in progress).
10. Some more extensions...

Summary: The substantive conclusions presented next are robust to these extensions.

Conclusions and Current work

- Many countries currently have or have had wealth taxes:
  - France, Spain, Norway, Switzerland, Italy, Denmark, Germany, Finland, Sweden, among others.
- However, the rationale for such taxes are often vague:
  - fairness, reducing inequality, etc... and not studied formally
- Here, we are proposing a case for wealth taxes based on efficiency and quantitatively evaluating its impact.
  - Wealth taxes reallocate capital from less productive wealthy to the more productive wealthy.
  - Welfare gains are substantial.

Thanks!

Robustness

Tax Reform: Aggregates

% Change	Baseline	No Shock	No Const.	Prog. Labour Tax
$\overline{k}$	19.37	9.56	6.28	21.27
Q	24.79	22.37	6.28	25.61
w	8.70	7.66	2.10	9.25
Y	10.10	9.54	3.02	10.01
L	1.28	1.75	0.91	0.69
C	10.01	11.25	2.93	10.01

Tax Reform: Welfare

	Baseline	No Shock	No Const.	Prog. Labour Tax
Wealth Tax Rate	1.13%	1.23%	1.65%	0.90%
CE_1 (All)	3.14	2.29	0.44	2.79
CE_1 (NB)	7.40	5.46	1.86	6.48
CE_2 (All)	5.14	2.92	0.36	4.68
CE_2 (NB)	7.86	5.36	1.43	7.06

Optimal Taxes

	τ_k	τ_ℓ	τ_a	Top 1%	$\overline{CE}_2$ (%)
Baseline	25%	22.4%	–	0.36	
Opt. τ_k	–34.4%	36.0%	–	0.56	6.28
Opt. τ_a	–	14.1%	3.06%	0.47	9.61
No Shock					
Opt. τ_k	-2.33%	29.0%	–	0.47	3.27
Opt. τ_a	–	18.5%	2.21%	0.46	5.80
No Constraint					
Opt. τ_k	13.6%	26.0%	–	0.39	0.41
Opt. τ_a	–	22.7%	1.57%	0.42	1.43

Optimal Taxes

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Opt. τ_a	–	3.06%			0.47	9.61
Prog. Lab. Tax						
Benchmark	25%	–	15.0%	0.185	0.36	–
Tax reform	–	0.90%	15.0%	0.185	0.67	7.06
Opt. τ_k	-38.8%	–	29.3%	0.280	0.61	9.31
Opt. τ_a	–	2.40%	12.7%	0.280	0.53	10.71

