The Political Economy of Macroprudential Policies and Capital Flows*

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Abstract

This paper explores the implications of political economy frictions on the dynamics of capital flows and the design of macroprudential policy. We present an open-economy model of financial crises extended with political turnover, where political parties vary in their inclinations toward regulating financial markets. We show that when the more responsible party is in office, it implements regulations that exceed those that would be optimal in the absence of political frictions. We also draw lessons for the empirical literature on the effectiveness of macroprudential regulation, and show that accounting for political economy frictions can help reconcile the theory with the mixed results from the empirical literature.

Keywords: Macroprudential policy, political economy, financial crises

JEL classification: E42, F31, F32, F34, F41, P48.

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1 Introduction

Financial crises often follow periods of rapid credit expansion and significant capital inflows. Recent research has highlighted the role of macroprudential policies in taming financial cycles. Despite the growing preeminence of macroprudential policies, their adoption varies widely across countries and over time, possibly reflecting divergent interests and institutional constraints inherent to the political economy of financial regulation.

The potential link between the financial and political economy cycles raises important questions: How do political factors influence the adoption and effectiveness of macroprudential policies? What are the implications of political economy dynamics for financial stability? How should policymakers adjust regulation in the face of political economy uncertainty?

To tackle these questions, this paper develops a simple dynamic model of macroprudential policy with political economy frictions. In contrast to much of the literature that focuses on a single benevolent social planner, we consider an environment where policymakers with different ideological backgrounds rotate in power. Taking the political cycle as given, we show that a responsible policymaker has incentives to tighten regulation above and beyond what would be the desired regulation in an environment without political economy frictions. We show how the dynamics of the regulatory cycle can contribute to an extended period of financial tranquility followed by a wave of financial deregulation that ends up in a financial crisis. Finally, we show how these dynamics resulting from political economy frictions can help shed light on the empirical evidence on the effectiveness of financial regulation.

We consider a small open economy model with tradable and non-tradable goods and imperfect capital markets. As in Mendoza (2002), households borrow from foreign investors subject to an occasionally binding constraint linked to income. In this economy, standard shocks to aggregate income can trigger a financial crisis through a feedback between consumption, the relative price of non-tradables, and the borrowing constraint. Key to our analysis is a pecuniary externality by which households overborrow because they do not internalize that curbing borrowing would help sustain higher future consumption and help relax the borrowing constraint for other households. As a normative benchmark, we consider a constrained-efficient solution where the planner can control the level of borrowing subject to the credit constraint, letting goods markets clear competitively. In this benchmark, a strictly positive tax on borrowing is needed to implement the constrained-efficient solution whenever there is a strictly positive probability of a binding constraint in the next period, as in Bianchi (2011).

We then study a Markov equilibrium in which two types of policymakers alternate in

power. An "irresponsible" policymaker lets capital flow freely and, because of an ideological bias (or other reasons), fails to impose any regulations. On the other hand, the "responsible" policymaker sets a tax on borrowing optimally, anticipating that it might be replaced by an irresponsible policymaker in the future. In contrast to the constrained-efficient solution, we show that in this case, the responsible policymaker implements a strictly positive tax on borrowing even if the probability of a crisis in the following period is nil.

If a responsible policymaker perceives that she will be in power forever, she realizes that it can loosen regulation in the present and tighten it in the future to correct future externalities. However, a responsible policymaker who might be replaced by an irresponsible one finds it optimal to take a more restrictive stance on macroprudential policy because she may not be able to take action in the future. Underlying this result is an envelope condition that fails to apply because of the political economy friction. We derive a Generalized Euler Equation (GEE) that shows the responsible policymaker internalizes how a lower debt level has a direct higher marginal utility from higher resources tomorrow as well as an additional marginal gain from the fact that lower borrowing today induces relatively lower borrowing tomorrow by the irresponsible policymaker. Therefore, by borrowing less today, the responsible policymaker can mitigate the negative externalities that result from overborrowing in the future.

Turning to our quantitative results, we show that the dynamics of capital flows differ sharply with and without political economy frictions. Using an event analysis, we first show that in the absence of political economy frictions, financial crises tend to be preceded by restrictive financial regulation. This may seem paradoxical, but it is a result of selection: absent political frictions, crisis events in the simulations tend to be preceded by tight financial regulation because governments that anticipate a crisis tend to tighten financial regulation. On the other hand, in the presence of political economy frictions, financial crises tend to be preceded by loose regulation on average, as in the data. This is because financial crises now tend to follow credit booms, which are more likely to emerge when the irresponsible policymaker is in power.

Finally, we draw lessons from the empirical literature on the effectiveness of macroprudential policies. A well-known challenge in the literature trying to assess how financial regulation affects credit flows is that the regulation changes are endogenous to the economic environment. Through the lens of our model, we formally show how the endogeneity bias in a standard OLS regression tends to suggest that financial regulation has modest effects, as frequently found in empirical studies. Then, we propose an instrumental variable specification that can overcome this endogeneity bias. Using simulated data from the model, we show that a two-stage least square regression indicates that macroprudential policies have significant

effects on capital flows. We validate this procedure using panel data regressions.

Related Literature. Our paper belongs to the literature on macroprudential regulation. This literature has examined how tightening borrowing limits can help correct pecuniary externalities that emerge because of price-dependent financial constraints (e.g., Lorenzoni, 2008; Bianchi, 2011; Bianchi and Mendoza, 2018; Jeanne and Korinek, 2018). The literature has focused on second-best environments where a benevolent policymaker chooses regulation to maximize average welfare. One notable exception is Rola-Janicka (2020). In an environment with heterogeneous borrowers that differ in the level of political connectedness, she shows that depending on the electoral power of the connected borrowers, the outcome may be a macroprudential policy that is either too lax or too strict. Our focus is different in that we take the political economy process as given and use our framework to understand the dynamic effects of political economy frictions for the design of macroprudential policy.

Herrera, Ordonez and Trebesch (2020) document how political booms, measured as increases in the popularity of the incumbents, precede financial crises. They find that political booms predict future financial crises above and beyond credit booms in emerging markets. They rationalize this fact with a model in which incumbents of differing quality have a preference for staying in office. Faced with a 'bad boom,' a poor-quality government may find it too costly (from a reelection point of view) to implement regulatory policy and may then choose to let the boom happen, increasing both its popularity and the probability of a future crisis.[1] Different from their work, we focus on an environment where the scope for regulation emerges because of excessive private borrowing.

Our paper is also related to an extensive literature on the effectiveness of macroprudential policy (e.g., Forbes, 2007; Forbes, Fratzscher and Straub, 2015a,b; Alfaro, Chari and Kanczuk, 2017; Rojas, Vegh and Vuletin, 2022; Das, Gopinath and Kalemli-Özcan, 2022). One challenge in this literature has been the endogeneity bias that is present because macroprudential policy responds to the economic environment. We use an IV approach that can remedy this bias by incorporating political economy factors that create an exogenous source of variation in macroprudential policies.

Outline of the paper. Section 2 presents the model. Section 3 describes the optimal policy and presents the analytical results of the model. Section 4 provides quantitative results. Section 5 discusses the implications of the political economy frictions for the empirical literature on the effectiveness of macroprudential policy. Section 6 concludes.

[1] Müller (2023) uses cross-country panel data and finds that changes in macroprudential regulation exhibit a predictable electoral cycle in the run-up to elections.

2 Model

We consider a dynamic small open-economy model with tradable and non-tradable goods. The economy is populated by a continuum of identical households that borrow externally subject to an occasionally binding borrowing constraint linked to their income. Policymakers set taxes on borrowing and alternate in power stochastically.

2.1 Households

Households have time separable preferences over consumption bundles of tradable and non-tradable goods:

$$\mathbb{E}_0 \sum_{t=0}^{\infty} \left(\prod_{j=0}^{t} \beta_j \right) u(c_t) \,. \tag{1}$$

We use a CRRA utility function over a consumption composite, c. The composite has a CES form:

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

with $\omega \in (0,1)$ denoting the weight on tradable consumption and where $\gamma > 0$ is the elasticity of substitution between tradable and non-tradable consumption, and β_t denotes the stochastic impatience of the households with the following process:

$$\beta_t = \bar{\beta}(1+\iota_t) \,, \tag{2}$$

where $\bar{\beta} \in (0,1)$ denotes the average impatience, $\iota_t \in [\underline{\iota}, \bar{\iota}]$ is i.i.d, and $\mathbb{E}[\iota_t] = 0$.

Households receive a stochastic endowment of tradable goods y_t^T and a constant endowment of non-tradable goods y^N. We assume that y_t^T follows a first-order Markov process. The budget constraint of the households is

$$p_t^N c_t^N + c_t^T + \frac{1}{R(1+\tau_t)} b_{t+1} = p_t^N y^N + y_t^T + b_t + T_t \,, \tag{3}$$

where b_t denotes a one-period non-state-contingent asset, which carries an interest rate R, τ_t is a tax on borrowing, and T_t are lump-sum transfer from the government. We normalize the price of tradable goods to one, and p_t^N stands for the relative price of non-tradable goods.

Household's debt $(-b_{t+1})$ cannot exceed a fraction κ of the value of its endowment:

$$b_{t+1} \geq -\kappa(y_t^T + p_t^N y^N) \,. \tag{4}$$

The constraint captures, in a parsimonious way, the empirical fact that income is critical in determining households' credit-market access (e.g., Jappelli, 1990; Lian and Ma, 2021), and from a macro perspective, it has been shown to be important for accounting for the dynamics of capital flows in emerging markets (e.g., Mendoza, 2002; Bianchi, 2011).

The problem of the households is to maximize (1) subject to (2)–(4) taking prices and taxes as given. The first optimality condition of this problem yields a standard condition equating the marginal rate of substitution between tradable and non-tradable goods to their relative price:

$$p_t^N = \frac{1-\omega}{\omega}\left(\frac{c_t^T}{c_t^N}\right)^{1/\gamma} . \tag{5}$$

The intertemporal Euler equation is:

$$u_T\left(c_t^T, c_t^N\right) = \beta R(1+\tau_t)\mathbb{E}u_T\left(c_{t+1}^T, c_{t+1}^N\right) + \mu_t\,, \tag{6}$$

where μ_t^H is the non-negative Lagrange multiplier on the borrowing constraint and u_T denotes the derivative of the household's utility with respect to the consumption of tradable goods.

