The Evolution of the Welfare State

Diego Huerta

October 18, 2023

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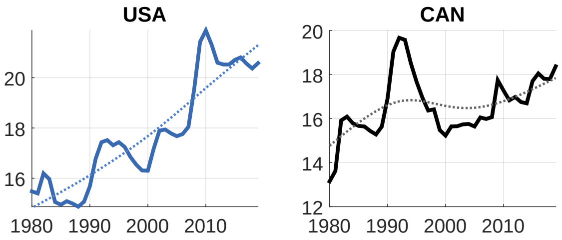

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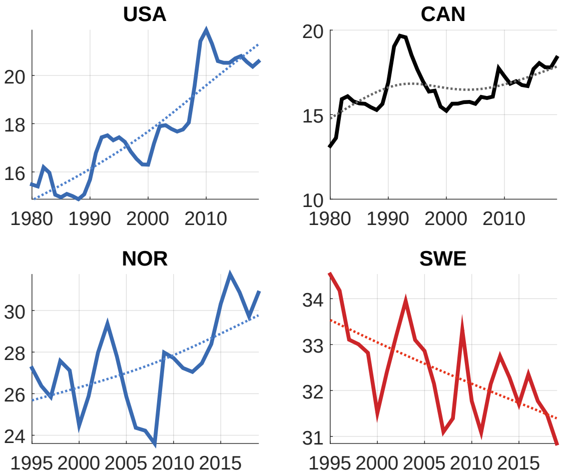

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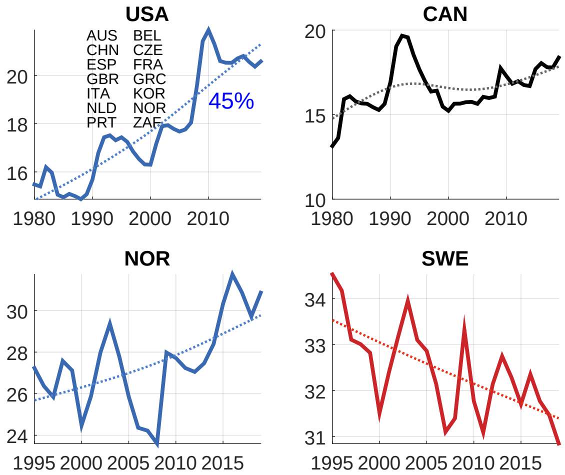

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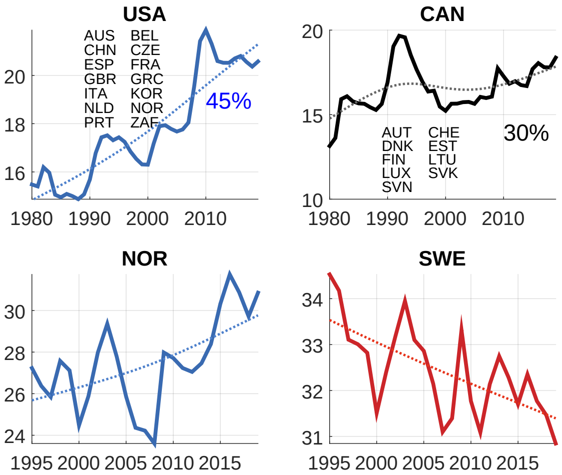

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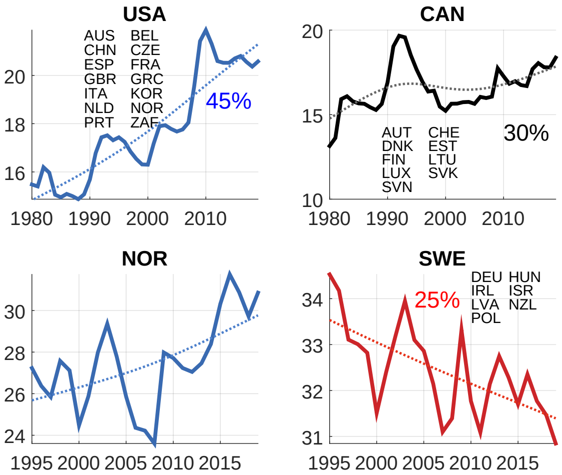

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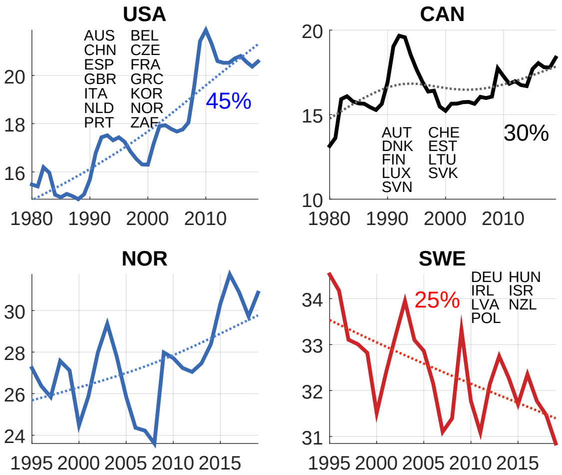

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Net soc. ben.

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- Single force PREDICTS trends of social benefits in 18 out 24 countries

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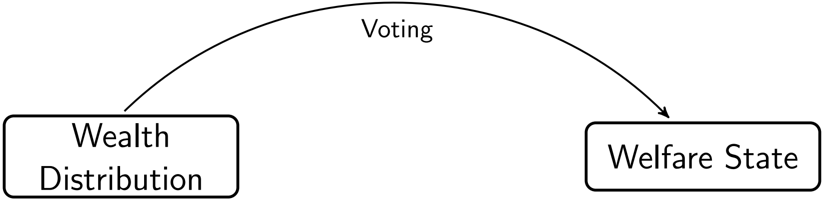

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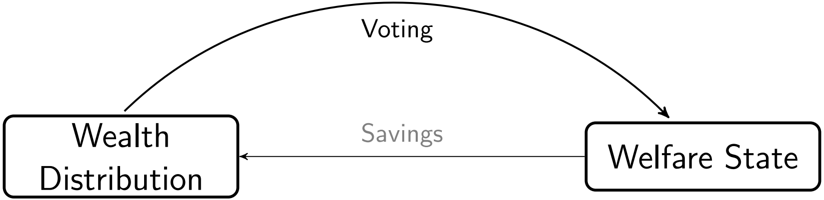

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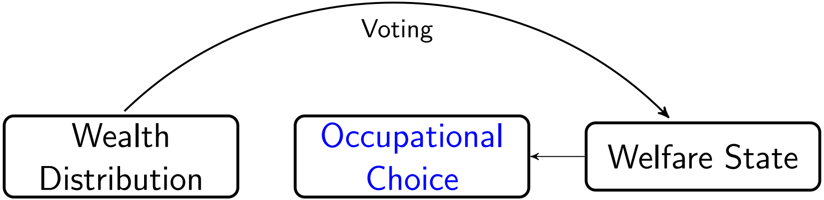

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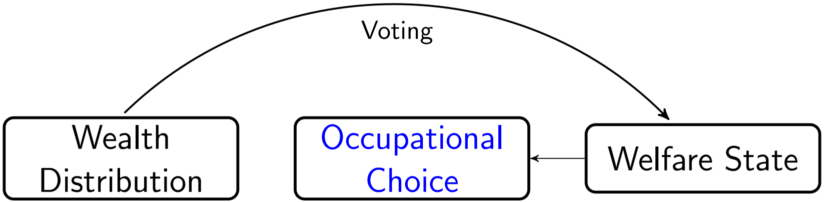

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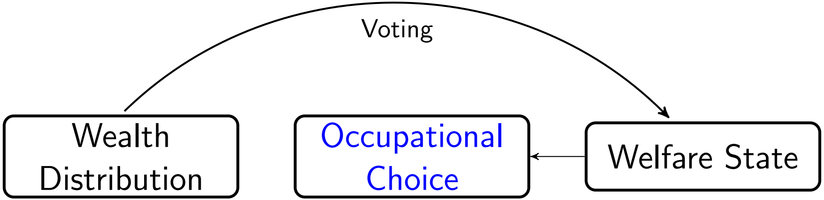

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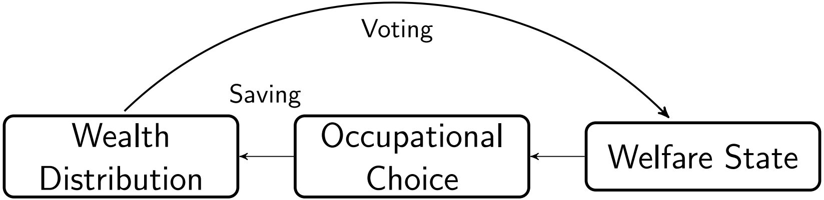

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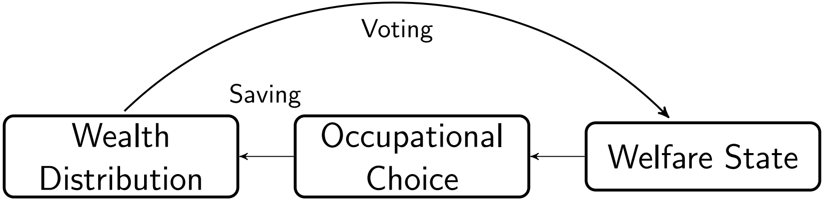

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2. Quantitative test for 24 countries from all continents (1995-2019)

Main Theoretical Result

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Intuition? Evolution of aspirational voting

Quantitative Result

- Theory PREDICTS trends of social benefits in $\frac{3}{4}$ of the countries (18 out 24) *(75% prediction rate)*

    1. Calibration based on empirical wealth distribution in 1995

    2. Simulation of next 25 years given the 1995's distribution

Literature

Macro:

- Politics in the neoclassical growth model (numerical analysis).
  Krusell et al. (1996); Krusell and Rios-Rull (1996, 1999)
- Optimal policy intervention with heterogeneous agents.
  Nuño and Moll (2018); Itskhoki and Moll (2019); Acharya et al. (2020)

Political Economy:

- Endogenous policy choice (Meltzer and Richard, 1981)
  Alesina and Rodrik (1994); Alesina and Angeletos (2005); Hassler et al. (2003)

Plan

Motivation

1. The Model

2. Political Process

3. Equilibrium
   Transition Dynamics

4. Quantitative Exercise

The Model

The Model

- Continuum of agents heterogeneous in wealth $a_t \sim \Gamma_t(a)$

$$\max_{\{c_t\}_{t=0}^{+\infty}} \left\{ \int_0^\infty e^{-\rho t} \log(c_t) dt \right\}$$

$$s.t. \qquad \dot{a}_t = (r - \tau_t) a_t - c_t + \begin{cases} w_t \ell + \boldsymbol{T_t} & \text{if worker} \\ \Pi_t & \text{if entrepreneur} \end{cases}$$

$$a_t \geq \underline{a}$$

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Gov. Trade-off: Evidence

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   Individual profits: $\Pi_t = p_t R - rI$

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- Economic Decisions (consumption-saving)

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  Alternative: fully-rational equilibrium (numerical)
  Krusell and Rios-Rull (1996, 1999); Quadrini and Rios-Rull (2023)

Occupational Choice

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- Occupational constraint: $\Pi_t \geq w_t \ell + T_t$

Occupational Choice

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- Credit constraints à la Holmstrom and Tirole (1997):

$$\Pi_t + ra \geq (I - a) + w_t \ell + T_t$$

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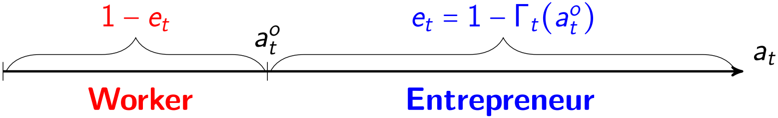

