Tax the Wealthy? A Dynamic General Equilibrium Analysis of Progressive Wealth Taxation

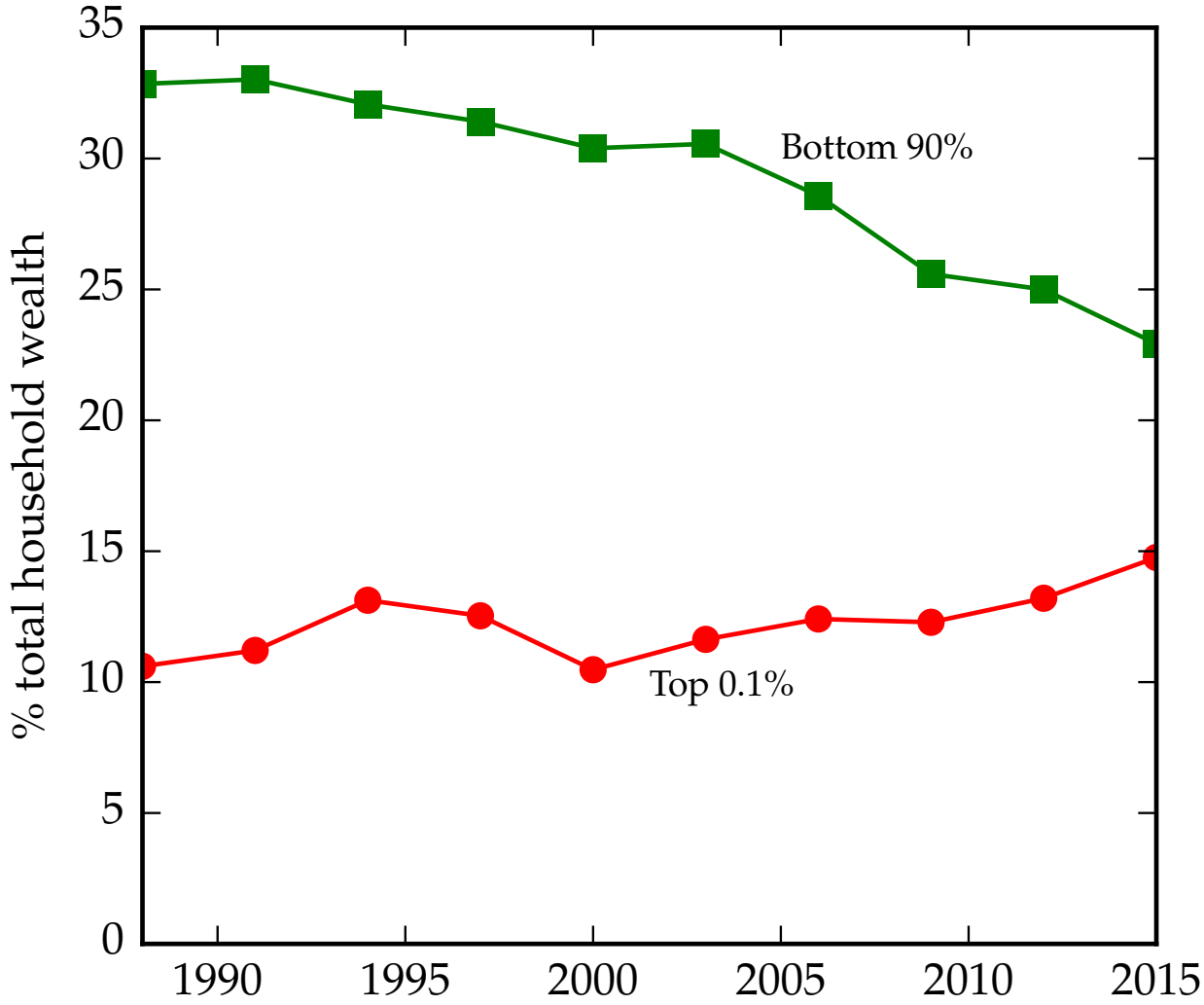
Shahar Rotberg (CMHC)[1] and Joseph B. Steinberg (UofT)

July 20, 2019

[1]The views expressed in this paper are the author's own views and they do not necessarily represent the views of the Canada Mortgage and Housing Corporation.

Introduction

Rising wealth inequality has spurred calls among policymakers and broader public to tax rich households' wealth



Introduction

Rising wealth inequality has spurred calls among policymakers and broader public to tax rich households' wealth

High-profile example: Senator Elizabeth Warren's proposal

- 2% tax on wealth above \$50M + 1% surtax on wealth above \$1B
- Saez and Zucman (2019) estimate that given current wealth distribution, policy would raise 1% of GDP per year in tax revenue

Consequences hinge crucially on answers to questions such as:

- How would wealth distribution evolve in response?
- How would macroeconomy respond in equilibrium?
- How quickly would consequences materialize?
- How would welfare effects be distributed?

This paper: Quantitative GE analysis of transition dynamics that would follow implementation of progressive wealth tax

What we do

Calibrate heterogeneous-agent OLG model to match current U.S. wealth distribution

- Households can work or operate businesses until retirement
- Entrepreneurs can borrow against wealth to finance capital
- Rate-of-return heterogeneity generates skewness (Benhabib et al., 2011, 2015, 2016; Cagetti and DeNardi, 2006, 2009)
- Builds on Guvenen et al. (2018), Rotberg (2019)

Simulate transition dynamics that would follow implementation of Warren's proposal

- Revenues used to finance UBI-like lump-sum transfer
- Government cannot enforce tax perfectly: rich households hide some of their taxable wealth as in Saez and Zucman (2019)
  - Specification 1: kept onshore for entrepreneurs to borrow against
  - Specification 2: moved offshore, taken out of domestic production

How would wealth distribution evolve?

Proponents argue that large share of wealth held by very rich represents deep potential tax base

- Partial-equilibrium argument: assumes tax-invariant distribution
- Cannot make claims about policy's effect on inequality
- If tax reduces rich households' wealth share, tax base could decline

We find large $\downarrow$ in revenues as top of wealth distribution evolves, but bottom of wealth distribution unaffected

Horizon	Top 0.1% share	Gini	Tax revenue (% GDP)
Short run	-	-	0.63
Long run	$\downarrow$ by $1/4$ to $1/3$	$\downarrow$ by 0.006–0.009	0.25 to 0.33

How would wages respond in equilibrium?

Proponents argue revenues could finance transfers that would raise poor households' disposable income

- If wealth tax caused wages to $\downarrow$, could negate benefit of transfers
- Welfare consequences depend on how quickly GE effects materialize

We find two kinds of macroeconomic effects:

- Tax $\downarrow$ rich households' saving $\Rightarrow$ $K \downarrow$ gradually $\Rightarrow$ $Y, W \downarrow$
- Hidden wealth held offshore $\Rightarrow$ $K \downarrow$ immediately

	Used domestically		Held offshore	
Horizon	GDP (%Δ)	Wages (%Δ)	GDP (%Δ)	Wages (%Δ)
Short run	-	-	-0.48	-0.48
Long run	-0.63	-0.43	-0.90	-0.56

How would transition dynamics shape welfare impact?

