Efficient Redistribution

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Motivation

- Increase in income and wealth inequality
- Calls for more redistribution
  - wealth taxes
  - higher top marginal income taxes
- Classic question: how to redistribute most efficiently?

Our Paper

- Revisit question using dynamic general equilibrium model
  - incomplete markets and uninsurable idiosyncratic risk
  - that reproduces distribution of U.S. wealth and income
  - taking account long-lived transition dynamics after policy reforms

- Key ingredient: consider tax instruments jointly
  - each in isolation can achieve redistribution
  - what combination is most efficient?

Findings

- Reform: one-time, unanticipated and permanent change in tax schedule
  - allow for non-linear income and wealth taxes
  - use revenue to finance lump-sum transfer

- A flat income tax is nearly optimal
  - small marginal gains from non-linear income or wealth taxes
  - least distortions in savings choices
  - can realize even larger gains with a consumption tax

Outline

1. Model

2. Parameterization

3. Inspect mechanism by studying individual instruments in isolation

4. Efficient tax reform

5. Sensitivity

6. A model with entrepreneurs

Model

Overview

- Consumers
  - idiosyncratic shocks to labor ability
  - work and save in gov't bonds, physical capital, corporate stocks
- Firms
  - decreasing returns to scale, mass pinned down by free-entry condition
- Government

Consumers

- Lifetime utility from consumption c_t, hours h_t

$$\mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t \left(\frac{c_t^{1-\theta}}{1-\theta} - \frac{h_t^{1+\gamma}}{1+\gamma} \right)$$

  - no aggregate uncertainty, so same return r_t on all assets
  - total wealth a_t
  - idiosyncratic labor ability e_t follows Markov process

- Income i_t from interest and wages

$$i_t = r_{t-1} a_t + W_t e_t h_t$$

- Budget constraint

$$c_t + a_{t+1} = \qquad\qquad i_t \qquad + a_t$$

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$$c_t + a_{t+1} = \iota_t + (1-\tau) \qquad i_t \qquad + a_t$$

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Consumers

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Consumers

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- Lifetime utility from consumption c_t, hours h_t

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- Budget constraint

$$(1+\tau_s) c_t + a_{t+1} = \iota_t + (1-\tau) \frac{1}{1-\xi} {i_t}^{1-\xi} + a_t - \tau_a \frac{1}{1+\xi_a} {a_t}^{1+\xi_a}$$

Technology

- Firms produce homogenous good
  - technology: $y_t = z^{1-\eta}\left(k_t^{\alpha} l_t^{1-\alpha}\right)^{\eta}$
  - mass N_t identical firms, exogenous exit at rate φ
  - subject to corporate profit tax rate τ_c

- Mass of firms $N_{t+1} = (1-\varphi)(N_t + \nu_t)$
  - ν_t pinned down by free entry condition
  - entry cost increases in number of entrants: $F_t = \bar{F}\nu_t^{\varepsilon}$

- No-arbitrage implies value of firm

$$Q_t = \frac{1-\varphi}{1+r_t}\left[Q_{t+1} + (1-\tau_c)\,\pi_{t+1}\right]$$

Government

- Constant outstanding stock of debt $B_t = \bar{B}$
- Exogenous spending G
- Finance with income, wealth, consumption and corporate profit taxes

$$r_{t-1}\bar{B} + G = T_t^i + T_t^a + T_t^s + T_t^c$$

Equilibrium

- Measure of households $n_t(a, e)$ evolves endogenously

- Labor maket

$$N_t l_t = \int e h_t(a, e)\, dn_t(a, e)$$

- Asset market

$$K_{t+1} + B_{t+1} + Q_t(N_t + \nu_t) = \int a_{t+1}(a, e)\, dn_t(a, e)$$

Tax Distortions

- Marginal income tax: $\tilde{\tau}_{it} = 1 - (1 - \tau) \left[r_{t-1} a_{it} + W_t e_{it} h_{it} \right]^{-\xi}$

- Hours choice

$$h_{it}^{\gamma} = \frac{1 - \tilde{\tau}_{it}}{1 + \tau_s} c_{it}^{-\theta} W_t e_{it}$$

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- Hours choice

$$h_{it}^{\gamma} = \frac{1 - \tilde{\tau}_{it}}{1 + \tau_s} c_{it}^{-\theta} W_t e_{it} = \frac{1}{\vartheta_{it}} c_{it}^{-\theta} W_t e_{it}$$

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- Marginal wealth tax: $\tilde{\tau}_{at} = \tau_a a_t^{\xi_a}$

- Savings choice (χ_{it} multiplier on borrowing constraint)

$$c_{it}^{-\theta} = \beta \mathbb{E}_t c_{it+1}^{-\theta} \left[1 - \tilde{\tau}_{at+1} + \left(1 - \tilde{\tau}_{it+1}\right) r_t + \chi_{it}\right]$$

Tax Distortions

- Marginal income tax: $\tilde{\tau}_{it} = 1 - (1-\tau)\left[r_{t-1}a_{it} + W_t e_{it} h_{it}\right]^{-\xi}$

- Hours choice

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$$c_{it}^{-\theta} = \beta \mathbb{E}_t c_{it+1}^{-\theta} \left[1 - \tilde{\tau}_{at+1} + (1-\tilde{\tau}_{it+1}) r_t + \chi_{it}\right] = \beta \mathbb{E}_t c_{it+1}^{-\theta} \frac{1+r_t}{\zeta_{it+1}}$$

Aggregate wedges

- Let $\hat{c}_{it} = c_{it}/C_t$ be the individual consumption share

- Aggregating individual FOC (Berger, Bocola, Dovis, 2020)

  - aggregate labor wedge

$$L_t^{\gamma} = \frac{1}{\bar{\vartheta}_t} W_t C_t^{-\theta}, \qquad \text{where} \quad \bar{\vartheta}_t = \left(\int \vartheta_{it}^{-\frac{1}{\gamma}} \hat{c}_{it}^{-\frac{\theta}{\gamma}} e_{it}^{1+\frac{1}{\gamma}} \, \mathrm{d}i \right)^{-\gamma}$$

  - aggregate savings wedge

$$C_t^{-\theta} = \frac{1}{\bar{\zeta}_t} \beta C_{t+1}^{-\theta} \left(1 + r_t\right), \quad \text{where} \quad \bar{\zeta}_t = \left(\int \mathbb{E} \left(\frac{\hat{c}_{it+1}}{\hat{c}_{it}} \right)^{-\theta} \zeta_{it+1}^{-1} \mathrm{d}i \right)^{-1}$$

Parameterization

Assigned Parameters

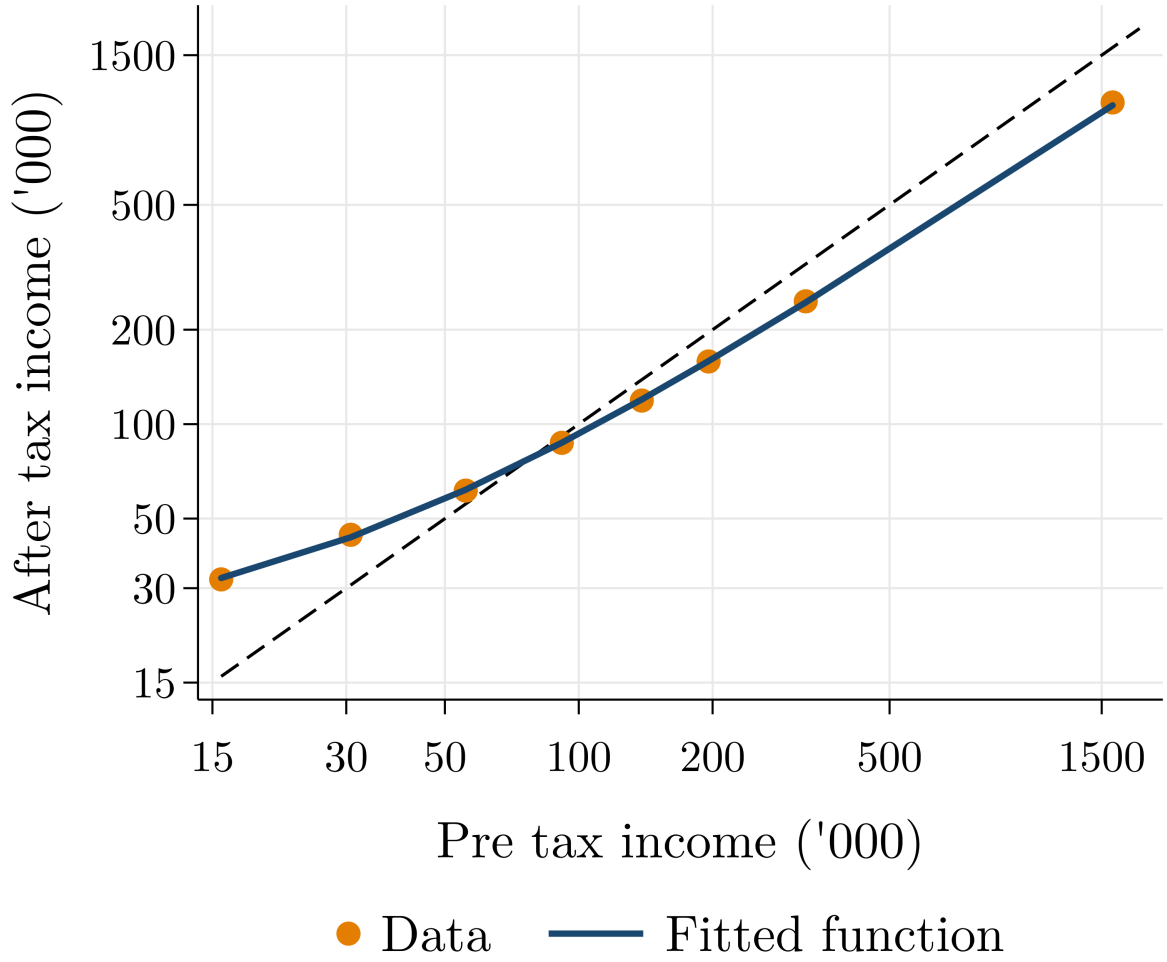
- Period 1 year

θ	relative risk aversion	1
γ	inverse Frisch elasticity	2
α	capital elasticity	$1/3$
η	span of control	0.85
δ	capital depreciation	0.06
φ	exit rate, corporations	0.04
τ_c	corporate profit tax	0.36
τ_a, ξ_a	wealth tax initial s.s	0
$\bar{B}$	gov't debt to GDP	1

- Elasticity of entry cost: $\varepsilon = 1.5$
  - estimate of Gutierrez, Jones, Philippon (2019)
  - comovement entry rates and stock prices in U.S. industries
- Equilibrium interest rate $r = 3.98\%$

Income Tax Schedule

- Estimate using CBO data on pre- and post-tax income (incl. transfers)



no ι

Calibration Strategy

- Choose discount factor and ability process to match
  - average wealth to income
  - moments describing wealth and income inequality
- Matching inequality requires fat-tailed income distribution
- Assume super-star state (Castaneda, Dias-Gimenez, Rios-Rull, 2003)
  - ability follows AR(1): $\log e_{t+1} = \rho_e \log e_t + \sigma_e u_t$
  - with probability p ability jumps to high level $\bar{e}$
  - stay in super-state with probability q

Calibration

			Data	Model
β	0.966	wealth to income	6.6	6.6
ρ_e	0.986	Gini wealth	0.85	0.84
σ_e	0.171	Gini income	0.64	0.65
p	0.0002	wealth share top 0.1%	0.22	0.23
q	0.975	wealth share top 1%	0.35	0.35
$\bar{e}$	15.1	income share top 0.1%	0.14	0.14
		income share top 1%	0.22	0.22

Untargeted Moments

- Reproduce well wealth/income distributions more broadly

	Data	Model		Data	Model
Wealth Distribution			*Income Distribution*		
Share top 5%	0.63	0.57	Share top 5%	0.39	0.39
Share top 10%	0.75	0.72	Share top 10%	0.51	0.51
Share bot 75%	0.09	0.08	Share bot 75%	0.29	0.27
Share bot 50%	0.01	0.00	Share bot 50%	0.10	0.06
Share bot 25%	-0.01	0.00	Share bot 25%	0.02	0.01

Welfare

- Let V_i be life-time value of an agent

$$V_i = \mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t \left(\frac{c_{it}^{1-\theta}}{1-\theta} - \frac{h_{it}^{1+\gamma}}{1+\gamma} \right)$$

- Compute welfare ω_i

$$V_i = \sum_{t=0}^{\infty} \beta^t \frac{\omega_i^{1-\theta}}{1-\theta}$$

  - constant amount consumed each period to enjoy same welfare
  - related to Benabou (2002), Bakis-Kaymak-Poschke (2015)
  - adjusts for risk, intertemporal substitution, mean-reversion