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- **Occupational choice:** $\boxed{\boldsymbol{a_t^o(b_t, \Gamma_t) = \max\{\hat{a}_t, \tilde{a}_t\} \quad (OC)}}$
- **Result** $a_t^o(b, \Gamma_t)$ increasing in b and $b \leq \overline{b}$

Crucial Trade-off: $\uparrow$ Social benefits $\Rightarrow \downarrow$ Entrepreneurs

Audretsch et al. (2022); Solomon et al. (2022, 2021); Henrekson (2005)

Plan

Motivation

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2. Political Process

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Political Process: Roadmap

1. Individual Preferences
2. Probabilistic Voting (Persson and Tabellini, 2000)
3. Equilibrium Policy

Individual Preferences

Individual preferred policy: $b(a; \Gamma_t)$

- Agents observe a and Γ_t, and maximize disposable income at t:

$$b(a; \Gamma_t) = argmax_{b \in [\underline{b}, \overline{b}]} \; y_t(a, b; \Gamma_t) = \begin{cases} y_t^W & \text{if } a < a^o(b, \Gamma_t) \\ y_t^E & \text{if } a \geq a^o(b, \Gamma_t) \end{cases}$$

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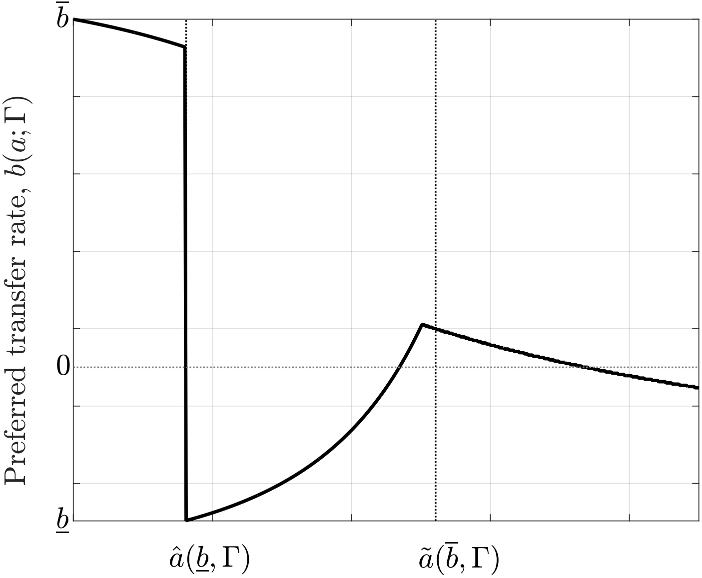
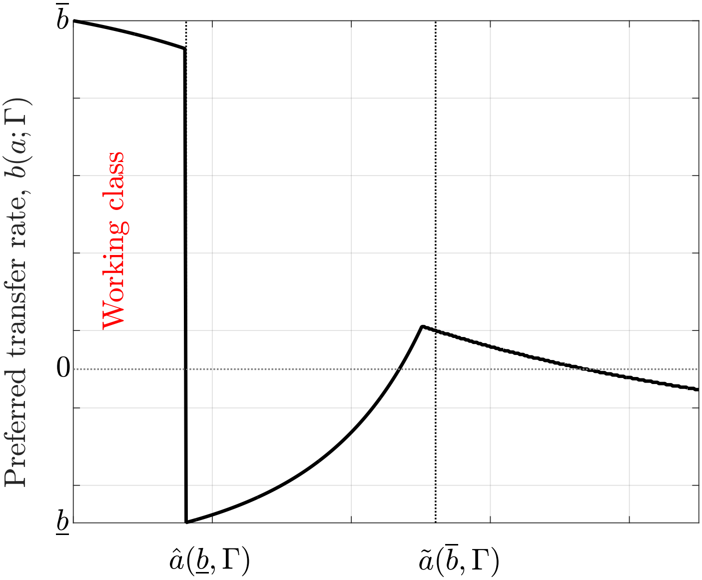
Middle-class may support pro-business policies



$\overline{b}$
0
$\underline{b}$
Preferred transfer rate, $b(a;\Gamma)$
$\hat{a}(\underline{b},\Gamma)$
$\tilde{a}(\overline{b},\Gamma)$



$\overline{b}$
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Preferred transfer rate, $b(a;\Gamma)$
Working class
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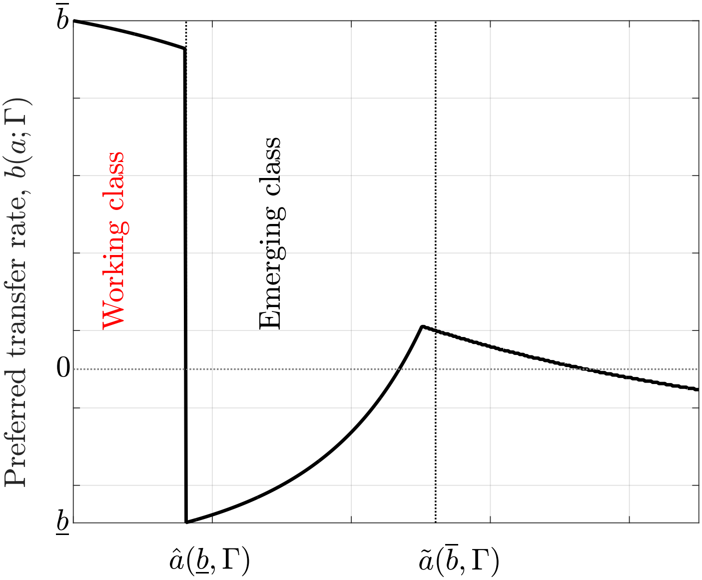
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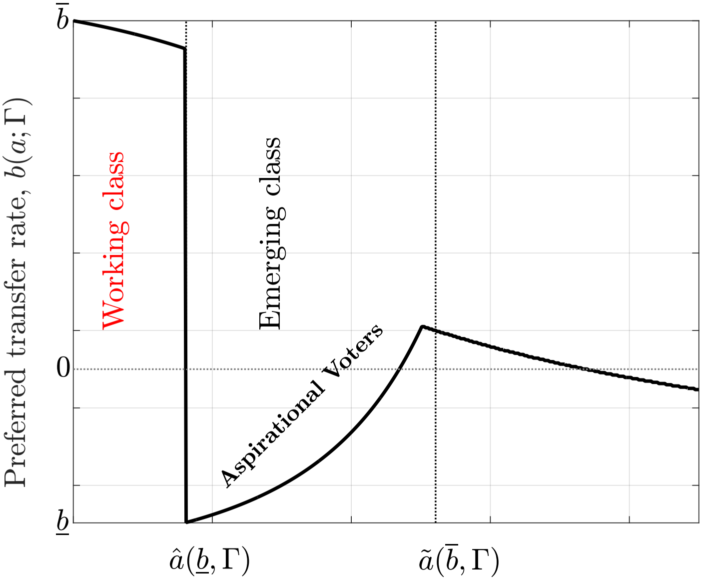

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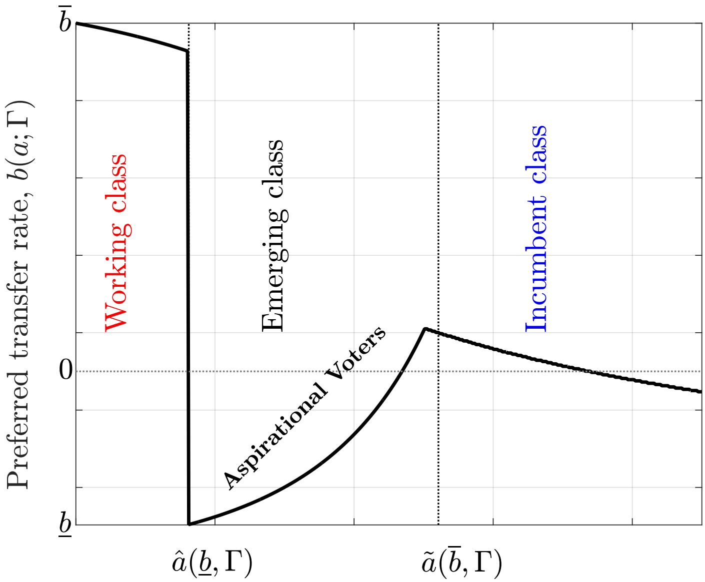

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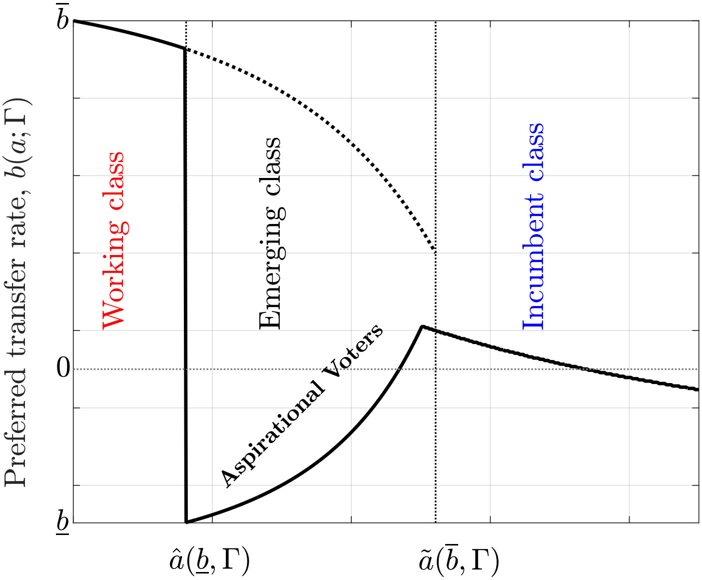

Income function

Probabilistic Voting

Electoral competition under uncertainty

- Two parties choose b_t^1 and b_t^2 to maximize expected share of votes

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- Voters indexed by (a, p)

  p: idiosyncratic political preference (Uniform, (ϕ^W, ϕ^E))
- Symmetric Nash equilibrium:

$$b_t = argmax_b \left\{ \int_{a<a_t^o(b)} y(a,b) d\Gamma_t(a) + \underbrace{\frac{\phi^E}{\phi^W}}_{\equiv \phi} \int_{a \geq a_t^o(b)} y(a,b) d\Gamma_t(a) \right\}$$

Equilibrium Policy

Equilibrium Social Benefits

- Maximize weighted income ($\phi \geq 1$ Political weight):

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- Equilibrium policy b_t:

$$\boxed{\mathbf{1 - \Gamma_t(a^o(b_t, \Gamma_t)) = e^* \quad (PE)}}$$

  - $e^* = \Psi(Z, r, \alpha, R, I, \ell, \phi) \in (0, \alpha)$

Forward looking gov. PE: 2-D diagram

Political Process: Takeaway

The Inequality → Policy link: $\boxed{\mathbf{1 - \Gamma_t(a^o(b_t, \Gamma_t)) = e^* \quad (PE)}}$

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The Inequality → Policy link: $\boxed{\mathbf{1 - \Gamma_t(a^o(b_t, \Gamma_t)) > e^* \quad (PE)}}$

- Suppose everyone gets wealthier (Γ_t shifts right)

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  Government: $\uparrow b_t \Rightarrow \uparrow a_t^o \Rightarrow \downarrow e_t$

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- (PE) captures aspirational voting in a neat way