Aggregate welfare: ↑, but more in short run than long run

Workers: depends on time horizon and nature of tax evasion

- Short run: ↑ because transfer outweighs ↓ in W
- Long run: ↑ if hidden wealth kept onshore, but ↓ if moved offshore because ↓ in W is larger

High-productivity entrepreneurs: depends on age

- Old, rich: ↓ because they pay the tax
- Young, not rich yet: ↑↑ because returns on capital rise

Bottom line:

- Widely popular in SR, but LR approval depends on nature of evasion
- May not help poorer households at the expense of the rich—could be the opposite!

Model

Model: overview

Overlapping generations of households:

- Heterogeneous in labor and entrepreneurial abilities
- Static choice: choose to work or operate business
- Dynamic choice: wealth accumulation

Representative firm produces aggregate output:

- Buys differentiated intermediate goods from entrepreneurs
- Rents labor from workers

Government levies taxes, pays SS benefits and lump-sum transfers

- Progressive wealth tax as well as income and consumption taxes
- Cannot perfectly enforce wealth tax

Small open economy: exogenous world interest rate r

Model: demographics

Households can live for up to J years, but may die at any age

- Survival probability, $\phi(j)$, decreasing with age
- Certain death at age J: $\phi(j) = 0$

Dying households are replaced by newborns with $j = 0$

- Offspring inherit parents' wealth and (to some extent) abilities
- Parents discount offsprings' utility and their own at the same rate:

$$V_t(j, \cdot) = u(c) + \beta\phi_j \underbrace{\mathbb{E}\left[V_{t+1}(j+1, \cdot)\right]}_{\text{parent contin. value}} + \beta(1-\phi_j) \underbrace{\mathbb{E}\left[V_{t+1}(0, \cdot)\right]}_{\text{child cont. value}}$$

Mandatory retirement at age R

- Retired households cannot work or operate businesses
- Earn passive investment income and receive SS benefits

Model: household characteristics

Labor market ability, $\zeta_j \times e$

- ζ_j: deterministic life-cycle component
- $e \in \mathcal{E} = \mathbb{R}_{++}$ drawn from ergodic distribution $\bar{F}(e)$ at birth
- Follows Markov process $F(e'|e)$ until retirement

Entrepreneurial ability, $z \in \mathcal{Z} = \mathbb{R}_{++}$

- Constant over household's life cycle
- Imperfectly transmitted to offspring: $z^{\text{child}} \sim G(z|z^{\text{parent}})$

Wealth, $a \in \mathcal{A} = \mathbb{R}_{+}$

- No intertemporal borrowing
- Entrepreneurs borrow intratemporally to finance capital

Distribution over types: $\Psi_t(j, e, z, a)$

Model: taxes

"Standard" taxes:

- τ_r: interest income
- τ_k: capital income
- τ_c: consumption
- $\tau_\ell(e)$: labor income, $\uparrow$ in e (progressive)

Wealth tax + surtax

- τ_a on wealth over $\bar{a}$
- Additional τ_a' on wealth over $\bar{a}' > \bar{a}$,

Transfers

- Social security benefit, B_t (retirees only)
- Lump-sum transfer, T_t (everyone)

Model: wealth tax evasion

Fraction ξ of taxable wealth hidden for each p.p. of wealth tax rate

- Hidden wealth:

$$\tilde{a}(a) = \max(a - \bar{a}, 0)\xi\tau_a - \max(a - \bar{a}', 0)\xi\tau_a'$$

- Wealth tax payment:

$$\tilde{\tau}_a(a) = \tau_a \left[\max(a - \bar{a}, 0)(1 - \xi\tau_a)\right] + \tau_a' \left[\max(a - \bar{a}', 0)(1 - \xi\tau_a')\right]$$

Can households earn interest on/borrow against hidden wealth?

Let $\hat{a}(a)$ denote "usable" wealth

- Specification 1: $\hat{a}(a) = a$ (hidden wealth usable)
- Specification 1: $\hat{a}(a) = a - \tilde{a}$ (hidden wealth not usable)

Model: workers, entrepreneurs, and retirees

Workers of age j with ability e earn net income

$$y_{\ell,t}(j,e,a) = (1-\tau_\ell(e))W_t\zeta(j)e + r(1-\tau_r)\hat{a}(a)$$

Entrepreneurs with ability z:

- Produce $x = zk$ intermediate goods, sell to firm at price $R_t(x)$
- Collateral constraint limits capital financing: $k \leq \bar{b}(z,\hat{a}(a))$
- Net income from entrepreneurship:

$$y_{k,t}(z,a) = \max_{k\leq\bar{b}(z,\hat{a}(a))} \Big\{ (1-\tau_k)\left[R_t(zk)zk - \delta k - r\max(k-\hat{a}(a),0)\right] + (1-\tau_r)r\max(\hat{a}(a)-k,0) \Big\}$$

Retirees cannot work or operate businesses, earn SS benefit B:

$$y_{R,t}(j,e,z,a) = B_t + r(1-\tau_r)\hat{a}(a),\ j \geq R$$

Model: household problem

Static problem: choose employment or entrepreneurship

$$y_t(j,e,z,a) = \begin{cases} \max\{y_{\ell,t}(j,e,a), y_{k,t}(z,a)\} & j < R \\ y_{R,t}(a) & j \geq R \end{cases}$$

Dynamic problem: choose saving

$$V_t(j,e,z,a) = \max_{c,a' \geq 0} \left\{ u(c) + \beta\phi(j) \int_{\mathcal{E}} V_{t+1}(j,e',z,a') \, \mathrm{d}F(e',e) \right.$$
$$\left. + \beta(1-\phi(j)) \int_{\mathcal{E}\times\mathcal{Z}} V_{t+1}(0,e',z',a') \, \mathrm{d}\bar{F}(e)\mathrm{d}G(z',z) \right\}$$
$$\text{s.t. } (1+\tau_c)c + a' + \tilde{\tau}_a(a) = y_t(j,e,z,a) + T_t + a$$

Policy functions:

- $\ell_t(j,e,z,a) = \zeta(j)e$ for workers, 0 for entrepreneurs/retirees
- $x_t(j,e,z,a) = zk$ for entrepreneurs, 0 for workers/retirees
- $a'_t(j,e,z,a)$: saving

Model: aggregation and production

Aggregate capital = CES bundle of intermediate goods:

$$K_t = \left(\int x_t(j,e,z,a)^\nu \, \mathrm{d}\Psi_t(j,e,z,a) \right)^{\frac{1}{\nu}}$$