2.2 Government

The budget constraint of the government is

$$T_t = -\frac{\tau_t}{1+\tau_t}\frac{B_{t+1}}{R}\,, \tag{7}$$

where we use upper-case B to denote the aggregate bond level.

Political parties rotate in power following an exogenous stochastic process. Let $g_t \in \{i, r\}$ be an indicator variable representing the identity of the incumbent party in period t, with i referring to the "irresponsible" party and r to the "responsible" one.

In particular, we assume the political process follows a Markov process characterized by a transition probability matrix:

$$\Gamma = \begin{bmatrix} \Gamma_i & 1-\Gamma_i \\ 1-\Gamma_r & \Gamma_r \end{bmatrix}, \tag{8}$$

where Γ_g is the probability that the incumbent party $g \in \{i, r\}$ remains in power in the next period.

2.3 Competitive Equilibrium

Market clearing in the non-tradable goods market implies that

$$c_t^N = y_t^N \,. \tag{9}$$

Combining this market clearing condition with households and government budget constraints, we arrive at a country resource constraint for tradables:

$$c_t^T + \frac{B_{t+1}}{R} = y_t^T + B_t \,. \tag{10}$$

We are now ready to define a competitive equilibrium.

Definition 1. (Competitive Equilibrium) Given initial assets b_0, the sequences of government policies $\{\tau_t, T_t\}_{t=0}^{\infty}$; 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. Given prices, and government policies, $\{c_t^T, c_t^N, b_t\}_{t=0}^{\infty}$ maximize (1) subject to (3) and (4);

ii. The government budget constraint is satisfied. That is, (7) holds;

iii. Market clears. That is, (9) holds and $b_t = B_t$.

Discussion of the political structure The structure of the political block of the model merits a brief discussion at this point. One interpretation of the political transition game is that parties may have a different ideological bias for or against regulation. An alternative interpretation is that some policymakers may not want to implement the optimal policy because they have concerns about their reelection prospects (e.g., Herrera, Ordonez and Trebesch, 2020 and Cotoc, Johri and Sosa-Padilla, 2023) or because they represent a constituency that is particularly affected by the regulation. We make the simplifying assumption that the irresponsible party sets prudential taxes to zero at all times. Relaxing this assumption and considering instead that this party faces private costs of introducing regulation would not change the main message of our paper.

2.4 Constrained-Efficient Allocations

We close the description of the model by defining the constrained-efficient allocations in this environment, following Bianchi (2011). Consider a planner who chooses the debt subject to the resources and borrowing constraints. These allocations are a helpful benchmark because they are equivalent to the choices of a responsible government if it were immune to political turnover. The problem of the constrained planner is

$$\begin{aligned} V^{SP}(s,B) = \max_{c^T,B'} & \; u(c^T,y^N) + \beta \mathbb{E} V^{SP}(s',B') \\ \text{s.t} \quad & c^T + \frac{B'}{R} = y^T + B \\ & B' \geq -\kappa \left[y^T + \mathcal{P}^N(c^T) y^N \right] \end{aligned} \tag{11}$$

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

The Euler equation that characterizes the optimal allocations of the social planner is:

$$\frac{u_T(c^T,y^N)}{R} = \beta \mathbb{E} \left[u_T(c^{T\prime},y^N) + \frac{\partial \mathcal{P}^N}{\partial c^T} \kappa \mu' \right] + \mu \left(1 - \frac{\partial \mathcal{P}^N}{\partial c^T} \frac{\kappa}{R} \right) . \tag{12}$$

As in Bianchi (2011), the pecuniary externality is reflected in a wedge in the planner's Euler equation relative to the Euler equation of individual households (6). When the borrowing constraint binds, $\mu > 0$[2], higher tradable consumption helps to appreciate the real exchange rate (i.e., to increase the relative price of non-tradable goods) and relaxes other households' borrowing constraints. When the borrowing constraint is not binding, $\mu = 0$, higher savings imply higher consumption tomorrow, positively affecting tomorrow's borrowing capacity. These dynamics imply there is scope for policy intervention in this environment.

3 Macroprudential Policy under Political Frictions

We next consider the political game between the two parties. We solve the problem of each party, subject to the implementability constraints derived from the problem of the households, and take the other party's policies as given. We focus on Markov equilibria, so the payoff relevant aggregate state variables are $s \equiv \{y^T, \beta\}$, g and B.

[2]With some abuse of notation, we denote by μ the multipliers in the borrowing constraint for all agents in this economy, including the social planner.

3.1 Responsible government

When the responsible party (r) is in power, it chooses the macroprudential tax τ that maximizes the welfare of the households subject to the allocations being a competitive equilibrium. The problem can be written as:

$$V^r(B,r,s) = \max_{c^T,B'} u\left(c^T, y^N\right) + \beta\left[\Gamma_r \,\mathbb{E}\, V^r(s',r,B') + (1-\Gamma_r)\,\mathbb{E}\, V^r(s',i,B')\right] \tag{13}$$

$$\begin{aligned} &\text{subject to} \\ c^T + \frac{B'}{R} &= y^T + B \\ B' &\geq -\kappa\left[y^T + \mathcal{P}^N(c^T) y^N\right] \end{aligned}$$

The key difference between the responsible party and the social planner problem (**??**) is that the continuation value reflects that with probability $(1-\Gamma_r)$, it will not be able to make optimal choices. In particular, its value function next period reflects is given by

$$V^r(B,i,s) = u\left(\mathcal{C}^T(B,i,s), y^N\right) + \beta[\Gamma_i \mathbb{E} V^r(s',i,\mathcal{B}(B,i,s)) + (1-\Gamma_i)\,\mathbb{E}\, V^r(s',r,\mathcal{B}(B,i,s))] \tag{14}$$

where $\mathcal{C}^T(s',g,B')$ and $\mathcal{B}(s',g,B')$ stand for the equilibrium consumption of debt functions when the aggregate debt is B, the state is s, and $g = \{i,r\}$ depending on whether the responsible or irresponsible government is power.

3.2 Irresponsible government

The irresponsible government is constrained to setting $\tau(B,i,s) = 0$ when in power. Consumption and borrowing satisfies

$$\mathcal{C}^T(s,i,B) = y^T + B - \frac{\mathcal{B}(s,i,B)}{R} \tag{15a}$$

$$\mathcal{B}(s,i,B') \geq -\kappa\left[y^T + \mathcal{P}^N\left(\mathcal{C}^T(s',i,B)\right) y^N\right] \tag{15b}$$

$$u_T\left(\mathcal{C}^T(s,i,B), y^N\right) \geq \beta R\left[\Gamma_i \mathbb{E} u_T(\mathcal{C}^T(s',i,B'), y^N) + (1-\Gamma_i)\mathbb{E}\, u_T\left(\mathcal{C}^T(s',r,B'), y^N\right)\right] \tag{15c}$$

where the last constraints holds with equality if $\mathcal{B}(s,i,B') < \kappa\left[y^T + \mathcal{P}^N\left(\mathcal{C}^T(s,i,B)\right) y^N\right]$. We assume implicitly that the allocations that solve these conditions are unique, which we verify numerically is the case under our calibration.

3.3 Markov Equilibrium

We define the Markov perfect equilibrium of this environment as follows.

Definition 2. (Markov Equilibrium) A Markov perfect equilibrium is defined by policy functions $\{\mathcal{C}^T(B,g,s), \mathcal{B}(B,g,s)\}$; value functions $V^r(B,g,s)$ for $g \in \{i,r\}$ such that; $\{\mathcal{C}^T(B,r,s), \mathcal{B}(B,r,s), V^r(B,g,s)\}$ solve the problem of the responsible party (13), $\{\mathcal{C}^T(B,i,s), \mathcal{B}(B,i,s)\}$ solve (15) and $V^r(B,i,s)$ satisfy (**??**)

Next, we analytically characterize the optimal policy of the responsible government and compare it to the constrained efficient tax that would implement the solution of a social planner who does not face political frictions.

3.4 The Generalized Euler Equation (GEE)

Now, we characterize the optimal policy in the environment with stochastic turnover. We define μ_t^r as the Lagrange multiplier of the borrowing constraint in the problem of the responsible party. The first-order condition for debt is:

$$\frac{u_T(c^T)}{R} = \beta \left[\Gamma_r \mathbb{E} \frac{\partial V^r(s',r,B')}{\partial B'} + (1-\Gamma_r)\, \mathbb{E} \frac{\partial V^r(s',i,B')}{\partial B'} \right] + \left(1 - \frac{\partial \mathcal{P}_t^N(s',r,B')}{\partial c^T} \frac{\kappa}{R}\right) \mu \quad (16)$$

With some abuse of notation, from now on, we denote $u_T(c_t^T) = u_T(c_t^T, y^N)$. To calculate the derivative of the value function of the responsible party when it remains in power, we can use the envelop condition:

$$\frac{\partial V^r(B,r,s)}{\partial B} = u_T(c^T) + \frac{\partial \mathcal{P}^N(B,r,s)}{\partial c^T} \kappa \mu \quad (17)$$

On the other hand, to calculate the derivative when the irresponsible party comes to

power, we have:

$$\frac{\partial V^r(B,i,s)}{\partial B} = u_T(c^T)\left(\frac{1}{R} - \frac{\partial \mathcal{B}(B,i,s)}{\partial B}\right) + \frac{\partial \mathcal{P}^N(B,r,s)}{\partial c^T}\kappa\mu + \beta\frac{\partial \mathcal{B}(B,i,s)}{\partial B} \times \left[\Gamma_i \, \mathbb{E}\, \frac{\partial V^r(s',i,\mathcal{B}(B,i,s))}{\partial B'} + \, (1-\Gamma_i)\mathbb{E}\, \frac{\partial V^r(s',r,B')}{\partial B'} + \left(1 - \frac{\partial \mathcal{P}^N(s',i,B')}{\partial c^{T\prime}}\kappa\right)\mu^{r\prime}\right] \quad (18)$$