- Less unequal than wealth, income

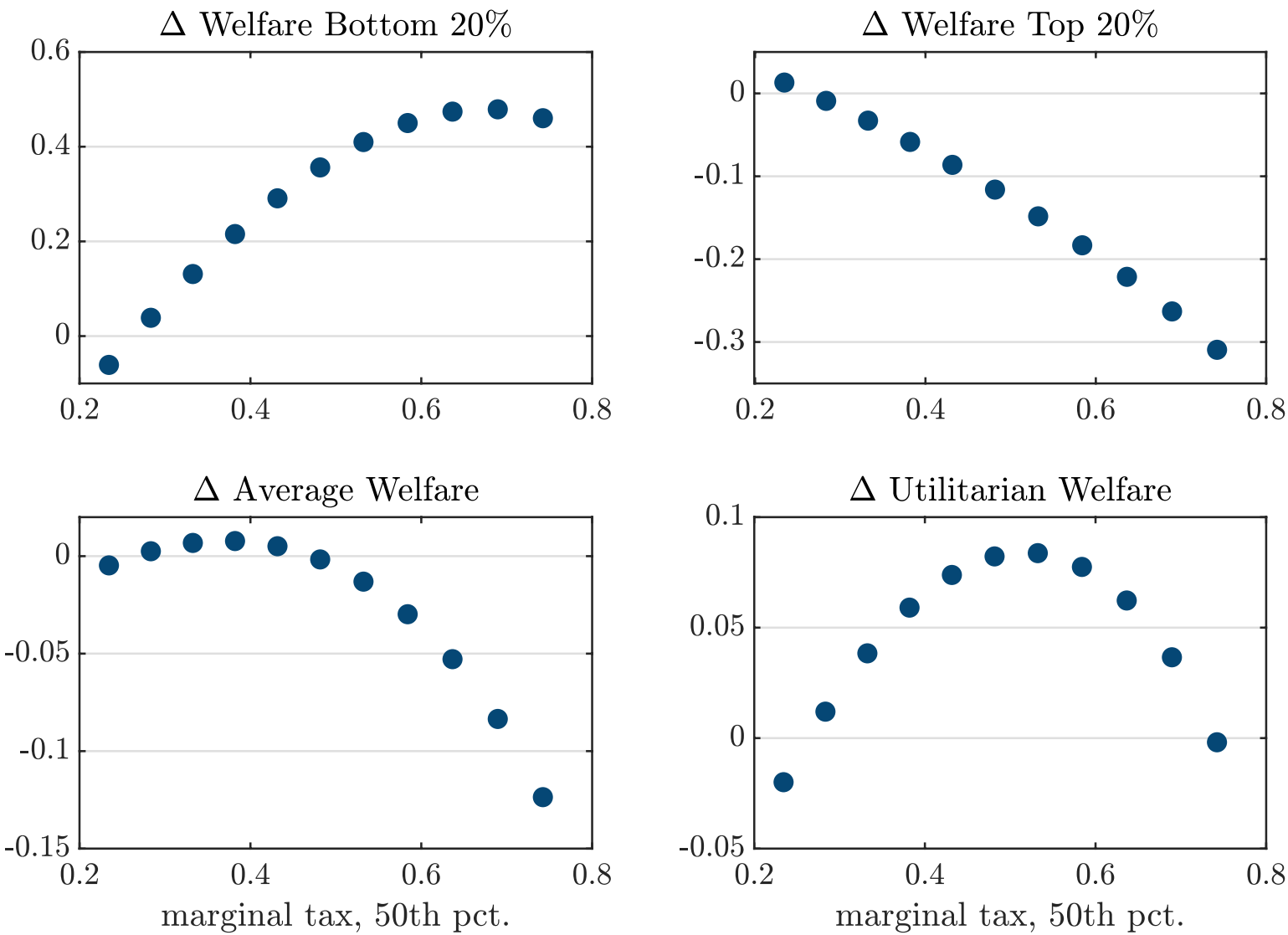
ω distribution

Inspect Mechanism

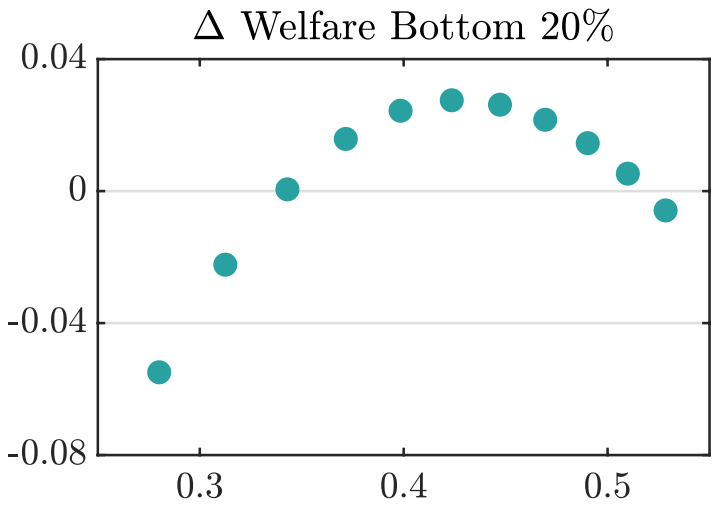
Experiments

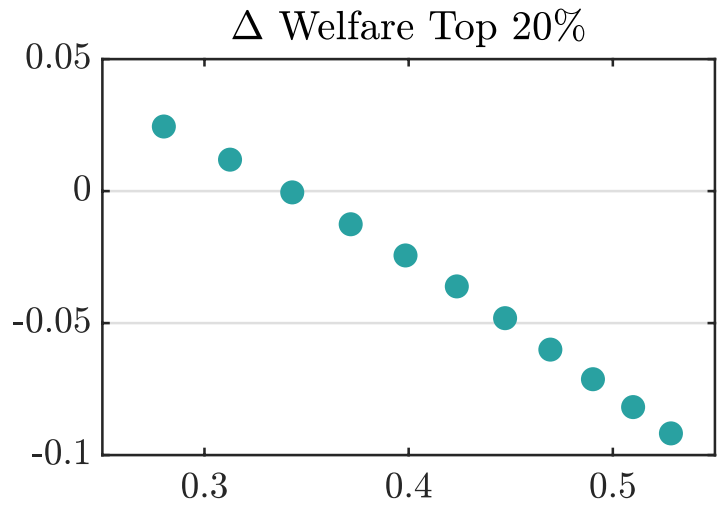
- Change each instrument in isolation
  - one-time, unanticipated, permanent change used to finance increase in ι_t
  - trace out implications for welfare in various parts of distribution
- Zoom in on experiments that increase welfare of bottom 20% by 20%
- Compute impulse response of
  - labor and savings wedges
  - macroeconomic outcomes

