The Political Economy of Credit Booms and Macroprudential Policy

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Political Frictions

- Macroprudential policy is now part of the policy toolkit
- Growing literature analyzing Macroprudential policy from a normative standpoint
- Important questions remain open regarding how governments decide the use of macroprudential policies in practice

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Q. What is the role of political economy considerations in shaping the financial and regulatory cycle?

This Paper

We extend a workhorse open-economy model of financial crises and pecuniary externalities with political economy frictions.

- Theory:
  - Two parties: turnover following an exogenous Markov process
  - Responsible party, r: sets macroprudential policy optimally
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Key insight. Political economy friction leads the responsible government to a more aggressive macroprudential policy.

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Absent political economy frictions

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The empirical literature in light of the Model

- We show OLS is biased
- We propose an IV specification using political frictions

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- Responsible party (r)
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- Households
  - ∗ Access to a regulated international market with a tax $\{\tau_t\}$.
  - ∗ Choose debt based on expectations of current and future regulations.

Political procees

- Probabilistic voting approach
  - Fixed preference for r: $\overline{\nu}$
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$$g_t = \begin{cases} r & \text{if} \quad \nu_t < \overline{\nu}, \\ i & \text{otherwise.} \end{cases}$$

- We map the political process to Markov chain, where

$$\Gamma = \begin{bmatrix} \Gamma_r & 1-\Gamma_r \\ 1-\Gamma_i & \Gamma_i \end{bmatrix}$$

Households

- Preferences

$$\max_{c_t^T, c_t^N, b_{t+1}} \mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t u(c_t)$$

$$c = \left[\omega \left(c^T\right)^{\frac{\gamma-1}{\gamma}} + (1-\omega)\left(c^N\right)^{\frac{\gamma-1}{\gamma}}\right]^{\frac{\gamma}{\gamma-1}}$$

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- Budget constraint

$$p_t^N c_t^N + c_t^T + \frac{1}{R(1+\tau_t)} b_{t+1} = p_t^N y^N + y_t^T + b_t + T_t$$

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- Credit constraint

$$\frac{b_{t+1}}{R} \geq -\kappa(y_t^T + p_t^N y^N)$$

Goverment

- Responsible party
  - Maximizes household's utility function
  - Budget constraint

$$T_t = \frac{\tau_t}{1+\tau_t}\frac{B_{t+1}}{R}.$$

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Equilibrium Conditions

- Households FOC:

$$
\begin{aligned}
u_T(c_t^T, y_t^N) &= \beta R(1+\tau_t)\mathbb{E}[u_T(c_{t+1}^T, c_{t+1}^N)] + \mu_t \\
0 &= \mu_t^H \Big(B_{t+1} + \kappa(y_t^T + p_t^N y^N) \Big)
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p_t^N = \frac{1-\omega}{\omega}\left(\frac{c_t^T}{c_t^N}\right)^{1/\gamma}
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- Market clearing conditions:

$$
\begin{aligned}
c_t^N &= y^N \\
c_t^T + \frac{B_{t+1}}{R} &= y_t^T + B_t
\end{aligned}
$$

Competitive Equilibrium

Normative Analysis

- Constrained-efficient allocations Bianchi (2011).
- Political economy game

Planner's Problem

$$\begin{aligned} V(B, y^T) &= \max_{c^T, B'} u(c^T, y^N) + \beta \mathbb{E} V(B', y^{T\prime}) \\ c^T + \frac{B'}{R} &= y^T + B && (\lambda) \\ B' &\geq -\kappa(\mathcal{P}^N(c^T) y^N + y^T) && (\mu) \end{aligned}$$

where $\mathcal{P}^N(c^T) = \frac{1-\omega}{\omega} \left(\frac{c^T}{y^N} \right)^{1/\gamma}$

The planner internalizes the effect on prices.

Planner's Problem

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c^T + \frac{B'}{R} &= y^T + B & (\lambda) \\
B' &\geq -\kappa(\mathcal{P}^N(c^T) y^N + y^T) & (\mu)
\end{aligned}
$$

- Euler equation for the social planner, when the constraint is not binding:

$$
u_T(c^T, y^N) = \beta R \mathbb{E}[u_T(c^{T\prime}, y^{N\prime})] + \beta R \mathbb{E}[\mu' \frac{\partial \mathcal{P}^N(c^{T\prime})}{\partial c^{T\prime}}]
$$

Marvkov Equilibrium: A political game

- Aggregate State

  * States $s \equiv \{B, y^T, g\}$.
  * Where $g \in \{r, i\}$ represent the party in power.

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- Individual State

  The individual state of the household is $\{s, b\}$.