TABLE: Wealth Concentration by Asset Type

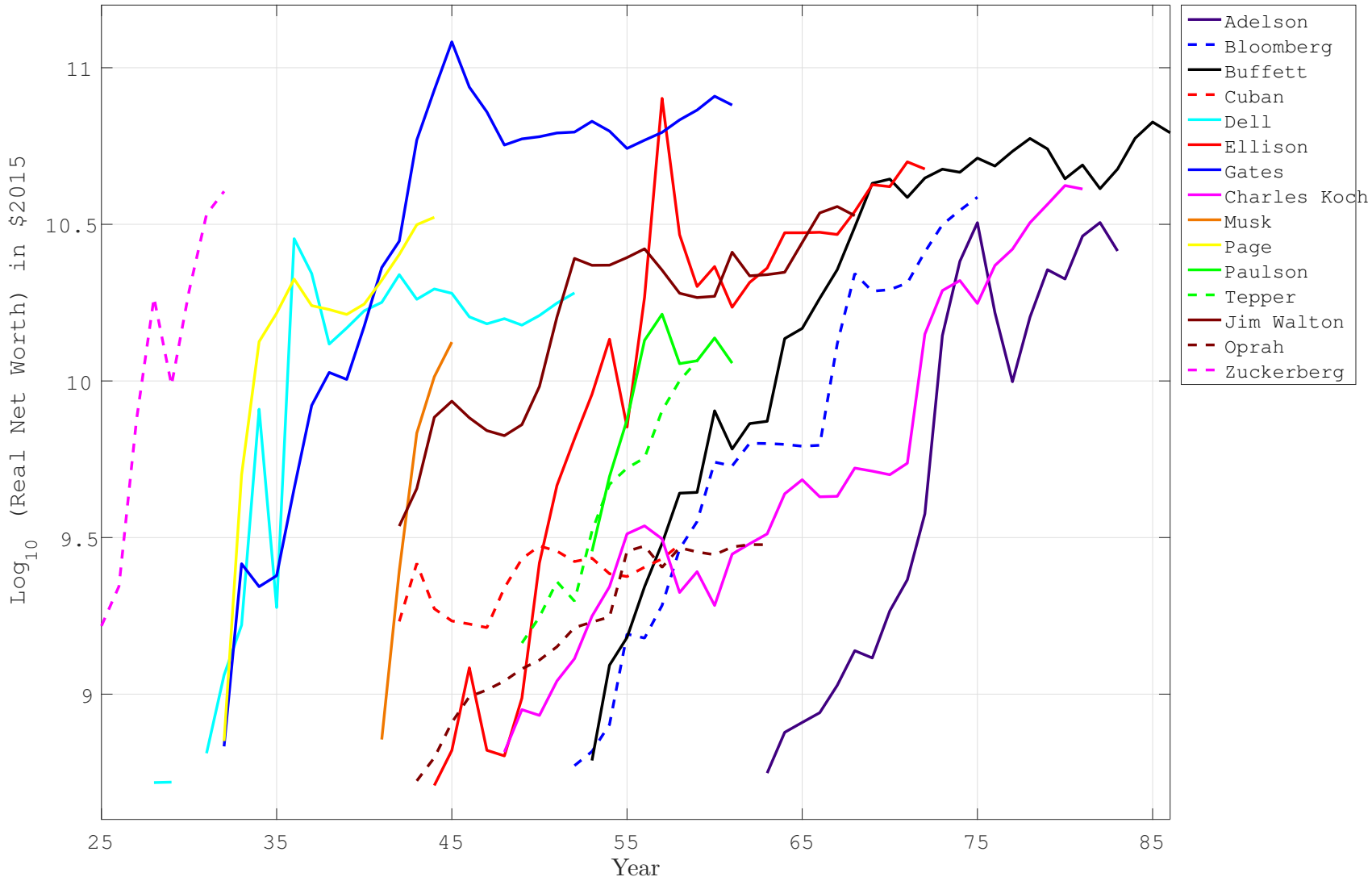
	Stocks w/o pensions	*All stocks*	*Non-equity financial*	*Housing equity*	*Net Worth*
Top 0.5%	41.4	37.0	24.2	10.2	25.6
Top 1%	53.2	47.7	32.0	14.8	34.0
Top 10%	91.1	86.1	72.1	51.7	68.7
Bottom 90%	8.9	13.9	27.9	49.3	31.3

Gini Coefficients

Financial Wealth	*Net Worth*
0.91	0.82

Source: Poterba (2000) and Wolff (2000)

BACK


Log10 (Real Net Worth) in $2015
Year
11
10.5
10
9.5
9
25
35
45
55
65
75
85
Adelson
Bloomberg
Buffett
Cuban
Dell
Ellison
Gates
Charles Koch
Musk
Page
Paulson
Tepper
Jim Walton
Oprah
Zuckerberg

BACK

	Calendar Year			
Name	80s	90s	00s	10s
Warren Buffett	44.37	18.57	0.02	5.81
Michael Dell		87.94	-5.58	2.97
Larry Ellison	54.09	31.31	4.90	8.06
Bill Gates	51.94	48.06	-7.54	5.46
Elon Musk				107.57
Larry Page			69.67	11.96
Mark Zuckerberg			33.81	62.24

BACK

- $1 + CE = (1 + CE_C)(1 + CE_L)$
- CE_C is given by

$$V_0((1 + CE_C(\mathbf{s}))c^*_{\text{US}}(\mathbf{s}), \ell^*_{\text{US}}(\mathbf{s})) = \widetilde{\mathbb{V}}_0(c(\mathbf{s}), \ell^*_{\text{US}}(\mathbf{s}))$$

  - CE_C can be decomposed into level $CE_{\overline{C}}$ and distrubution component CE_{σ_C} as

$$V_0((1 + CE_{\overline{C}}(\mathbf{s}))c^*_{\text{US}}(\mathbf{s}), \ell^*_{\text{US}}(\mathbf{s})) = \widehat{\mathbb{V}}_0(\widehat{c}(\mathbf{s}), \ell^*_{\text{US}}(\mathbf{s}))$$

    where $\widehat{c}(\mathbf{s}) = c(\mathbf{s})\frac{\overline{C}}{\overline{C}^*_{US}}$ and

$$\widehat{\mathbb{V}}_0\left((1 + CE_{\sigma_C})\,\widehat{c}(\mathbf{s}), \ell^*_{\text{US}}(\mathbf{s})\right) = \widetilde{\mathbb{V}}_0(c(\mathbf{s}), \ell^*_{\text{US}}(\mathbf{s}))$$