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$$s_t(a) = \theta_t \cdot y_t(a) \qquad (HJB)$$

$$d_t\Gamma_t(a) = H(\Gamma_t, s_t, a_t^o) \qquad (KFE)$$

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$$a_t^o = \max\{\hat{a}_t, \tilde{a}_t\} \qquad (OC)$$

$$e^* = 1 - \Gamma_t(a_t^o) \qquad (PE)$$

$$\tau_t \cdot A_t = T_t \cdot (1 - e^*) \qquad (BB)$$

Stationary Equilibrium

Stationary Equilibrium

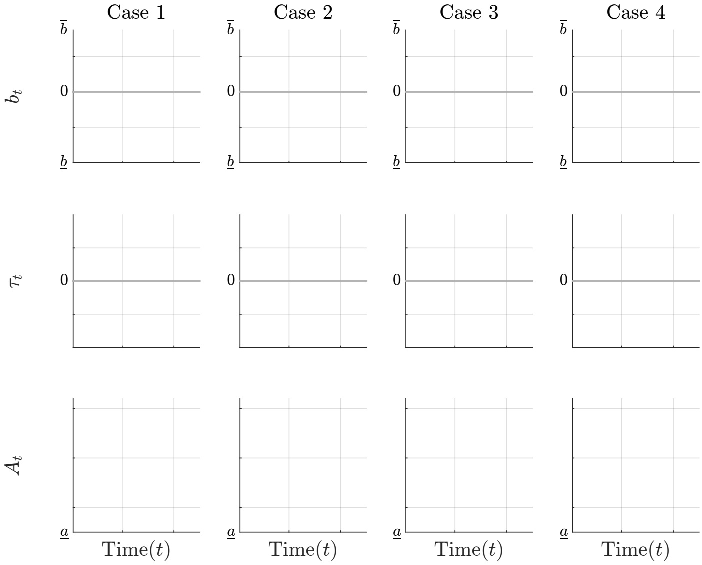
1. Unique stationary tax rate: $\boldsymbol{\tau^* = r - \rho}$ $(\theta(\tau^*) = 0)$

2. Set of stationary distributions: $\boldsymbol{\Gamma^*}$

SS details

Transition dynamics

Cases are function of $r - \rho$ and Γ_0



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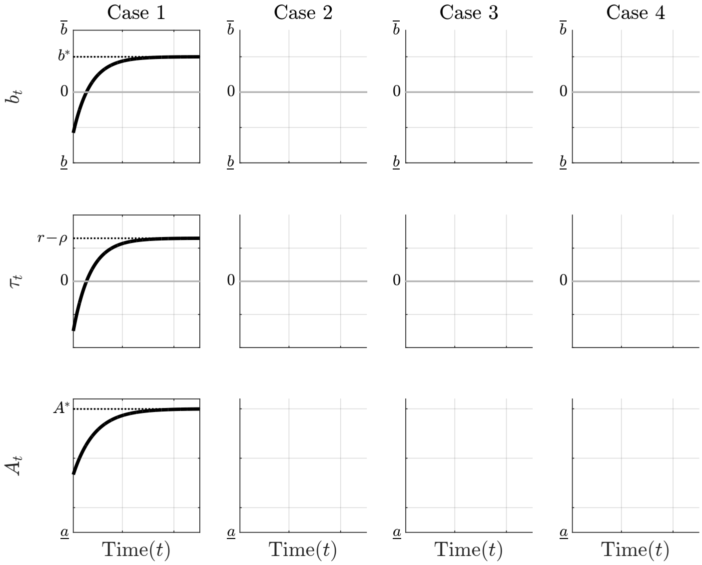

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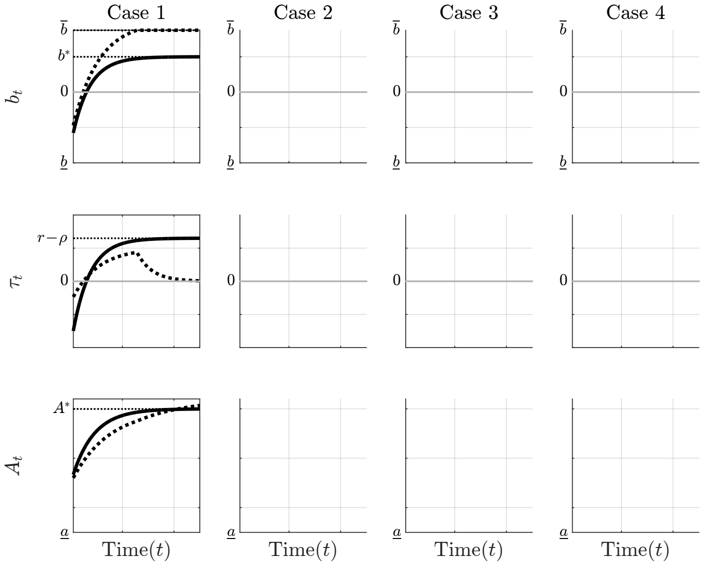

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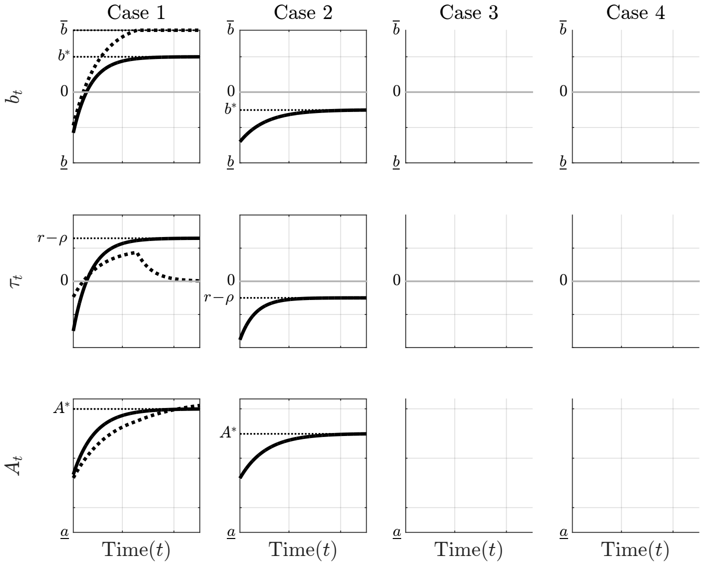

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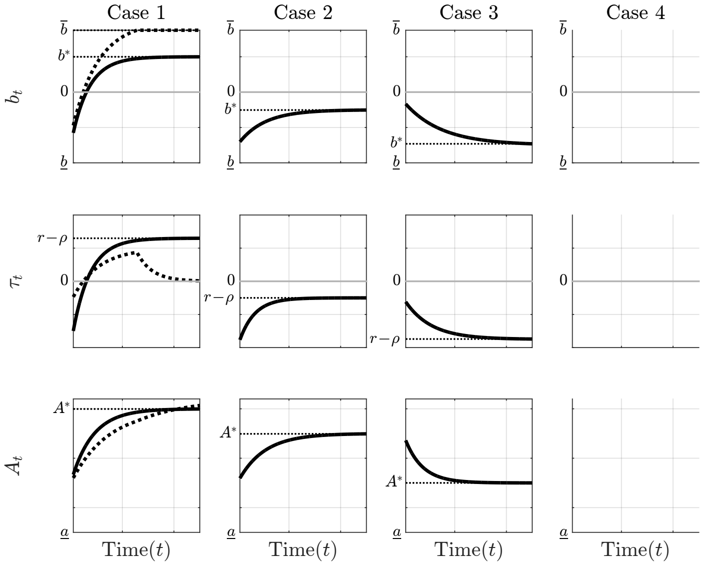

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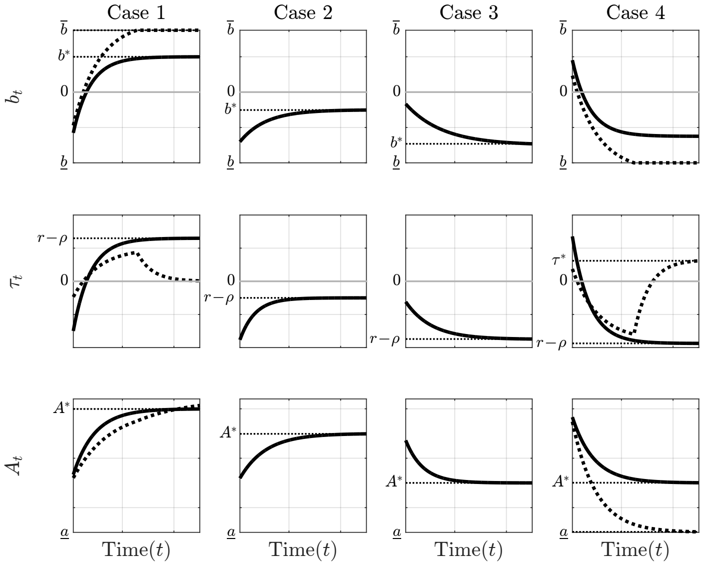

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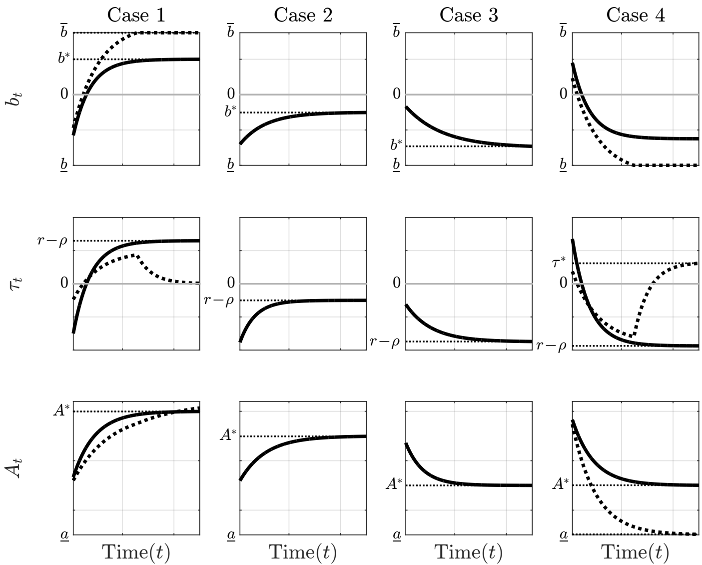

Details

Transition dynamics: Takeaways so far...

Main result

1. If $\tau(\Gamma_0) < r - \rho \Rightarrow b$ increasing over time

2. If $\tau(\Gamma_0) > r - \rho \Rightarrow b$ decreasing over time

Question Which properties of Γ_0 give rise to each case?

Question Which properties of Γ_0 imply that $\uparrow b$ or $\downarrow b$?

- Problem Characterizing distributions is analytically cumbersome

Question Which properties of Γ_0 imply that $\uparrow b$ or $\downarrow b$?

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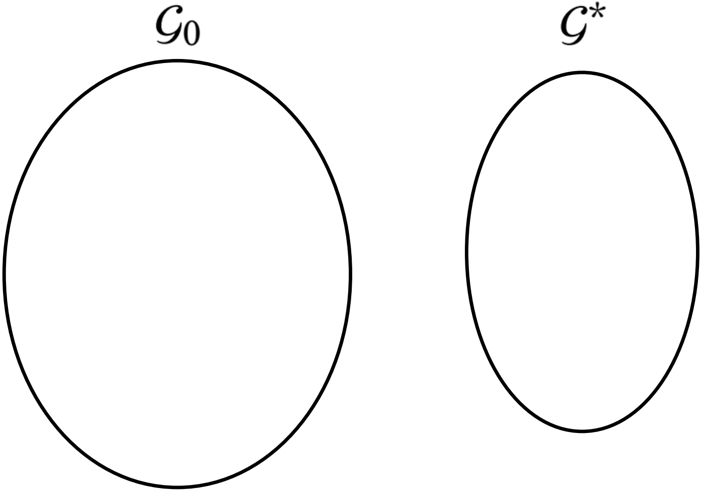
- **Solution** Construct Γ_0 perturbing stationary distributions Γ^*

Question Which properties of Γ_0 imply that $\uparrow b$ or $\downarrow b$?