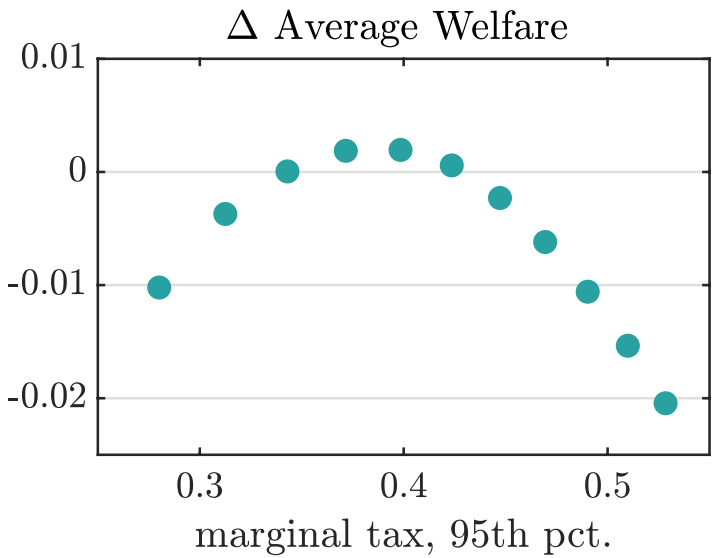
Average Level of Income Tax, τ

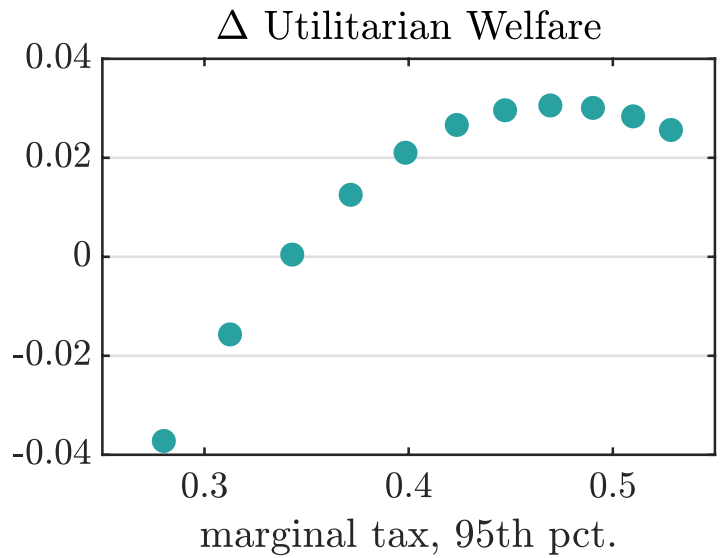


Slope of Marginal Income Tax, ξ

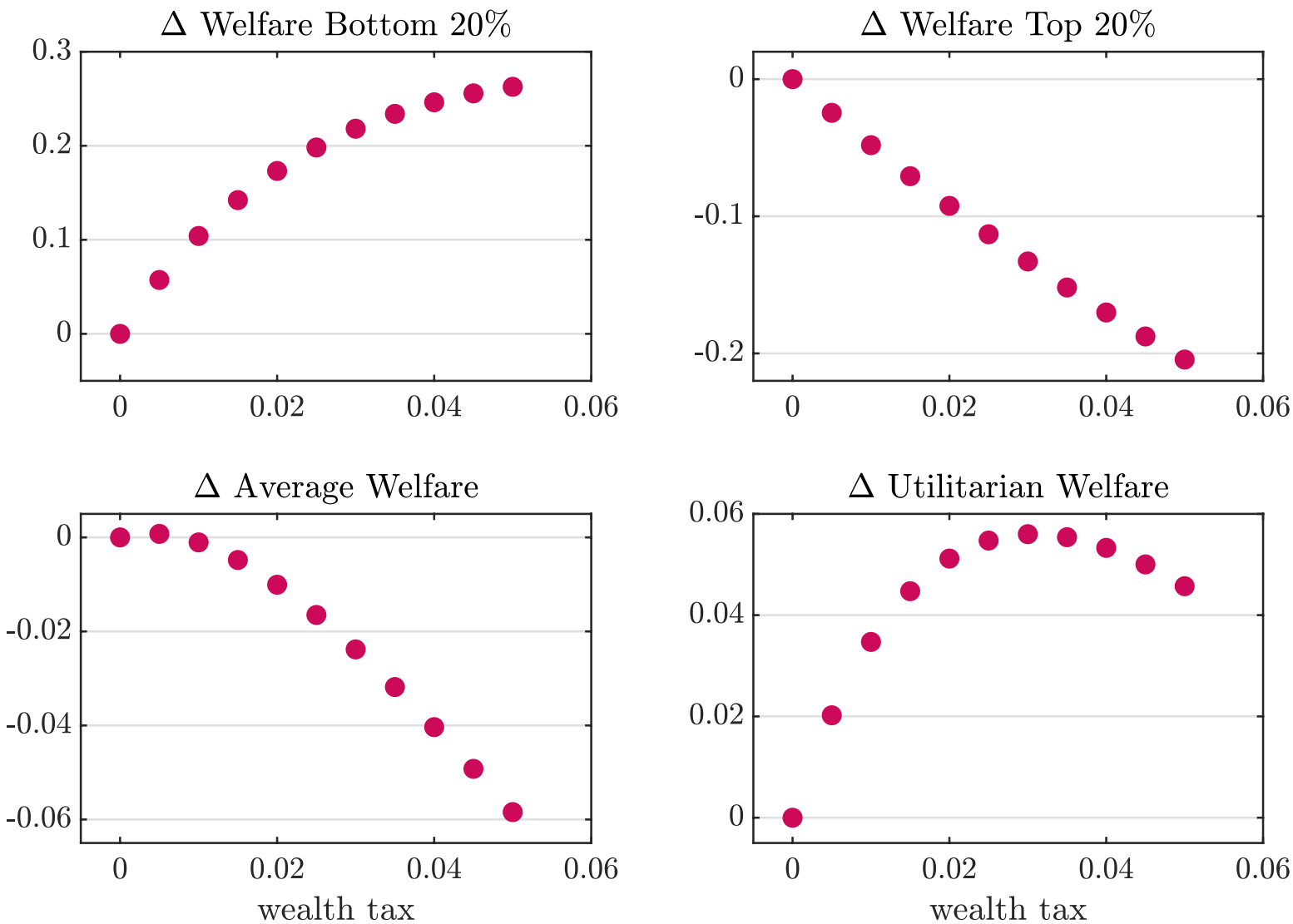




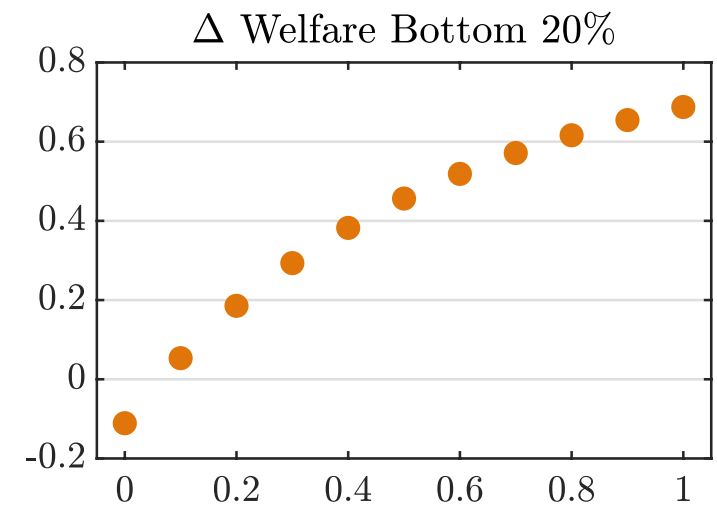


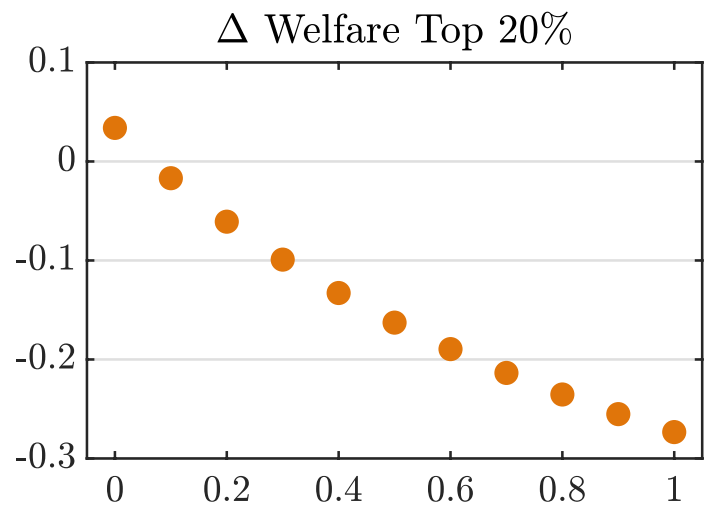


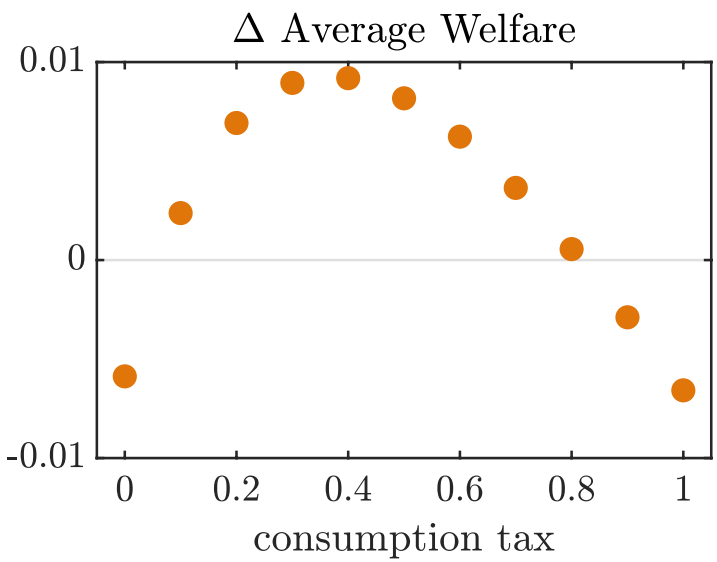
Wealth Tax, τ_a

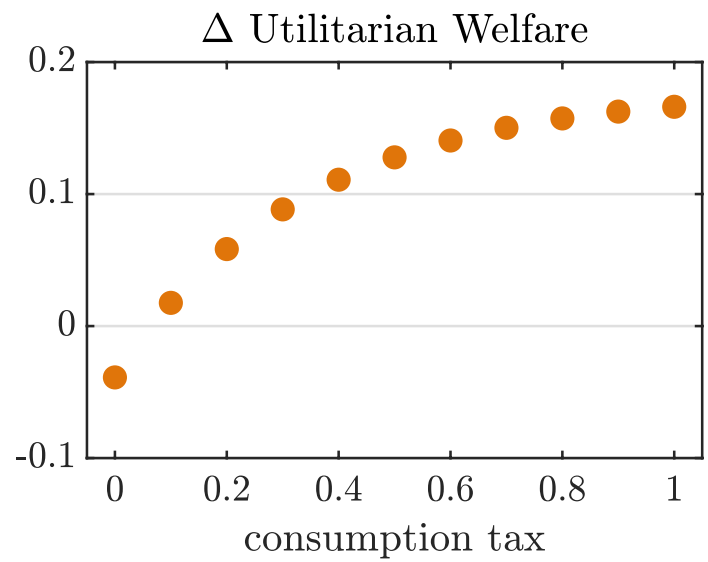


Consumption Tax, τ_s





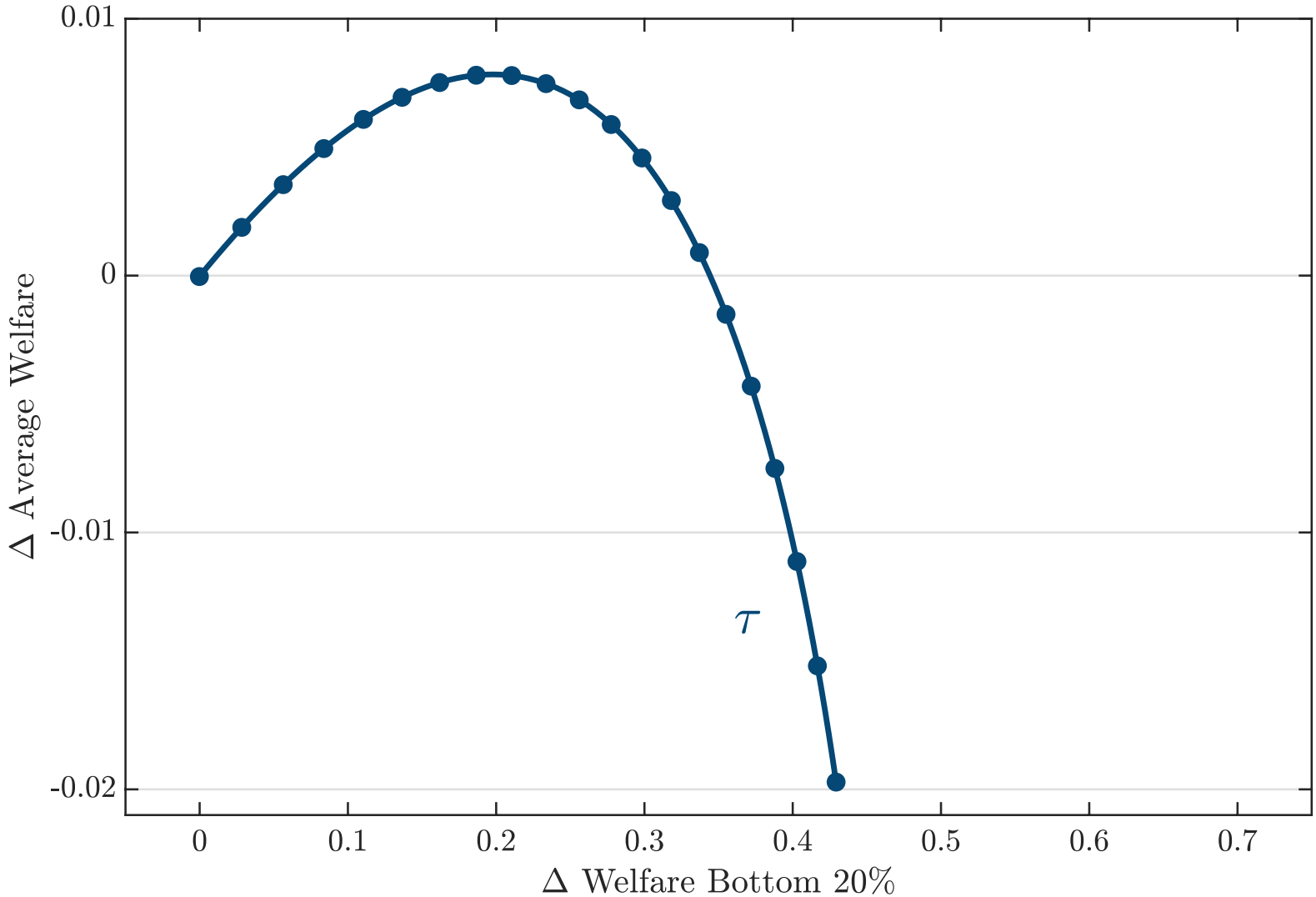




Taking Stock

- Increasing any of these taxes increases welfare of the poor
  - provided proceeds finance lump-sum transfers
- Previous work uses this result to argue in favor of a particular instrument
  - but only allows for one instrument of redistribution at a time
- Instead, we ask: which instrument is most efficient way to redistribute?
- Next, evaluate the cost of redistribution implied by each instrument
  - trace each instrument in isolation
  - contrast change in welfare of bottom 20% with average welfare $\int \omega_i \mathrm{d}i$

Compare Instruments of Redistribution



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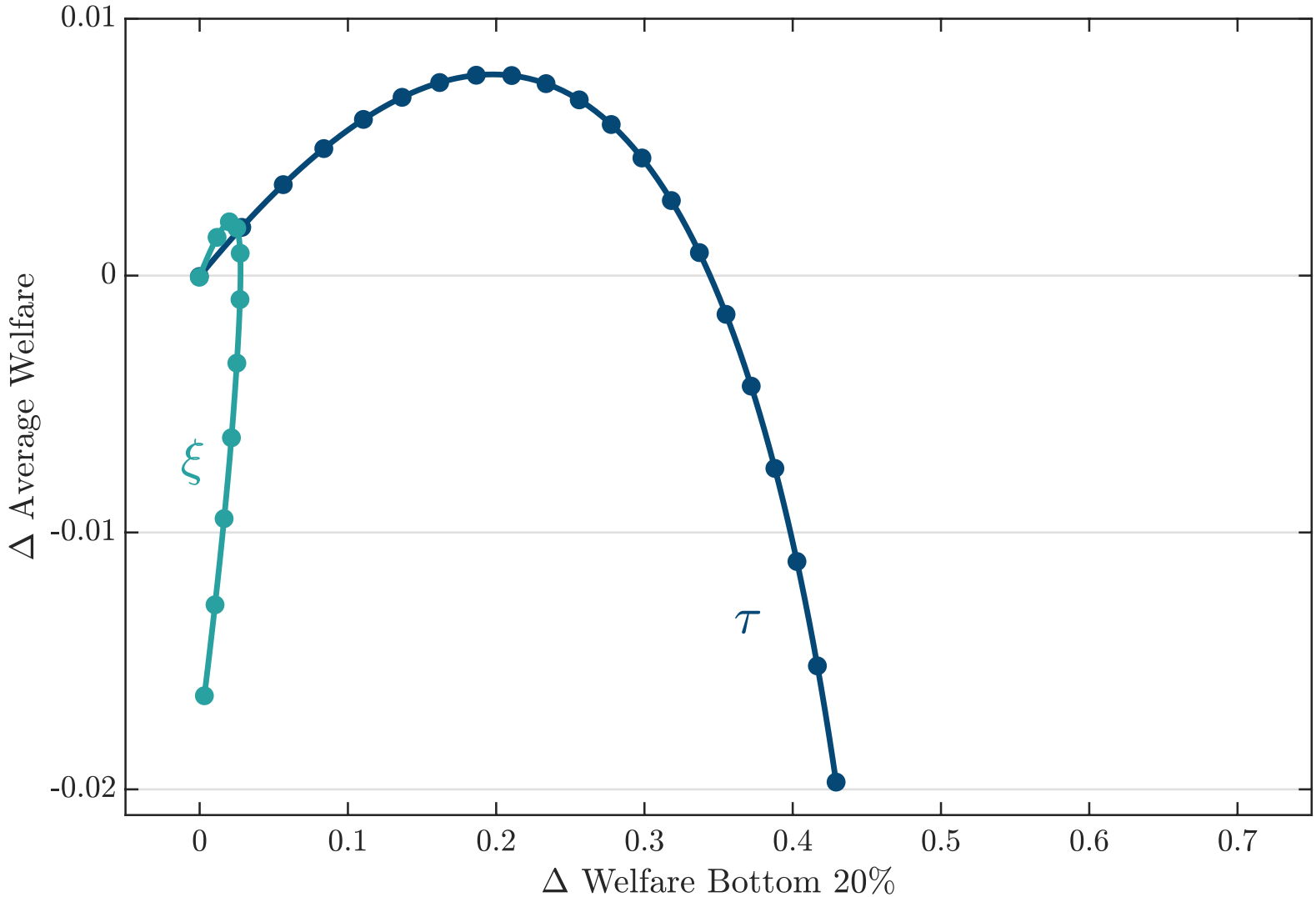