Aggregate labor = standard linear bundle

$$L_t = \int \ell_t(j,e,z,a) \, \mathrm{d}\Psi_t(j,e,z,a)$$

Output = Cobb-Douglas aggregate of labor and capital:

$$Y_t = K_t^\alpha L_t^{1-\alpha}$$

Firms choose L_t and $x_t(\cdot)$ to maxmize profits taking prices as given:

$$R_t(x) = \alpha K_t^{\alpha-\nu} L_t^{1-\alpha} x^{\nu-1}, \quad W_t = (1-\alpha) K_t^\alpha L_t^{-\alpha}$$

Model: equilibrium

Given parameters and initial distribution $\Psi_0(\cdot)$, equilibrium is:

- Sequence of value and policy functions, $\{V_t(\cdot), \ell_t(\cdot), x_t(\cdot), a'_t(\cdot)\}_{t=0}^{\infty}$
- Sequence of aggregate prices and quantities, $\{W_t, K_t, L_t\}$
- Sequence of distributions $\{\Psi_t(\cdot)\}_{t=0}^{\infty}$

that solve household's problem, satisfy firm's FOCs, gov'ts budget constraint, and law of motion for distribution:

$$\Psi_{t+1}(j+1, E \times Z \times A) = \phi(j) \int \left[F(E|e) \mathbb{1}_{\{a'_t(j,e,z,a) \in A\}} \mathbb{1}_{\{z \in Z\}} \right] \mathrm{d}\Psi_t(j,e,z,a)$$

$$\Psi_{t+1}(0, E \times Z \times A) = \sum_{j=0}^{J} (1 - \phi(j)) \int \left[F(E|e) G(Z|z) \mathbb{1}_{\{a'_t(j,e,z,a) \in A\}} \right] \mathrm{d}\Psi_t(j,e,z,a)$$

Always converges to stationary equilibrium in long run

- Length of transition determined by distance of initial distribution, Ψ_0, from long-run counterpart

Calibration

Calibration: overview

Approach: calibrate parameters so that stationary equilibrium without wealth tax represents current U.S. economy

External calibration: assign standard parameter values and estimates from literature

Internal calibration: jointly choose key parameters so that model matches wealth distribution

Validation: compare non-targeted moments in model to U.S. data

Calibration: externally assigned parameters

Parameter	Description	Value	Target or source
(a) Demographics, preferences, and interest rates			
J	Lifespan	61	86 years of life
R	Retirement age	20	Retirement at age 66
ϕ_j	Survival prob.	Varies	U.S. Dept. of HHS
σ	Risk aversion	2	Standard
r	Real interest rate	0.008	Mehra and Prescott (1993)
(b) Labor income			
e	Stoch. labor ability	$\{0.14, 0.32, 0.49, 1.0\}$	McNeil (2001)
$F(e'\|e)$	Labor ability trans. probs.	Varies	Burkhauser et al. (1996)
ζ_j	Life-cycle labor ability	$1 + \min\{0.38j/30, 0.38\}$	Guvenen et al. (2015)

Parsimonious labor income process matches # of low-income households, their relative income, and inflow/outflow rate

- e set to McNeil (2001) estimates of income shares by quintile
- $e_4 = 1$ represents top two quintiles
- $F(e'|e)$ chosen to match Burkhauser et al. (1996) estimates of prob. of moving down a quartile

Calibration: externally assigned parameters

Parameter	Description	Value	Target or source
(c) Entrepreneurial income and production			
α	Capital share	0.4	Guvenen et al. (2017)
ν	CES curvature	0.9	Guvenen et al. (2017)
δ	Depreciation rate	0.05	Guvenen et al. (2017)
ρ_z	Intergen. persist.	0.15	Fagereng et al. (2016)
(d) Taxes			
τ_c	Consumption tax	0.075	McDaniel (2007)
τ_k	Capital income tax	0.25	McDaniel (2007)
τ_r	Investment income tax	0.15	Data
$\tau_\ell(e)$	Labor income tax	Varies	Data
$\bar{B}$	Social security benefit	$0.4 \times \mathbb{E}[y_{\ell,t}]$	U.S. SSA

Follow Guvenen et al. (2018) in assigning production, entrepreneurship parameters

Tax structure taken from data; $\tau_\ell(e)$ set to match avg. labor income tax rate of each quartile

Calibration: internally calibrated parameters

Parameter	Description	Value	Target statistic	Source
β	Discount factor	0.948	Wealth/GDP = 4.79	SCF (2016)
σ_z	Std. entr. ability	0.291	Top 0.1% share = 15%	SCF (2016)
λ	Collateral constraint	1.297	Debt/assets = 0.31	Asker et al. (2011)

Collateral constraint parameterization from Guvenen et al. (2018):

$$\bar{b}(z_k, \hat{a}) = \left[1 + \lambda \left(\frac{k-1}{\#\mathscr{Z} - 1}\right)\right] \hat{a}$$

Each parameter effects all moments $\Rightarrow$ joint calibration required

Each parameter affects one moment more than others $\Rightarrow$ approximate 1-1 mapping between parameters and moments

Model matches all targeted statistics exactly

Calibration: validation

Statistic	Model	Data	Source
(a) Wealth distribution			
Top 0.01% share	5%	5%	SCF (2016)
Top 1% share	39%	39%	
Top 10% share	68%	77%	
Top 20% share	79%	88%	
Bottom 50% share	5%	1%	
Gini coefficient	0.78	0.86	
(b) Other statistics			
Entrepreneurship rate	7.7%	7.6%	Cagetti and DiNardi (2009)
Avg. pre-tax return	5.1%	7.1%	Piketti (2014)
Bequests/Net wealth	1.5%	1.2%	Nishiyama (2000)
Revenue from τ_k, τ_r/Total revenue	27%	27%	OECD (2011)

We target only top 0.1% share, but model matches other wealth distribution moments well, especially at the top

Also consistent with other statistics important for wealth accumulation

Quantitative analysis

Quantitative analysis: overview

Goal: analyze transition dynamics after wealth tax implementation

- Wealth tax is unanticipated (MIT shock)
- Ψ_0 = no-wealth-tax stationary distribution
- Analyze transition under both $\hat{a}(a)$ specifications (usable wealth)