From now on, we will focus on the macroprudential motives of the responsible government. So, we will focus on states where the borrowing constraint is not binding ($\mu_t^r = 0$). We combine (16)–(18) to obtain:

$$u_T(c^T) = \beta R\left[\Gamma_r \mathbb{E}_r \, \left(u_T(c^{T\prime}) + \frac{\partial \mathcal{P}^N(s',r,B')}{\partial c^{T\prime}}\kappa\mu^{r\prime}\right) + (1-\Gamma_r) \, \mathbb{E}_r\left[\left(u_T(\mathcal{C}^T(s',i,B')) + \frac{\partial \mathcal{P}^N(s',r,B')}{\partial c^{T\prime}}\kappa\mu^{r\prime}\right)\left(\frac{1}{R} - \frac{\partial \mathcal{B}(B,i,s)}{\partial B}\right) - \beta'\frac{\partial \mathcal{B}(s',i,B')}{\partial B'}\left[u_T(\mathcal{C}^T(s'',i,B'')) - (1-\Gamma_i)\,\frac{\partial V^i(s'',r,B'')}{\partial B''} - \Gamma_i \, \frac{\partial V^i(s'',r,\mathcal{B}(s'',r,B''))}{\partial B''} - \left(1 - \frac{\partial \mathcal{P}^N(s'',i,B'')}{\partial c^{T\prime}}\kappa\right)\mu^{r\prime\prime}\right]\right]\right] \quad (19)$$

Suppose the household chooses optimal consumption and debt policy when the irresponsible party is in power. In that case, we can use the envelop theorem to cancel the second line in (19) and recover the Euler equation that characterizes the solution of the constrained efficient allocations (12). Instead, the FOC of the responsible government accounts for the deviations from the optimal policy when the irresponsible party is in power. In particular, the responsible party reduces debt because there might be the case that in the future, they will get out of power. Consequently, households would overborrow due to the lax macroprudential policy of the irresponsible party. The best response of the responsible party is to increase current taxes to reduce the exposure of the economy and reduce future over-borrowing. In the next subsection, we will show that this effect leads to the responsible government's more aggressive macroprudential policy than the constrained efficient policy. Iterating forward the GGE of the responsible party is

Lemma 1. *(Generalized Euler Equation) Let $\mu_t^r(s)$ be the Lagrange multiplier on the borrowing constraint. The Generalized Euler Equation (GEE) for the responsible party satisfies:*

$$u_T(c_t^T) = \beta_t R\Bigg[\Gamma_r \mathbb{E}\left(u_T(c_{t+1}^T) + \frac{\partial \mathcal{P}_t^N}{\partial c_t^T}\kappa\mu_{t+1}^r\right) + (1-\Gamma_r)\Bigg[\sum_{n=1}^{\infty}(\Gamma_i)^n \prod_{j=t}^{t+n}\beta_j\left(\frac{\partial \mathcal{B}}{\partial B}\right)$$
$$\Bigg[\mathbb{E}\left(\left(u_T(\mathcal{C}^T(s_{j+1}, i, B_{j+1})) + \frac{\partial \mathcal{P}_j^N}{\partial c_j^T}\kappa\mu_j^r\right)\left(1 - \frac{1}{R}\frac{\partial \mathcal{B}}{\partial B}\right)\right) +$$
$$(1-\Gamma_i)\mathbb{E}_r\left(u_T(c_{j+1}^T) + \frac{\partial \mathcal{P}_{j+1}^N}{\partial c_{j+1}^T}\kappa\mu_{j+1}^r\right)\Bigg]\Bigg]\Bigg] \quad (20)$$

Proof. See Appendix A.1. □

The GEE of the responsible government equates the marginal utility of current consumption with the cost of carrying higher debt into the future. The cost of the debt depends on which party will be in power in all possible future histories. The first term on the right-hand side of the equation is the marginal cost of one unit of debt if the responsible party remains in power. The second term measures the cost of one unit of debt if the irresponsible party takes power in any history in the future. Note the future cost of one unit of debt when the irresponsible party is in power depends on the derivatives of the optimal debt policy function of the irresponsible government and on the sequence of Lagrange multipliers of the borrowing constraints.

3.5 Tax Function

One of the key results in the literature on macroprudential policy is that the competitive equilibrium is inefficient if and only if, at least for some states, the borrowing constraint is binding in the next period. This, in turn, implies that macroprudential policy has no role in states where the probability of the borrowing constraint binding the next period is zero. This result no longer holds for an economy with political frictions.

Proposition 1. *(Macroprudential Policy is always active.) Define $s_t = \{y_t^T, \beta_t\}$. Let $\mu_t^r(s_t, g_t, B_t)$ be the Lagrange multiplier on the borrowing constraint, and let $\tau_t(s_t, r, B_t)$ the state contingent tax that implements the solution of the problem of the responsible government. Assume there exist $\mu_{t+h}^r(s_{t+h}, g_{t+h}, B_{t+h}) \neq 0$ for any $h > 0$ in a given*

state s_{t+h}. *Then* $\tau_t(s_t, r, B_t) > 0$.

Proof. See Appendix A.2. □

Proposition 1 summarizes a key difference between the optimal policy in our model and the one typically found in the literature. In the model, households do not internalize the effect of their decisions on the price of non-tradable goods. They do not consider that by taking more debt, they are reducing their expected consumption of tradable goods in the next period, thus reducing prices and increasing the probability of the borrowing constraint binding. In a model without political frictions, the externality is irrelevant in states where the probability that the constraint binds in the next period is zero. In those states, the household's debt policy coincides with the efficient one, and the constrained efficient tax is zero. Critical for the results is that without political frictions, the government will adjust macroprudential policy if risk increases to prevent households from overborrowing.

In contrast, with political frictions, even if the probability of a crisis in the next period is nil, there is still a chance that some macroprudential policy would be necessary down the road if the risk were to increase. It might also be that future governments will be irresponsible and not implement the necessary regulations. This implies that if the risk increases, the economy will overborrow. In response, the optimal regulation is more aggressive in reducing the risk.

On the other hand, in Lemma 1, we see that whenever $\mu_{t+1} \geq \mu_{t+1}$ the macroprudential policy is more aggressive than the constrained efficient policy. The mechanism is as follows. In states with a chance of crisis in the next period, the tax implemented by the responsible party eliminates the current overborrowing of households just as the constrained efficient tax does. But it also reduces future overborrowing. Consequently, the responsible party will always set a more aggressive macroprudential policy in the presence of political frictions. Although there is no formal proof for this result, in the next section, we show that this feature holds in the numerical solution of the model under our baseline calibration.

4 Quantitative Analysis

In this section, we describe the solution of the quantitative model to explore the implications of political frictions. We solve the model for three different economies: (i) an "Unregulated" economy where the irresponsible party is always in power, (ii) a "constrained efficient" economy where the responsible party is always in power, and (iii) a regulated economy with political frictions.

4.1 Calibration

The calibration strategy follows Bianchi (2011). All parameter values used in the baseline calibration are in Table 1. We set a series of parameters to predetermined values, common in the literature, while other parameters are calibrated to match moments of interest in the Argentine economy.

Table 1: Calibration

	Value	Source
Interest rate	$R = 1.04$	Bianchi (2011)
Risk aversion	$\sigma = 2$	Bianchi (2011)
Elasticity of substitution	$\gamma = 0.83$	Bianchi (2011)
Weight on tradable in CES	$\omega = 0.31$	Share of tradable output Argentina
Stochastic structure	$\rho = 0.5$	Argentine economy
Mean of discount factor	$\bar{\beta} = 0.904$	Average NFA-GDP ratio
Stochastic part of discount factor	$\iota \in [-0.05\,, 0.05]$	Uniform distribution
Credit coefficient	$\kappa = 0.32$	Frequency of crises
Prob. of reelection of responsible gov.	$\Gamma_r = 0.22$	Mean in data
Prob. of reelection of irresponsible gov.	$\Gamma_i = 1 - \Gamma_r$	No persistence in pol. process

The predetermined parameters are the coefficient of relative risk aversion, which we set to $\sigma = 2$, the international interest rate $R = 1.04$, and the elasticity of substitution $\gamma = 0.83$.

We assume the endowment of tradable goods follows a log-normal AR(1) process with a persistence $\rho = 0.5$ to match the Argentine tradable sector as in Bianchi (2011).[3] For simplicity, we assume the endowment of non-tradable goods is constant, so we normalize it to $y^N = 1$. Also, we set $\omega = 0.31$ to match the average share of the tradable output of Argentina. We set $\bar{\beta} = 0.904$ to match the average net foreign asset position-to-GDP. We assume ι follows a uniform distribution with support $[-0.05, 0.05]$. Also, we assume $\kappa = 0.32$ to match the observed frequency of "sudden stops" in the data.

The political process is described by the values of the transition matrix of the party in power, Γ. In the baseline calibration, we assume no persistence in the political process. Given this assumption, the political process can be summarized by one parameter. In particular, we use data on party orientation and the use of capital inflow taxes to parametrize this Markov

[3]For the calibration strategy of non-tradable goods, we follow the procedure described in the supplement material (the Matlab code available online) to calibrate the model when the endowment of non-tradable goods is constant

process so that the party more likely to use capital controls is in office 22% of the time.[4] Additionally, we perform a sensitivity analysis to show that the main results of the paper are robust to different parametrizations of this political process.

We solve the Markov equilibrium of the model using value function iteration to determine the optimal policy function of the responsible party. Additionally, we use time iteration to the optimal policy when the irresponsible party is in power. Further details on the numerical solution can be found in Appendix B.

4.2 Optimal Tax Policy

Figure 1 shows the tax policy of the responsible party and the social planner for mean values of the tradable endowment and the impatience of the households. First, note that the optimal tax is zero for high debt levels in both economies. In those states, the borrowing constraint is already binding, so there is no scope for macroprudential policy. The social planner and the responsible party set high taxes for intermediate debt levels to reduce the crisis probability. However, the responsible government implements a more aggressive policy. Finally, for low levels of debt, the constrained-efficient tax converges to zero while the tax of the responsible party does not, which is consistent with the analytical results (see Proposition 1).