- Problem Characterizing distributions is analytically cumbersome
- **Solution** Construct Γ_0 perturbing stationary distributions Γ^*

  Apply an MPS on Γ^* to obtain Γ_0 (MIT shock)
  MPS around the mean (Rothschild and Stiglitz, 1971)

The MPS approach



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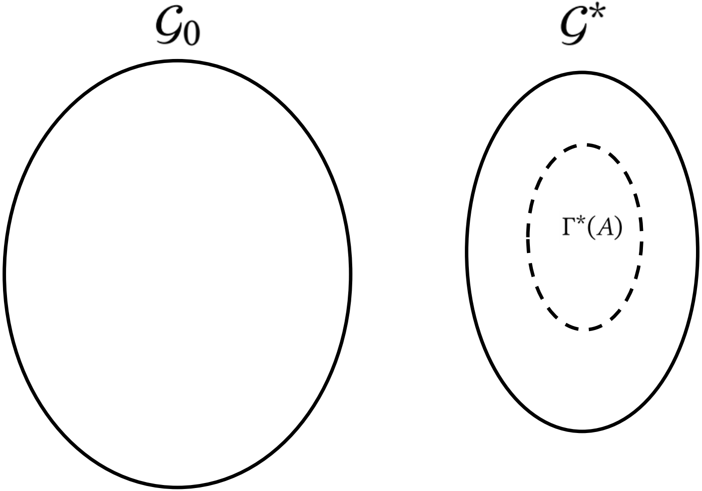

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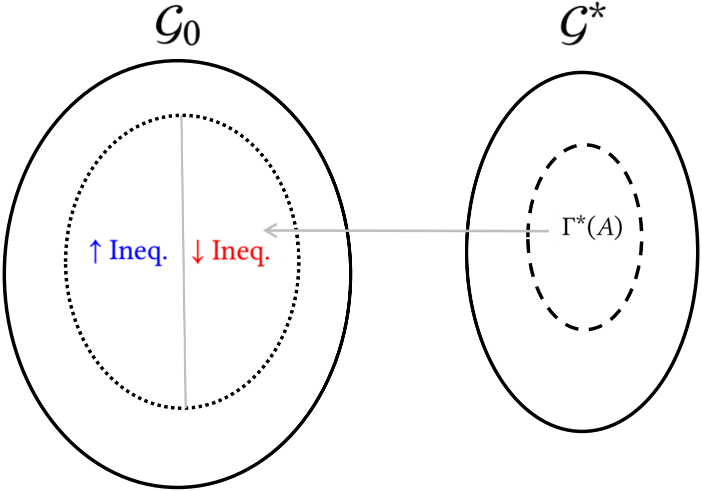

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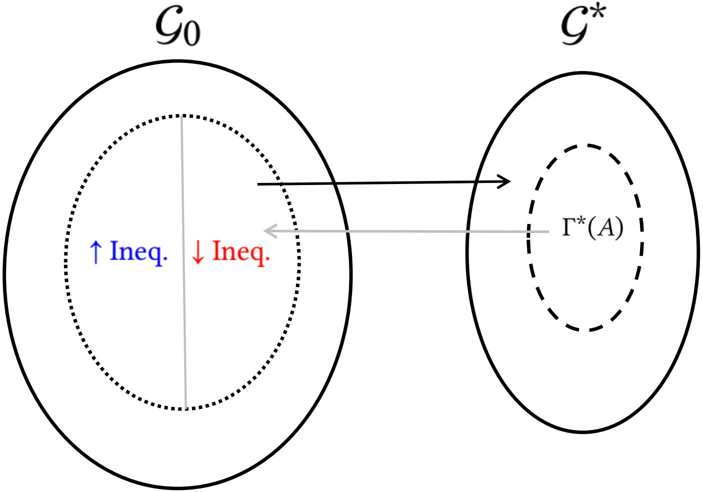

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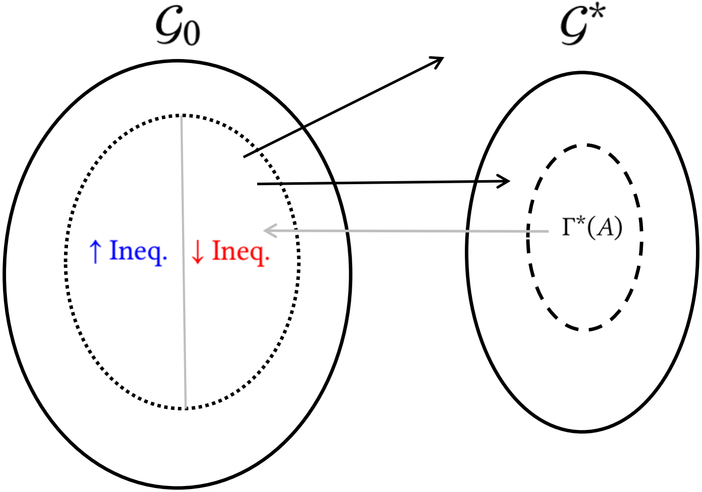

The Evolution of the Welfare State: Developed Countries

High inequality: USA (1970-2019)

Increasing social benefits
($\searrow$ Aspirational voting)

Low inequality: Sweden (1995-2019)

Decreasing social benefits
($\nearrow$ Aspirational voting)

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- $t = 1$ Large Ambitious Emerging Class: Low b
- $t = 2$ Conformist Emerging Class
  $+$
  Working Class

  High b

MPS graph

The Evolution of the Welfare State: Takeaways

Developed countries

- Initially unequal $\Rightarrow b$ increasing
- Initially equal $\Rightarrow b$ decreasing

The Evolution of the Welfare State: Takeaways

Developed countries

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Developing countries

- Effects reversed

The Evolution of the Welfare State: Takeaways

Developed countries

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Developing countries

- Effects reversed

Question Can the model predict the evolution of the Welfare State?

Quantitative Exercise

Quantitative Exercise (1995-2019)

Inputs

1. Starting wealth distribution: Γ_{1995}
   World Inequality Database (WID)

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Quantitative Exercise (1995-2019)

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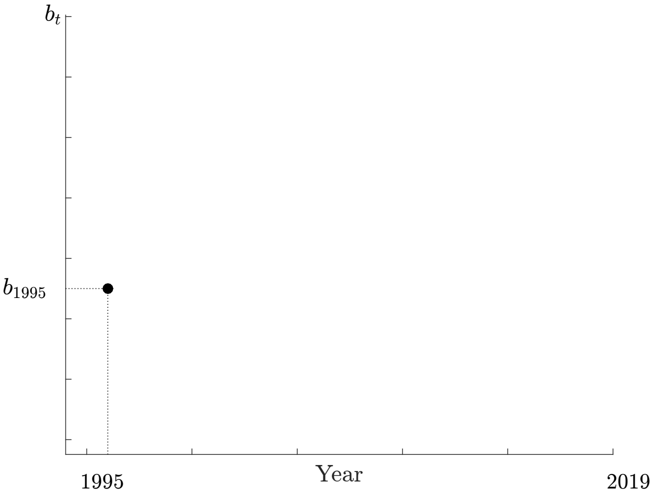
2. Production function and productivity: $\alpha, \{Z_t\}_{t=1995}^{2019}$
   2.1 Solow Residual (24 countries)
       Penn World Table

   2.2 Olley and Pakes (1996): control for selection/simultaneity (17 countries)
       COMPUSTAT North America and COMPUSTAT Global

Quantitative Exercise (1995-2019)



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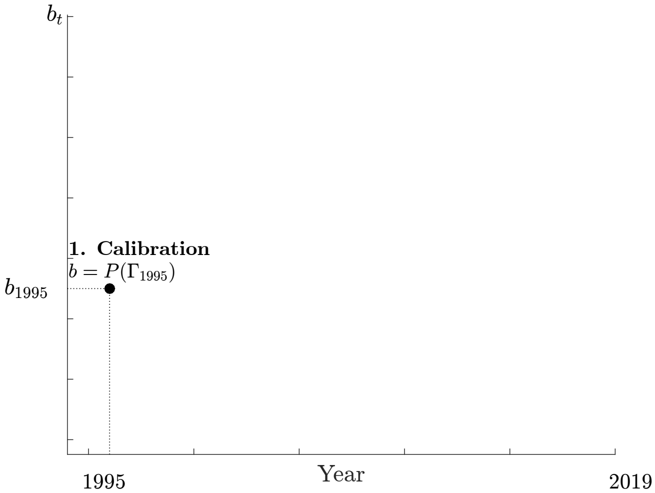
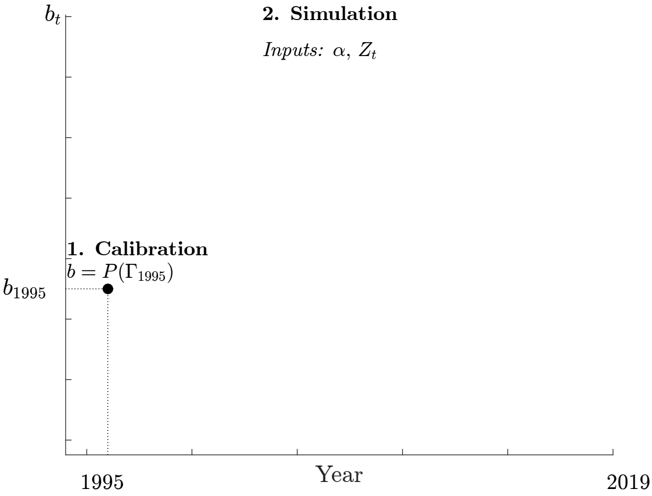


Calibration method

Quantitative Exercise (1995-2019)



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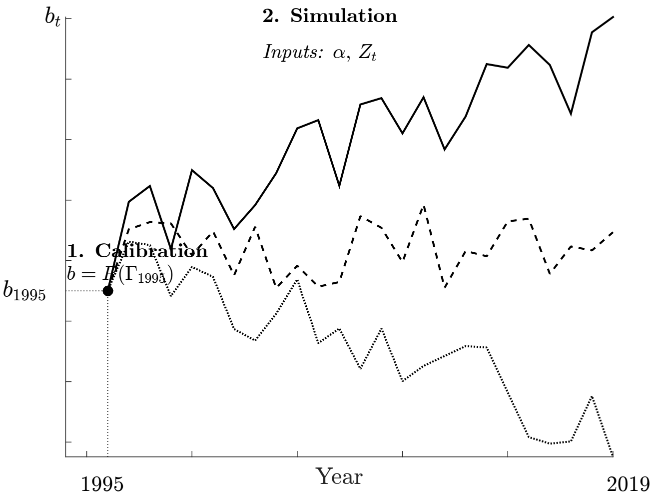