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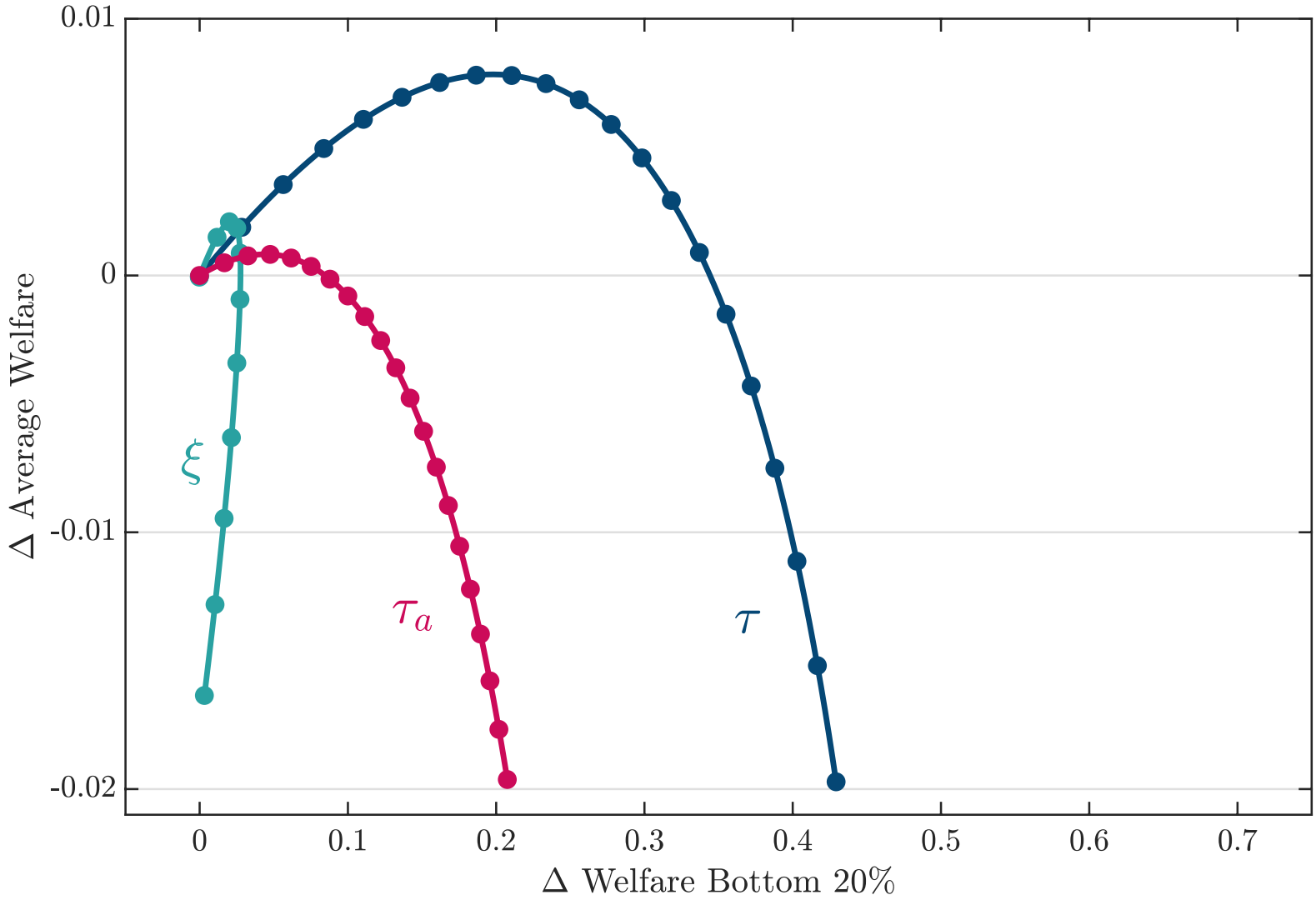

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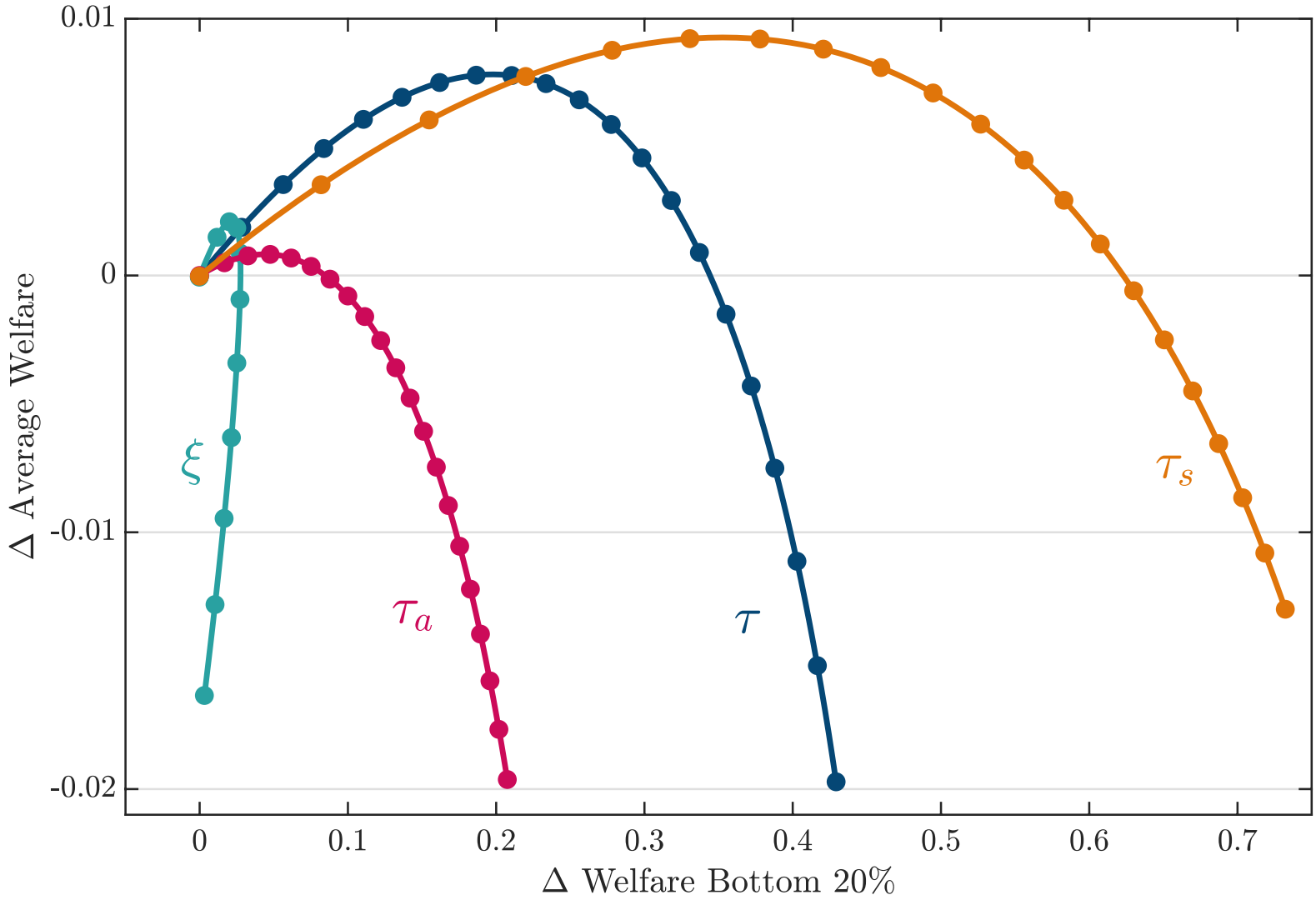


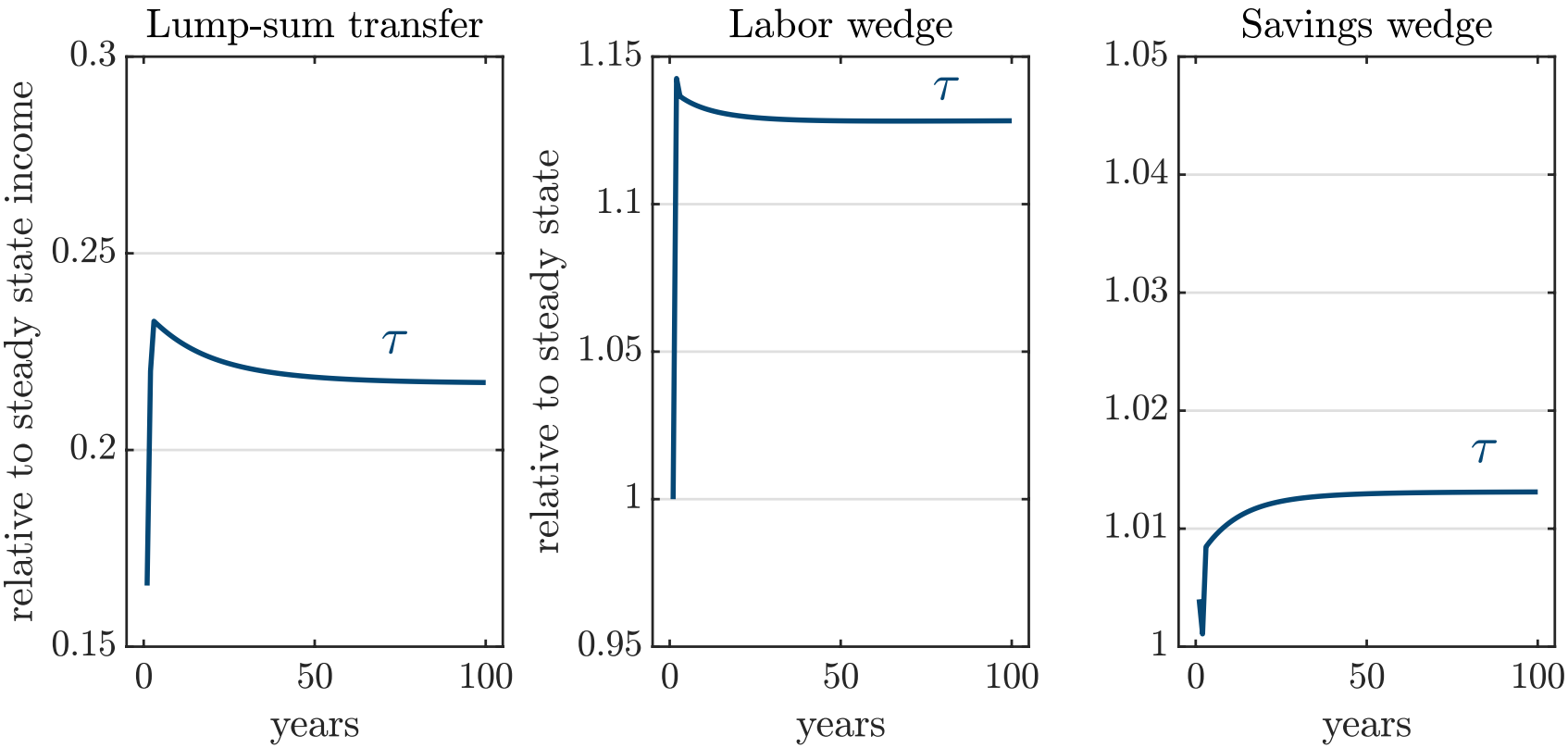
Transition Dynamics After A Policy Reform

- Illustrate why some instruments are more costly than others

- Consider response to a one-time increase in
  - average level of income taxes τ
  - wealth tax τ_a
  - consumption tax τ_s

- Each chosen so welfare of bottom 20% increases by 20%
  - median marginal income tax increases from to 26% to 37%
  - wealth tax increases from 0 to 2.5%
  - consumption tax increases from 6.5% to 21%