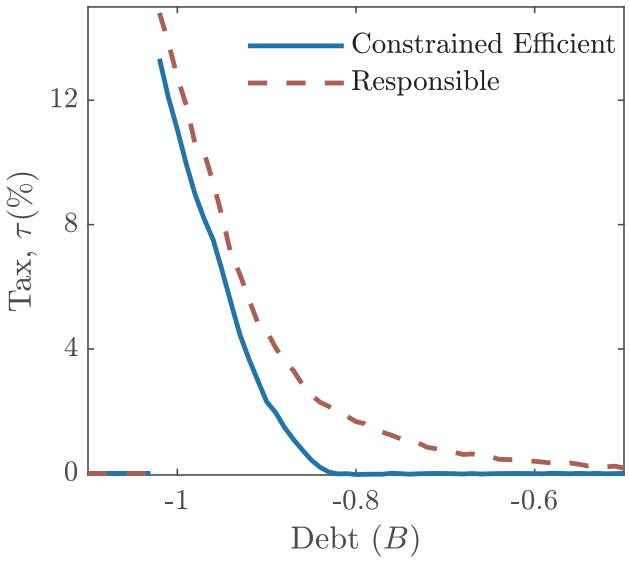


Figure 1: Tax

Note: This figure is computed assuming the endowment of tradable goods and the impatience of the households are their respective means ($y^T = 1$ and $\beta = 0.904$).

[4]See section 5.7 for details about the data.

Next, we perform an event analysis comparing the macroprudential policy in the model and the data. We analyze episodes of sudden stops. For the model, we follow the literature in classifying an event as a sudden stop if the borrowing constraint binds and the current account falls by more than one standard deviation compared to the historical mean. On the other hand, we follow the empirical literature for the data to define a sudden stop as any event in which the current account falls two standard deviations below its mean.

In Figure 2, we use data from Das et al. (2022) on changes in capital controls to construct measures of how countries use macroprudential policy around episodes of sudden stops. In particular, we use a measure that takes a value of one if a country introduces a capital control and minus one if it removes a capital control. We focus on capital controls on inflows because they better represent the type of macroprudential policy that we study in the model. We can see that in the data, the typical crisis is preceded by periods in which countries tend to remove capital controls.

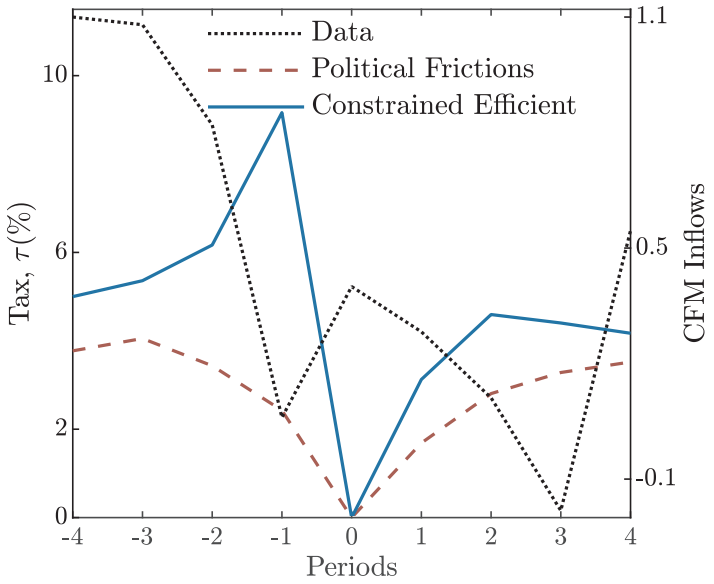


Figure 2: Tax on Borrowing around Crises

Note: This figure plots the simulation results of both the constraint-efficient and the political-frictions economies. Period zero corresponds to a sudden stop. We present the average tax policy for five periods before and after the sudden stop.

In Figure 2, we also present an event analysis of the optimal tax in the economies with and without political frictions. We can see two very different patterns of the optimal policy in those economies. On average, in a constrained-efficient economy, the planner increases taxes just before a sudden stop episode because she perceives that risk builds up and tries to avoid the crisis. On the other hand, in an economy subject to political frictions, macroprudential

regulation, on average, decreases in periods before an episode of sudden stop. As in the data, in this economy, the typical crises follow credit booms fueled by lax regulation.

4.3 Optimal Debt Policy

Figure 3 plots the optimal policy functions for debt when the endowment is one standard deviation below the mean and the impatience of the households is at the mean. For an economy with political frictions, we plot the optimal policy when both the irresponsible and the responsible parties are in power. The numerical results first show that households take, in general, less debt when there is a responsible party in power compared to an efficient economy. This is explained by the fact that the responsible government uses a more aggressive macroprudential policy than the policy of the social planner. Second, households take less debt when the irresponsible party is in power compared to the unregulated economy. The intuition of this result is that the policy functions are affected by the expected tax policy in the next period, which is always different from zero because there is a chance of political turnover, bringing back the responsible party into office.

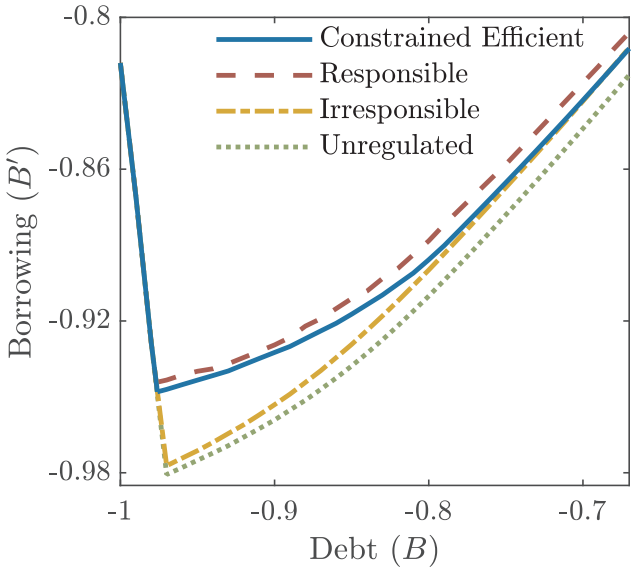


Figure 3: Policy functions

Note: This figure is computed assuming the endowment of tradable goods and the impatience of the households are at the mean. This is, $y^T = 1$ and $\beta = 0.904$.

Figure 4 shows the ergodic distribution of debt in all three economies. 56.2% of the time, the unregulated economy visits a level of debt that the efficient one never does. Moreover, 23.8% of the time, the economy with political frictions visits levels of debt that the constraint

efficient never does. We can see a loss in the macroprudential policy's effectiveness in reducing the economy's debt level in an environment with political frictions. However, the effect of the prudential policy remains sizeable.

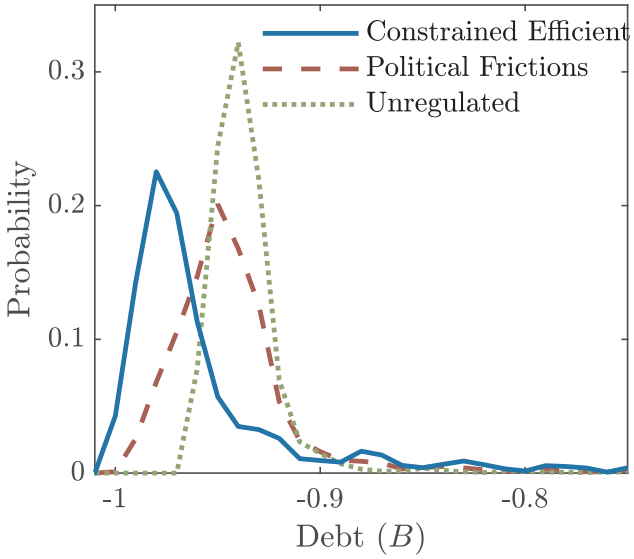


Figure 4: Ergodic Distributions

Finally, we perform a simulation exercise to evaluate the probability of sudden stops in the three economies. Table 2 presents the probability of a sudden stop derived from the models' simulations. The social planner effectively reduces the probability of crises from 11.1% to 2.2%, while the responsible government gets to reduce it to 5.3%.

Table 2: Probability of Sudden Stop

Constrained Efficient	2.2%
Political Frictions	5.3%
Unregulated Economy	11.1%

4.4 Welfare Analysis

Now, let us measure the welfare cost of political frictions. For every initial state, we compute the percentage increase in consumption in all possible future histories that the household would require to be indifferent between living in an economy with political frictions or in a constrained-efficient economy. Due to the homotheticity of the utility function, the welfare gain γ in state s is given by:

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

Figure 5 shows the welfare cost of the political friction as a function of current bond holdings. In panel 5a, we show the cost for a level of endowment one standard deviation below the mean when the government in power is responsible or irresponsible. Panel 5b shows the same functions for an endowment one standard deviation above the mean. We can see in Panel 5a that for very high levels of debt, the cost of political friction is relatively low because the economy is already in the crisis zone. The cost increases for intermediate debt levels but increases more when the irresponsible party is in power. On the other hand, the risk is lower for high levels of endowments (Panel 5b), so both the cost of the distortion and the difference across parties are smaller. Intuitively, when risk is low, either because the endowment is high or because debt is low, there is less need for a macroprudential policy, and the cost of the political frictions is lower. Instead, for a combination of endowment and debt close to the crisis zone, having an irresponsible government is costly for the economy because those are the estates where having an active macroprudential policy has a higher impact on welfare.

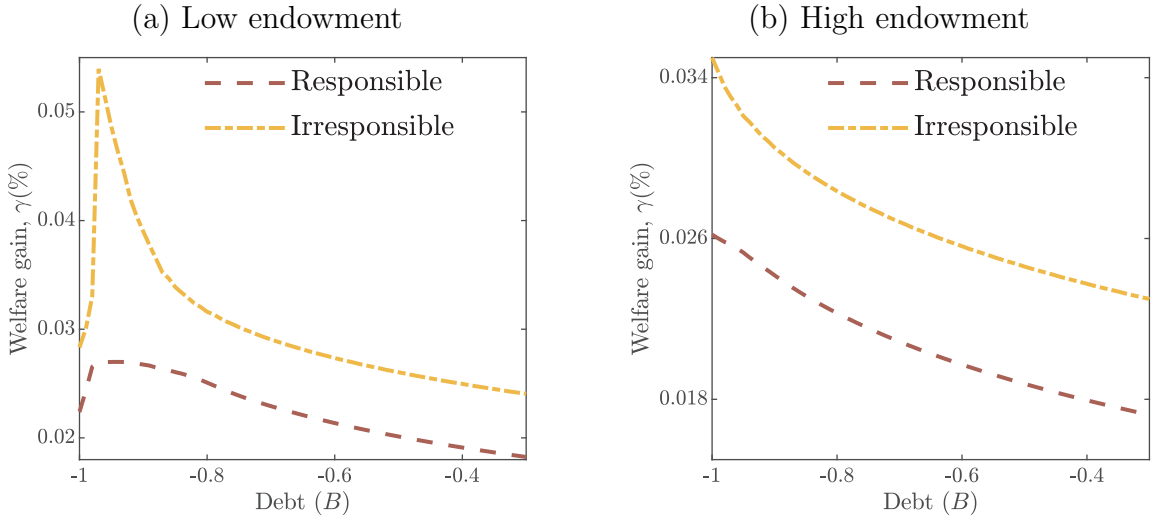


Figure 5: Welfare Losses of Political Frictions

Note: This figure is computed assuming the impatience of the households is at the mean $\beta = 0.904$. The figures assume the current government is responsible.