  - CE_L is given by

$$V_0((1 + CE_L(\mathbf{s}))c^*_{\text{US}}(\mathbf{s}), \ell^*_{\text{US}}(\mathbf{s})) = \widetilde{\mathbb{V}}_0(c^*_{\text{US}}(\mathbf{s}), \ell(\mathbf{s}))$$

  - Similar decomposition applies to leisure.

BACK

Political Support for Wealth Taxes

Fraction with Positive Welfare Gain-**Optimal Capital Inc. Tax**

	Productivity group								
Age	z_1	z_2	z_3	z_4	z_5	z_6	z_7	z_8	z_9
20–25	0.96	0.95	0.95	0.98	0.99	0.99	0.99	0.99	0.99
25–34	0.97	0.97	0.96	0.98	0.97	0.96	0.94	0.90	0.85
35–44	0.95	0.94	0.92	0.95	0.93	0.88	0.80	0.68	0.58
45–54	0.88	0.88	0.86	0.89	0.85	0.78	0.66	0.53	0.43
55–64	0.68	0.67	0.68	0.72	0.69	0.62	0.52	0.41	0.31
65–74	0.09	0.05	0.14	0.22	0.22	0.21	0.18	0.15	0.11
75+	0.12	0.12	0.13	0.15	0.15	0.15	0.13	0.11	0.09

Political Support for Wealth Taxes

Fraction with Positive Welfare Gain-**Optimal Wealth Tax**

	Productivity group								
Age	z_1	z_2	z_3	z_4	z_5	z_6	z_7	z_8	z_9
20–25	0.97	0.97	0.95	0.93	0.93	0.94	0.93	0.90	0.87
25–34	0.98	0.98	0.96	0.93	0.90	0.86	0.77	0.59	0.43
35–44	0.97	0.97	0.94	0.87	0.80	0.66	0.48	0.35	0.27
45–54	0.93	0.93	0.88	0.79	0.68	0.55	0.42	0.32	0.25
55–64	0.73	0.72	0.67	0.59	0.51	0.41	0.33	0.25	0.19
65–74	0.00	0.02	0.01	0.02	0.01	0.01	0.01	0.00	0.00
75+	0.00	0.00	0.04	0.03	0.02	0.02	0.01	0.01	0.00

Political Support for Wealth Taxes

Frac. with Pos. Welfare Gain-**Optimal Wealth Tax with Threshold**

	Productivity group								
Age	z_1	z_2	z_3	z_4	z_5	z_6	z_7	z_8	z_9
20–25	0.97	0.97	0.95	0.93	0.93	0.94	0.93	0.90	0.86
25–34	0.98	0.98	0.96	0.93	0.90	0.85	0.77	0.57	0.42
35–44	0.97	0.97	0.94	0.87	0.79	0.66	0.48	0.35	0.27
45–54	0.93	0.92	0.87	0.79	0.68	0.55	0.42	0.32	0.25
55–64	0.79	0.78	0.74	0.65	0.56	0.46	0.36	0.28	0.21
65–74	0.70	0.63	0.65	0.57	0.49	0.42	0.34	0.26	0.20
75+	0.93	0.92	0.90	0.84	0.78	0.68	0.55	0.43	0.34

How Much Inequality in Aiyagari-Style Models?

Back

Parametrization:	U.S. Data	Gaussian $\rho = 0.985, \sigma^2 = 0.0234$	GKOS benchmark Rich process
Gini	**0.85**	**0.58**	**0.66**
Top 0.1%	14.8%	1.1%	2.2%
Frac > \$10M	0.4–0.5%	≈ 0	0.02%
Top 1%	35.5%	7.0%	9.2%
Top 10%	75.0%	37.9%	41.6%
Top 20%	87.0%	48.2%	52.8%

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Top 10%	**75.0%**	**37.9%**	**41.6%**
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Return Heterogeneity in Norway