Effect on Distortions



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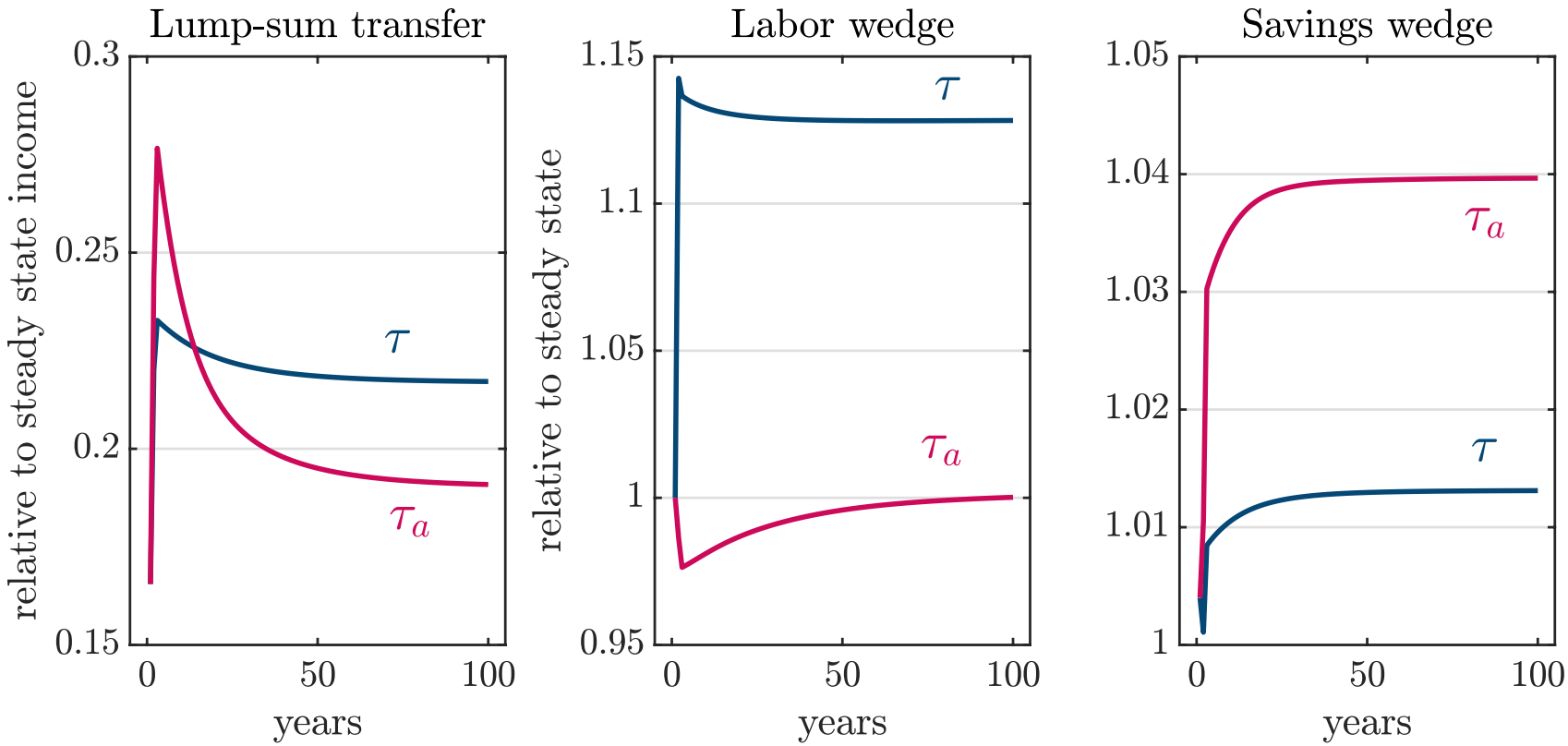

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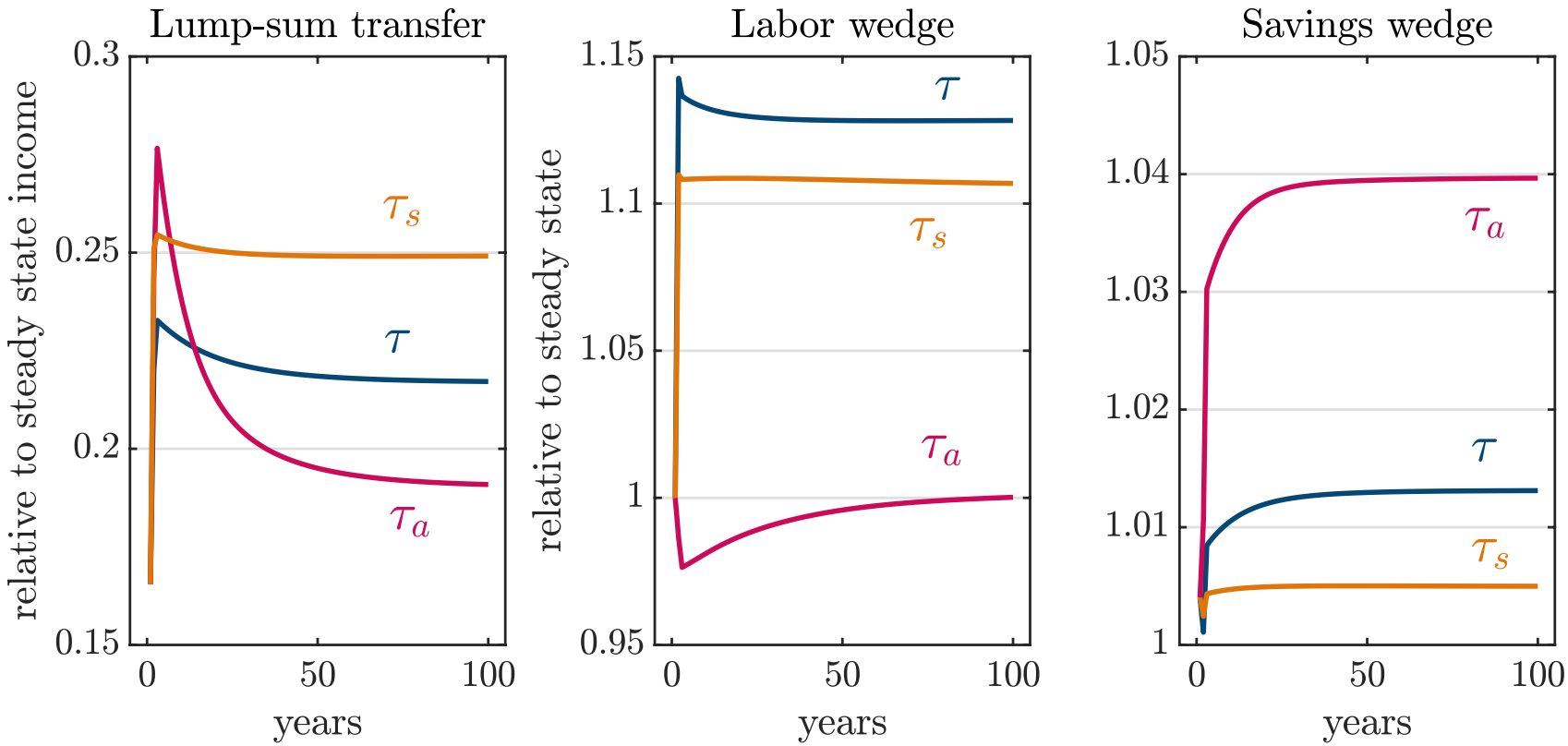
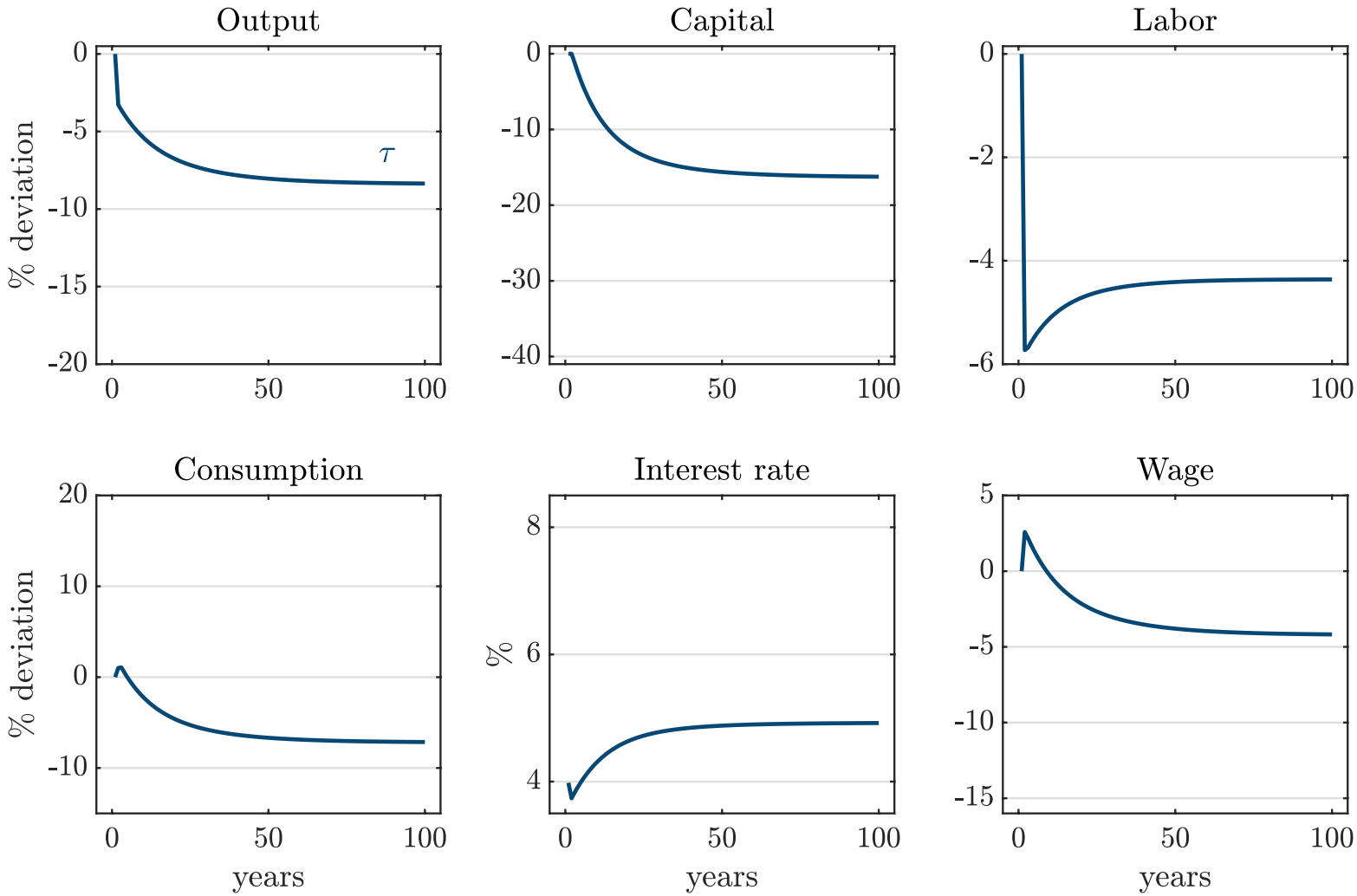


