The Political Economy of Domestic and External Sovereign Debt*

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Abstract

This paper explores the political and distributional consequences of sovereign debt and default taking into account that a sizable share of public debt is held by domestic creditors. We develop a quantitative macroeconomic model in which heterogeneous households face idiosyncratic income risk and save in non-state-contingent government bonds. Debt contracts are not enforceable and the government is politically constrained in its policy choices: A fiscal plan is required to receive the support of the majority of households. If neither fiscal plan is approved, the government has to default and to restructure domestic and external debt. Debt crises are characterized by a political conflict. In the course of a crisis, rising debt service costs force the government to cut redistributive spending. While wealthy households benefit from high interest rates on their savings, poor households support a default. Consequently, the approval of the fiscal plan decreases and the likelihood of a political default rises. Political constraints generate sizable welfare costs highlighting that individuals do not internalize the impact of their voting on interest rates and redistributive spending in equilibrium.

Keywords: sovereign debt and default, inequality, political economy, fiscal policy, heterogeneous agents

JEL Codes: F34, H63, E62, F41, D72

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1 Introduction

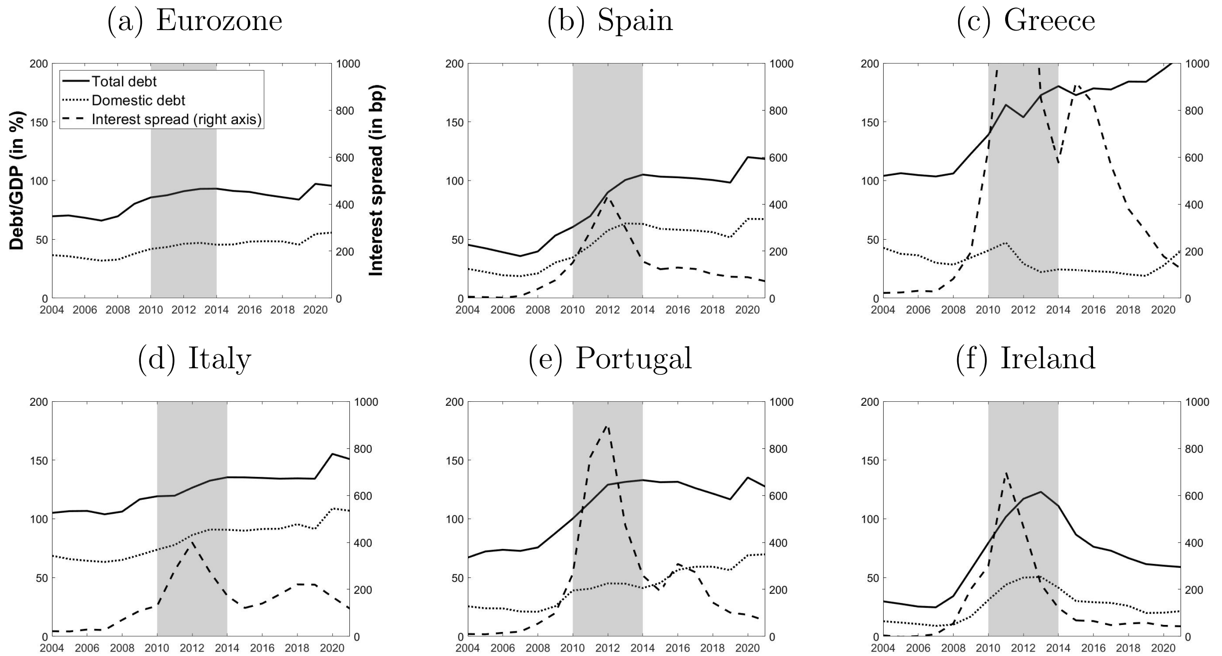
During sovereign debt crises, rising spreads on government bonds tighten the government's fiscal space. To prevent a default and to pay for the increasing debt service costs, governments need to implement fiscal adjustments, but their costs and benefits are unevenly distributed across the population. On the one hand, austerity measures such as spending cuts impose a burden particularly on the poor, making a sovereign default an attractive option for them. On the other hand, in many countries, a sizable share of government bonds is owned by domestic creditors. For example, in the Eurozone, on average 51.49% of public debt is held by its own residents (Figure 1). Domestic creditors benefit from rising interest rates, but face severe wealth losses in the event of a sovereign default. Consequently, the distributional implications of sovereign debt crises bear the risk of triggering political conflicts constraining the fiscal policy choices of policymakers.