On average, a household would require an increase in consumption of 0.021% to be indifferent between living in an economy subject to political frictions and moving to a constrained-efficient one.

4.5 Sensitivity Analysis

This sub-section evaluates how our main results change when we change the political process's parameters. We focus on two measures: the mean of the welfare cost and the mean tax conditional on the responsible party being in power. To do so, we fix all other parameters to their values in the baseline calibration and change values in the transition matrix of the political process (Γ). For each exercise, we only change one probability of re-election at a time. As we change the probability of re-election, the political process has persistence.

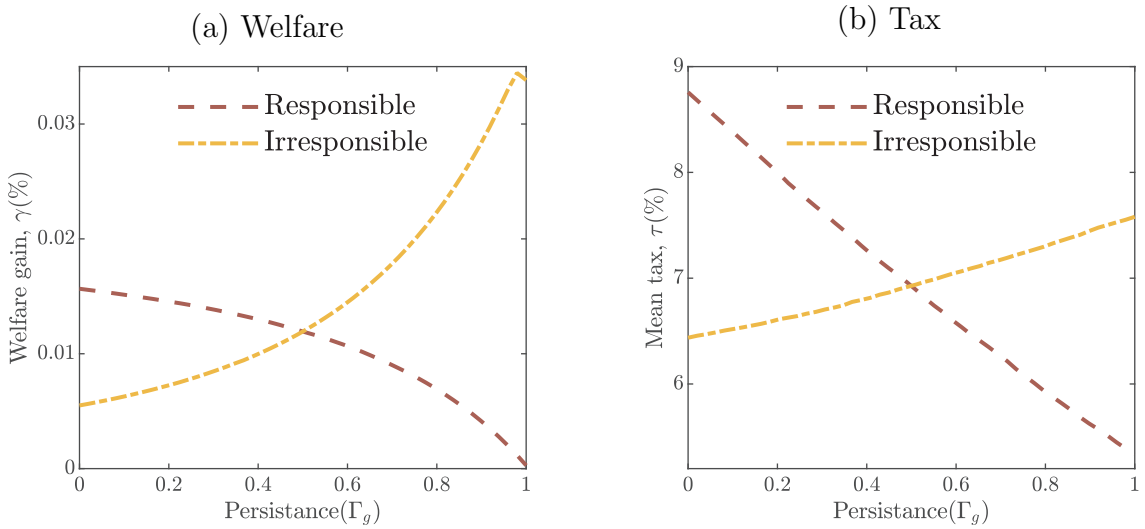


Figure 6: Sensitivity Analysis

Note: In this figure, we keep fixed all parameters at the value in the baseline and change only the probability of re-election (Γ_g) of one party at the time. The average tax is conditional on a responsible government. The welfare corresponds to the gains from removing the political economy friction.

Figure 6a shows the sensitivity analysis for the welfare cost of political frictions. The dashed red line shows how the welfare cost changes as we increase the probability that the responsible government gets reelected, Γ_r. The dotted yellow line plots how the welfare cost changes as we increase the probability that the irresponsible government gets reelected, Γ_i. In both cases we keep all other parameters unchanged. We can see that the welfare costs of political frictions goes down as the probability of reelection of the responsible party goes to one. On the other hand, the welfare costs increase as we increase the probability of the irresponsible party being in power.

In Figure 6b we show how the tax chosen by the responsible party changes as we vary the

reelection probability of each party. As expected, the mean tax increases as the probability of the irresponsible party being in power increases. This reflects the fact that the responsible party sets more aggressive regulations when the probability of losing power in the next period is higher.

5 Effectiveness of Regulation: Theory Meets Evidence

A vast amount of empirical literature has focused on estimating the effects of capital controls on different variables of interest and assessing the effectiveness of preemptive policy measures of the kind we study in this paper. A significant challenge in this literature revolves around endogeneity concerns, which arise from the potential presence of omitted variables and reverse causality.[5] Using structural relations implied by our model, we first establish that the typical OLS estimation suffers from endogeneity bias and then propose an IV specification that corrects this bias and performs better prediction.

5.1 Political Process

At this point, it is useful to put more structure on the political process. Each period, an election is held during which voters decide which party will be in office. We assume that voters derive a stochastic utility ν_t if the irresponsible party is in power (see Lindbeck and Weibull, 1987 and Davis, DeGroot and Hinich, 1972 for references on this type of preferences). Additionally, we assume that voters derive a fixed utility $\overline{\nu}$ if the responsible party is in power. Therefore, the decision rule of the voters is as follows:

$$g_t = \begin{cases} i & \text{if} \quad \nu_t \geq \overline{\nu}, \\ r & \text{otherwise.} \end{cases} \tag{21}$$

We model ν_t as a convex combination of a persistent component χ_t (which itself follows an AR(1) process) and of an i.i.d component ϱ_t. Therefore, we have:

$$\nu_t = \lambda \chi_t + (1 - \lambda)\varrho_t \,, \tag{22}$$

where $\lambda \in [0, 1]$. From (21) and (22), we can derive a Markov process for the identity of the incumbent party (g_t), mapping the transition probabilities of χ_t and ϱ_t to the transition

[5] There are, of course, attempts to alleviate partially such endogeneity concerns by resorting to microdata and by using high-frequency data that allows control better for variables that are correlated with the use of preemptive capital control (e.g., Das et al., 2022; Andreasen, Schindler and Valenzuela, 2019).

matrix that we used in the analysis of the model (equation 8).

5.2 Structural Linear Relations

Our model features key structural relations for the debt and the tax, both as functions of the initial states. According to Lemma 2, we can approximate these (potentially non-linear) relations as simple linear functions of the initial states.

Lemma 2. *(Structural relations of the model) Let* $\{\mathcal{B}(B,g,s),\tau(B,g,s)\}$ *denote the debt and tax policies part of the Markov equilibrium. Then, it is possible to write the linear approximations of the policy functions as:*

(i) $B_{t+1} = \Upsilon_0 + \Upsilon_B B_t + \Upsilon_\tau \tau_t + \Upsilon_y y_t^T + \Upsilon_\beta \beta_t + \Upsilon_g g_t + o_t$, *and*

(ii) $\tau_t = \gamma_0 + \gamma_B B_t + \gamma_y y_t^T + \gamma_\beta \beta_t + \gamma_g g_t + u_t$,

where $\Upsilon_g = 0$ *if and only if the political process is not persistent (i.e.,* $\lambda = 0$*).*

Proof. See Appendix A.3. □

First, o_t and u_t stand for the non-linearities of the debt and tax policy functions. Also, Υ_g accounts for the persistence of the political process. In particular, if $\lambda \neq 0$, the political process is persistent, and the identity of the incumbent party has explanatory power over the level of external debt beyond the effect of the current tax. The intuition is the following: when the political process is persistent, the identity of the incumbent affects the probability of political turnover in the next period, and in turn, this affects the expected sequence of future taxes and the current borrowing choices of the household. Note that (i) $\Upsilon_\beta > 0$ because the more patient households are, the more assets they will accumulate (i.e., the less debt they will carry), and (ii) $\gamma_\beta < 0$ because when the households are more patient, the government uses macroprudential policy less aggressively. This occurs because households take less debt; therefore, the economy is exposed to less risk.

Next, we will use the structural linear relations derived in Lemma 2 to analyze a common econometric model used to estimate the effect of capital controls on the current account. Critically, we will establish that when $\Upsilon_g = 0$, it is possible to get an unbiased estimation of the coefficient of interest (i.e., the effect of capital controls on the current account) using the identity of the political party in power as an instrument for capital controls. Instead, when $\Upsilon_g \neq 0$, we need to identify the non-persistent shocks to the political process (ϱ_t) and use them as an instrument to obtain an unbiased estimate of the coefficient of interest.

5.3 Endogeneity Bias in the OLS Estimation

Consider the following econometric model aimed at estimating the effect of macroprudential policy on the current account:

$$CA_t = \delta_0 + \delta_B B_t + \delta_\tau \tau_t + \delta_y y_t^T + \epsilon_t \quad s.t. \quad \mathbb{E}[\epsilon_t] = 0 \tag{23}$$

We are not including shocks to the impatience of households in (23). We do so to acknowledge that this is an unobservable variable in most relevant empirical applications. Next, we will investigate the consequences of this omitted variable in the properties of the estimation.

First, we use the definition of the current account ($CA_t \equiv B_{t+1} - B_t$), Lemma 2 and (23) to get a mapping between the parameters of the regression model and the structural relations of the endogenous variables:

$$\begin{aligned}
\delta_0 &= \Upsilon_0 + \Upsilon_\beta \bar{\beta} + \mathbb{E}[o_t] \\
\delta_b &= \Upsilon_b - 1 \\
\delta_y &= \Upsilon_y \\
\delta_\tau &= \Upsilon_\tau \\
\epsilon_t &= (o_t - \mathbb{E}[o_t]) + \Upsilon_\beta \bar{\beta}\, \iota_{i,t}
\end{aligned} \tag{24}$$

The main coefficient of interest in (23) is δ_τ. Next, we will investigate whether the estimation of (23) using an OLS regression delivers a biased estimate for δ_τ. Recalling that we have argued above that $\Upsilon_\beta > 0$ and $\gamma_\beta < 0$, then it is possible to establish the following proposition.