Effect on Macro Aggregates



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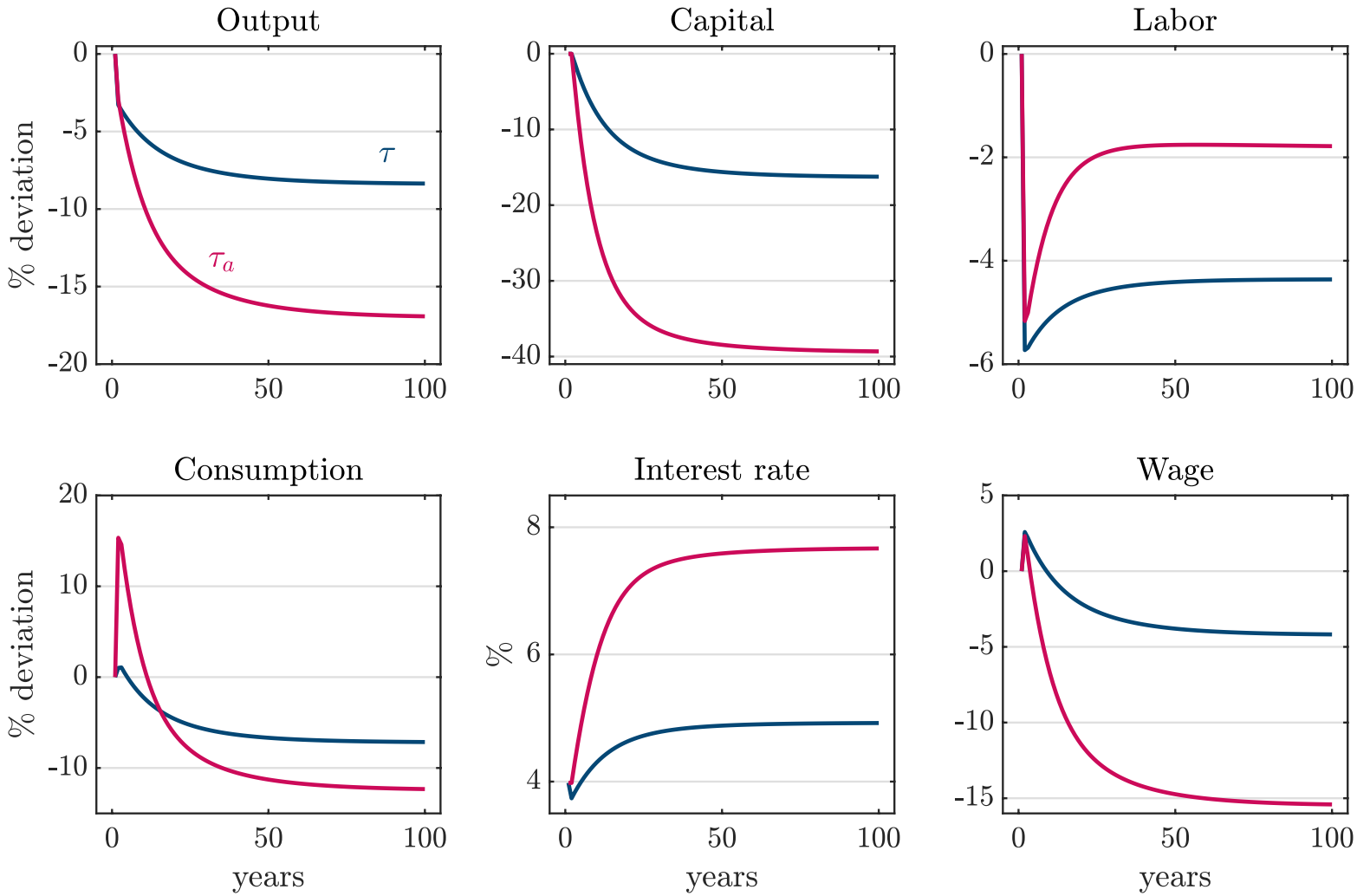

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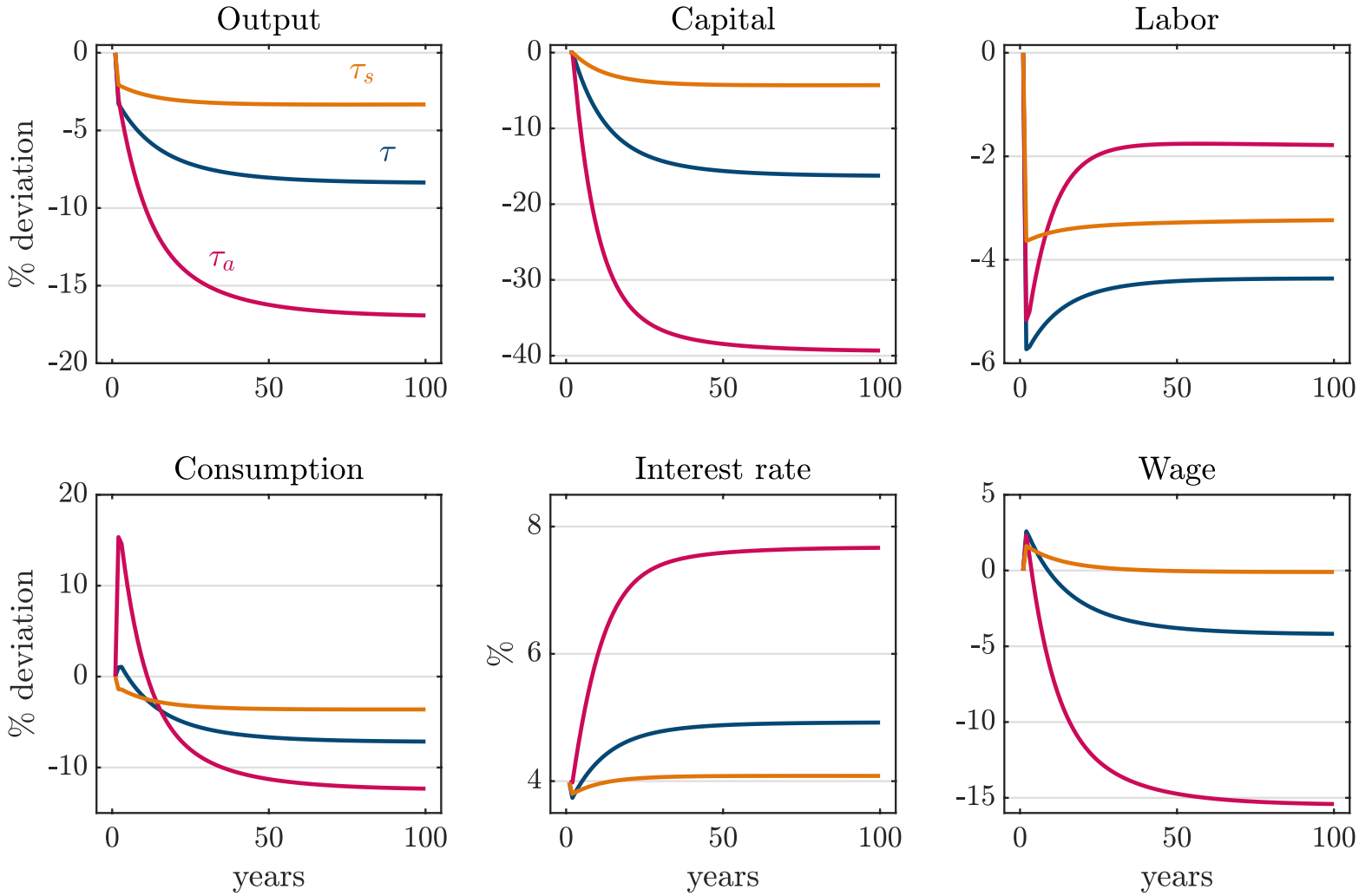

distributional effects

Optimal Policy

Efficient Redistribution

- Policy instruments: $\boldsymbol{\pi} = (\tau, \xi, \tau_a, \xi_a, \tau_s)$

- Consider one-time, unanticipated, permanent change in $\boldsymbol{\pi}$
  - ι_t adjusts to satisfy gov't budget constraint at all dates
  - Domeij, Heathcote (2004), Conesa et al. (2009), Guvenen et al. (2019)

- Planner's problem is

$$\max_{\boldsymbol{\pi}} \left(\int \omega_i(\boldsymbol{\pi})^{1-\Delta} \mathrm{d}i \right)^{\frac{1}{1-\Delta}}$$

- ω_i takes into account transition from initial steady state

- Δ is captures the planner's preference for redistribution
  - $\Delta = 0$: average welfare; $\Delta = \theta$: utilitarian welfare

Optimal Tax Policy: Utilitarian Planner

	Flat Income Tax
marginal income tax	
50^{th} pctile	0.56
95^{th} pctile	0.56
marginal wealth tax	
50^{th} pctile	0
95^{th} pctile	0
consumption tax	0.065
welfare gains	
bottom 20%	0.42
middle 20%	0.06
top 20%	-0.14
social welfare gains	0.078

Optimal Tax Policy: Utilitarian Planner

	Flat Income Tax	Non-linear Income Tax
marginal income tax		
50^{th} pctile	0.56	0.50
95^{th} pctile	0.56	0.58
marginal wealth tax		
50^{th} pctile	0	0
95^{th} pctile	0	0
consumption tax	0.065	0.065
welfare gains		
bottom 20%	0.42	0.38
middle 20%	0.06	0.07
top 20%	-0.14	-0.14
social welfare gains	0.078	0.085

Optimal Tax Policy: Utilitarian Planner

	Flat Income Tax	Non-linear Income Tax	+ Flat Wealth Tax
marginal income tax			
50^{th} pctile	0.56	0.50	0.47
95^{th} pctile	0.56	0.58	0.55
marginal wealth tax			
50^{th} pctile	0	0	0.006
95^{th} pctile	0	0	0.006
consumption tax	0.065	0.065	0.065
welfare gains			
bottom 20%	0.42	0.38	0.38
middle 20%	0.06	0.07	0.08
top 20%	-0.14	-0.14	-0.15
social welfare gains	0.078	0.085	0.087

Optimal Tax Policy: Utilitarian Planner

	Flat Income Tax	Non-linear Income Tax
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50^{th} pctile	0.56	0.50
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consumption tax	0.065	0.065
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Optimal Tax Policy: Utilitarian Planner

	Flat Income Tax	Non-linear Income Tax	+ Non-linear Wealth Tax
marginal income tax			
50^{th} pctile	0.56	0.50	0.49
95^{th} pctile	0.56	0.58	0.55
marginal wealth tax			
50^{th} pctile	0	0	0.002
95^{th} pctile	0	0	0.007
consumption tax	0.065	0.065	0.065
welfare gains			
bottom 20%	0.42	0.38	0.40
middle 20%	0.06	0.07	0.09
top 20%	-0.14	-0.14	-0.21
social welfare gains	0.078	0.085	0.095

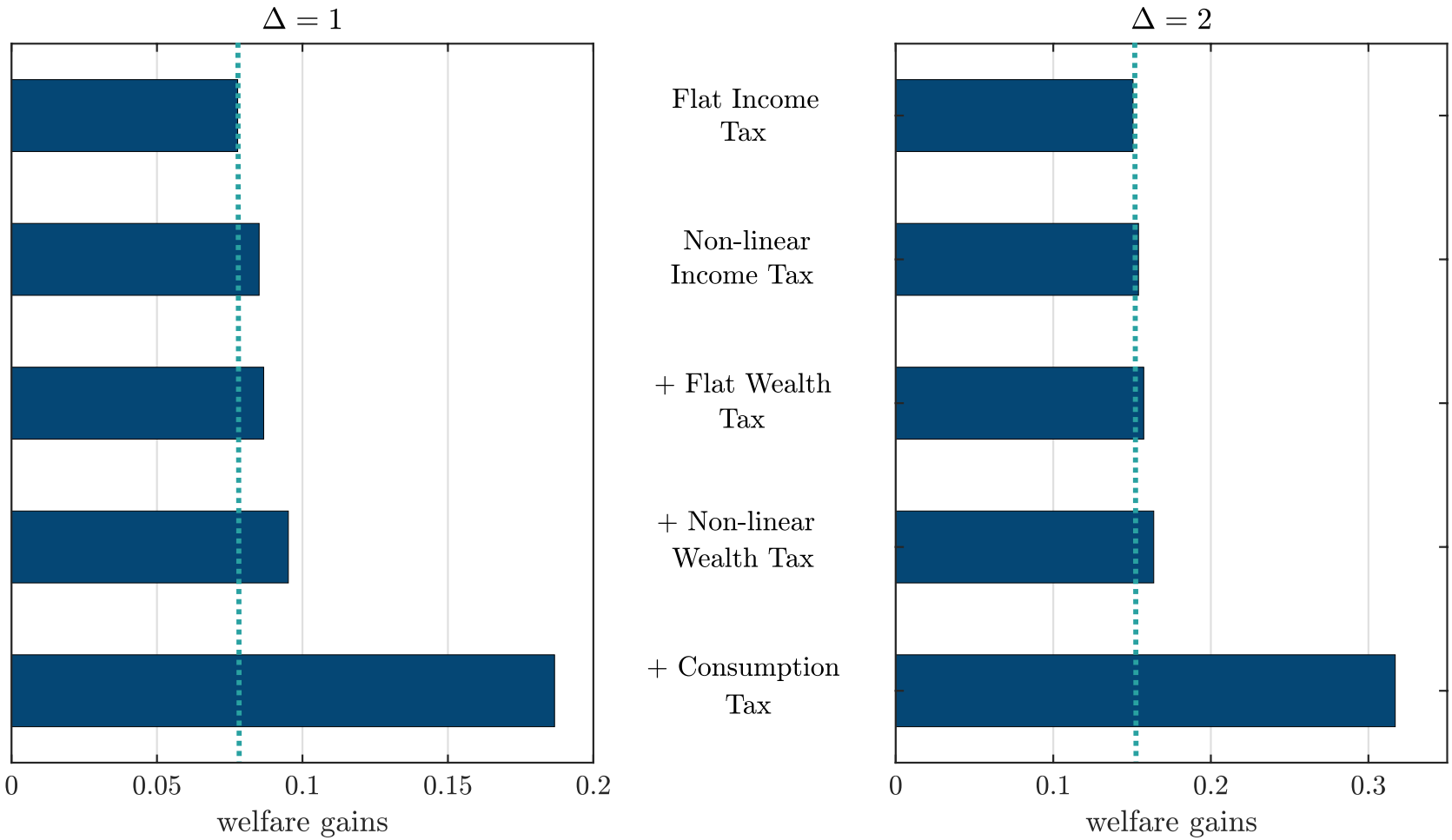
Optimal Tax Policy: Utilitarian Planner

	Flat Income Tax	Non-linear Income Tax
marginal income tax		
50^{th} pctile	0.56	0.50
95^{th} pctile	0.56	0.58
marginal wealth tax		
50^{th} pctile	0	0
95^{th} pctile	0	0
consumption tax	0.065	0.065
welfare gains		
bottom 20%	0.42	0.38
middle 20%	0.06	0.07
top 20%	-0.14	-0.14
social welfare gains	0.078	0.085