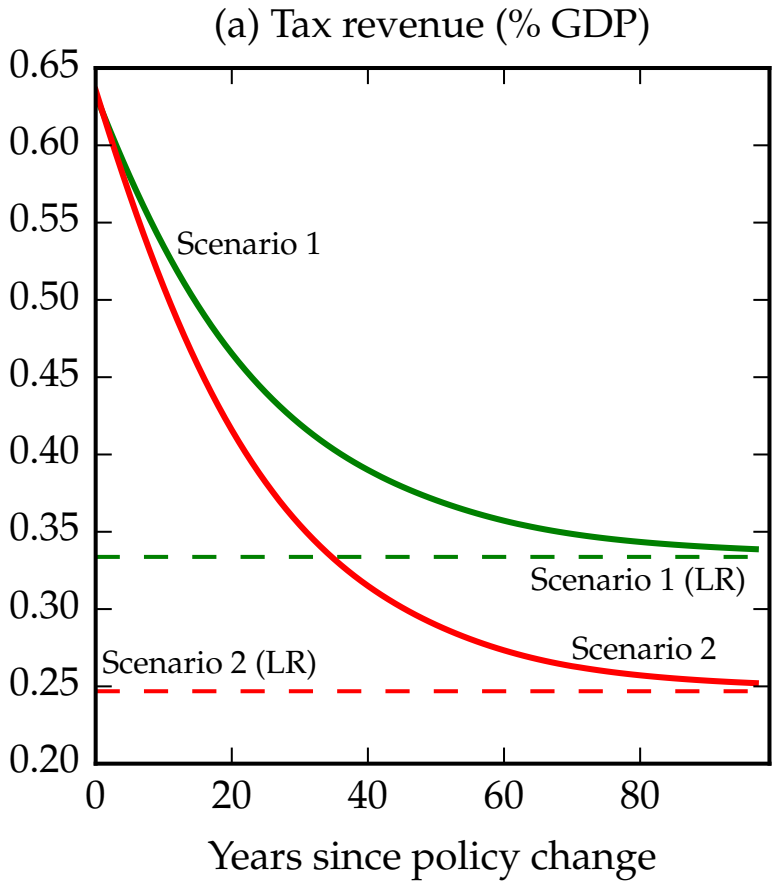
Wealth tax parameters calibrated to match Warren's proposal

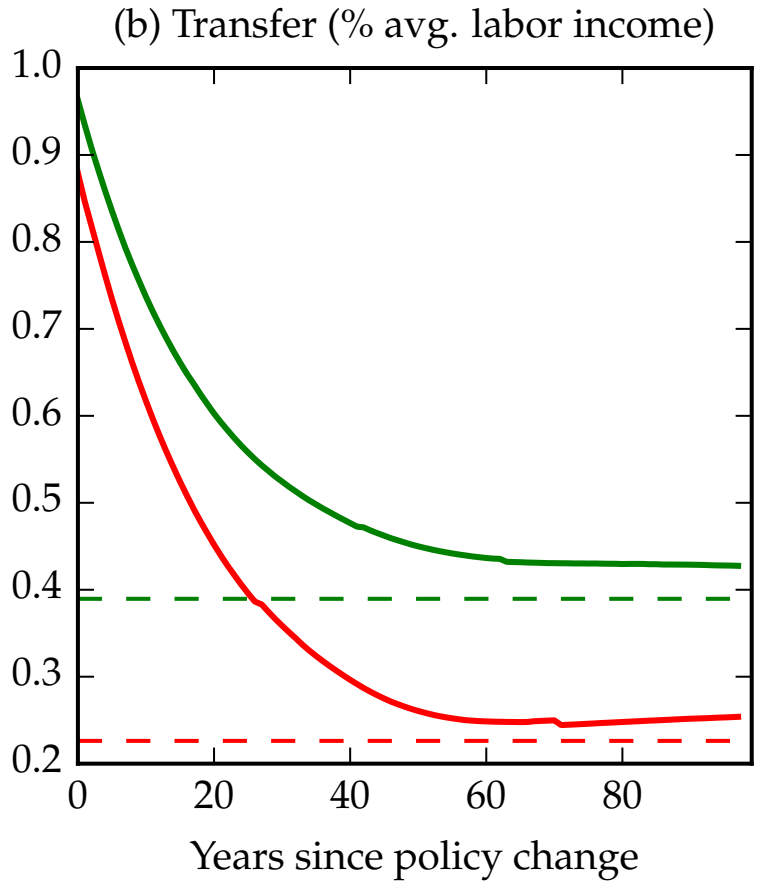
- Tax rates: $\tau_a = 2\%$, $\tau_a' = 1\%$
- Threshholds: $\bar{a} = \$50M$, $\bar{a}' = \$1B$
- Evasion: $\xi = 7.5\%$ (Saez and Zucman, 2019)

Revenues used to finance lump-sum payment

- Potentially offset by change in other tax revenues
- T_t = wealth tax revenues - ($\tau_\ell, \tau_r, \tau_k, \tau_c$ revenues - SS benefits)

Quantitative analysis: public finance





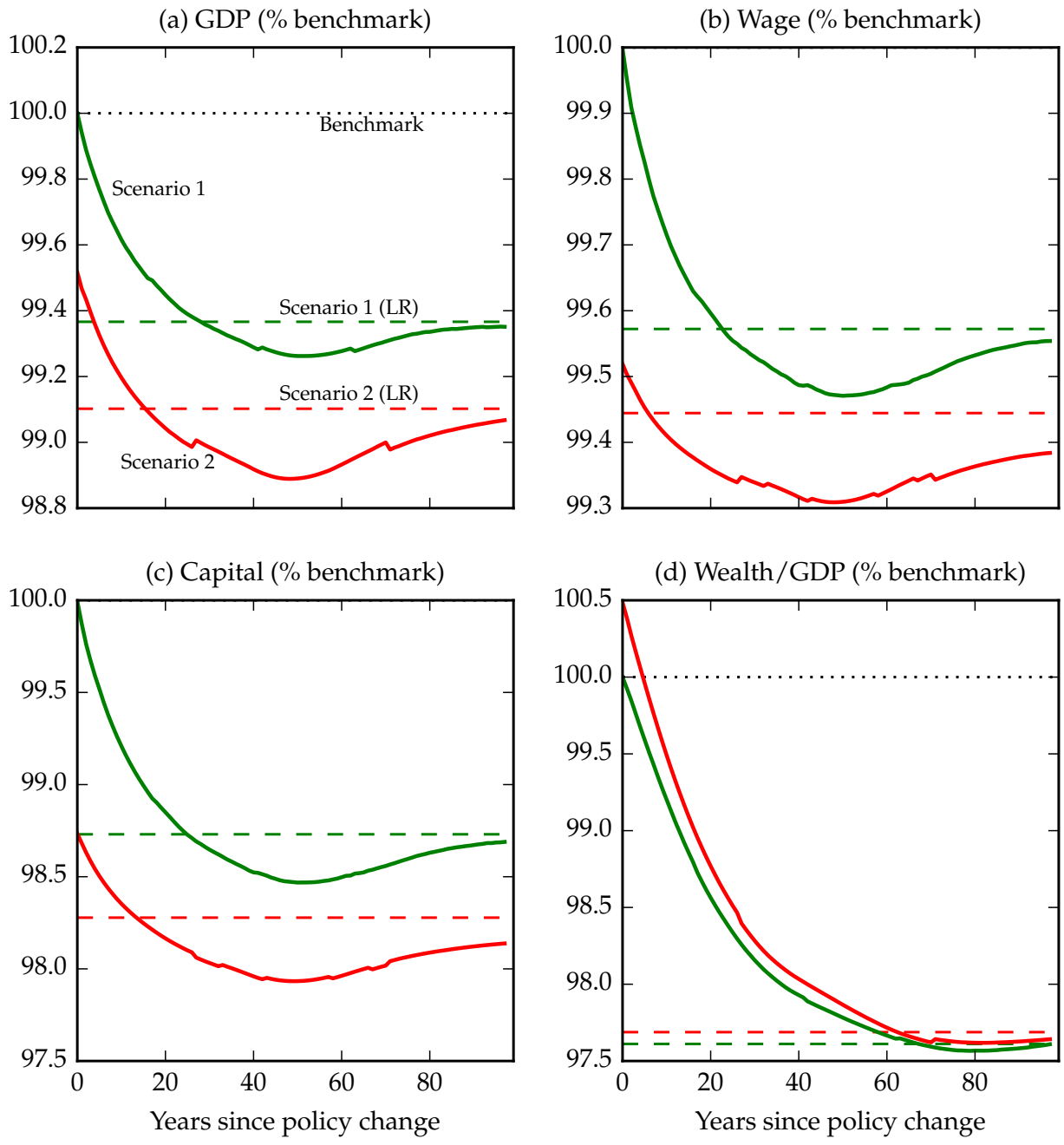
Short run:

- Revenue: 0.63% GDP
- Transfer: $\sim$ 1% avg. $y_{t,\ell}$

Long run:

- Revenue $\downarrow$ 47% (S1) – 60% (S2)
- Transfer $\downarrow$ 59% (S1) – 74% (S2)

Quantitative analysis: macro dynamics



Specification 1

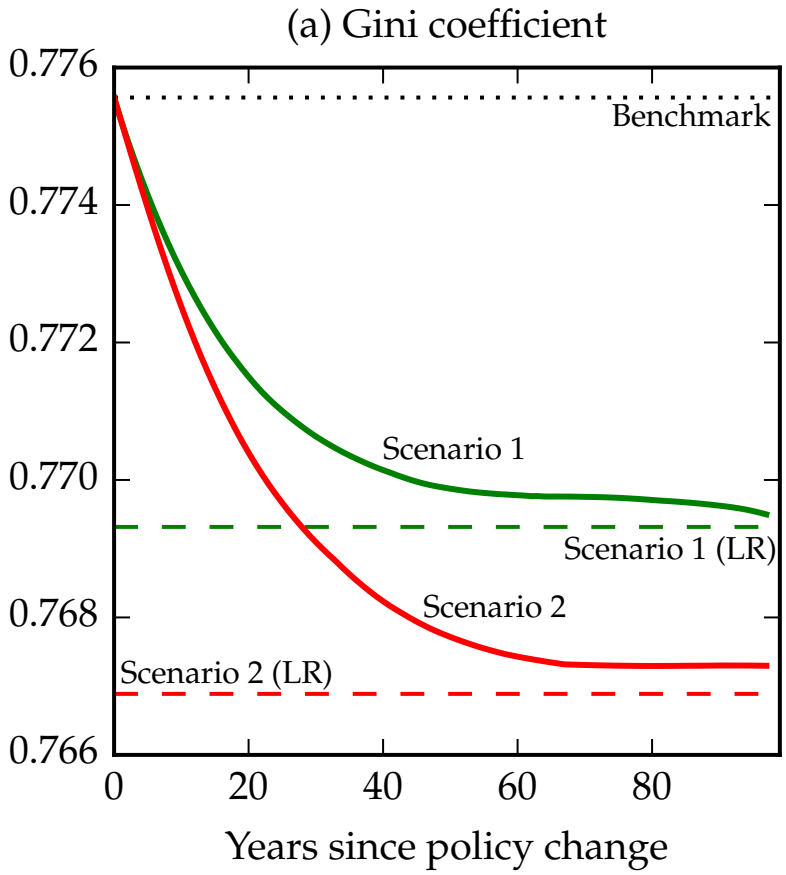
- No immediate macro response
- LR response driven only by $\downarrow$ in wealth

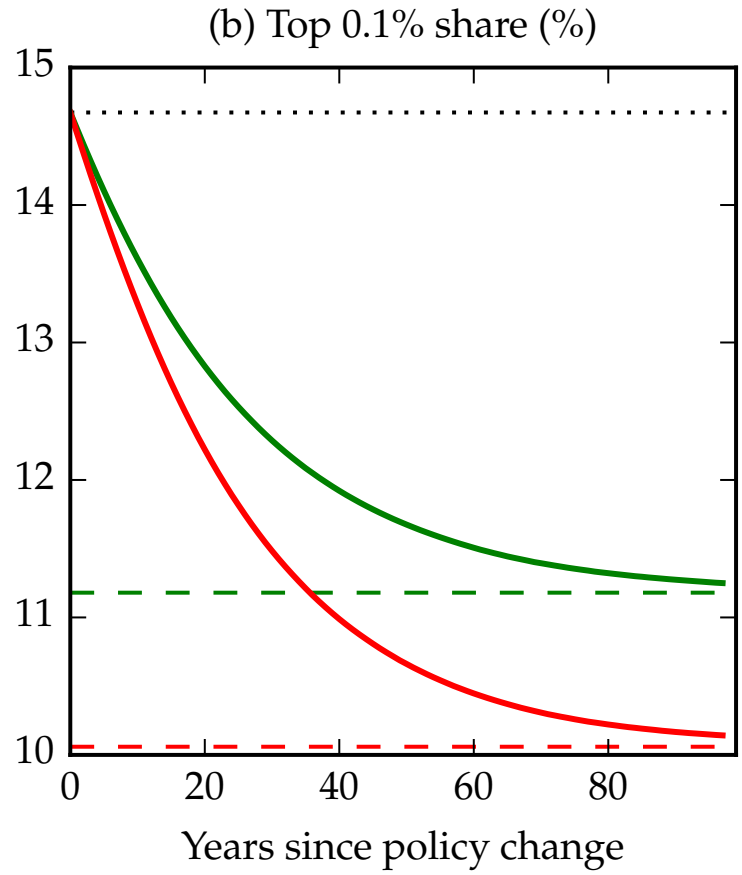
Specification 2

- $Y, W, K \downarrow$ immediately as hidden wealth moved offshore
- Non-wealth tax revenue $\downarrow$ immediately

Overshooting in both specs

Quantitative analysis: wealth inequality





Short run:

- No change in wealth inequality
- Distribution hasn't changed yet!