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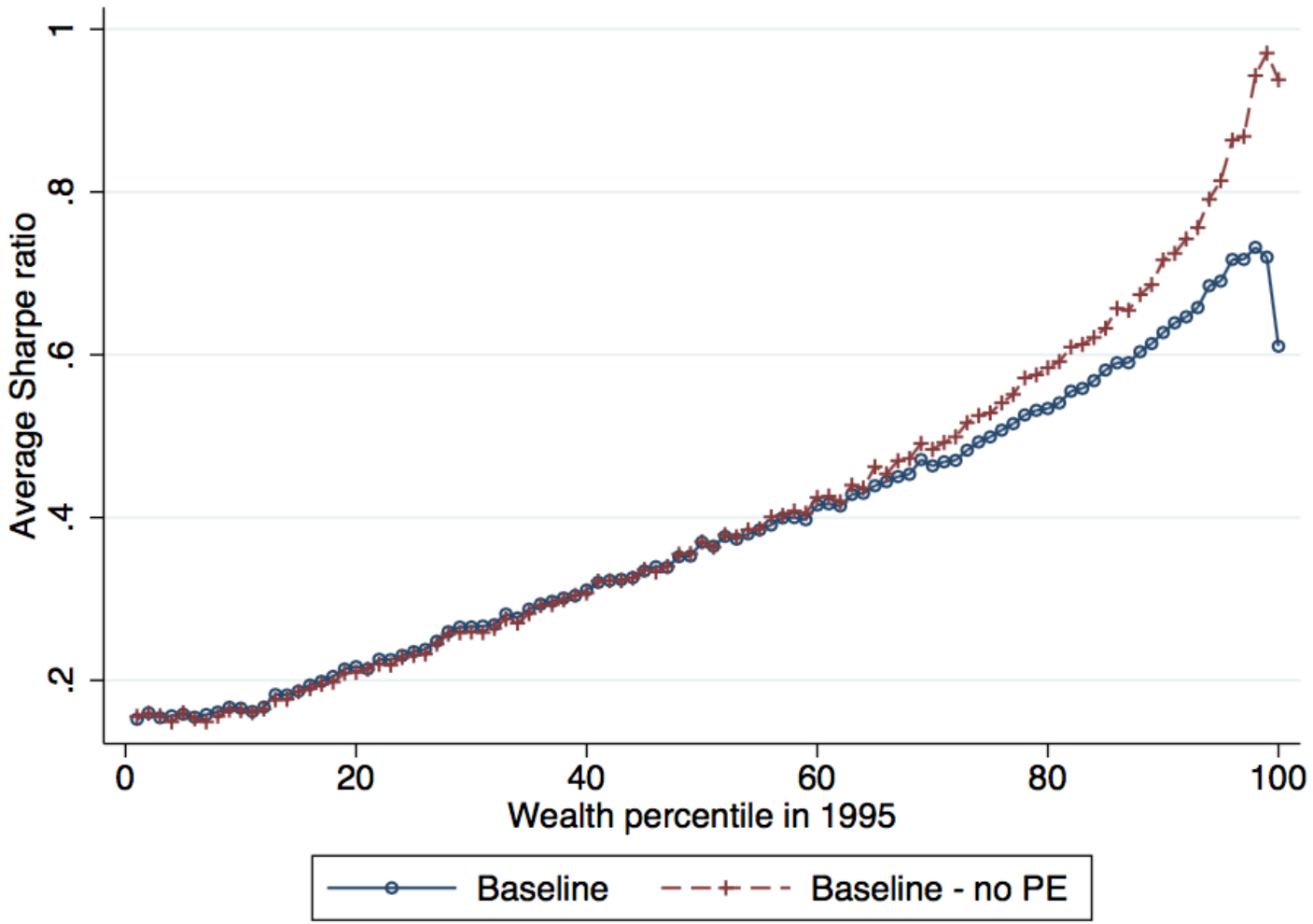
Figure 8. The Sharpe ratio and the level of wealth



Labor Market Productivity

- Labor market efficiency of household i at age h is

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

- Individual-specific labor market efficiency θ_i is imperfectly inherited from parents:

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

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Competitive Final Good Producer

- Final good output is $Y = Q^{\alpha} L^{1-\alpha}$, where

$$Q = \left(\int_i x_i^{\mu} di \right)^{1/\mu}, \quad \mu < 1,$$

and L is efficiency-adjusted aggregate labor input.