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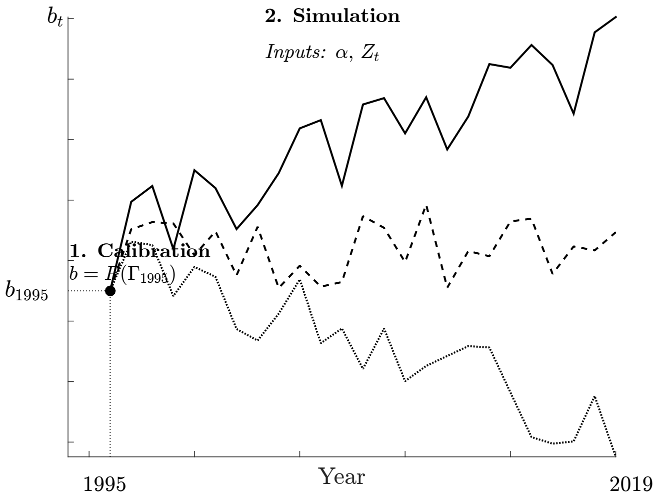
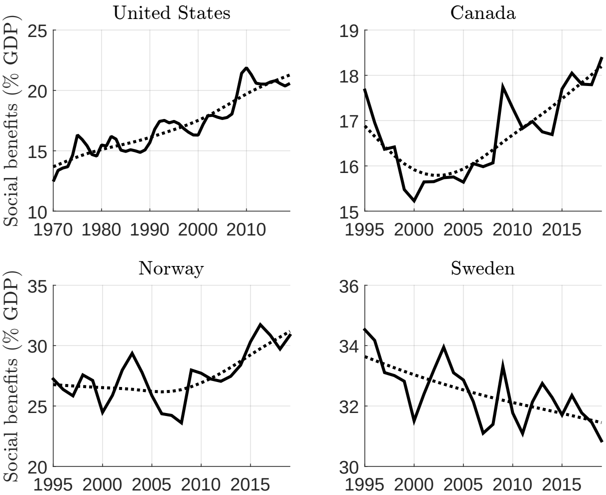


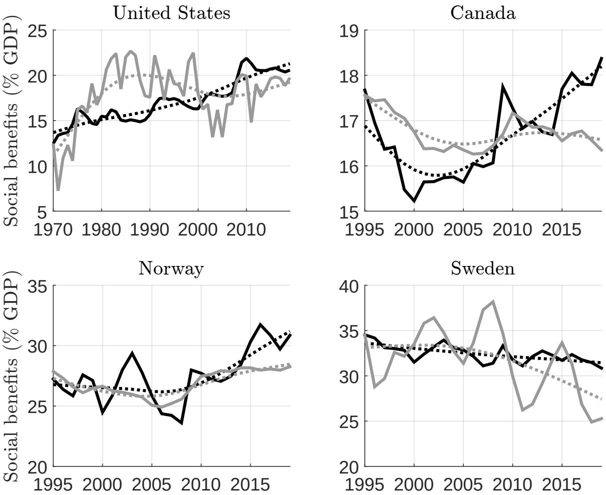
Result: the model predicts the trend of **18 out of 24** countries

Data versus Model



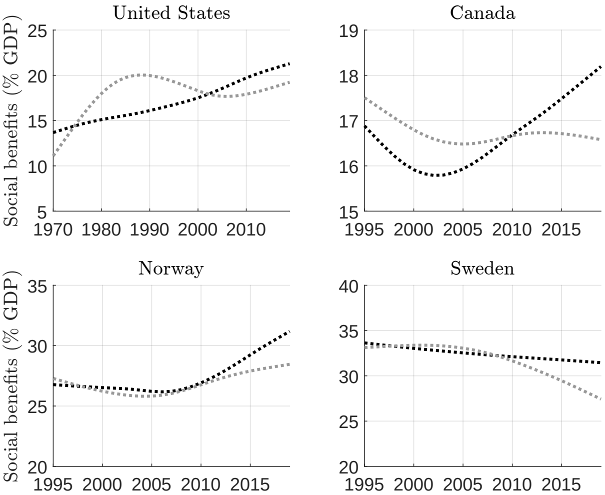
Black: Data

Data versus Model



Black: Data Gray: Model

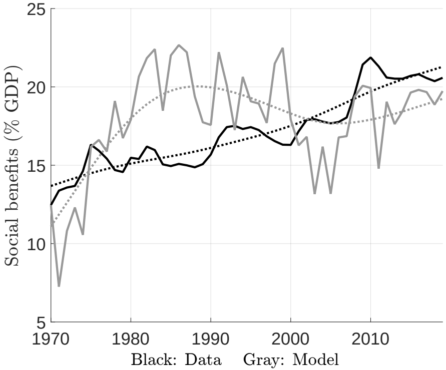
Data versus Model

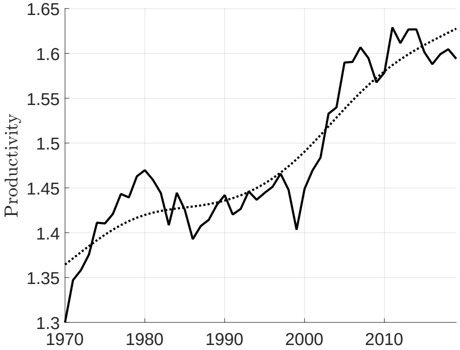


Black: Data Gray: Model

The American Experience

United States: Social benefits and Productivity





Effects of a permanent increase of productivity

1. Direct effect (1st round)

Details here

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   - $\uparrow Z \Rightarrow \uparrow e^* \Rightarrow e_t < e^* \Rightarrow \downarrow \boldsymbol{b}$

Details here

Effects of a permanent increase of productivity

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     (Aspirational voting strengthens)

Details here

Effects of a permanent increase of productivity

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2. Distributional effect (2nd round)

Details here

Effects of a permanent increase of productivity

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   - Γ shifts right $\Rightarrow e_{t+\Delta} > e^* \Rightarrow \uparrow \boldsymbol{b}$

Details here

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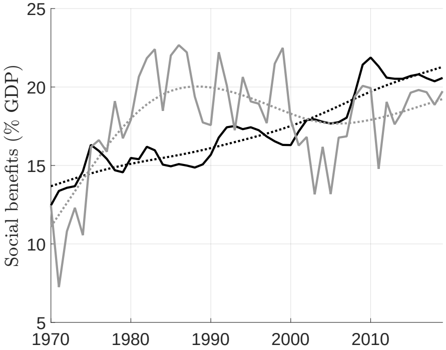
     (Aspirational voting weakens)

Details here

USA: distributional effect of $\nearrow Z$ dominates



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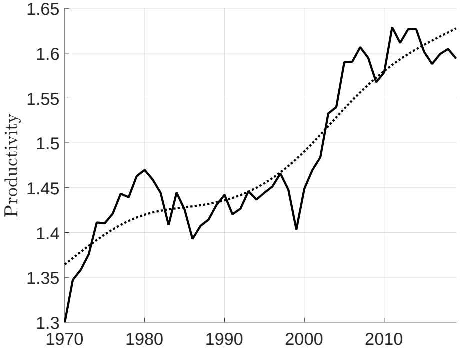

Quantitative Exercise: Takeaways

Main result

- The model predicts the trend of social benefits in 18 out of 24 countries (75% prediction rate)

Main message

- The Wealth Distribution $\Rightarrow$ Evolution of the Welfare State

Extensions

1. Labor and capital tax $\surd$

Extensions

1. Labor and capital tax $\surd$
2. Transfers to entrepreneurs and workers $\surd$

Extensions

1. Labor and capital tax $\surd$
2. Transfers to entrepreneurs and workers $\surd$
3. Alternative IC constraints $\surd$

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1. Labor and capital tax $\surd$
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4. Counterfactual Analysis (Canada, USA, Sweden) $\surd$

Extensions

1. Labor and capital tax $\surd$
2. Transfers to entrepreneurs and workers $\surd$
3. Alternative IC constraints $\surd$
4. Counterfactual Analysis (Canada, USA, Sweden) $\surd$
    - Limited role of government changes in the trend of the Welfare State

Future Work

1. Role of inequality-policy link for growth

2. How do governments choose policies?
   Politics versus Economics

Thanks!!!

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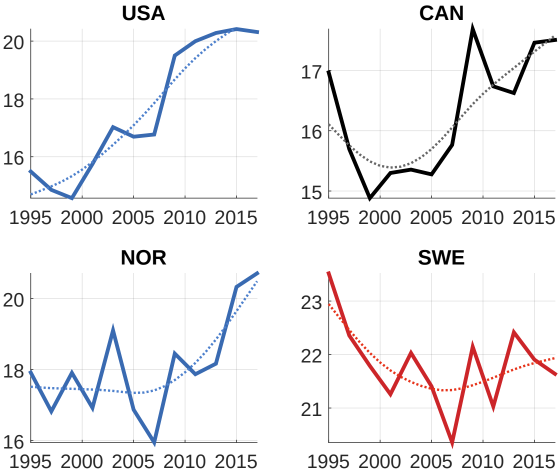
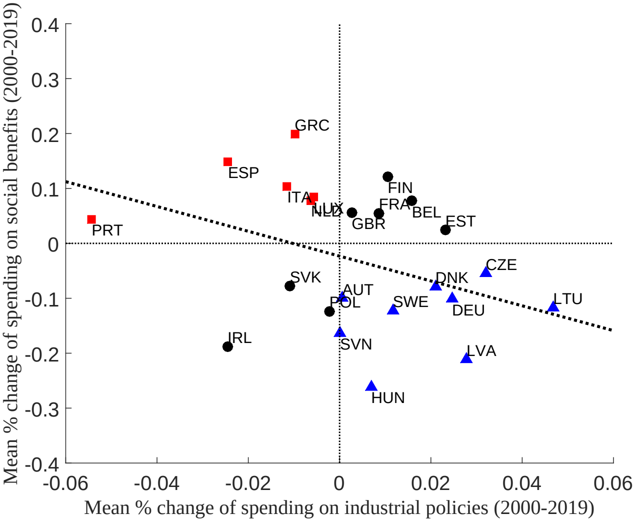
Supplementary Material

The Evolution of Net Social Benefits

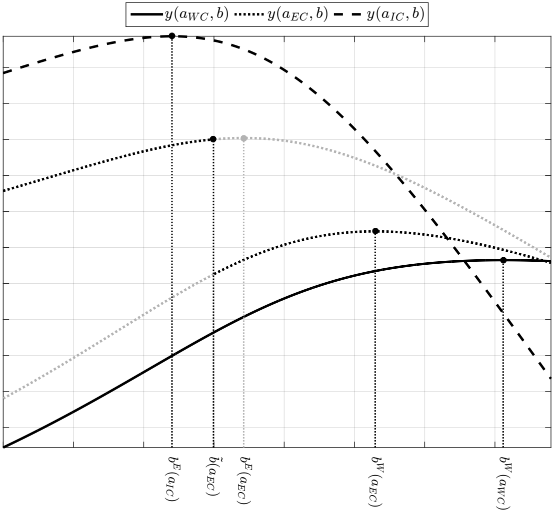


Main

Social Benefits versus Business Policies



Main



Main

Forward-looking government

- The government solves:

$$max_b\{\int v_t(a,b)d\Gamma_t(a)\}$$

- The PE condition is:

$$\int_{a<a^o(b,\Gamma_t)}\frac{(d_b w_t\ell + d_b T_t)}{y_t(a)}d\Gamma_t(a) + \int_{a\geq a^o(b,\Gamma_t)}\frac{d_b p_t}{y_t(a)}d\Gamma_t(a) = d_b\tau_t\int\frac{a}{y(a)}d\Gamma_t(a) + e^{\rho t}\left(\int_t^{+\infty} d_b\tau_s\frac{1}{r-\tau_s}e^{-\rho s}ds\right) + \frac{1}{\rho}$$

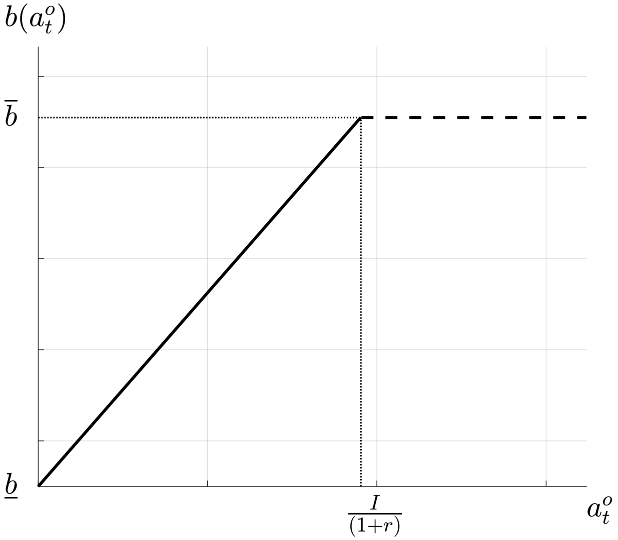
- **Observation** The evolution of b depends on the the density function