Long run:

- Top 0.1% share falls by 1/4–1/3
- Gini barely moves

Quantitative analysis: welfare

Welfare measure: ex-ante welfare of agent randomly placed into stationary distribution (Conesa et al. 2009)

- Welfare in initial steady state: $W^* = \int V^*(j,e,z,a)\, \mathrm{d}\Psi^*(j,e,z,a)$
- Welfare in period t after wealth tax: $W_t = \int V_t(j,e,z,a)\, \mathrm{d}\Psi_t(j,e,z,a)$
- Welfare change: $CE_t = (W_t/W^*)^{1/(1-\sigma)} - 1$
- Also measure fraction of households for whom $V_t > V^*$

	CE_t		Approval (%)	
Period	Spec 1	Spec 2	Spec 1	Spec 2
0	0.64	0.58	99.88	99.89
10	0.46	0.36	99.88	85.46
25	0.31	0.18	99.80	68.38
50	0.25	0.11	88.96	52.71
∞	0.41	0.18	99.88	54.66

Welfare gains + majority approval across specifications and time, but support falls in LR, especially if hidden wealth held offshore

Quant. analysis: welfare by age and entrepreneurial ability

	Year of policy change						Long run					
$z \backslash j$	25–34	35–44	45–54	55–64	65–74	75–85	25–34	35–44	45–54	55–64	65–74	75–85
z_1	+0.67	+0.62	+0.60	+0.62	+0.65	+0.72	+0.24	+0.21	+0.21	+0.23	+0.27	+0.28
z_2	+0.67	+0.62	+0.60	+0.62	+0.65	+0.72	+0.25	+0.22	+0.22	+0.23	+0.27	+0.28
z_3	+0.66	+0.62	+0.60	+0.62	+0.65	+0.72	+0.27	+0.24	+0.24	+0.26	+0.29	+0.31
z_4	+0.66	+0.62	+0.60	+0.62	+0.65	+0.71	+0.29	+0.25	+0.25	+0.27	+0.30	+0.31
z_5	+0.66	+0.62	+0.60	+0.62	+0.65	+0.71	+0.34	+0.32	+0.31	+0.33	+0.36	+0.37
z_6	+0.73	+0.67	+0.62	+0.58	+0.59	+0.65	+0.55	+0.66	+0.80	+0.90	+0.90	+0.84
z_7	+1.13	+0.95	+0.74	+0.52	+0.48	+0.54	+1.10	+1.73	+2.17	+2.46	+2.47	+2.45
z_8	+1.10	+0.13	-2.36	-6.84	-6.65	-4.18	+2.43	+5.84	+5.03	-1.46	-6.21	-9.01
z_9	+0.93	-2.33	-16.63	-35.13	-37.56	-35.64	+1.36	-0.27	-13.30	-31.69	-38.95	-43.65

Spec 1: Hidden wealth remains onshore

- Workers (low z) gain from transfer
- Old entrepreneurs (high z) lose significantly
- Young entrepreneurs (high z) gain more than workers

Quant. analysis: welfare by age and entrepreneurial ability

	Year of policy change						Long run					
$z \backslash j$	25–34	35–44	45–54	55–64	65–74	75–85	25–34	35–44	45–54	55–64	65–74	75–85
z_1	+0.54	+0.49	+0.47	+0.55	+0.66	+0.68	-0.11	-0.13	-0.12	-0.09	-0.06	-0.06
z_2	+0.54	+0.49	+0.47	+0.55	+0.66	+0.68	-0.09	-0.11	-0.11	-0.08	-0.05	-0.06
z_3	+0.53	+0.49	+0.47	+0.55	+0.66	+0.68	-0.06	-0.09	-0.08	-0.06	-0.03	-0.04
z_4	+0.53	+0.49	+0.47	+0.55	+0.67	+0.68	-0.02	-0.06	-0.06	-0.03	-0.01	-0.03
z_5	+0.54	+0.49	+0.48	+0.56	+0.67	+0.68	+0.06	+0.03	+0.02	+0.05	+0.07	+0.05
z_6	+0.69	+0.64	+0.60	+0.59	+0.60	+0.62	+0.41	+0.62	+0.86	+1.01	+0.99	+0.87
z_7	+1.51	+1.51	+1.29	+0.88	+0.60	+0.71	+1.32	+2.21	+2.84	+3.22	+3.25	+3.22
z_8	+1.69	+0.61	-2.81	-8.50	-7.13	-4.50	+2.81	+6.05	+3.87	-4.92	-10.22	-12.95
z_9	+1.59	-3.99	-26.86	-44.09	-40.15	-38.33	+1.87	-1.97	-24.73	-47.64	-53.89	-57.42

Spec 2: Hidden wealth held off shore

- Workers (low z) gain in SR, but lose in LR because $\downarrow W > \uparrow T$
- Old entrepreneurs (high z) lose more
- Young entrepreneurs (high z) gain more than in spec 1

Quant. analysis: newborns' welfare by ability type

	Year of policy change				Long run			
$z \setminus e$	e_1	e_2	e_3	e_4	e_1	e_2	e_3	e_4
z_1	+1.11	+0.79	+0.49	+0.33	+0.47	+0.32	+0.17	+0.09
z_2	+1.10	+0.78	+0.49	+0.33	+0.48	+0.33	+0.18	+0.10
z_3	+1.09	+0.78	+0.49	+0.33	+0.50	+0.35	+0.20	+0.12
z_4	+1.09	+0.77	+0.49	+0.33	+0.53	+0.38	+0.22	+0.14
z_5	+1.08	+0.77	+0.49	+0.34	+0.58	+0.42	+0.26	+0.17
z_6	+1.14	+0.84	+0.57	+0.45	+0.72	+0.56	+0.40	+0.32
z_7	+1.44	+1.22	+1.03	+0.95	+0.99	+0.90	+0.82	+0.80
z_8	+1.96	+1.64	+1.02	+0.74	+1.37	+1.24	+0.86	+0.73
z_9	+2.48	+1.46	+0.94	+0.68	+1.59	+1.16	+0.91	+0.83

Spec 1: Hidden wealth remains onshore

- On average, all newborn types benefit in SR and LR
- Workers (low z): largest gains for low-income (low e)
- Entrepreneurs (high z): gain $\sim 2.5\times$ more than low-income workers