Proposition 2. *(OLS estimation is biased) Given $\Upsilon_\beta > 0$ and $\gamma_\beta < 0$, let $\hat{\delta_\tau}$ be the OLS estimation of δ_τ in (23). Then, we can show that the OLS estimator is downward biased: $\mathbb{E}[\hat{\delta_\tau} - \delta_\tau] < 0$.*

Proof. See Appendix A.4. □

The negative sign of the bias is related to the structural relation between the omitted variable, the macroprudential policy, and new borrowing. In particular, the omission of the impatience shocks from the regression model introduces a negative correlation between the current account and the capital controls, which makes the OLS estimator smaller than the true coefficient.

5.4 Instrumental Variable

We propose using the political process as an instrument in the first stage of a two-stage IV regression to correct the endogeneity in (23). Let z_t be the proposed instrument in the estimation of (23). As usual, for z_t to be a valid instrument, we must confirm three conditions, which we restate below using the notation in our model.

i) Exogeneity. First, the proposed instrument should be uncorrelated with the error term in (23). This is:

$$Cov(z_t, \epsilon_t) = 0\,. \tag{25}$$

ii) Relevance. Second, we need to establish that the instrument is correlated with the endogenous regressor τ_t conditional on the exogenous variables of the model. This implies:

$$Cov(z_t, \tau_t \,|\, y_t^T, B_t, \beta_t) \neq 0\,. \tag{26}$$

iii) Exclusion. Finally, we need to confirm the exclusion restriction, which states that the instrument only affects the dependent variable CA_t through its effect on the endogenous regressor τ_t.

$$Cov(z_t, CA_t \,|\, \tau_t) = 0\,. \tag{27}$$

Usually, this condition is the most difficult to establish because it is typically impossible to test. In our case, however, we know the data-generating process, and this allows us to analyze conditions under which exclusion holds using the structural relations of the model derived in Lemma 2. It is possible to establish:

Proposition 3. *(IV estimation is unbiased) Let ϱ_t be the non-persistent component of the political process, and $\overline{\delta}_\tau$ be the IV estimation of δ_τ in (23), using ϱ_t as the exogenous instrument. Assume $\lambda \neq 1$. Then, the IV estimator is unbiased: $\mathbb{E}\left[\,\overline{\delta}_\tau - \delta_\tau\right] = 0$.*

Proof. See Appendix A.5. □

Proposition 3 implies that the non-persistent political process component is a valid instrument to solve the endogeneity problem in the estimation of δ_τ. In Proposition 3, we exclude the case of $\lambda = 1$. In this case, the non-persistent shock does not have predictive power over which party will be in office, so ϱ_t would not be a valid instrument because it would violate the relevance condition.

Proposition 3 also implies that if there were no persistence in the political process ($\lambda = 0$), one could use the identity of the incumbent party directly as an instrument in the estimation, formally, in that case, $g_t = \varrho_t$, therefore, setting $z_t = g_t$ delivers a valid instrument. Instead, suppose there is persistence in the political process. In that case, one needs to identify the non-persistent shocks to the political process and use them as a valid instrument in the estimation. In the numerical section, we explore the performance of the estimation on finite samples. We also provide a numerical estimation of the bias on the OLS and IV estimations when we use g_t (the incumbent's identity) directly as an instrument and the political process has persistence.

We also highlight that in this structure, there is a role for ϱ_t (or g_t when $\lambda = 0$) as an instrument for τ_t rather than as a control variable in (23). In fact, one implication of Proposition 3 is that the exclusion restriction is satisfied, which in turn implies $\text{Cov}(\varrho_t, CA_t \,|\, \tau_t) = 0$. Consequently, if we were to use ϱ_t as a control variable in (23), the expected value of its coefficient should be zero.

5.5 Model Based Regressions

Next, we will explore numerically the performance of the OLS and IV estimators in finite samples. To do so, we conduct a Monte Carlo simulation using the calibrated model and estimate (23) using both OLS and IV regressions. For this exercise, we simulate the model and create 30,000 samples of 700 observations each. For each sample, we discard the initial 300 observations. We use the following 300 observations to estimate the econometric model. Finally, we save 100 observations to perform prediction error tests.

Figure 7 shows the distribution of the coefficient of interest (δ_τ) for both regressions. The OLS estimator is negative or positive with roughly similar probabilities. Instead, for the IV exercise, the mean of the estimated coefficients is higher, and its value is never negative.

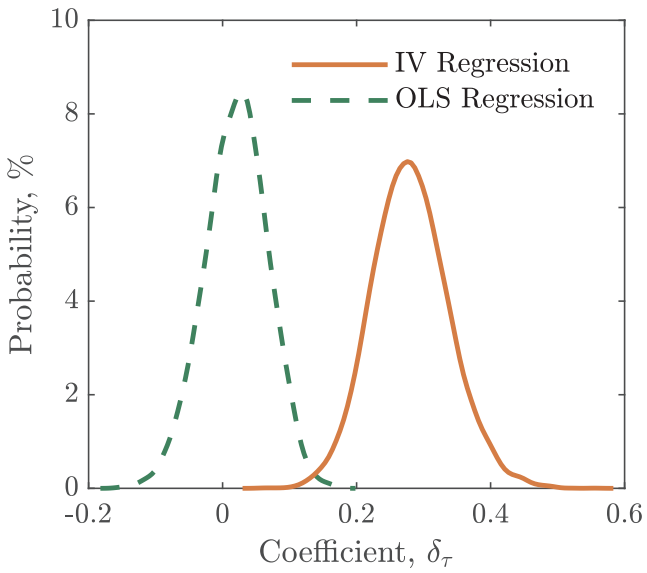


Figure 7: Monte Carlo Comparison

In Table 3, we confirm these results using regressions with large samples. We use a sample size of 10,000 observations. The OLS coefficient is close to zero and the IV identifies an effect of the macroprudential policy that is roughly an order of magnitude larger.

Table 3: Large Samples

Variables	OLS	IV
τ	0.02	0.28
P-value	0.0001	0.00007
Observations	10,000	10,000

We conclude this subsection by comparing the prediction performance of both econometric models. In Figure 8, we plot the current account as a function of the macroprudential tax. We first plot the policy functions from the structural model (the data-generating process). Also, we use the means of the coefficients estimated in the Monte Carlo simulations to construct the linear relations predicted by the OLS and IV estimators. We plot all three models using the mean values for all state variables. We can see that the IV econometric model predicts a linear relation between macroprudential policy and the current account closer to the one in the data-generating process.

Furthermore, we conducted a formal prediction error test using 100 observations. For

most of the observations in the sample, the government tax was between zero and ten percent. As shown in Figure 8, prediction errors are relatively small in that region. However, we find that, on average, the prediction error from the OLS model has a standard deviation of 0.032, whereas, for the IV regression model, it is 0.028.

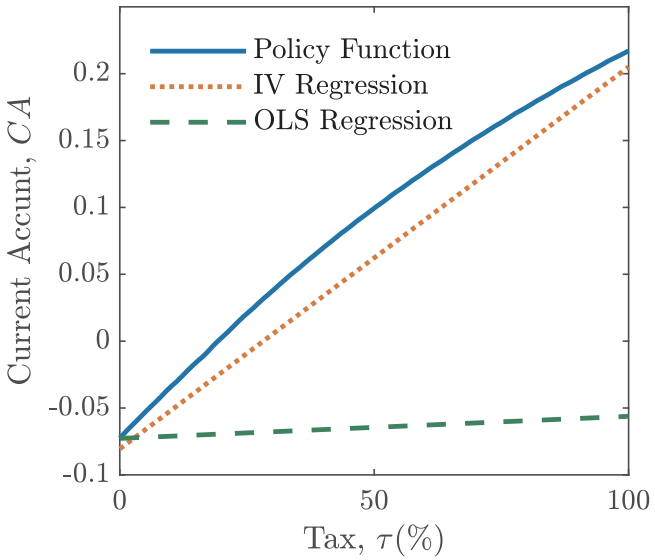


Figure 8: Prediction of the Current Account

Note: This figure is computed assuming the endowment of tradable goods and the impatience of the households are at the mean. This is, $y^T = 1$ and $\beta = 0.904$. The initial debt position is $b_t = -0.7$

5.6 Persistence in the Political Process

Next, we analyze how the results of the econometric analysis change when we change the persistence of the political process, λ. Recall that if the political process has a persistent component ($\lambda > 0$), the exclusion restriction is violated, and the estimation using the identity of the incumbent (g_t) as an instrument is biased. In Figure 9, we explore the size of the bias in the estimation of δ_τ as we change λ.

We plot the mean of the estimated δ_τ using three approaches: an OLS regression, an IV estimation where the instrument is the identity of the political party in power g_t, and an unbiased estimation using the non-persistent shock to the political process (ϱ_t) as the instrument. Consistent with our analytical results, when λ goes is zero, the political process is an i.i.d process, and the IV estimator using the political party in power as an instrument coincides with the unbiased estimation. On the other hand, as we increase the persistence of the political process (by increasing λ), the IV specification produces a biased estimate of δ_τ.

In this case, it is below the true parameter. Additionally, we can see that the OLS estimation is an order of magnitude lower than the true parameter. Also, the IV estimator is always closer to the true parameter for our calibration.

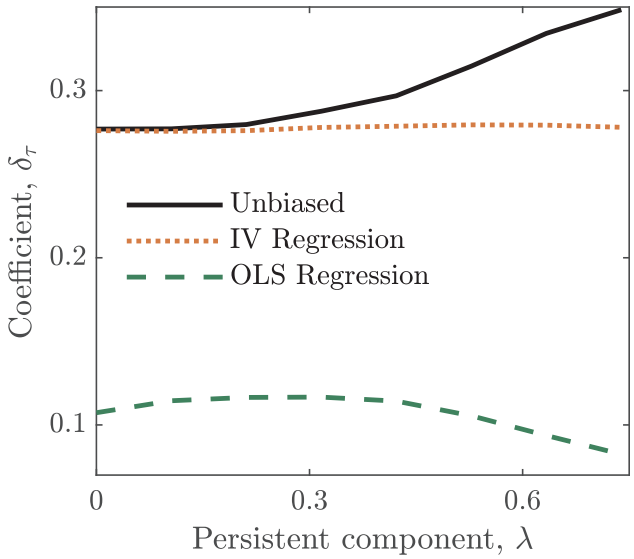


Figure 9: Sensitivity of the Empirical Results

Note: In this figure, we keep all parameters fixed at their values in the baseline calibration and only vary the persistence of the political process, λ.