Main

The inequality → policy link: $\boxed{1 - \Gamma_t(a^o(b_t, \Gamma_t)) = e^*}$

The inequality $\rightarrow$ policy link: $\boxed{a_t^o = \Gamma_t^{-1}(1 - e^*)}$

The **inequality** → **policy** link: $\boxed{a_t^o = \Gamma_t^{-1}(1 - e^*)}$



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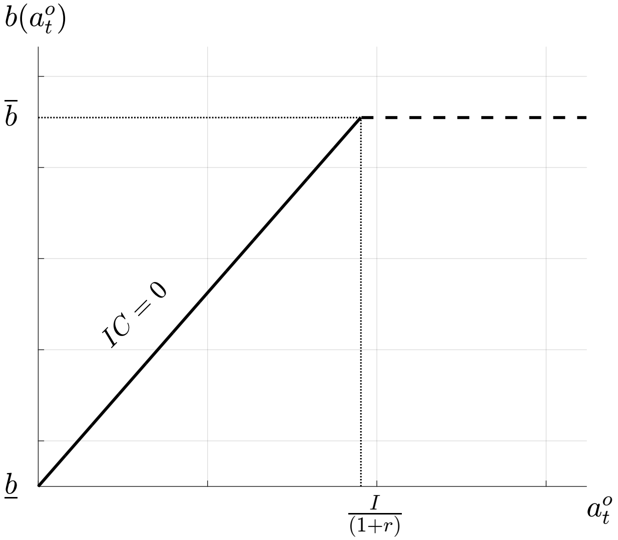

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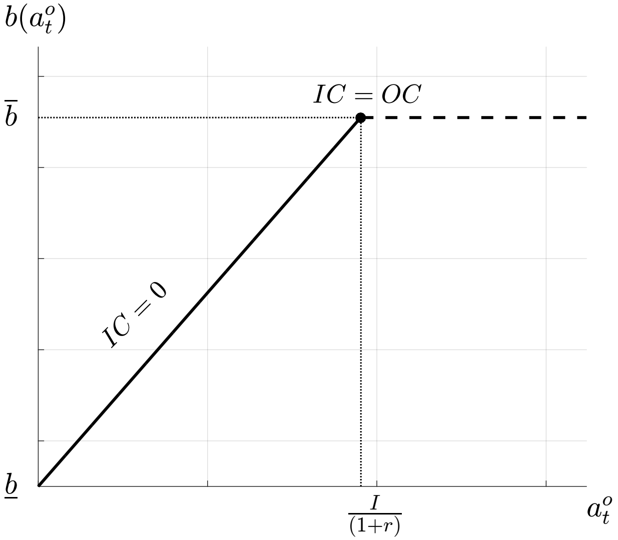

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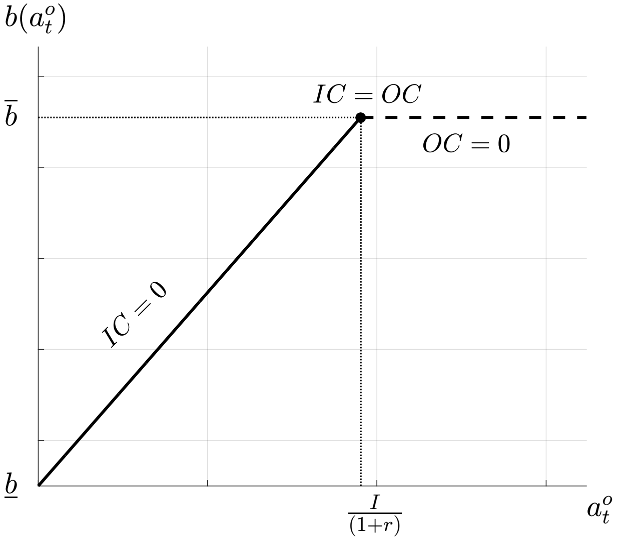

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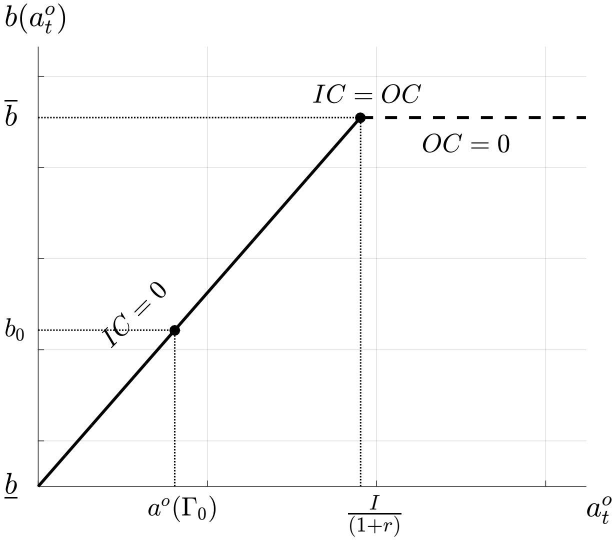

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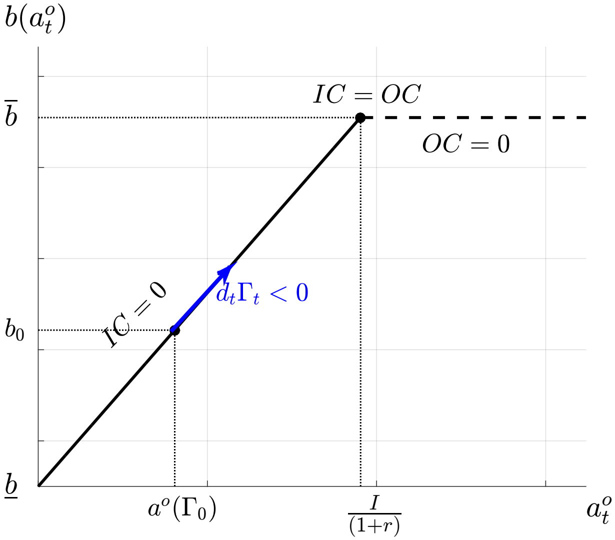

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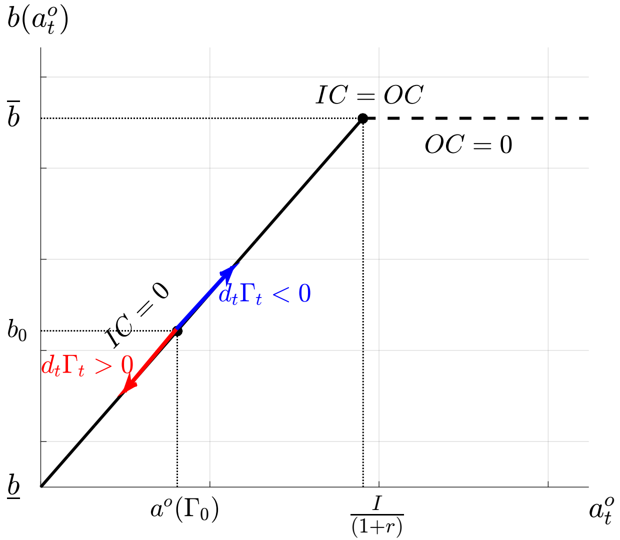


Stationary Equilibrium

Steady-state: $d_t \Gamma_t(a) = 0$

$$
\begin{aligned}
\tilde{H}(\Gamma^*, s = \theta^* \cdot y) &= 0 \qquad\qquad (HJB) + (KFE) \\
&\Rightarrow \theta^* = 0 \\
&\Rightarrow \boxed{\boldsymbol{\tau^* = r - \rho}}
\end{aligned}
$$

- **Result** *There is a unique stationary tax-rate:* τ^*

Stationary Equilibrium

Steady-state distribution (Γ^*)

$$r - \rho = \frac{b^* \Gamma^*(\hat{a}^*) \cdot y(\Gamma^*)}{A^*} \qquad (BB)$$

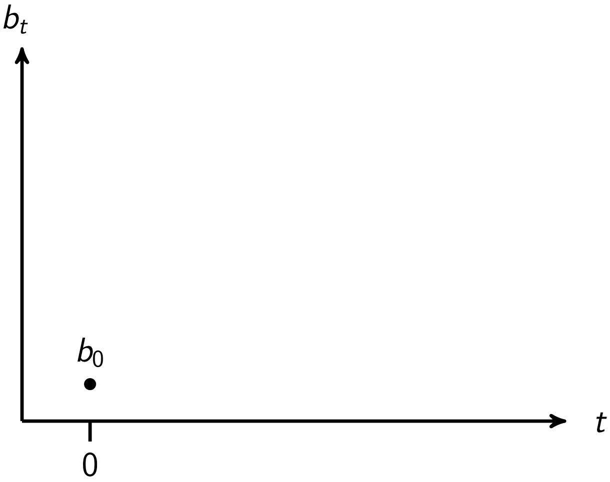
$$a^o * = \tilde{\psi}(\Gamma^*) \qquad (OC)$$

$$b^* = \tilde{\phi}(\Gamma^*) \qquad (PE)$$

- **Result** Γ^* *is non-unique:* there is a set (A^*, Γ^*) that solves the system.
  - Similar result in the neoclassical model + politics.
    Krusell and Rios-Rull (1996, 1999)

Main

Transfer rate dynamics: Γ_0 such that $\tau_0 < r - \rho$



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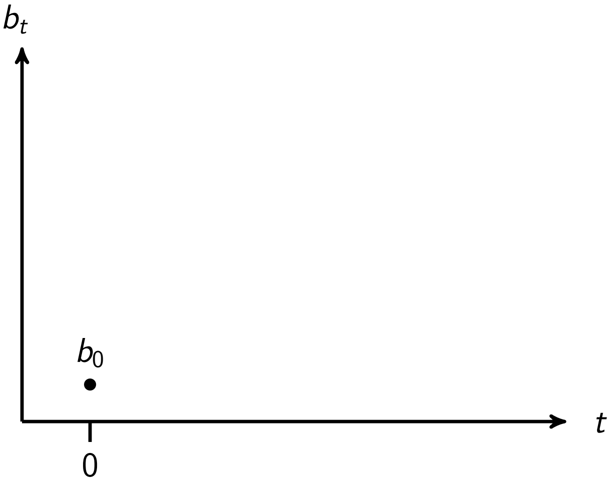
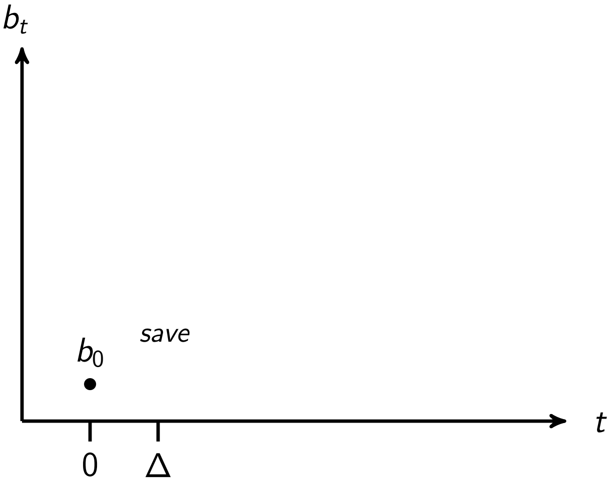