Responsible government

$$V^r(B, y^T, r) = \max_{c^T, B', \tau} u\left(c^T, y^N\right) + \beta\left[\Gamma_r \, \mathbb{E}_s \, V^r(B', y^{T\prime}, r) + (1 - \Gamma_r)\, \mathbb{E}_s \, V^r(B', y^{T\prime}, i)\right]$$

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subject to

$$c^T + \frac{B'}{R} = y^T + B$$

$$\frac{B'}{R} \geq -\kappa\left[y^T + \frac{1-\omega}{\omega}\left(\frac{c^T}{y^N}\right)^{1/\gamma} y^N\right]$$

$$u_T\left(c^T, y^N\right) = \beta R\left[\Gamma_r\, \mathbb{E}_s\, u_T(c^T, y^N) + (1 - \Gamma_r)\, \mathbb{E}_s\, u_T\left(\mathcal{C}^T(B', y^{T\prime}, i), y^N\right)\right] (1 + \tau) + \mu_h$$

$$0 = \mu_h\left(\frac{B'}{R} + \kappa\left[y^T + \frac{1-\omega}{\omega}\left(\frac{c^T}{y^N}\right)^{1/\gamma} y^N\right]\right)$$

Irresponsible government

$$V^i(B, y^T, i) = \max_{c^T, B'} \; u\left(c^T, y^N\right) + \beta\left[\Gamma_i \, \mathbb{E}_{s'} \; V^i(B', y^{T\prime}, i) + (1 - \Gamma_i) \, \mathbb{E}_{s'} \; V^i(B', y^{T\prime}, r)\right]$$

subject to

$$c^T + \frac{B'}{R} = y^T + B$$

$$\frac{B'}{R} \geq -\kappa\left[y^T + \frac{1-\omega}{\omega}\left(\frac{c^T}{y^N}\right)^{1/\gamma} y^N\right]$$

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Markov Equilibrium

Is defined by policy functions $\{\mathcal{C}^T(s), \mathcal{B}(s), \tau(s), T(s)\}$; value functions $\{V^r(B, y^T, r), V^i(B, y^T, i), W(b, s)\}$, and a price function $\{\mathcal{P}^N(s)\}$ such that:

i Given the price function, policy functions solve the problems of the households and both types of governments

ii Policy functions are part of a Nash equilibrium.

Generalized Euler Equation (GEE)

- The FOC of the responsible government, when borrowing constraint not binding:

$$u_T = \beta R \left[\Gamma_r \mathbb{E}_s \frac{\partial V^r(B_{t+1}, y^T_{t+1}, r)}{\partial B_{t+1}} + (1 - \Gamma_r)\, \mathbb{E}_s \frac{\partial V^r(B_{t+1}, y^T_{t+1}, i)}{\partial B_{t+1}} \right]$$

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- We can use the envelope for responsible government:

$$\frac{\partial V^r(B_t, y^T_t, r)}{\partial B_t} = u_T(c^T_t, c^N_t) + \frac{\partial \mathcal{P}^N_t}{\partial c^T_t} \kappa \mu_t$$

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- For irresponsible government:

$$\frac{\partial V^i(B_t, y^T_t, i)}{\partial B_t} = u_T(c^T_t, c^N_t) + \frac{\partial \mathcal{P}^N_t}{\partial c^T_t} \kappa \mu_t + \frac{\partial \mathcal{B}(B_t, y^T_t, i)}{\partial B_t}$$

$$\left[\beta(1 - \Gamma_i) \mathbb{E}_r \frac{\partial V^r(B_{t+1}, y^T_{t+1}, r)}{\partial B_{t+1}} + \beta \Gamma_i \, \mathbb{E}_i \frac{\partial V^i(\mathcal{B}(B_{t+1}, y^T_{t+1}, i), y^T_{t+1}, i)}{\partial B_{t+1}} - \frac{u_T(c^T_t, c^N_t)}{R} - \frac{\partial \mathcal{P}^N_t}{\partial c^T_t} \kappa \mu_t \right]$$

Generalized Euler Equation (GEE)

Assume the borrowing constraint is not binding in the current period:

$$u_T(c_t^T, c_t^N) = \beta R \Bigg[\Gamma_r \mathbb{E}_s \left(u_T(c_t^T, c_t^N) + \frac{\partial \mathcal{P}_t^N}{\partial c_t^T} \kappa \mu_{t+1} \right) +$$

$$(1-\Gamma_r) \left[\sum_{n=1}^{\infty} (\Gamma_i \beta)^n \prod_{h=t}^{t+n} \left(\frac{\partial \mathcal{B}(B, y_h^T, i)}{\partial B_h} \right) \Bigg[\mathbb{E}_s \left(u_T(c_{h+1}^T, c_{h+1}^N) \left(1 - \frac{1}{R} \frac{\partial \mathcal{B}(B, y^T, i)}{\partial B_{h+1}} \right) \right) + \right.$$

$$(1-\Gamma_i) \mathbb{E}_s \left(u_T(c_{h+1}^T, c_{h+1}^N) + \frac{\partial \mathcal{P}_{h+1}^N}{\partial c_{h+1}^T} \kappa \mu_{h+2} \right) + \frac{\partial \mathcal{P}_h^N}{\partial c_h^T} \kappa \mu_h \Bigg] \Bigg]$$