- Price of intermediate good i is

$$p_i(x_i) = \alpha x_i^{\mu-1} \times Q^{\alpha-\mu} L^{1-\alpha}.$$

- Wage rate (per efficiency unit of labor) is

$$w = (1-\alpha) Q^{\alpha} L^{-\alpha}.$$

Back

- Preferences:

$$u(c, \ell) = \frac{\left(c^{\gamma} \ell^{1-\gamma}\right)^{1-\sigma}}{1-\sigma}$$

Parameters Set Outside the Model

Table: Benchmark Parameters

Parameter		Value
Curvature of utility	σ	4.0
Curvature of CES aggregator of varieties	μ	0.90
Capital share in production	α	0.40
Depreciation rate of capital	δ	0.05
Interg. persistence of invest. ability	ρ_{z^P}	0.10
Interg. persistence of labor efficiency	ρ_θ	0.50
Persistence of labor efficiency shock	ρ_η	0.90
Std. dev. of labor efficiency shock	$\sigma_{\varepsilon_\eta}$	0.20

$\tau_k = 25\%$, $\tau_\ell = 22.4\%$, and $\tau_c = 7.5\%$ (McDaniel, 2007)

Back

Life Cycle Evolution of Entrepreneurial Ability

- Over the life cycle, entrepreneurial ability evolves as follows:
  - $\mathbb{I}_{ih} \in \{H, L, 0\}$

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

with transition matrix:

$$\Pi_{z^s} = \begin{bmatrix} 1 - p_1 - p_2 & p_1 & p_2 \\ 0 & 1 - p_2 & p_2 \\ 0 & 0 & 1 \end{bmatrix}.$$

- λ : degree of superstar returns.
- p_1: annual probability of losing superstar returns
- p_2 : annual probability of losing investment ability completely → become a passive saver.

Calibration Targets and Outcomes

- $\rho_{\overline{z}} = 0.1$ is set based on Fagereng et al (2016) for Norway. (We have also experimented with values up to 0.5)
- We calibrate 4 remaining parameters $(\beta, \gamma, \sigma_{\varepsilon_{zp}}, \sigma_{\varepsilon_\theta})$ to match 4 data moments:

Table: Benchmark Parameters Calibrated Jointly in Equilibrium

Parameter		Value	Moment	
Discount factor	β	0.948	Capital/Output	3.00*
Cons. share in U	γ	0.46	Avg. Hours	0.40*
σ of entrepr. ability	$\sigma_{\varepsilon_{zp}}$	0.072	Top 1% share	0.36*
σ of labor fix. eff.	$\sigma_{\varepsilon_\theta}$	0.305	$\sigma(\log(\text{Earn}))$	0.80*

- Other parameters (set outside the model): Here

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Political Support for Wealth Taxes

	Productivity group								
Age	z_1	z_2	z_3	z_4	z_5	z_6	z_7	z_8	z_9
20–25	0.98	0.98	0.96	0.96	0.97	0.97	0.97	0.97	0.94
25–34	0.99	0.99	0.98	0.97	0.95	0.94	0.89	0.78	0.59
35–44	0.98	0.98	0.97	0.95	0.91	0.84	0.67	0.45	0.34
45–54	0.96	0.96	0.93	0.90	0.84	0.71	0.54	0.41	0.31
55–64	0.77	0.77	0.73	0.70	0.64	0.53	0.42	0.32	0.24
65–74	0.00	0.06	0.06	0.08	0.09	0.08	0.06	0.04	0.03
75+	0.00	0.12	0.09	0.11	0.10	0.09	0.07	0.05	0.04

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Political Support with Retirees on Board

	Productivity group								
Age	z_1	z_2	z_3	z_4	z_5	z_6	z_7	z_8	z_9
20–25	0.97	0.97	0.95	0.94	0.96	0.97	0.97	0.96	0.94
25–34	0.98	0.98	0.96	0.95	0.94	0.93	0.88	0.77	0.59
35–44	0.98	0.98	0.96	0.93	0.90	0.83	0.67	0.45	0.34
45–54	0.98	0.98	0.96	0.93	0.89	0.78	0.60	0.46	0.35
55–64	0.99	0.98	0.97	0.95	0.92	0.81	0.65	0.50	0.38
65–74	1.00	1.00	0.99	0.98	0.96	0.87	0.71	0.56	0.43
75+	1.00	1.00	1.00	1.00	0.99	0.94	0.81	0.66	0.52

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Welfare: Levels vs. Redistribution