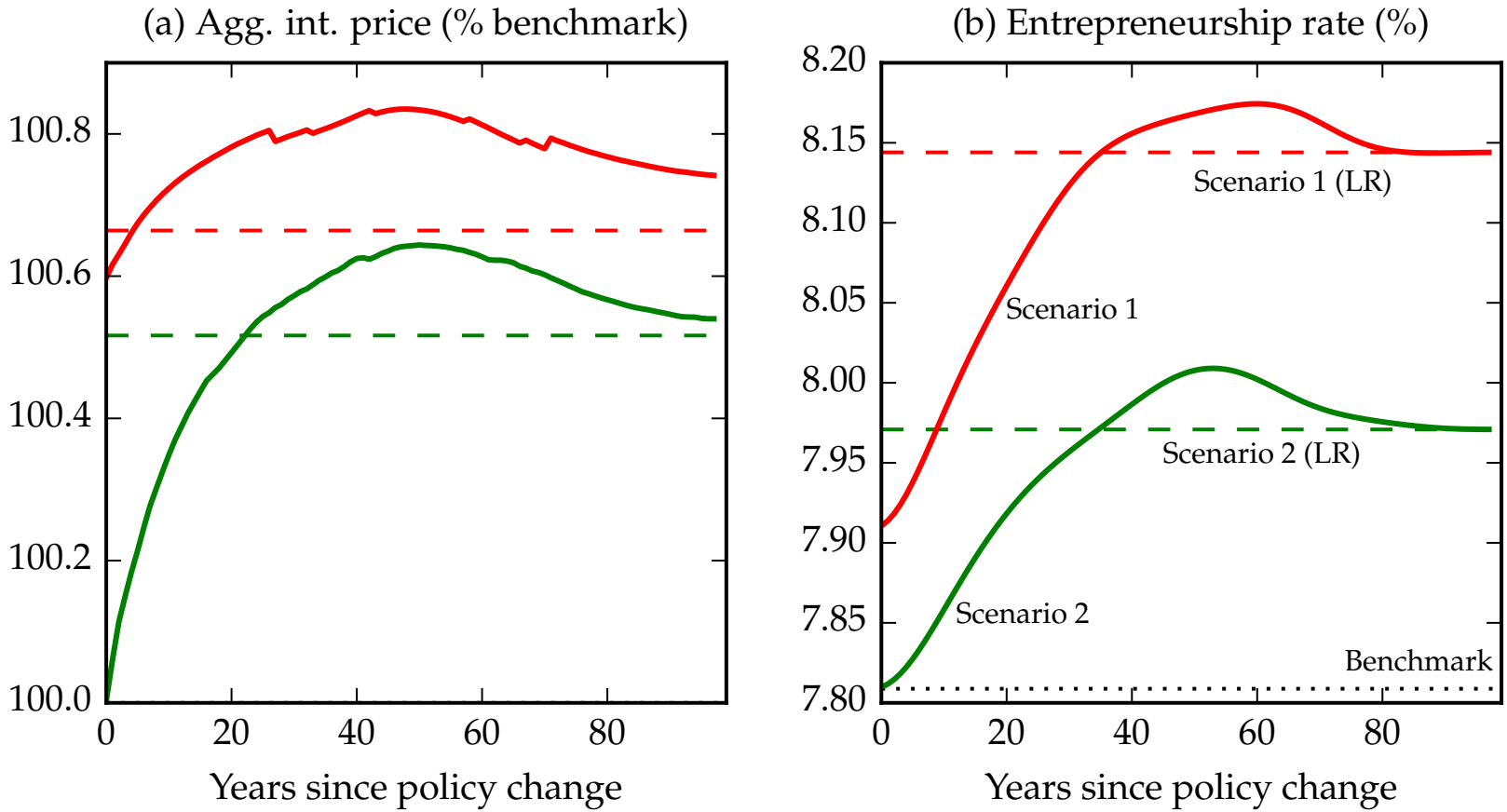
Quant. analysis: newborns' welfare by ability type

	Year of policy change				Long run			
$z \setminus e$	e_1	e_2	e_3	e_4	e_1	e_2	e_3	e_4
z_1	+1.08	+0.68	+0.32	+0.13	+0.06	-0.05	-0.15	-0.20
z_2	+1.07	+0.68	+0.32	+0.13	+0.09	-0.02	-0.12	-0.18
z_3	+1.06	+0.67	+0.32	+0.13	+0.13	+0.01	-0.09	-0.15
z_4	+1.06	+0.67	+0.32	+0.13	+0.17	+0.06	-0.06	-0.12
z_5	+1.07	+0.68	+0.33	+0.14	+0.26	+0.13	+0.00	-0.07
z_6	+1.21	+0.82	+0.48	+0.32	+0.51	+0.37	+0.24	+0.19
z_7	+1.75	+1.48	+1.26	+1.17	+1.04	+0.99	+0.95	+0.96
z_8	+2.52	+2.20	+1.37	+1.03	+1.71	+1.58	+1.17	+1.02
z_9	+3.25	+2.04	+1.35	+1.02	+2.02	+1.74	+1.43	+1.28

Spec 2: Hidden wealth held offshore

- SR: On average, all newborn types benefit
- LR: low-income workers (high-income workers) gain (lose) because transfer larger (smaller) than $\downarrow$ in labor income
- Entrepreneurs (high z) gain more than in spec 1

Quantitative analysis: entrepreneurship



Aggregate $K \downarrow \Rightarrow p(x) \uparrow \Rightarrow$ Returns to entrepreneurship $\uparrow$

Young entrepreneurs' welfare $\uparrow$, although pay tax when old

Stronger, more immediate effect when hidden wealth held offshore

Quantitative analysis: summary

	Public finance		Macro variables		Wealth inequality		Welfare	
Period	Tax rev. (%Y)	Transfer (% $\mathbb{E}[y_{t,\ell}]$)	Y (%Δ)	W (%Δ)	p99 share (p.p.Δ)	Gini (p.p.Δ)	CE (%Δ)	Approval (%)
0	0.63	0.96	-	-	-	-	0.64	99.88
5	0.59	0.86	-0.19	-0.15	-0.46	-0.12	0.55	99.88
10	0.54	0.75	-0.36	-0.27	-0.97	-0.23	0.46	99.88
25	0.44	0.57	-0.60	-0.44	-2.09	-0.45	0.31	99.80
50	0.37	0.45	-0.74	-0.53	-2.98	-0.57	0.25	88.96
∞	0.33	0.39	-0.63	-0.43	-3.49	-0.62	0.41	99.88

Spec 1: Hidden wealth remains onshore

- Public-finance benefits lower in LR than SR
- Inequality falls at very top, but remainder of distribution unaffected
- Output and wages ↓ gradually over transition
- Strong overall public approval in both SR and LR
- Low-income workers, young entrepreneurs benefit most

Quantitative analysis: summary

	Public finance		Macro variables		Wealth inequality		Welfare	
Period	Tax rev. (%Y)	Transfer (% $\mathbb{E}[y_{t,\ell}]$)	Y (%Δ)	W (%Δ)	p99 share (p.p.Δ)	Gini (p.p.Δ)	CE (%Δ)	Approval (%)
0	0.64	0.88	-0.48	-0.48	-	-	0.58	99.89
5	0.58	0.76	-0.64	-0.54	-0.59	-0.13	0.46	99.08
10	0.52	0.64	-0.78	-0.58	-1.27	-0.28	0.36	85.46
25	0.39	0.41	-1.00	-0.65	-2.78	-0.58	0.18	68.38
50	0.29	0.26	-1.11	-0.69	-3.99	-0.78	0.11	52.71
∞	0.25	0.23	-0.90	-0.56	-4.61	-0.87	0.18	54.66

Spec 2: Hidden wealth held offshore

- Output, wages fall immediately
- Public-finance benefits lower than in spec 1, especially in LR
- Welfare gains + approval similar to spec 1 in SR, but lower in LR
- All newborns gain in SR, but most newborn workers lose in LR
- Young entrepreneurs benefit more than in spec 1

Extensions

Extensions: overview

Endogenous interest rate

- $\downarrow$ in K increases MPK, $\uparrow r$
- Stronger macro effects

Housing wealth vs. non-housing wealth

- Incorporate Rotberg (2019) model of housing market
  - Matches wealth distribution
  - Matches variation in wealth composition and homeownership across wealth distribution
  - Realistic housing costs for renters
- Poor households spend large fraction of income on rent, creates income effect that makes transfers more valuable
- Effect of tax on house prices changes rich households' collateral