As long as some distant $\mu_{t+h} > 0$ macropudential policy is active

Our model features two key structural relationships:

$$b_{t+1} = \Upsilon_0 + \Upsilon_b b_t + \Upsilon_\tau \tau_t + \Upsilon_y y_t^T + \Upsilon_\beta \beta_t + \Upsilon_g g_t + \nu_t$$

$$\tau_t = \gamma_0 + \gamma_b b_t + \gamma_y y_t^T + \gamma_\beta \beta_t + \gamma_g g_t + u_t$$

Econometric Analysis

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\tau_t &= \gamma_0 + \gamma_b b_t + \gamma_y y_t^T + \gamma_\beta \beta_t + \gamma_g g_t + u_t
\end{aligned}
$$

Assume we are interested in estimating the effect of macroprudential policy on the current account

$$
CA_t = \delta_0 + \delta_b b_t + \delta_\tau \tau_t + \delta_y y_t^T + \epsilon_t \quad s.t \quad \mathbb{E}[\epsilon_{it}] = 0
$$

OLS is Biased

The mapping between the error term of the regression model and the structural relations is:

$$\epsilon_{i,t} = \nu_{i,t} + \Upsilon_{\beta}\iota_{i,t}$$

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Proposition 1

Given $\Upsilon_{\beta} < 0$ *and* $\gamma_{\beta} > 0$, *let* $\hat{\delta_{\tau}}$ *be the OLS estimation of* δ_{τ}. *Then the OLS estimator is biased– this is:*

(i) $\mathbb{E}[\hat{\delta_{\tau}} - \delta_{\tau}] < 0$

Instrumental Variable

For $g_{i,t}$ to be a valid instrument, we need to confirm three requirements:

1 Exogeneity: $Cov(g_{i,t}, \epsilon_{it}) = 0$

2 Relevance: $Cov(g_{i,t}, \tau_{it} | y_{it}^{T}, b_{it}) \neq 0$

3 Exclusion: $\Upsilon_{g} = 0$

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3 Exclusion: $\Upsilon_g = 0$

Proposition 2

Let $\overline{\delta}_\tau$ be the IV estimation of δ_τ, using the political process as the exogenous instrument:

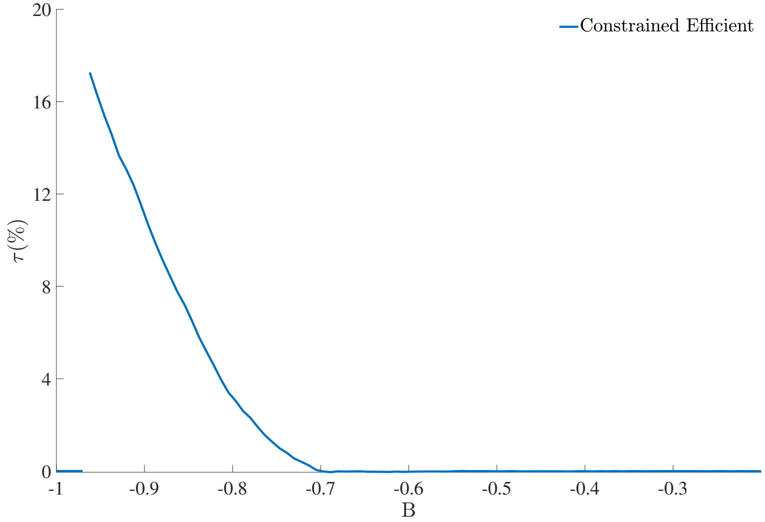
$$z_t = \begin{cases} g_t & \text{if} \quad \lambda = 1, \\ \varrho_t & \text{otherwise.} \end{cases} .$$

Then, the IV estimator is unbiased– this is: $\mathbb{E}[\overline{\delta_\tau} - \delta_\tau] = 0$

Calibration

	Value	Source
Interest rate	$R = 1.04$	Bianchi (2011)
Risk aversion	$\sigma = 2$	Bianchi (2011)
Elasticity of substitution	$1/(1+\eta) = 0.83$	Bianchi (2011)
Weight on tradable in CES	$\omega = 0.45$	Share of tradable output Mexico
Stochastic structure	$\rho = 0.46$	Argentinean economy
Mean of discount factor	$\hat{\beta} = 0.904$	Average NFA-GDP ratio
Stochastic part of discount factor	$[-0.05 \quad 0.05]$	Uniform distribution
Credit coefficient	$\kappa = 0.32$	Frequency of crises
Probability of re-election of responsible gov.	$\Gamma_i = 0.15$	Mean in data
Probability of re-election of irresponsible gov.	$\Gamma_j = 0.85$	Mean in data