The distributional and political consequences of sovereign debt and default raise several important questions. First, how do political conflicts restrict optimal fiscal policy choices? Second, how does the composition of domestic and external sovereign debt shape political constraints and sovereign default risk? And, third, what are the welfare effects of political constraints?

This paper studies these questions within a quantitative macroeconomic model of sovereign debt and default with heterogeneous households in which the government needs political support for the implementation of fiscal policies. We build on D'Erasmo and Mendoza (2021) and consider an infinite-horizon small open endowment economy inhabited by a continuum of households who face idiosyncratic income risk. Households are borrowing-constrained but can save in government bonds. The government of the small open economy finances stochastic government spending and lump-sum transfers by taxing income and by issuing non-state-contingent bonds. Debt contracts are not enforceable and are subject to sovereign default risk. In addition to domestic creditors, there is a pool of risk-neutral, perfectly competitive foreign creditors. We assume that the government cannot discriminate between between domestic and foreign creditors. The government's political preferences are characterized by weights imposed on the welfare of individual households across income and wealth. However, as in Andreasen et al. (2019), the government is politically constrained in its fiscal policy choices: A fiscal plan is required to receive the support of the majority of households. If neither fiscal plan is approved by the households, the government is forced to default. In default, the government bargains with its creditors and reschedules its domestic and external debt.

Solving the model for the optimal policies is challenging because the aggregate approval

Figure 1. The European Sovereign Debt Crisis: Composition of Debt and Interest Spreads



Notes: The figure shows consolidated government debt (solid line) and the share of government debt held by domestic residents (dotted line) as fractions of GDP. The dashed lines display the long term government bond yield spreads of the respective country vs. Germany. The shaded areas mark the Eurozone debt crisis. Data are taken from the ECB Government Finance Statistics and from Eurostat.

of a fiscal plan depends on the distribution of income and wealth, which itself is affected by the fiscal policies chosen by the government. To solve this issue, we implement an iterative procedure in which the government uses a forecasting rule to predict the aggregate vote share, which is estimated using simulated model-based approval rates.

We calibrate the model to the Italian economy motivated by the large share of public debt held by domestic creditors amounting to on average 65.67% (Figure 1). Our analysis highlights the following trade-off: On the one hand, the government borrows to finance lump-sum transfers. On the other hand, higher debt raises the interest rate making debt service more expensive and reducing the government's fiscal space for redistributive spending. To implement a fiscal plan, the government needs the support of the majority of the households. Individual households assess the government's fiscal plan by evaluating the size of transfers relative to the outcomes in default. Moreover, they inspect the rate of return they receive on their savings. If high interest rates strongly reduce transfers, households at the bottom of the wealth distribution reject the fiscal plan and prefer the government to renegotiate debt. In contrast, wealthier households support the fiscal plan because they benefit from the larger interest rate on their savings.

In the model, political conflicts generate sovereign defaults. Our model simulations suggest that prior to a typical default, the economy is characterized by favorable economic conditions allowing the government to issue more debt. The default is triggered by an adverse aggregate shock. Since the government has accumulated a substantial amount of debt, the interest spread increases strongly making households with a large bond position richer. Debt repayment becomes very costly requiring a reduction of lump-sum transfers, such that a political conflict occurs. While wealthy households prefer the government to honor outstanding debt obligations, poor households are in favor of debt renegotiation. Consequently, the approval rate of the fiscal plan decreases substantially forcing the government to default.

To highlight the impact of political constraints on sovereign debt and default, we provide a comparison with a counterfactual economy in which the government is politically unconstrained in its fiscal policy choices. It turns out that the political constraint makes fiscal plans infeasible already for intermediate levels of debt. Compared to the counterfactual economy, the default set is enlarged by political defaults. In turn, the greater sovereign default risk is reflected in a higher interest rate reducing the government's fiscal space for redistributive spending. We find that political constraints generate sizable welfare costs highlighting a pecuniary externality: Individuals do not internalize how their voting behavior and the resulting political defaults affect the interest rate and transfers in equilibrium.