In many applications, one can expect the exclusion restriction may not be satisfied. The exclusion restriction is violated when the covariance of the CA and macroprudential tax, conditional on debt and income, differs from zero. It could happen because the change in the political party is correlated with other variables that affect the CA (for example, the risk-free interest rate could be correlated with the incumbent government).

We explore the performance of the IV estimator when the exclusion restriction is violated by considering an economy where the political process has persistence.

5.7 Empirical Application

In this section, we use quarterly data for 36 countries from $2008q1$ to $2019q1$ to estimate an empirical version of the econometric model presented before. We include this as a proof of concept and emphasize that we use it merely as an illustration of the methodology.

We use data from Binici and Das (2021) on capital controls to construct a measure of changes in the macroprudential policy. In particular, we focus on changes in "Capital Flow Management" (CFMs) tools targeting inflows because they are closer to the type of policy

we consider in the model. Let us define an empirical version of (23) as:

$$CA_{it} = \delta_i + \delta_b CA_{i,t-1} + \delta_\tau \tau_{it} + \delta_y GDP_{it} + \epsilon_{it} \quad s.t. \quad \mathbb{E}[\epsilon_{it}] = 0\,, \tag{28}$$

where τ_{it} is a cumulative index that accounts for every new capital control the government introduced since the sample began. In particular, the index increases by one every time the country introduces a capital control measure and decreases by one every time that the country removes one capital control.[6] We also used data on capital flows and GDP growth from the International Financial Statistics database of the IMF. Finally, we include fixed effects δ_i.

To construct a proxy for the political process, we use the Global Populisms Data (from Stanford University) to classify governments as populist or non-populist. Also, we use data from the Database of Political Institutions (2020 vintage) to classify countries as either left- or right-wing. We use the interaction of these two variables as proxies of political conditions. In particular, the specification of the first stage in our IV estimation is:

$$\tau_{it} = \gamma_0 + \gamma_b CA_{i,t-1} + \gamma_y GDP_{it} + \gamma_{g,1}\text{Populist}_{it} + \gamma_{g,2}(\text{Populist}_{it} \times \text{Left}_{it}) + u_{it}\,, \tag{29}$$

where Populist_{it} is an indicator variable that takes the value of one if the party in power is classified as populist, and Left_{it} is an indicator variable that takes the value of one if the party in power is classified as left-wing.

In Table 4, we compare the empirical estimation of (28) using OLS and IV regressions. In line with the analytical results, we find the IV regression produces an estimated coefficient that is an order of magnitude larger than the one from the OLS regression. In Appendix C, we show tables with the complete results for estimating (28).

Table 4: Empirical Regression

Variables	OLS	IV
τ	0.024	1.517
P-value	0.167	0.035
Observations	786	590
Number of countries	18	14

[6] See Das et al. (2022) for details on the construction of this index

This simple exercise illustrates how the insights from the model regarding the interaction between political frictions and macroprudential policy can be used to discipline the related empirical work.

6 Conclusions

This paper explores the implications of political economy frictions for implementing macroprudential policy and the dynamics of capital flows. We extend a workhorse open-economy model of financial crises and macroprudential policy with political turnover where "responsible" and "irresponsible" policymakers alternate in power. Our analysis shows that a responsible policymaker has incentives to tighten regulation above and beyond what would be the desired regulation in an environment without political economy frictions, how the dynamics of the regulatory cycle can contribute to an extended period of financial tranquility followed by a wave of deregulation that ends up in financial crisis, and how these dynamics can help shed light on the empirical evidence on the effectiveness of financial regulation.

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A Proofs

A.1 Proof Lemma 1

Proof. Let us start by analyzing the responsible government's Generalized Euler Equation:

$$\frac{u_T}{R} = \beta \left[\Gamma_r \mathbb{E} \frac{\partial V^r(B_{t+1}, y^T_{t+1}, r)}{\partial B_{t+1}} + (1-\Gamma_r)\, \mathbb{E} \frac{\partial V^i(B_{t+1}, y^T_t, i)}{\partial B_{t+1}} \right] + \mu_t \left(1 - \frac{\partial p^N_t}{\partial c^T_t} \frac{\kappa}{R}\right) \tag{A.1}$$

For the i party, we can use the envelope condition:

$$\frac{\partial V^r(B_t, y^T_t, r)}{\partial B} = u_T(c^T, c^N) + \frac{\partial p^N_t}{\partial c^T_t} \kappa \mu_t$$

When the party j is in power:

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

Updating one period and replacing in (A.1):

$$u_T(c^T_t, c^N_t) = \beta R \left[\Gamma_r \mathbb{E} \left(u_T(c^T_t, c^N_t) + \frac{\partial p^N_t}{\partial c^T_t} \kappa \mu_{t+1} \right) + (1-\Gamma_i)\ \mathbb{E} \left[u_T(c^T_{t+1}, c^N_{t+1}) \left(1 - \frac{1}{R} \frac{\partial \mathcal{B}(B, y^T_t, i)}{\partial B_t}\right) \right.\right.$$
$$\left.\left. +\ \beta \frac{\partial \mathcal{B}(B_t, y^T_t, i)}{\partial B_t} \left[(1-\Gamma_i) \frac{\partial V^r(B_{t+1}, y^T_{t+1}, r)}{\partial B_{t+1}} + \Gamma_i \frac{\partial V^i(\mathcal{B}(B_t, y^T_t, i), y^T_{t+1}, r)}{\partial B_{t+1}} \right] + \frac{\partial P^N_t}{\partial c^T_{t+1}} \kappa \mu_{t+1} \right] \right]$$
$$+ \mu_t \left(1 - \frac{\partial P^N_t}{\partial c^T_t} \frac{\kappa}{R_t}\right) \tag{A.2}$$

Finally, if we continue iterating:

$$u_T(c^T_t, c^N_t) = \beta_t R \left[\Gamma_r \mathbb{E} \left(u_T(c^T_t, c^N_t) + \frac{\partial \mathcal{P}^N_t}{\partial c^T_t} \kappa \mu^r_{t+1} \right) + (1-\Gamma_r) \left[\sum_{n=1}^{\infty} (\Gamma_i)^n \prod_{j=t}^{t+n} \beta_j \left(\frac{\partial \mathcal{B}}{\partial B} \right) \right.\right.$$
$$\left.\left. \left[\mathbb{E} \left(u_T(c^T_{j+1}, c^N_{j+1}) \left(1 - \frac{1}{R} \frac{\partial \mathcal{B}}{\partial B}\right)\right) + (1-\Gamma_i) \mathbb{E}_r \left(u_T(c^T_{j+1}, c^N_{j+1}) + \frac{\partial \mathcal{P}^N_{j+1}}{\partial c^T_{j+1}} \kappa \mu^r_{j+2} \right) + \right.\right.\right.$$
$$\left.\left.\left. \frac{\partial \mathcal{P}^N_j}{\partial c^T_j} \kappa \mu^r_j \right] \right] + \mu^r_t \left(1 - \frac{\partial \mathcal{P}^N_t}{\partial c^T_t} \frac{\kappa}{R_t}\right) \right] \tag{A.3}$$

□

A.2 Proof of Proposition 1

Proof. The proof is by contradiction. Then, $\mu(s_{t+1}) = 0$ for every s_{t+1} and $\tau(s) = 0$. It implies that the Generalized Euler Equation (GEE) of the responsible party and the Euler equation of the households in (6) should coincide.

Let us start by analyzing the GEE of the responsible party. First, we replace $\mu = 0$ and $\mu' = 0$ in (A.2):

$$u_T(c^T, c^N) = \beta_t R \Bigg[\Gamma_r \mathbb{E}_r \; u_T(c^{T\prime}, c^{N\prime}) + (1-\Gamma_r) \;\; \mathbb{E}_r \Bigg(u_T(\mathcal{C}^T(B', y^{T\prime}, i), y^{N\prime}) \left[1 - \frac{1}{R}\frac{\partial \mathcal{B}(B, y^T, i)}{\partial B}\right] + \;\; \beta \frac{\partial \mathcal{B}(y^T, B, i)}{\partial B} \left[\Gamma_i \; \frac{\partial V^i(B', y^{T\prime}, r)}{\partial B'} + (1-\Gamma_i) \;\; \frac{\partial V^i(\mathcal{B}(B, y^T, i), y^{T\prime}, r)}{\partial B'}\right]\Bigg)\Bigg]$$

Reorganizing terms, we can write it as:

$$u_T(c^T, c^N) = \beta_t R \left[\Gamma_r \mathbb{E}_r \; u_T(c^{T\prime}, c^{N\prime}) + (1-\Gamma_r) \;\; \mathbb{E}_r \left(u_T(\mathcal{C}^T(B', y^{T\prime}, i), y^{N\prime}) - \right.\right.$$
$$\left.\left. \beta \frac{\partial \mathcal{B}(y^T, B, i)}{\partial B} \left[u_T(\mathcal{C}^T(B', y^{T\prime}, i), y^{N\prime}) - (1-\Gamma_i) \; \frac{\partial V^i(B', y^{T\prime}, r)}{\partial B'} - \Gamma_i \;\; \frac{\partial V^i(\mathcal{B}(B, y^T, i), y^{T\prime}, r)}{\partial B'}\right]\right)\right]$$

On the other hand, the Euler equation of household problem is:

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

Then those conditions are equivalent if and only if:

$$u_T(\mathcal{C}^T(B', y^{T\prime}, i), y^{N\prime}) = u_T(\mathcal{C}^T(B', y^{T\prime}, j), y^{N\prime})$$
$$u_T(\mathcal{C}^T(B', y^{T\prime}, i), y^{N\prime}) = \Gamma_i \; \frac{\partial V^i(B', y^{T\prime}, r)}{\partial B'} + (1-\Gamma_i) \;\; \frac{\partial V^i(\mathcal{B}(B, y^T, i), y^{T\prime}, r)}{\partial B'}$$

This implies the irresponsible government's policy functions are optimal, which leads to a contradiction if there exists an s_{t+h} such that $\mu(s_{t+h}) \neq 0$.