Quantitative Results: Tax Policy



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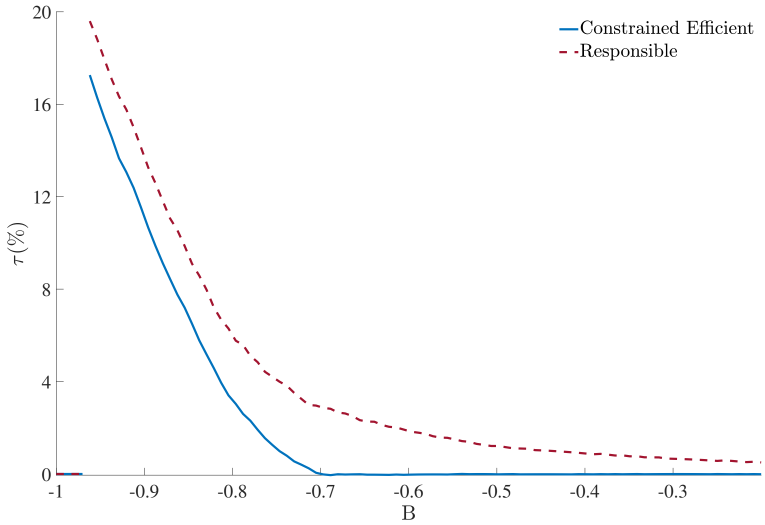


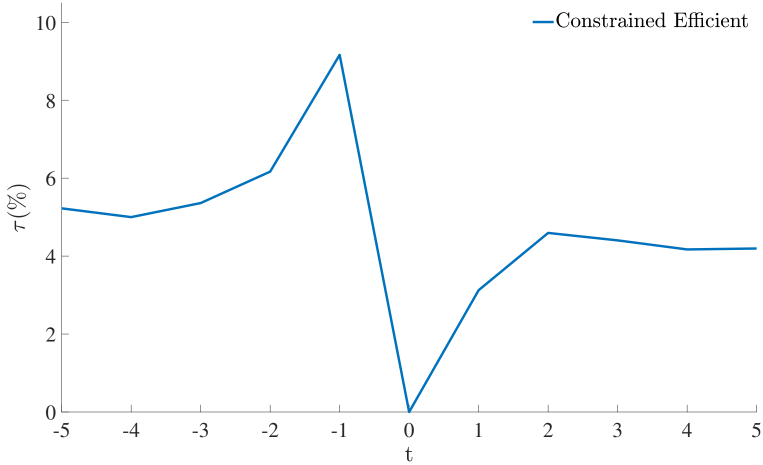
More aggressive macroprudential policy than the constrianed-efficent

Macropudential policy loses effectiveness

Probability of Sudden Stop

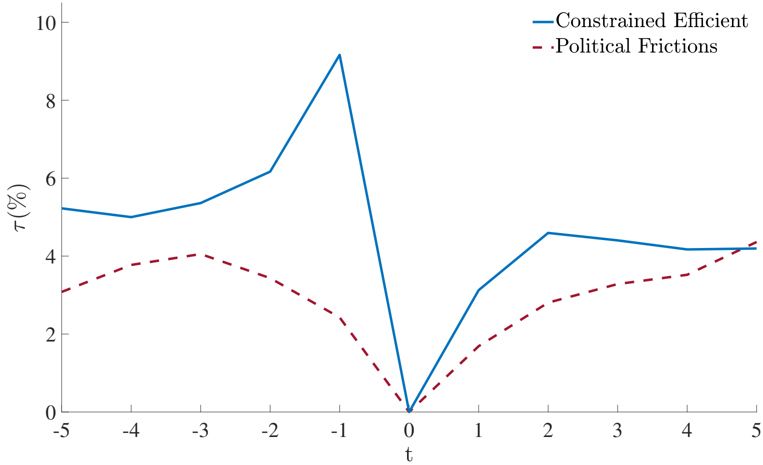
Constrained Efficient Economy	2.2%
Political Frictions Economy	5.3%
Unregulated Economy	11.6%

Tax on Borrowing around Crises



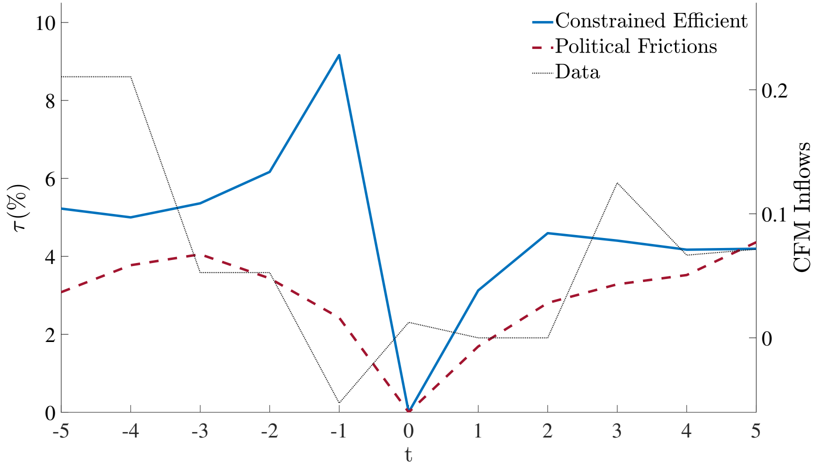
More regulation before a typical crisis without political frictions