Transition dynamics not numerically tractable in extensions, focus on long-run results

Extensions: long-run results

	Public finance		Macro variables		Wealth inequality		Welfare	
Model version	Tax rev. (%Y)	Transfer (% $\mathbb{E}[y_{t,\ell}]$)	Y (%Δ)	W (%Δ)	p99 share (p.p.Δ)	Gini (p.p.Δ)	CE (%Δ)	Approval (%)
(a) Scenario 1: Hidden wealth used in production								
Baseline	0.33	0.39	-0.63	-0.43	-3.49	-0.62	0.41	99.88
Endo. r	0.42	0.55	-0.92	-0.93	-4.56	-1.72	0.83	99.88
Housing	0.42	0.34	-0.53	-0.35	-3.61	-0.86	1.16	99.87
(b) Scenario 2: Hidden wealth held offshore								
Baseline	0.25	0.23	-0.90	-0.56	-4.61	-0.87	0.18	54.66
Endo. r	0.31	0.25	-1.33	-1.33	-6.16	-2.29	0.29	45.67
Housing	0.31	0.18	-0.80	-0.56	-5.00	-1.34	0.53	89.73

Endogenous interest rate

- Similar public finance implications to baseline
- Stronger macro + inequality responses
- ↑ in CE driven by larger transfer, higher returns for entrepreneurs

Extensions: long-run results

Model version	Public finance: Tax rev. (%Y)	Public finance: Transfer (% $\mathbb{E}[y_{t,\ell}]$)	Macro variables: Y (%Δ)	Macro variables: W (%Δ)	Wealth inequality: p99 share (p.p.Δ)	Wealth inequality: Gini (p.p.Δ)	Welfare: CE (%Δ)	Welfare: Approval (%)
(a) Scenario 1: Hidden wealth used in production								
Baseline	0.33	0.39	-0.63	-0.43	-3.49	-0.62	0.41	99.88
Endo. r	0.42	0.55	-0.92	-0.93	-4.56	-1.72	0.83	99.88
Housing	0.42	0.34	-0.53	-0.35	-3.61	-0.86	1.16	99.87
(b) Scenario 2: Hidden wealth held offshore								
Baseline	0.25	0.23	-0.90	-0.56	-4.61	-0.87	0.18	54.66
Endo. r	0.31	0.25	-1.33	-1.33	-6.16	-2.29	0.29	45.67
Housing	0.31	0.18	-0.80	-0.56	-5.00	-1.34	0.53	89.73

Housing model

- Similar public finance + macro implications to baseline
- Similar ↓ in top-end inequality, but larger ↓ in lower-end inequality
- Significantly higher *CE* and approval rate due to income effect

Sensitivity analysis

Sensitivity analysis: overview

Wealth distribution skewness

- Saez and Zucman (2019) manually add Forbes 500 to SCF, raises top 0.1% share to 20%
- Recalibrate model to match more highly skewed wealth distribution, creates larger wealth tax base

GE effects

- Welfare gains of young entrepreneurs driven by $\uparrow$ in price of intermediate goods
- Welfare losses of workers in LR driven by $\downarrow$ in wage
- Isolate these forces by holding one or more price fixed

Focus on long-run results again

Sensitivity analyses: long-run results

Model version	Public finance: Tax rev. (%Y)	Public finance: Transfer (% $\mathbb{E}[y_{t,\ell}]$)	Macro variables: Y (%Δ)	Macro variables: W (%Δ)	Wealth inequality: p99 share (p.p.Δ)	Wealth inequality: Gini (p.p.Δ)	Welfare: CE (%Δ)	Welfare: Approval (%)
(a) Scenario 1: Hidden wealth used in production								
Baseline	0.33	0.39	-0.63	-0.43	-3.49	-0.62	0.41	99.88
PE (W_0, P_∞)	0.33	0.51	-0.68	0.00	-3.50	-0.64	0.93	99.89
PE (P_0, W_∞)	0.31	-0.11	-2.60	-0.43	-3.60	-1.31	-0.51	0.00
↑ skewness	0.55	0.52	-0.75	-0.50	-4.52	-0.76	0.77	99.88
(b) Scenario 2: Hidden wealth held offshore								
Baseline	0.25	0.23	-0.90	-0.56	-4.61	-0.87	0.18	54.66
PE (W_0, P_∞)	0.25	0.37	-0.95	0.00	-4.62	-0.90	0.82	99.89
PE (P_0, W_∞)	0.23	-0.41	-3.43	-0.56	-4.67	-1.74	-1.03	0.00
↑ skewness	0.41	0.29	-1.11	-0.71	-6.29	-1.12	0.30	76.48

Old wage and new price of intermediate outputs

- Everyone gains (other than those hit, or soon to be hit, by the tax)
- Wage does not decline and transfer rises
- Higher welfare gains and approval rates

Sensitivity analyses: long-run results

Model version	Public finance: Tax rev. (%Y)	Public finance: Transfer (% $\mathbb{E}[y_{t,\ell}]$)	Macro variables: Y (%Δ)	Macro variables: W (%Δ)	Wealth inequality: p99 share (p.p.Δ)	Wealth inequality: Gini (p.p.Δ)	Welfare: CE (%Δ)	Welfare: Approval (%)
(a) Scenario 1: Hidden wealth used in production								
Baseline	0.33	0.39	-0.63	-0.43	-3.49	-0.62	0.41	99.88
PE (W_0, P_∞)	0.33	0.51	-0.68	0.00	-3.50	-0.64	0.93	99.89
PE (P_0, W_∞)	0.31	-0.11	-2.60	-0.43	-3.60	-1.31	-0.51	0.00
↑ skewness	0.55	0.52	-0.75	-0.50	-4.52	-0.76	0.77	99.88
(b) Scenario 2: Hidden wealth held offshore								
Baseline	0.25	0.23	-0.90	-0.56	-4.61	-0.87	0.18	54.66
PE (W_0, P_∞)	0.25	0.37	-0.95	0.00	-4.62	-0.90	0.82	99.89
PE (P_0, W_∞)	0.23	-0.41	-3.43	-0.56	-4.67	-1.74	-1.03	0.00
↑ skewness	0.41	0.29	-1.11	-0.71	-6.29	-1.12	0.30	76.48

Higher top 0.1% share

- Wealth tax generates more revenue, larger transfers
- Macro responses more pronounced
- Higher welfare gains and approval rates

Conclusion

Conclusion

Progressive wealth taxation growing part of public policy discussion

- Proponents claim taxing high-wealth households would raise signficant revenue and reduce wealth inequality
- Macroeconomic effects could reduce public-finance, welfare benefits

Our contribution: quantify SR and LR consequences of wealth taxation using dynamic GE analysis

Key findings:

- Large public-finance benefits in SR, but $\downarrow$ significantly over time as distribution evolves
- Macroeconomic consequences could be gradual or swift depending on nature of tax evasion
- Widely popular in SR, but may hurt workers in LR if hidden wealth taken out of domestic economy