We use our model to explore the impact of the government's political preferences on sovereign default risk. The government's political preferences are given by the weights on the individuals' welfare across income and wealth and are characterized by a creditor bias if they are increasing in the household's bond position. In the counterfactual economy without political constraints, the government with a more pronounced creditor bias is less likely to default. Consequently, such a government faces a lower interest rate relaxing its endogenous borrowing constraint and facilitating larger lump-sum transfers for a given level of debt. In contrast, in the political economy, the political constraint becomes more binding if the government is characterized by a larger creditor bias. The larger likelihood of a political default implies that different government types have similar default sets and implement similar debt policies. Thus, the equilibrium allocation of the political economy *endogenously* reflects the preferences of the population across income and wealth. However, with an increasing creditor bias, the pecuniary externality becomes more important and generates larger welfare losses in the aggregate.

For a given level of debt, the political economy is characterized by larger sovereign default risk and higher interest rates than the counterfactual economy. In equilibrium, however, due to the tighter borrowing constraint, the government accumulates less debt in the political economy, which, in turns, dampens sovereign default risk in the long run. In an empirical analysis, we provide evidence in support of this theoretical prediction.

Related Literature. With its focus on the distributional consequences of sovereign default risk, our paper is closely related to D'Erasmo and Mendoza (2021) and Andreasen et al. (2019). D'Erasmo and Mendoza (2021) allow for heterogeneous agents and domestic creditors in a quantitative model of sovereign debt and default.[1] We extend their model by adding a political constraint that restricts the set of feasible fiscal plans. Our approach is in the spirit of Andreasen et al. (2019) who explore political defaults in an economy with hand-to-mouth households. Novelli (2021) and Azzimonti and Mitra (forthcoming) analyze the role of political constraints in the form of legislative bargaining in models of external debt. While these studies abstract from domestic debt, our model allows us to study the rich dynamics between wealth inequality, the composition of sovereign debt, and political conflict. A distinctive feature of our model is that the equilibrium allocation *endogenously* reflects the preferences of the population across income and wealth. In contrast, in D'Erasmo and Mendoza (2021) the equilibrium allocation is determined by the *exogenous* preferences of the government.

Our paper builds on quantitative macroeconomic models with heterogeneous agents and incomplete markets that focus on the role of public debt and redistribution, see among others Aiyagari and McGrattan (1998), Flodén (2001), Heathcote (2005), Azzimonti et al. (2014). Similar to D'Erasmo and Mendoza (2021), the models in Tran-Xuan (2022) and Tran-Xuan (2023) allow for domestic creditors and limited commitment but focus on constrained-efficient allocations abstracting from default in equilibrium. In contrast, Ferriere (2015), Jeon and Kabukcuoglu (2018), Deng (2021), and Scholl (2023) study the distributional implications of sovereign default risk within quantitative models of sovereign debt and default pioneered by Aguiar and Gopinath (2006) and Arellano (2008). These papers focus on external debt and assume that domestic households are hand-to-mouth.

Our paper contributes to the literature that studies political aspects in models of public debt pioneered by Tabellini (1991), Aghion and Bolton (1990), Dixit and Londregan (2000). Dovis et al. (2016) consider an overlapping generation model in which current and future governments disagree on redistributive policies and debt. In their setting, boom-bust cycles arise in which the current government issues debt to redistribute via transfers, followed by a future government cutting transfers to reduce debt. Similarly, Aguiar and Amador (2011) study the interaction of political economy frictions and sovereign default risk, but as in Dovis et al. (2016), allocations are subject to enforceability constraints such that defaults do not occur in equilibrium. In contrast, we allow the government to default on external as well

[1] A stylized two-period version of the model can be found in D'Erasmo and Mendoza (2016).

as domestic debt. Guembel and Sussman (2009) analyze a stylized two-period endowment economy with domestic and external debt in which households differ in terms of income and bond savings such that a political conflict arises. In a two-party setting, the government's debt and default decisions are taken by majority voting.

Guembel and Sussman (2009) highlight that debt is only supportable if the government cannot discriminate between different classes of creditors. We use this result and assume that the government cannot differentiate between domestic and foreign creditors in a fully dynamic model with endogenous wealth distribution. Di Casola and Sichlimiris (2017) and Erce and Mallucci (2018) study quantitative models of sovereign debt and default in which the government issues domestic and external debt. Erce and Mallucci (2018) allow for selective defaults, however, they do not account for household heterogeneity and the distribution of wealth. Instead, we focus on the distributional and political implications of government bonds owned by domestic residents but abstract from selective default. While D'Erasmo and Mendoza (2021) assume that default takes place on all outstanding debt obligations, we allow for debt restructuring with a recovery rate being the endogenous outcome of a bargaining process between the government and its creditors. Our modeling choices of the debt renegotiation process follow Yue (2010), Chatterjee and Eyigungor (2015), Sunder-Plassmann (2018), and Prein (2023).