Tax on Borrowing around Crises

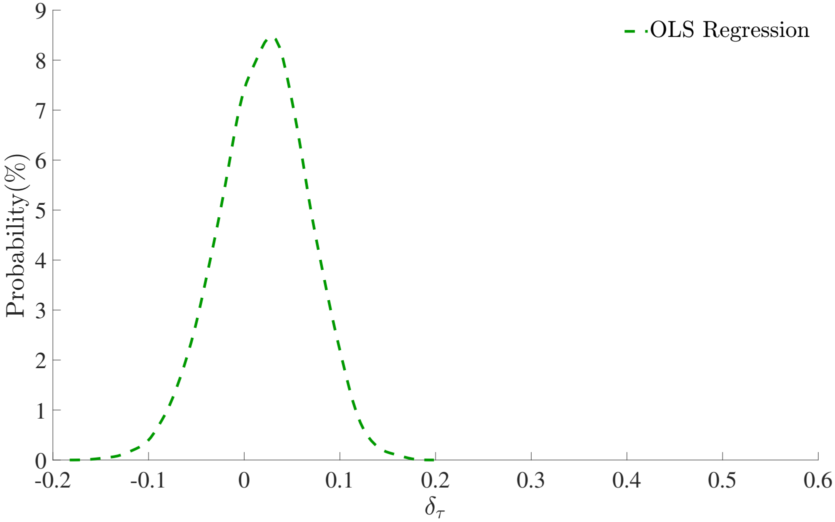


With political frictions, less regulation before the typical crises

Tax on Borrowing around Crises

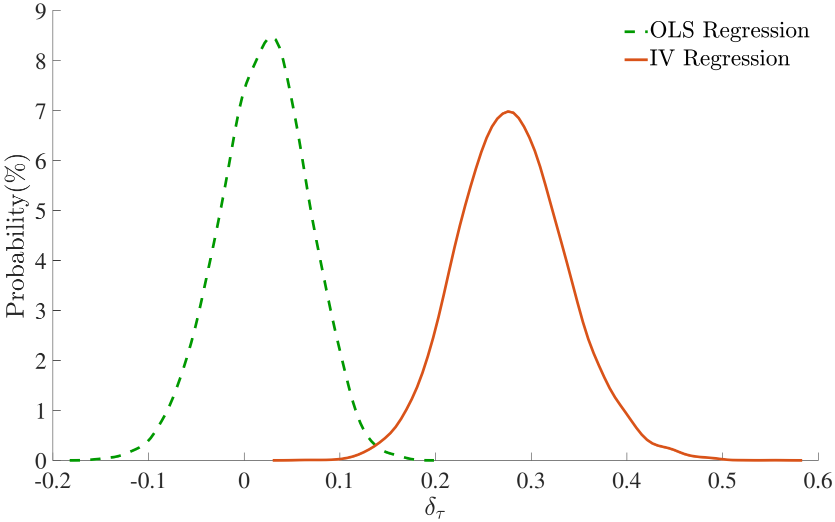


Monte Carlo Simulations



β_τ could be either negative or positive using model-based regressions

Comparison



Any of the regressions esitmated w/ IV give a negative effect

An Empirical Estimation of this Econometric Model

$$CA_{i,t} = \beta_0 + \alpha_i + \beta_\tau \tau_{i,t} + \beta_X X_{i,t} + \epsilon_{i,t}$$

- We use quarterly data for 36 countries. Time: 2008q1 – 2019q1
- Instrument macropru policy w/ Political Orientation and Institutional Quality vars.
  Data from WDI and Global Populisms Data
- Also include macro controls (GDP) from IFS

An Empirical Estimation of this Econometric Model

$$CA_{i,t} = \beta_0 + \alpha_i + \beta_\tau \tau_{i,t} + \beta_X X_{i,t} + \epsilon_{i,t}$$