Optimal Tax Policy: Utilitarian Planner

	Flat Income Tax	Non-linear Income Tax	+ Consumption Tax
marginal income tax			
50^{th} pctile	0.56	0.50	-0.06
95^{th} pctile	0.56	0.58	0.12
marginal wealth tax			
50^{th} pctile	0	0	0
95^{th} pctile	0	0	0
consumption tax	0.065	0.065	2.11
welfare gains			
bottom 20%	0.42	0.38	0.80
middle 20%	0.06	0.07	0.21
top 20%	-0.14	-0.14	-0.34
social welfare gains	0.078	0.085	0.186

Stronger Preference for Redistribution



- Even smaller gains from wealth tax, because these mostly help middle class

Sensitivity

Sensitivity

- Optimal tax policy critically shaped by
  - preferences, elasticities, ability distribution
- Maximize utilitarian welfare for
  - lower IES, $\theta = 2$
  - higher Frisch, $\gamma = 1$
  - Gaussian ability distribution
- Though size of optimal taxes changes, flat income tax nearly optimal
  - marginal gains from non-linear income taxes or wealth taxes small

Sensitivity: Calibration

	Data	Lower IES $\theta = 2$	Higher Frisch $\gamma = 1$	Gaussian Ability
mean wealth to income	6.6	6.6	6.6	6.6
Gini Wealth	0.85	0.84	0.85	0.87
Gini income	0.64	0.65	0.64	0.78
wealth share top 0.1%	0.22	0.22	0.22	0.06
wealth share top 1%	0.35	0.35	0.35	0.25
income share top 0.1%	0.14	0.14	0.14	0.06
income share top 1%	0.22	0.22	0.22	0.23

Sensitivity: Calibration

	Data	Lower IES $\theta = 2$	Higher Frisch $\gamma = 1$	Gaussian Ability
mean wealth to income	6.6	6.6	6.6	6.6
Gini Wealth	0.85	0.84	0.85	0.87
Gini income	0.64	0.65	0.64	0.78
wealth share top 0.1%	0.22	0.22	0.22	0.06
wealth share top 1%	0.35	0.35	0.35	0.25
income share top 0.1%	0.14	0.14	0.14	0.06
income share top 1%	0.22	0.22	0.22	0.23

- Absent fat-tailed ability shocks, cannot match wealth and income inequality

Sensitivity Analysis, Lower IES

	Flat Income Tax	Non-linear Income Tax	Add Flat Wealth Tax
		Benchmark	
marg inc tax 50^{th} pct	0.56	0.50	0.47
marg inc tax 95^{th} pct	0.56	0.58	0.55
wealth tax	0	0	0.006
social welfare gains	0.078	0.085	0.087
		Lower IES, $\theta = 2$	
marg inc tax 50^{th} pct	0.72	0.67	0.52
marg inc tax 95^{th} pct	0.72	0.75	0.66
wealth tax	0	0	0.044
social welfare gains	0.289	0.298	0.339

- Higher taxes because insurance more valuable and stronger desire to redistribute
- Nevertheless, small marginal gains from non-linear income or wealth taxes

Sensitivity Analysis, Higher Frisch

	Flat Income Tax	Non-linear Income Tax	Add Flat Wealth Tax
		Benchmark	
marg inc tax 50^{th} pct	0.56	0.50	0.47
marg inc tax 95^{th} pct	0.56	0.58	0.55
wealth tax	0	0	0.006
social welfare gains	0.078	0.085	0.087
		Higher Frisch, $\gamma = 1$	
marg inc tax 50^{th} pct	0.51	0.46	0.39
marg inc tax 95^{th} pct	0.51	0.52	0.46
wealth tax	0	0	0.014
social welfare gains	0.049	0.053	0.061

- Lower income, higher wealth taxes because labor more elastic
- Nevertheless, small marginal gains from non-linear income or wealth taxes

Sensitivity Analysis, Gaussian Ability

	Flat Income Tax	Non-linear Income Tax	Add Flat Wealth Tax
		Benchmark	
marg inc tax 50^{th} pct	0.56	0.50	0.47
marg inc tax 95^{th} pct	0.56	0.58	0.55
wealth tax	0	0	0.006
social welfare gains	0.078	0.085	0.087
		Gaussian Ability	
marg inc tax 50^{th} pct	0.65	0.79	0.78
marg inc tax 95^{th} pct	0.65	0.63	0.61
wealth tax	0	0	0.005
social welfare gains	0.246	0.256	0.257

- Decreasing marginal income taxes
- Nevertheless, small marginal gains from non-linear income or wealth taxes

Economy with Entrepreneurs

Importance of Entrepreneurs

1. Empirical

- Much of wealth, income concentrated with entrepreneurs facts
- Rigid ownership rules make it difficult to issue equity
  - rely more on internal savings and collateralized borrowing
  - generates heterogeneity in rates of return

2. Theoretical

- Profits taxed as individual income
  - so tax reforms Δ incentives to accumulate wealth, produce
  - potentially important since private businesses account for 40% output
  - Guvenen et al. (2019) argue that in such setup large gains from wealth tax

model

Economy with Entrepreneurs

	Flat Income Tax	Non-linear Income Tax	Add Flat Wealth Tax
		Benchmark	
marg inc tax 50^{th} pct	0.56	0.50	0.47
marg inc tax 95^{th} pct	0.56	0.58	0.55
wealth tax	0	0	0.006
social welfare gains	0.078	0.085	0.087
		Economy with Entrepreneurs	
marg inc tax 50^{th} pct	0.58	0.51	0.47
marg inc tax 95^{th} pct	0.58	0.60	0.57
wealth tax	0	0	0.006
social welfare gains	0.091	0.098	0.100

- Very similar to benchmark
- Savings and labor wedges much larger than wedges due to collateral constraint

Importance of Transition Dynamics

	Flat Income Tax	Non-linear Income Tax	Add Flat Wealth Tax
		Benchmark	
marg inc tax 50^{th} pct	0.56	0.50	0.47
marg inc tax 95^{th} pct	0.56	0.58	0.55
wealth tax	0	0	0.006
lump-sum transfer, rel. GDP	0.28	0.25	0.24
social welfare gains	0.078	0.085	0.087
		Maximize Steady State Welfare	
marg inc tax 50^{th} pct	0.45	0.23	0.39
marg inc tax 95^{th} pct	0.45	0.58	0.73
wealth tax	0	0	-0.02
lump-sum transfer, rel. GDP	0.25	0	0.02
social welfare gains	-0.010	0.177	0.213

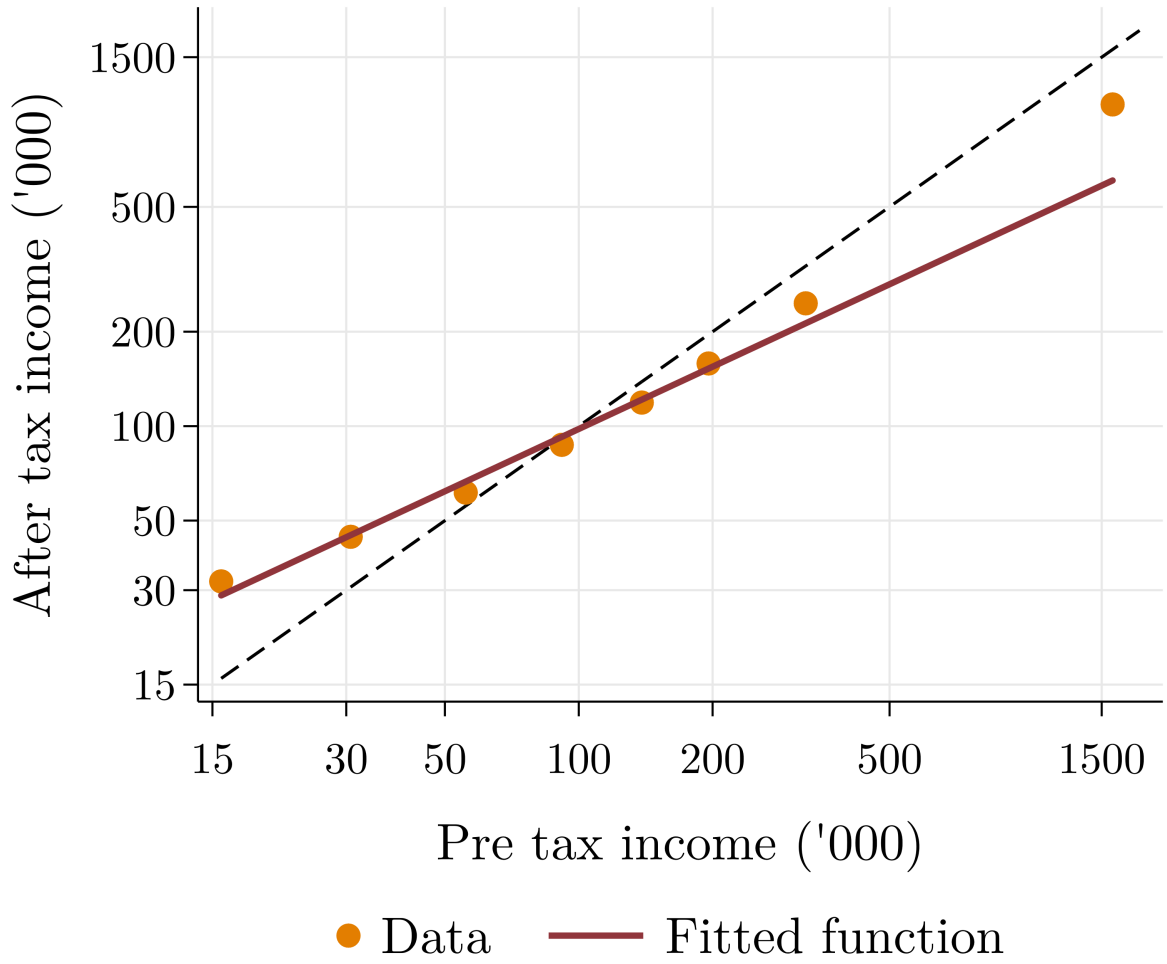
Conclusions

- Studied what is the most efficient way to redistribute
  - allow for non-linear income and wealth taxes
- A flat income tax schedule is nearly optimal
  - small marginal gains from non-linear income and wealth-taxes
  - result robust to preferences and underlying distribution of ability
- Consumption tax can do even better, but must be very high

Extras

Income Tax Schedule

- Worse fit without lump-sum transfer ($\xi = 0.34$ vs. $\xi = 0.05$ in baseline)



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Distribution of Welfare

- Less unequal than wealth, income
- Nevertheless, top 1% have twice more than bottom 25%

	Welfare	Post-Tax Inc.	Pre-Tax Inc.	Wealth
Share top 1%	0.12	0.15	0.22	0.35
Share top 5%	0.23	0.28	0.39	0.57
Share top 10%	0.33	0.39	0.51	0.72
Share bot 75%	0.47	0.40	0.27	0.08
Share bot 50%	0.26	0.14	0.06	0.00
Share bot 25%	0.06	0.05	0.01	0.00