Finally, our paper is related to Hatchondo et al. (2009), Cuadra and Sapriza (2008), Scholl (2017), Chatterjee and Eyigungor (2019), Prein and Scholl (2021), and Cotoc et al. (2021) who focus on the interaction between political turnover and sovereign default in models of external debt. While these studies focus on the impact of fiscal policy choices on electoral outcomes, they abstract from domestic debt and wealth inequality, which is the focus of our paper.

The remainder of the paper is structured as follows. Section 2 describes the model environment and defines the recursive equilibrium. Section 3 deals with the solution algorithm and the calibration. Section 4 presents the quantitative results and discusses the economic mechanisms and the impact of political constraints in the short and long run. Section 5 discusses the empirical evidence of the economic mechanisms. Section 6 concludes.

2 A Political Economy Model of Domestic and External Debt

2.1 Environment

We build on D'Erasmo and Mendoza (2021) and consider an infinite-horizon small open endowment economy inhabited by a continuum of households of measure one who face idiosyncratic income risk. Households are borrowing-constrained but can save in bonds. The government of the small open economy finances government spending and lump-sum transfers by taxing income and by issuing non-state-contingent bonds. Government spending G_t is stochastic and follows a Markov process with a compact support $\mathbb{G} = [\underline{G}, \bar{G}]$. Debt contracts are not enforceable and are subject to sovereign default risk. The government cannot discriminate between between domestic and foreign creditors. Foreign creditors are risk-neutral, act in perfect competition, and borrow at the risk-free rate. If the government defaults, the economy is hit by exogenous default costs and the government negotiates over debt reduction with its creditors. After one period, debt is rescheduled and the government regains access to financial markets with a reduced amount of debt. Following Andreasen et al. (2019), the government is politically constrained in its fiscal policy choices: A fiscal plan is required to receive the support of the majority of the households. If neither fiscal plan is approved by the households, the government is forced to default.

The household's preferences are given by

$$E_0 \sum_{t=0}^{\infty} \beta^t u(c_t),$$

where $\beta \in (0,1)$ denotes the rate of time preference and c_t refers to consumption of an individual household. $u(c_t)$ is continuous, twice differentiable, strictly increasing and satisfies the Inada conditions. Households face stochastic idiosyncratic income y_t which follows a Markov process with compact support $\mathbb{Y} = [\underline{y}, \bar{y}]$. We assume that idiosyncratic income shocks have a zero mean across households such that aggregate income Y is deterministic. Moreover, idiosyncratic income shocks and aggregate government spending shocks are independent. To insure against idiosyncratic income fluctuations, households can save in non-state contingent one-period government bonds but face an exogenous borrowing constraint, $b_{t+1} \geq 0$.

In the absence of a sovereign default, the date t budget constraint of an individual household is given by:

$$c_t + q_t b_{t+1} = y_t(1-\tau) + b_t + T_t,$$

where q_t denotes the price of the bond with face value b_{t+1}. The government taxes individual income at an exogenous proportional tax rate τ. T_t denote lump-sum transfers provided by the government. The idiosyncratic income shocks and saving decisions generate an endogenous distribution of wealth and income denoted by $\Lambda_t(b_t, y_t)$.

In case of a sovereign default, the government renegotiates its debt. Renegotiation lasts one period during which the budget constraint of an individual household is given as:

$$c_t = y_t(1-\tau) + T_t - \phi(G_t).$$

Following D'Erasmo and Mendoza (2021), $\phi(G_t)$ denotes exogenous default costs with $\phi'(G_t) < 0$ such that default becomes more costly for lower realizations of government spending.

The government issues bonds at price q_t. Let B_{t+1} denote sovereign debt between period t and $t+1$. We assume the government to be a debtor such that $B_{t+1} \geq 0$. If debt is fully repaid, the government's budget constraint is given by:

$$T_t = \tau Y + q_t B_{t+1} - B_t - G_t.$$

The government uses revenues from income taxation τY and resources from borrowing $q_t B_{t+1}$ net of debt repayment B_t to finance government spending G_t and lump-sum transfers T_t.