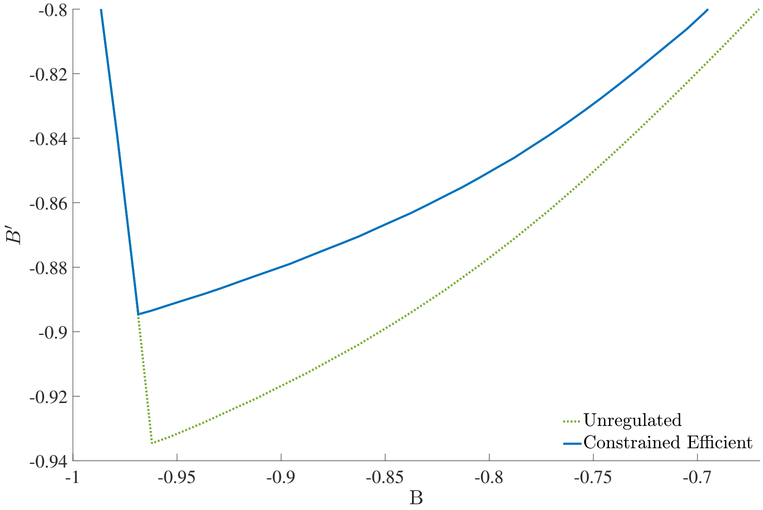
VARIABLES	OLS	IV
τ	0.0240	1.629
P-value	0.167	0.043
Observations	786	590
Number of country	18	14

Conclusions

- Explored the role of political frictions in the design of macropru policy
- Responsible government chooses a stronger macropru policy

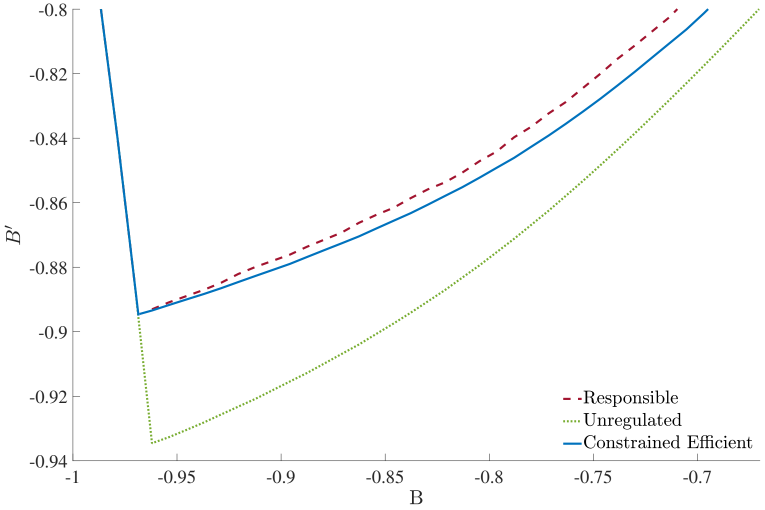
  Capital inflow taxes are positive all the time
- Link w/ empirical literature. Propose a way to deal w/ endogeneity of macropru taxes

Policy functions



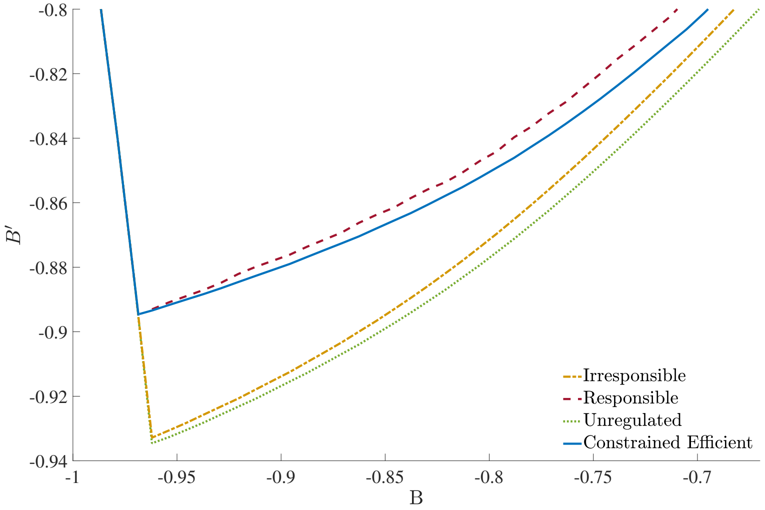
Households take more debt in an unregulated economy.