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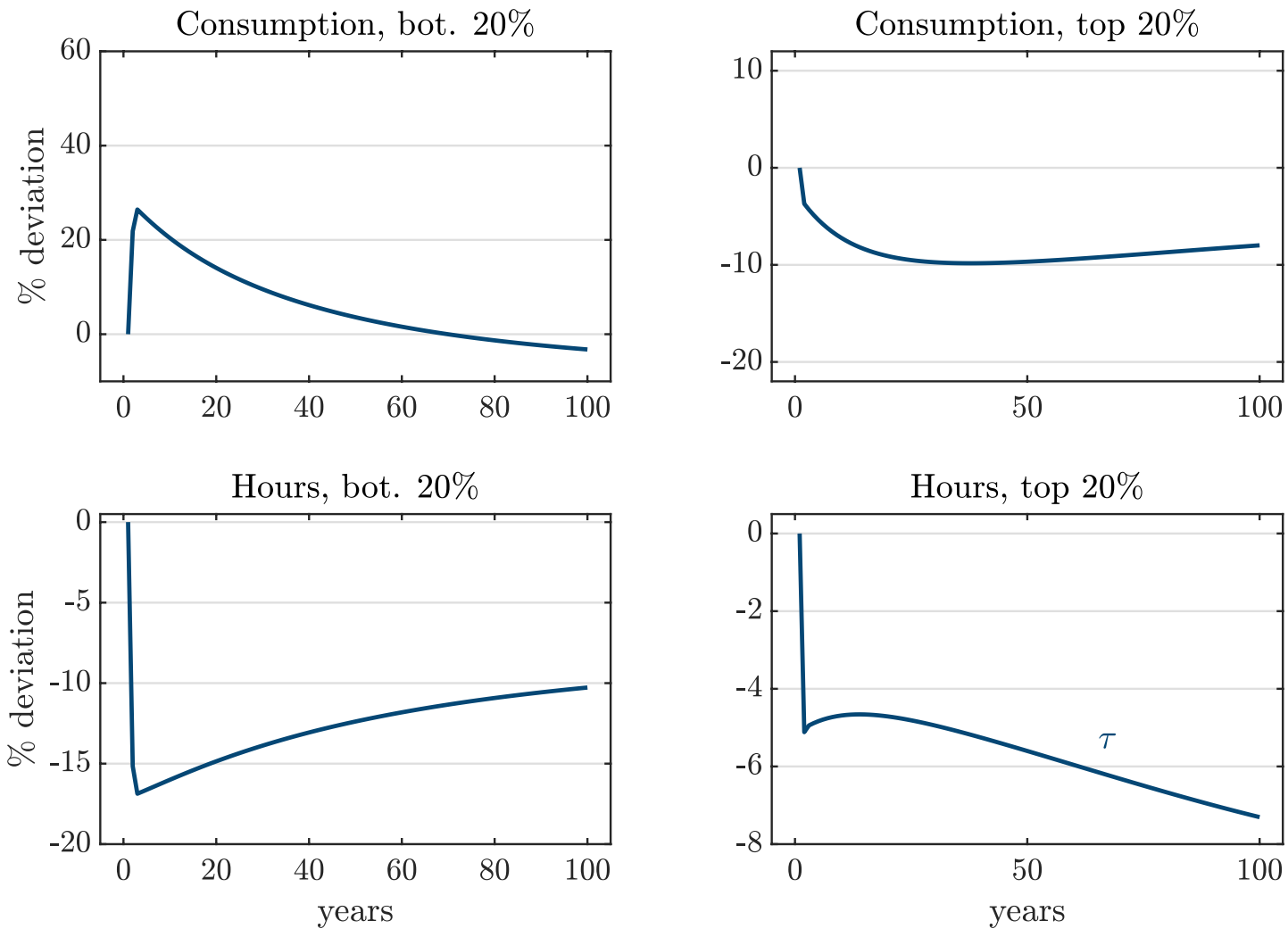
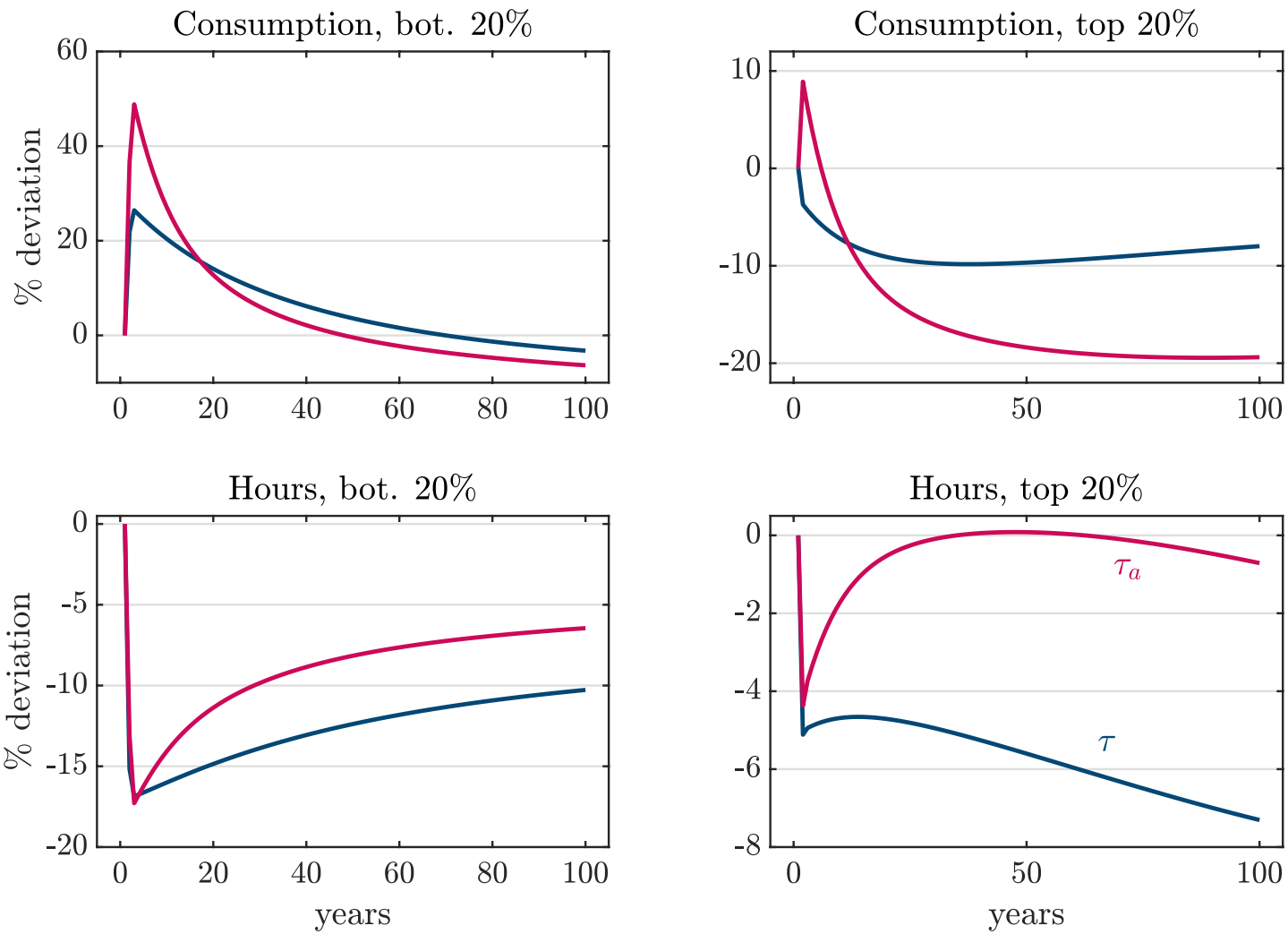
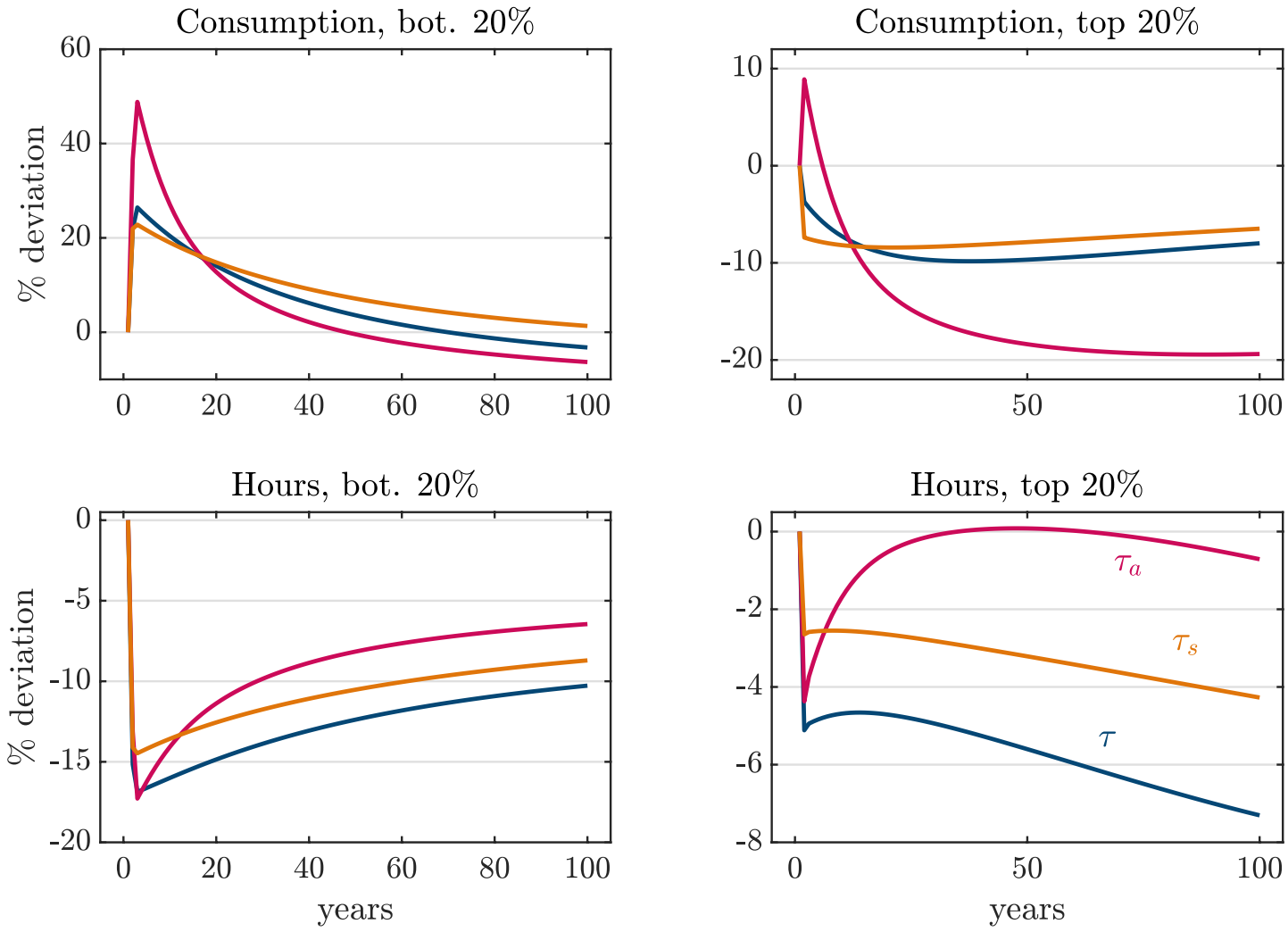
Distributional Effects



Distributional Effects



Distributional Effects



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Importance of Entrepreneurs

- Much of wealth, income concentrated with entrepreneurs

	Wealth distribution		Income distribution	
	Fraction entrepreneurs	Wealth share entrepreneurs	Fraction entrepreneurs	Income share entrepreneurs
All	0.12	0.46	0.12	0.31
Top 1%	0.70	0.70	0.62	0.65
Top 5%	0.50	0.61	0.45	0.56

2013 SCF. Entrepreneur: pass-through business owner.

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Problem of Entrepreneurs

- Fraction ϕ can run a private business, earn profits π_t
- Income $r_{t-1}a_t + W_t e_t h_t + \pi_t$ subject to taxes
- Technology $y_t = z_t^{1-\eta}\left(k_t^{\alpha} l_t^{1-\alpha}\right)^{\eta}$, z_t follows AR(1)
- Unlike corporate firms, subject to collateral constraint $k_t \leq \lambda a_t$
- Income, wealth taxes depress incentive to overcome collateral constraint
- Savings choice (μ_{it} multiplier on collateral constraint)

$$c_{it}^{-\theta} = \beta \mathbb{E}_t c_{it+1}^{-\theta} \left[1 - \tilde{\tau}_{at+1} + \left(1 - \tilde{\tau}_{it+1}\right)\left(r_t + \lambda \mu_{it+1}\right)\right]$$

Calibration

			Data	Model
		wealth to income	6.6	6.6
		fraction entrepreneurs	0.12	0.12
		wealth share entrepr.	0.46	0.44
β	0.969	income share entrepr.	0.31	0.28
ϕ	0.117			
ρ_z	0.961	Gini wealth, all	0.85	0.87
σ_z	0.696	Gini wealth, entrepr.	0.78	0.78
ρ_e	0.981	Gini wealth, workers	0.81	0.87
σ_e	0.198	wealth share top 0.1%	0.22	0.17
λ	2.303	wealth share top 1%	0.35	0.37
η	0.784			
p	0.0001	Gini income, all	0.64	0.66
q	0.985	Gini income, entrepr.	0.68	0.68
$\bar{e}$	18.36	Gini income, workers	0.58	0.62
		income share top 0.1%	0.14	0.12
		income share top 1%	0.22	0.22
		average debt to capital	0.35	0.35
		sales share entrepreneurs	0.37	0.37

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