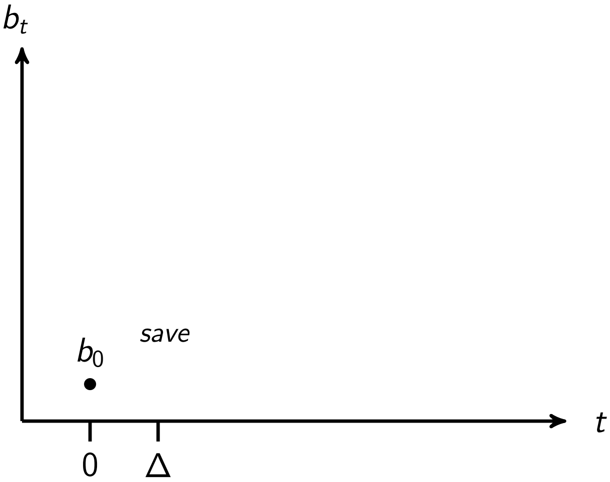
- $\tau_0 < \tau^* = r - \rho$
  - $\theta_0 > 0 \Rightarrow$ agents save

Transfer rate dynamics: Γ_0 such that $\tau_0 < r - \rho$



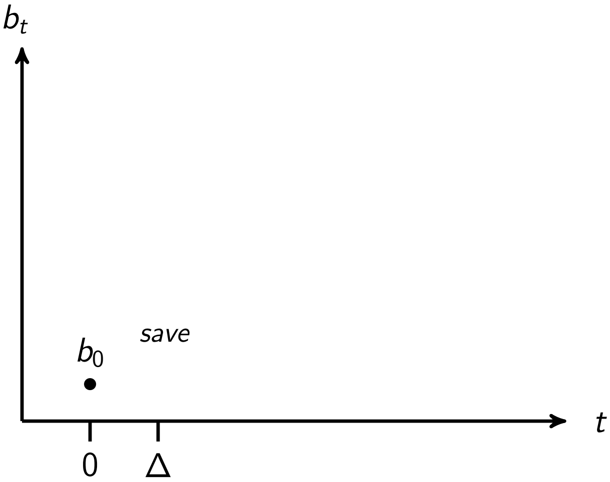
- $\tau_0 < \tau^* = r - \rho$
  - $\theta_0 > 0 \Rightarrow$ Γ_Δ FOSD Γ_0 (Γ shifts right)

Transfer rate dynamics: Γ_0 such that $\tau_0 < r - \rho$



1. More entrepreneurs: $1 - \Gamma_\Delta(a^o(b_0, \Gamma_0)) > e^*$

Transfer rate dynamics: Γ_0 such that $\tau_0 < r - \rho$



1. More entrepreneurs: $1 - \Gamma_\Delta(a^o(b_0, \Gamma_0)) > e^*$
2. More competition ($\downarrow \Pi$): $a^o(b_0, \Gamma_\Delta) > a^o(b_0, \Gamma_0)$

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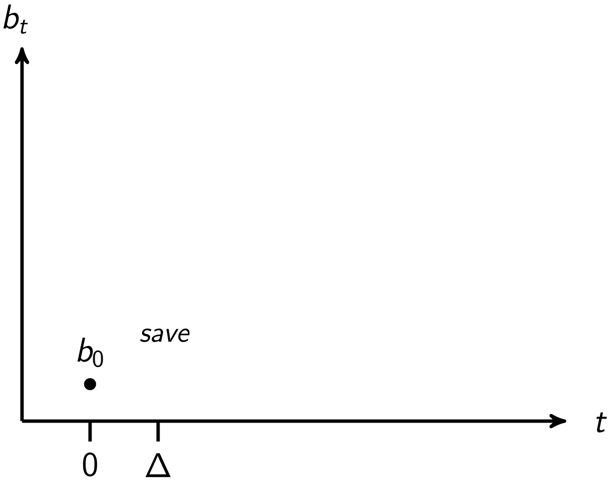

1. More entrepreneurs: $1 - \Gamma_\Delta(a^o(b_0, \boldsymbol{\Gamma_\Delta})) > e^*$ (net effect)
2. More competition ($\downarrow \Pi$): $a^o(b_0, \Gamma_\Delta) > a^o(b_0, \Gamma_0)$

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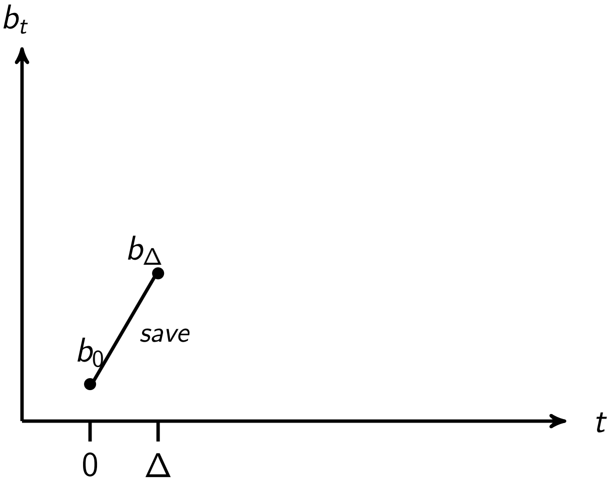
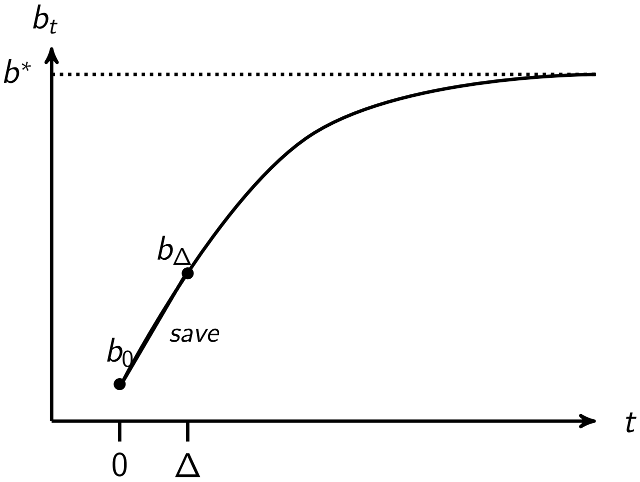


- Too many entrepreneurs: $1 - \Gamma_\Delta(a^o(b_0, \Gamma_\Delta)) > e^*$
  - Government: increases b to raise $a^o \Rightarrow \boldsymbol{b_\Delta > b_0}$

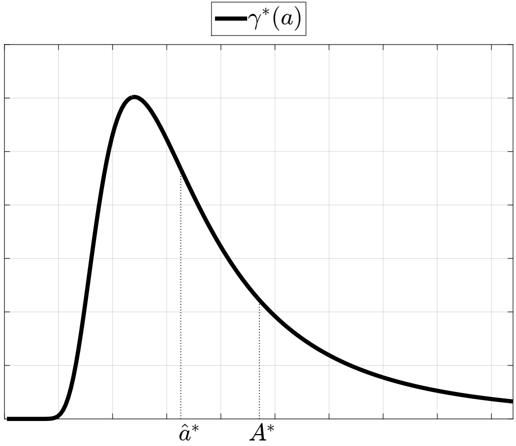
Transfer rate dynamics: Γ_0 such that $\tau_0 < r - \rho$



- b_t keeps increasing as long as $\theta_t > 0$
  - When $\theta_t = 0 \Rightarrow b_t = b^*$ Main

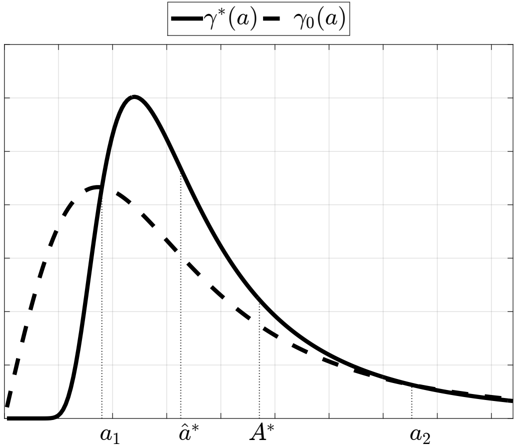
MPS in a Developed Country

- Capital unconstrained country ($A^* > \hat{a}^*$)



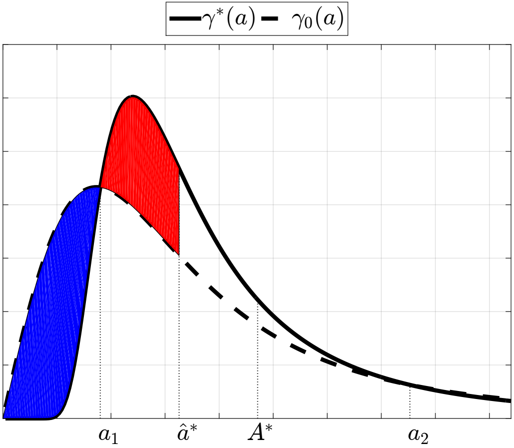
MPS in a Developed Country

- γ_0 more unequal than γ^* (*double-crossing*)



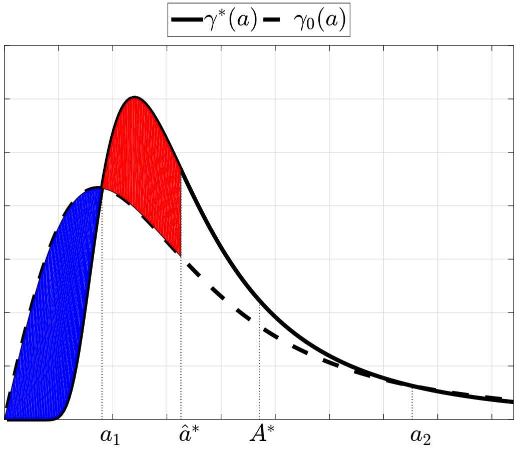
MPS in a Developed Country

- More unequal $\Rightarrow$ Less entrepreneurs: $1 - \Gamma_0(\hat{a}^*) < 1 - \Gamma^*(\hat{a}^*)$



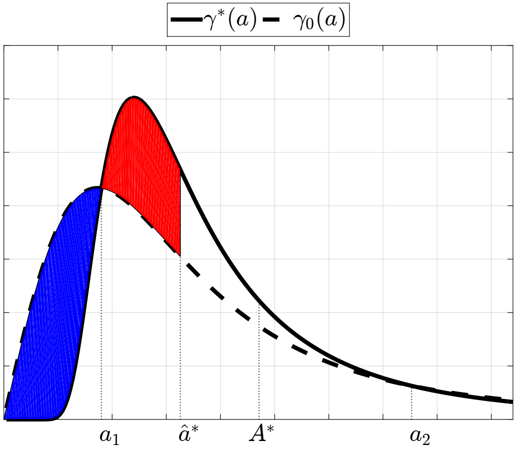
MPS in a Developed Country

- Net effect: $1 - \Gamma_0(\hat{a}_0) < 1 - \Gamma^*(\hat{a}^*) \Rightarrow \boldsymbol{b_0} < \boldsymbol{b^*} \Rightarrow \tau_0 < r - \rho$