Policy functions



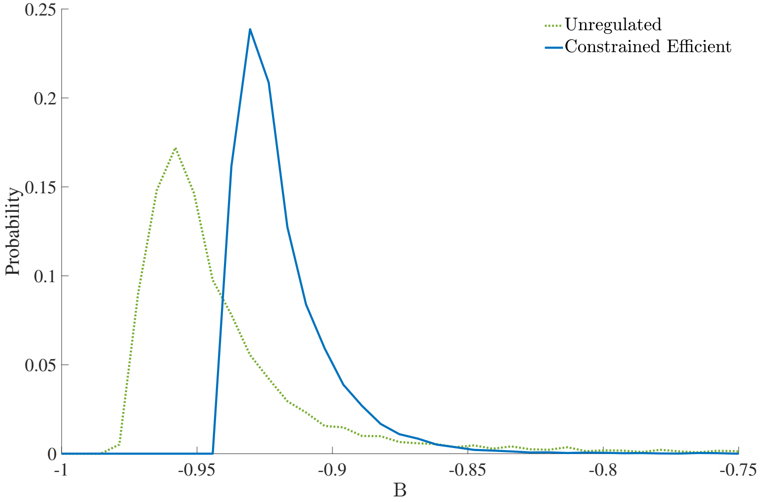
Households take even less debt under a responsible goverment

Policy functions

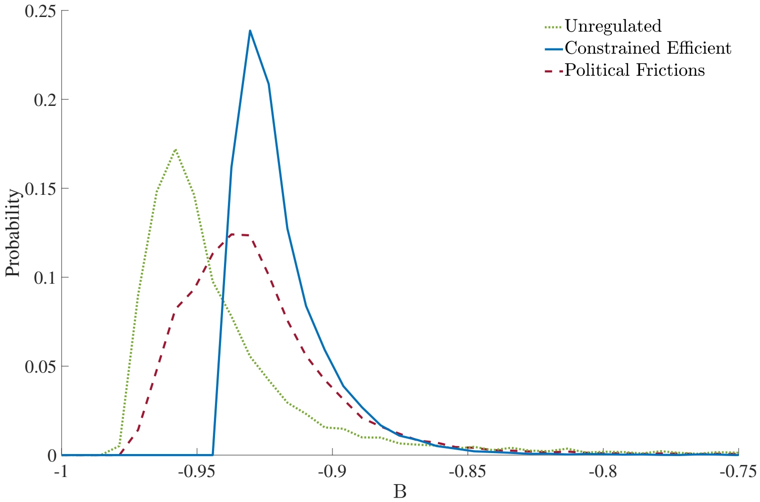


They take less debt under an irresponsible government than in an unregulated economy.

Macropudential policy loses effectiveness

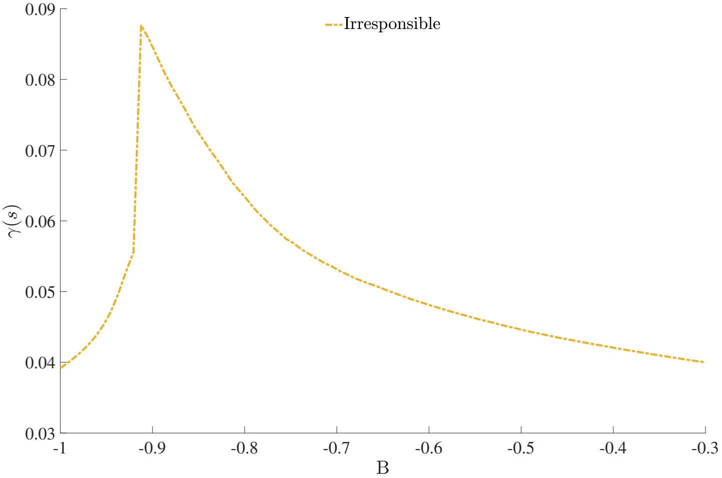


Macropudential policy loses effectiveness



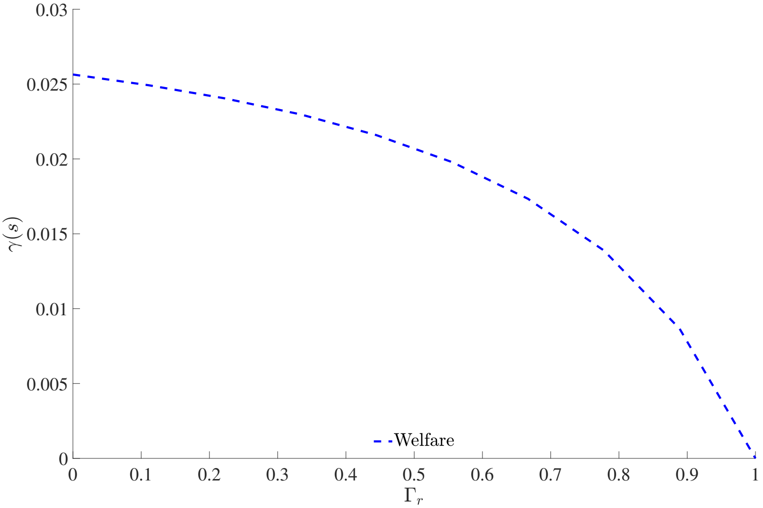
Probability of a sudden stop are 5.5%, 1% and 2.9%