Formula

	Tax Reform	Opt. τ_k	Opt. τ_a
CE_2 (NB)	**7.86**	**6.28**	**9.61**
	Consumption		
Total	8.27		
Level	10.01		
Dist.	–1.58		
	Leisure		
Total	–0.38		
Level	–0.66		
Dist.	0.27		

Back

Welfare: Levels vs. Redistribution

Formula

	Tax Reform	Opt. τ_k	Opt. τ_a
CE_2 (NB)	**7.86**	**6.28**	**9.61**
	Consumption		
Total	8.27	5.90	
Level	10.01	21.04	
Dist.	–1.58	–12.51	
	Leisure		
Total	–0.38	0.36	
Level	–0.66	0.73	
Dist.	0.27	–0.38	

Back

Welfare: Levels vs. Redistribution

Formula

	Tax Reform	Opt. τ_k	Opt. τ_a
CE_2 (NB)	**7.86**	**6.28**	**9.61**
	Consumption		
Total	8.27	5.90	11.02
Level	10.01	21.04	8.28
Dist.	–1.58	–12.51	2.53
	Leisure		
Total	–0.38	0.36	–1.27
Level	–0.66	0.73	–2.21
Dist.	0.27	–0.38	0.76

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Optimal Capital Income Tax: Welfare

Optimal Capital Income Taxes

	Productivity group								
Age	z_1	z_2	z_3	z_4	z_5	z_6	z_7	z_8	z_9
20–25	**3.7**	**3.6**	**3.7**	**4.9**	**7.1**	**10.7**	**14.8**	**16.7**	**17.1**
25–34	3.5	3.4	3.4	4.4	5.9	8.2	10.1	8.9	7.3
35–44	2.9	2.8	2.7	3.4	4.1	4.7	3.8	1.5	–0.6
45–54	2.1	2.0	1.9	2.4	2.7	2.6	1.0	–1.1	–3.2
55–64	0.7	0.7	0.6	1.0	1.2	1.0	–0.2	–2.0	–3.9
65–74	–0.3	–0.3	–0.3	0.0	0.2	0.1	–0.7	–2.0	–3.5
75+	–0.1	–0.1	–0.1	0.1	0.2	0.2	–0.3	–1.0	–1.9

Optimal Wealth Tax: Welfare

Optimal Wealth Taxes

	Productivity group								
Age	z_1	z_2	z_3	z_4	z_5	z_6	z_7	z_8	z_9
20–25	**11.0**	**10.7**	**9.9**	**9.1**	**9.2**	**10.3**	**12.1**	**12.4**	**11.3**
25–34	10.5	10.2	9.1	7.7	6.6	5.7	4.3	–0.1	–5.5
35–44	8.9	8.6	7.5	5.8	4.1	1.7	–2.4	–8.2	–13.1
45–54	6.5	6.3	5.4	3.9	2.3	–0.3	–4.6	–9.3	–13.2
55–64	2.5	2.4	1.8	0.9	–0.1	–2.1	–5.4	–9.1	–12.3
65–74	–0.7	–0.7	–0.9	–1.3	–1.8	–3.0	–5.3	–7.9	–10.4
75+	–0.1	–0.1	–0.2	–0.3	–0.6	–1.3	–2.7	–4.5	–6.2

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Sharing the Gains with Retirees

	Productivity group								
Age	z_1	z_2	z_3	z_4	z_5	z_6	z_7	z_8	z_9
20–25	**5.3**	**5.2**	**4.8**	**4.9**	**5.7**	**7.4**	**9.6**	**10.6**	**10.4**
25–34	5.3	5.1	4.6	4.4	4.5	5.0	5.2	3.2	0.6
35–44	4.9	4.8	4.3	3.8	3.4	2.8	0.9	–2.4	–5.3
45–54	4.8	4.7	4.3	3.8	3.3	2.1	–0.2	–3.1	–5.6
55–64	5.6	5.6	5.3	4.8	4.3	3.1	0.8	–1.9	–4.3
65–74	**7.0**	**7.0**	**6.8**	**6.3**	**5.8**	**4.7**	**2.6**	**0.1**	**–2.2**
75+	**7.7**	**7.7**	**7.6**	**7.4**	**7.0**	**6.2**	**4.5**	**2.5**	**0.6**

Note: Each cell reports the average of $CE_1(\theta, z, a, h) \times 100$ *within each age and productivity group*

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