□

A.3 Proof of Lemma 2

Proof. Recall $\mathcal{B}(s)$ is defined as the optimal policy function of debt that solves the problem of the households at each state of the economy. In particular, it solves:

$$0 = u_T\left(c^T, c^N\right) - (1+\tau(s))\beta R \left[\Gamma_g \; \mathbb{E} \; u_T\left(c^{T'}, c^{N'}\right) + (1-\Gamma_g) \; \mathbb{E} \; u_T\left(c^{T'}, c^{N'}\right)\right] + \mu^H$$
$$b_{t+1} = -\kappa \left[y^T + P^N(s) y^N\right] \quad if \quad \mu^H > 0. \tag{A.4}$$

The implicit function theorem implies one could define a function f such that: $\mathcal{B}(s,g,B) \equiv f(s,g,B)$. In particular, note that if the political process is not persistent, then $\Gamma_g = \Gamma_0$ of $g \in \{i,r\}$ and then f is collapsed just to $f(s,g,B)$. This is, if the political process is not persistent, the policy function of debt only depends on g through its effect on current taxes. Next, let's take the first order Taylor expansion of f around the steady state:

$$b_{t+1} - \hat{b} = \frac{\partial f}{y}[y_t - \hat{y}] + \frac{\partial f}{b}[b_t - \hat{b}] + \frac{\partial f}{g}[g_t - \hat{g}] + \frac{\partial f}{\tau}[\tau_t - \hat{\tau}] + \frac{\partial f}{\beta}[\beta_t - \hat{\beta}] + m_t \quad \text{(A.5)}$$

where $\hat{x}$ accounts for the steady state value of each variable, $\frac{\partial f}{x}$ is the derivative of the function f at the steady state, and m_t accounts for the residual in the Taylor expansion which are the larger orders of derivation. Finally, define:

$$\Gamma_0 \equiv \hat{b} - \frac{\partial f}{y}[\hat{y}] - \frac{\partial f}{b}[\hat{b}] - \frac{\partial f}{g}[\hat{g}] - \frac{\partial f}{\tau}[\hat{\tau}]$$

$$\Gamma_y \equiv \frac{\partial f}{y}, \quad \Gamma_b \equiv \frac{\partial f}{b}, \quad \Gamma_\tau \equiv \frac{\partial f}{\tau}, \quad \Gamma_g \equiv \frac{\partial f}{g}, \quad \Gamma_\beta \equiv \frac{\partial f}{\beta}$$

Finally note if $\lambda = 1$, then $\Gamma_g = \frac{\partial f}{g} = 0$

□

A.4 Proof of Proposition 2

Proof. The proof is by contradiction. Assume $\hat{\delta_\tau}$ is unbiased, then $\mathbb{E}[\hat{\delta_\tau} - \delta_\tau] \geq 0$. Given $\Upsilon_\beta > 0$ and $\gamma_\beta < 0$, it implies

$$\begin{aligned} cov(\tau_t, \epsilon_t) &= 0 \\ \mathbb{E}[\tau_t \epsilon_t] - \mathbb{E}[\tau_t]\mathbb{E}[\epsilon_t] &= 0 \\ \mathbb{E}[\tau_t \epsilon_t] &= 0 \end{aligned} \quad \text{(A.6)}$$

We replace (24)

$$\begin{aligned} \mathbb{E}[\tau_t \epsilon_t] &= \mathbb{E}[(\gamma_0 + \gamma_b b_t + \gamma_y y_t^T + \gamma_\beta \beta_t + \gamma_p \tau_t + u_t)(\nu_t + \Upsilon_\beta \iota_t)] \\ &= \gamma_\beta \Upsilon_\beta \mathbb{E}[\iota_t^2] \\ &= \gamma_\beta \Upsilon_\beta \sigma_\iota^2 \\ &< 0 \end{aligned}$$

Which contradicts (A.6). Following a standard textbook derivation, it is easy to show that

this negative correlation implies that the OLS estimation is biased to be below the true parameter.

□

A.5 Proof of Proposition 3

Proof. First, we check the three conditions for using g_t or ϱ_t as potential instruments.

1. Exogeneity. Note

$$\begin{aligned} cov(g_t, \epsilon_t) &= \mathbb{E}[g_t \epsilon_t] - \mathbb{E}[g_t]\mathbb{E}[\epsilon_t] \\ &= \mathbb{E}[g_t(\nu_t + \gamma_\beta \iota_t)] \\ &= 0 \end{aligned}$$

Similarly, it can be shown that $cov(\varrho_t, \epsilon_t) = 0$.

2. Relevance. First, we will study the exclusion restriction if the proposed instrument is g_t. It is implied by Lemma 2 and $\gamma_g \neq 0$.

Second, we will study the exclusion restriction if the proposed instrument is ϱ_t. Then note that in this case $\text{Cov}(\varrho_t, \tau_t) \neq 0$ if and only if $\lambda \neq 1$. So, the relevance restriction is violated if the proposed instrument is ϱ_t and $\lambda = 1$.

3. Exclusion. When the proposed instrument is the identity of the party in power, we need to confirm $\text{Cov}(g_t, \mathcal{B}(s, g, B)|\tau_t) = 0$. That is, we need to check $\Gamma_g = 0$. From the proof Lemma 2, we know $\Gamma_g = 0$ if $\lambda = 0$. Then, the exclusion restriction is violated if $\lambda \neq 0$.

On the other hand, when the proposed instrument is ϱ_t we need to confirm $\text{Cov}(\varrho_t, \mathcal{B}(s, g, B)|\tau) = 0$. In general, $\mathcal{B}(s, g, B) \equiv f(s, g, B)$ which does not depend on ϱ_t. It implies that $\text{Cov}(\varrho_t, \mathcal{B}(s, g, B)|\tau) = 0$. So, the exclusion restriction always holds.

After checking those three conditions, one could follow the textbook proof to show that the IV estimation is unbiased if the proposed instrument meets these conditions. So we confirm ϱ_t is an unbiased instrument if and only if $\lambda \neq 1$. Also, g_t is an unbiased instrument if and only if $\lambda = 0$.

□

B Algorithm

1. Construct a grid for B and the shocks.

2. Guess value functions V^j and V^i and policy function for consumption and bonds. Choose constrained efficiency as an initial guess.

3. Solve responsible government value function V^r

$$\begin{aligned} V^r(b, y^T, r) &= \max_{b'} u(y^T - b + \frac{b'}{R}, c^N) + \beta\ \Gamma^r\ \mathbb{E}_{y'}\ V^r(b', y^{T\prime}, r) + (1 - \Gamma^r)\ \mathbb{E}_{y^T,}\ V^r(b', y^{T\prime}, i) \\ \frac{b'}{R} &\leq \kappa \left(\frac{1-\omega}{\omega} \left(\frac{y^T - b + \frac{b'}{R}}{c^N} \right)^{1/\gamma} y^N + y^T \right) \end{aligned}$$

To solve this problem, notice there is only one choice variable. One could do a grid for b' and choose the one that maximizes the value (setting $-\infty$ for those that violate the constraint).

4. Solve the irresponsible government's value function V^i. Find $C^T(y, b, i^*)$ and $B(y, b, i)$ consistent with equilibrium conditions associated with zero tax.

$$\begin{aligned} C^T(y, b, i^*) + b - \frac{B(y, b, i)}{R} =& y^T \\ \frac{B(y, b, i)}{R} \leq& \kappa(\frac{1-\omega}{\omega} \frac{C^T(y, b, i^*)}{y^N} y^N + y^T) \\ u_T(c^T, c^N) \geq& \beta R \left[\Gamma^i\ \mathbb{E}_{y'}\ u_T(\mathcal{C}^T(b', y', r)) + (1 - \Gamma^i)\ \mathbb{E}_{y'}\ u_T(\mathcal{C}^T(b', y', i)) \right] \end{aligned}$$

$$(\kappa(p^N y^N + y^T) - \frac{b'}{R})(u_T(c^T, c^N) - \beta R \left[\Gamma^i\ \mathbb{E}_{y'}\ u_T(\mathcal{C}^T(b', y', r)) + (1 - \Gamma^j)\ \mathbb{E}_{y'}\ u_T(\mathcal{C}^T(b', y', r)) \right]) = 0$$

Then, compute the value function

$$V^j(b, y^T, j) = u\left(C^T(y, b, i), y^N\right) + \Gamma^i\ \beta \mathbb{E}_{y^T,}\ V^i(\mathcal{B}(y, b, i), y^{T\prime}, j) + (1 - \Gamma^i)\ \mathbb{E}_{y^T,}\ \beta V^i(\mathcal{B}(y, b, i), y^{T\prime}, r)$$

5. Update value functions and go to step 3 if not converge. Otherwise, political economy equilibrium converges.

6. Compute tax as

$$1 + \tau = \frac{u_T(C^T(y, b, r^*), c^N)}{\beta R \left[\Gamma^i\ \mathbb{E}_{y'}\ u_T(\mathcal{C}^T(b', y', r)) + (1 - \Gamma^i)\ \mathbb{E}_{y'}\ u_T(\mathcal{C}^T(b', y', i)) \right]}$$

Remark: $V^i(b, y, r) = V^r(b, y, r)$

7. Simulate the economy.

C Additional Regression Tables

In this Appendix, we present the full regression results for the exercise conducted in section 5.7. First, in Table 5 we report the result of the first stage where τ_t is in the left hand side:

Table 5: First Stage - Empirical Analysis

VARIABLES	First-Stage
Populist_{it}	0.23*
	(0.14)
$\text{Populist}_{it} \times \text{Left}_{it}$	0.89**
	(0.382)
GDP Growth	3.62
	(3.01)
Lag CA	-0.04
	(0.042)
Constant	-1.06***
	(0.406)
Observations	590
R-squared	

Note: Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

On the other hand, in Table 6, we report the full results of the second stage.

Table 6: Second Stage - Empirical Analysis

VARIABLES	IV	OLS
CFMs on Inflows Index	1.517**	0.0240
	(0.718)	(0.0174)
GDP Growth	-1.826	1.522
	(12.83)	(10.72)
Lag CA	0.24	0.221***
	(0.096)	(0.0842)
Constant	0.756***	0.284
	(0.289)	(0.225)
Observations	590	786
R-squared		0.676

Note: Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1