Welfare Losses of Political Frictions

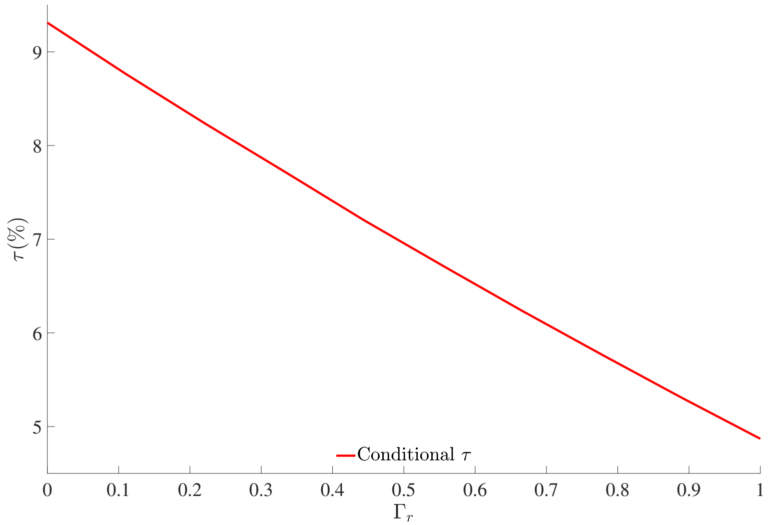


$$(1+\lambda(s))^{(1-\sigma)} V^{g}(s) = V^{SP}(B, y^{T}, y^{N})$$

Sensitivity Analysis: Welfare cost.



Sensitivity Analysis: The conditional tax.



Competitive Equilibrium

Definition 1. (Competitive Equilibrium) Given initial assets b_0, sequences of an exogenous process $\{g_t \in \{i, j\}, y_t^T, y_t^N\}_{t=0}^{\infty}$ and a sequence of government policies $\{\tau_t(i), \tau_t(j), T_t(i), T_t(j)\}_{t=0}^{\infty}$; a *competitive equilibrium* is a sequence of household allocations $\{c_t^T, c_t^N, b_t\}_{t=0}^{\infty}$, and a sequence of prices $\{p_t^N\}_{t=0}^{\infty}$ such that: (i) households solve their optimization problem, (ii) all market clears.

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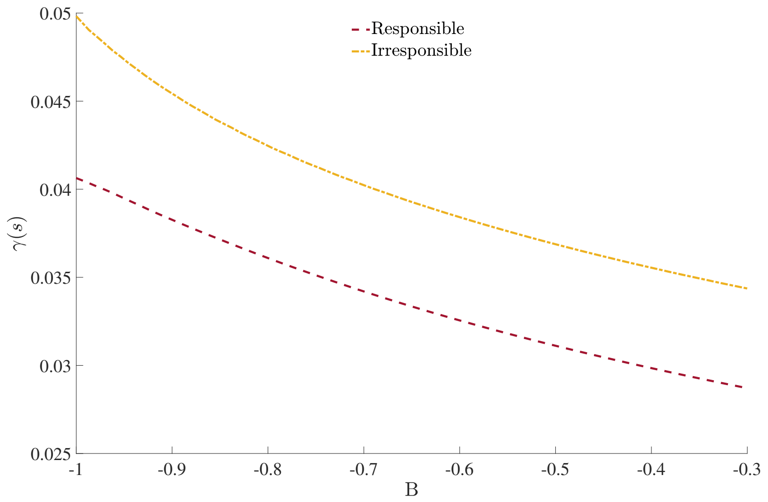
Walfare: Low Endowment



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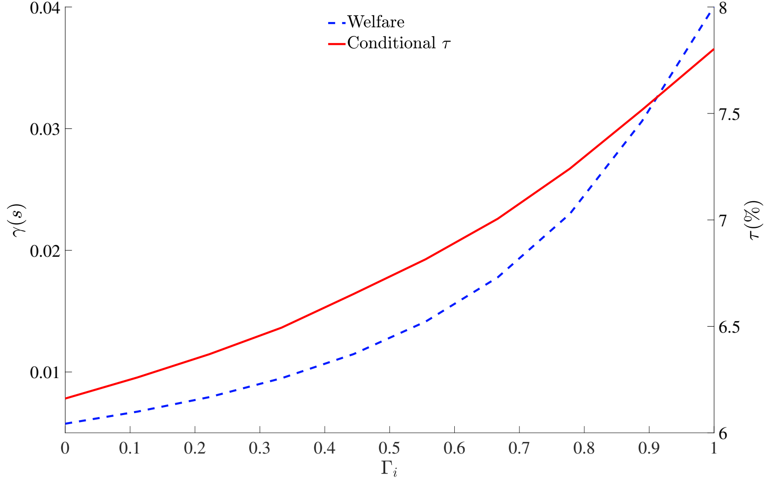
Sensitivity: Irresponsible



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Bianchi, J. (2011). Overborrowing and systemic externalities in the business cycle. *American Economic Review*, 101(7):3400–3426.