MPS in a Developed Country

- $\tau_0 < r - \rho \Rightarrow$ b increasing over time



Main

Calibration Method

- Set of parameters $\Psi = (r, \phi, I, R, \ell, \rho, \omega)_{1x7}$

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- Set of moments:

$$m(\Psi|\Gamma_0) = \begin{bmatrix} \boldsymbol{b_0 - P(\Gamma_0, \Psi)} \\ K_0/L_0 - K/L(\Gamma_0, \Psi) \\ I_0/Y_0 - Inv(\Gamma_0, \Psi) \\ Giniy_0 - Giniy(\Gamma_0, \Psi) \\ b_0 - P(\Gamma_\Delta, \Psi) \\ \mathbb{E}[a|\Gamma_0] - \mathbb{E}[a|\Gamma_\Delta] \\ Var[a|\Gamma_0] - Var[a|\Gamma_\Delta] \\ Gini[a|\Gamma_0] - Gini[a|\Gamma_\Delta] \end{bmatrix}_{8x1}$$

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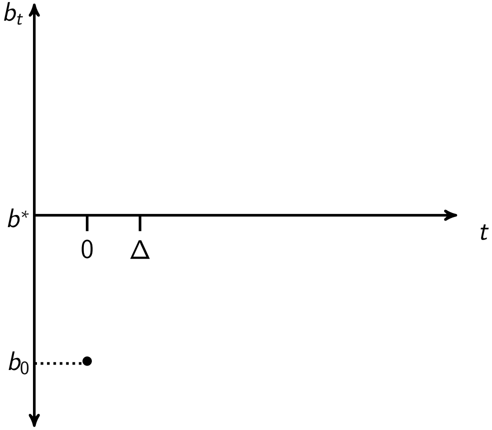
- Solve: $\hat{\Psi} = argmin_\Psi \{m(\Psi|\Gamma_0)' \; W \; m(\Psi|\Gamma_0)\}$

Main

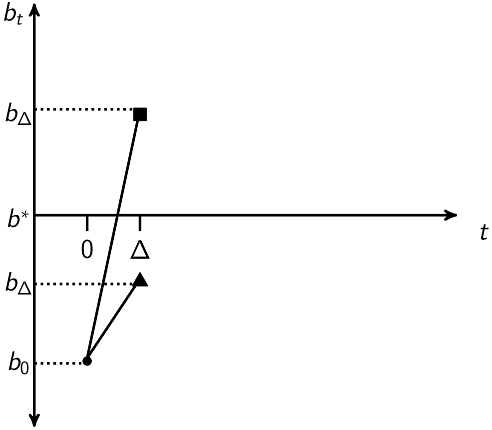
A permanent increase of productivity (MIT shock)

- At $t = 0$: $\uparrow Z \Rightarrow \uparrow e^* \Rightarrow 1 - G_0(\hat{a}(b^*)) < e^* \Rightarrow \downarrow \boldsymbol{b}$



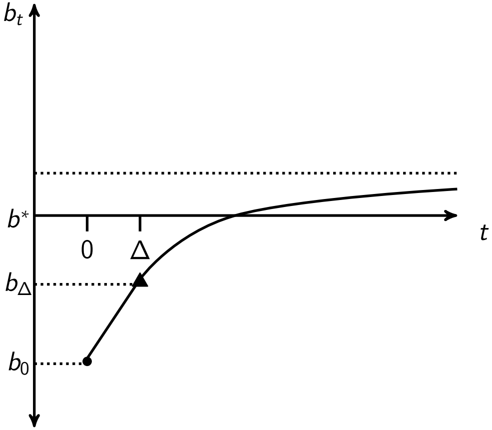
A permanent increase of productivity (MIT shock)

- At $t = \Delta$: $\boldsymbol{G}$ shifts right $\Rightarrow\uparrow \boldsymbol{b}$
  - $1 - G_\Delta(\hat{a}(b_0)) > e^*$



A permanent increase of productivity (MIT shock)

Case 1



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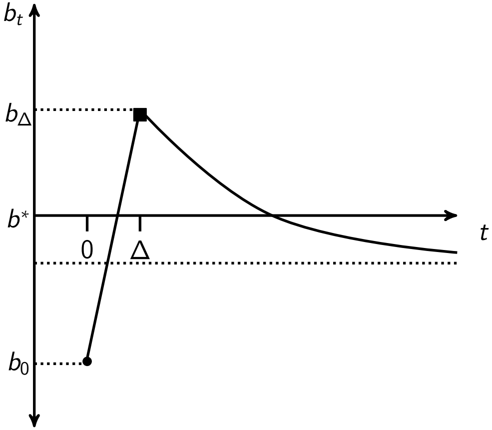
Case 2



Main

The “Oscillatory” Behavior of τ

- *Example:* Suppose that $\uparrow b_t$ and $\uparrow A_t$. Recall:

$$\tau_t = \frac{b_t}{A_t} \cdot (1 - e^*) \cdot y(e = e^*)$$

The "Oscillatory" Behavior of τ

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    - τ may oscillate over time $\Rightarrow$ b may hit the PC before $\tau_t \to \tau^*$

- The dynamics of b can still be characterized!

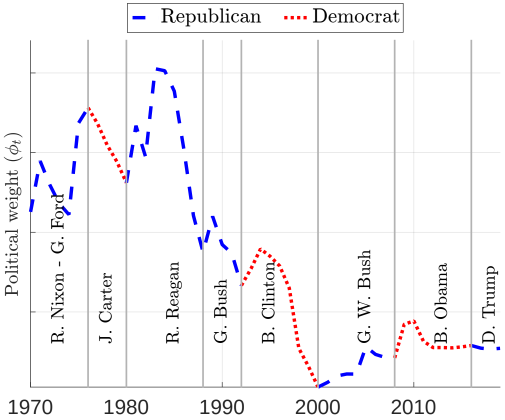
Counterfactual Analysis

Question Role of Politics in the Evolution of the Welfare State?

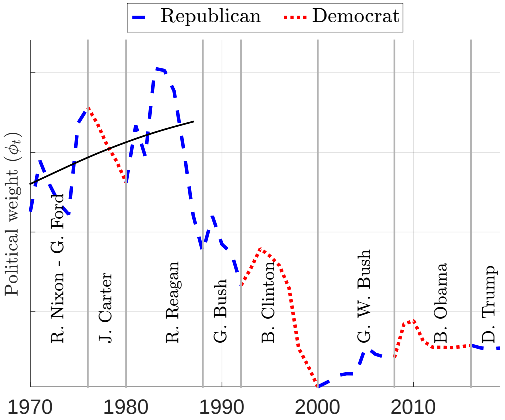
Counterfactual Analysis for the US

1. Find the sequence of Political Weights $\{\phi_t\}_{1970}^{2019}$ that matches $\{b_t\}_{1970}^{2019}$
2. Simulate the model for "extreme" alternative paths around $\{\phi_t\}_{1970}^{2019}$
3. **Question** Does the trend of social benefits change?

USA:The Evolution of the Political Weight

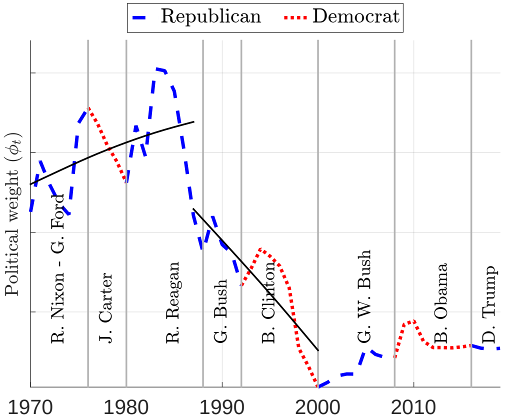


USA:The Evolution of the Political Weight



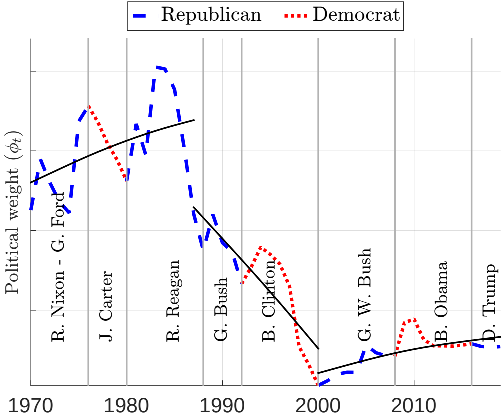
- 1970-1990: Pro-business trend ($\uparrow \phi$)

USA:The Evolution of the Political Weight



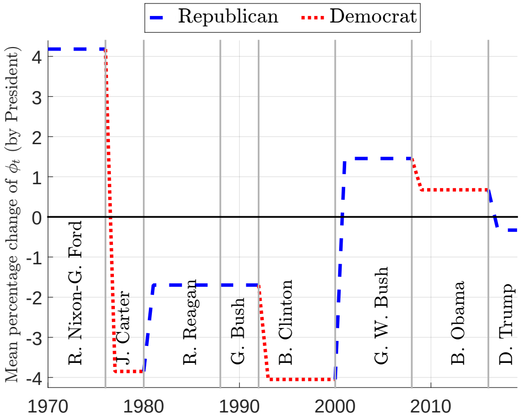
- 1990-2000: Pro-worker trend ($\downarrow \phi$)

USA:The Evolution of the Political Weight



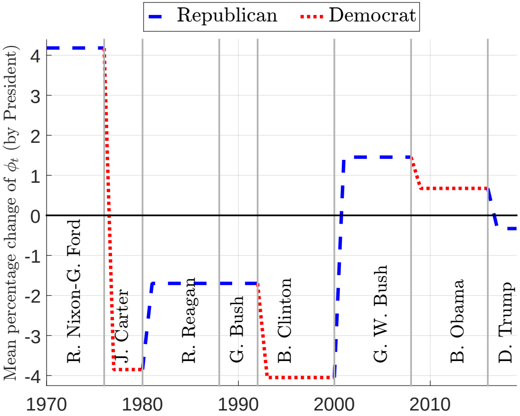
- 2000-present: moderate Pro-business trend ($\nearrow \phi$)

USA:The Evolution of the Political Weight



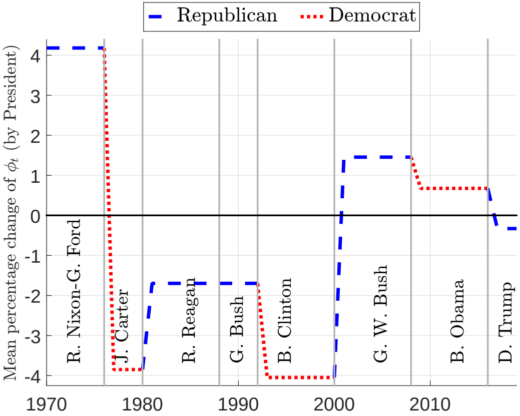
- **Republicans:** largest increases of ϕ

USA:The Evolution of the Political Weight



- **Democrats:** largest decreases of ϕ

USA:The Evolution of the Political Weight



- Behavior of ϕ consistent with partisan political perspectives

Question What would have been the evolution of b if?

1. Pro-worker scenario (Low ϕ): $\phi_t \times$ largest % drop

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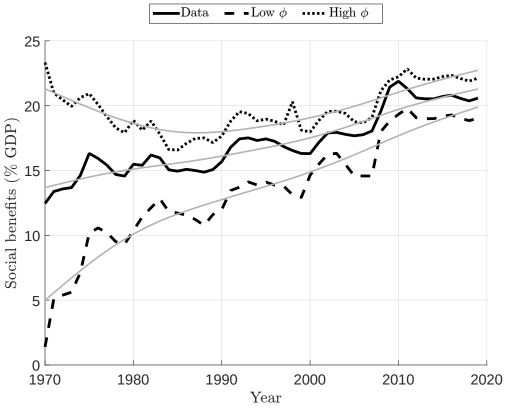

Question What would have been the evolution of b if?

Main

- Trend of b would have remained positive since 1990

- **Main message:** Limited role of politics in the evolution of the welfare state