Following Andreasen et al. (2019), the government faces a political constraint when choosing its fiscal policy. To get accepted, a fiscal plan needs the majority of votes of the households. We define the individual approval $p_t \in \{0, 1\}$ of a fiscal plan to be an indicator function which equals one if the associated household's discounted expected lifetime utility is greater than the one associated with a default and zero otherwise. Using the endogenous distribution $\Lambda_t(b_t, y_t)$, the individual approvals can be aggregated to derive the population's vote share P_t supporting the fiscal plan. The fiscal plan is accepted if the aggregate approval P_t exceeds an exogenous vote threshold: $P_t \geq P^s$. If all fiscal plans are rejected, the government is forced to default.

We follow Yue (2010) and Chatterjee and Eyigungor (2015) and assume that in default debt is rescheduled. The debt renegotiation process is modeled as a one-period Nash-bargaining over the joint surplus, in which the government and the creditors agree on the debt recovery rate a_t.

In case of a sovereign default, in the period of debt renegotiation, the government's budget constraint reads as:

$$T_t = \tau Y - G_t.$$

After the renegotiation period, the government re-enters international financial markets with a reduced amount of debt.

In addition to domestic creditors, there are many identical foreign creditors who are risk-neutral, act in perfect competition, and borrow at the risk-free rate r. They have full information about the state of the economy.

2.2 Recursive Equilibrium

The timing is as follows. At the beginning of each period t, idiosyncratic and aggregate shocks are realized. Individual states (b, y), aggregate states (B, G), and the distribution $\Lambda(b, y)$ are observed. The government proposes its fiscal plan and individual voting on the fiscal plan takes place. Either the fiscal plan is implemented or a sovereign default takes place. Taking as given the government's policies, households make their savings and consumption choices.

2.2.1 Private Sector

Taking as given the government's fiscal policy, an individual household maximizes her expected discounted lifetime utility subject to her budget constraint. B' denotes the government's borrowing policy and lump-sum transfers T fulfill the government's budget constraint. d is an indicator function that takes the value of one if the government defaults and zero otherwise. The individual household's value function is given as:

$$V(b, y, B, G; B') = (1-d)V^{d=0}(b, y, B, G; B') + dV^{d=1}(b, y, B, G) \tag{1}$$

$V^{d=0}(b, y, B, G; B')$ refers to the individual household's value function if the government does not default and issues new debt B', given the individual states (b, y) and the aggregate states (B, G). $V^{d=1}(b, y, B, G)$ is the household's value function if the government defaults and enters debt renegotiation.

If the government repays its debt, the individual's value function is given by:

$$\begin{aligned} V^{d=0}(b, y, B, G; B') &= \max_{\{c,b'\}} \; u(c) + \beta\mathbb{E}[V(b', y', B', G'; B''|y, G)] \qquad (2) \\ &\text{s.t.} \\ c + q(B', G)b' &= y(1-\tau) + b + T, \\ b' &\geq 0. \end{aligned}$$

The solution to maximization problem (2) yields the individual policy functions $c^{d=0}(b, y, B, G; B')$ and $b'(b, y, B, G; B')$.

If the government defaults and negotiates over debt reduction, the individual's value function is given as:

$$\begin{aligned} V^{d=1}(b, y, B, G) &= u(c) + \beta\mathbb{E}[V(ab, y', aB, G'; B''))|y, G] \qquad (3) \\ &\text{s.t.} \\ c &= y(1-\tau) + T - \phi(G), \end{aligned}$$

where a denotes the recovery rate being the outcome of a static Nash bargaining described below. The individual policy function $c^{d=1}(b, y, B, G)$ satisfies Eq. (3).

2.2.2 Political Process

An individual household supports the government's fiscal plan (B', T) if her associated expected discounted lifetime utility is larger than her expected discounted lifetime utility of a sovereign default:

$$p(b, y, B, G; B') = \begin{cases} 1 \text{ if } V^{d=0}(b, y, B, G; B') \geq V^{d=1}(b, y, B, G) \\ 0 \text{ else} \end{cases} \tag{4}$$

Using the distribution $\Lambda(b, y)$, the aggregate population's vote share supporting the fiscal plan can be derived as:

$$P(B, G; B') = \int_{\mathbb{Y}x\mathbb{B}} p(b, y, B, G; B') d\Lambda(b, y). \tag{5}$$

2.2.3 Public Sector

The government chooses its optimal policy as to maximize the weighted expected discounted lifetime utility of households. The weights $\omega(b, y)$ characterize the political preferences of the government. The government's maximization problem is given by:

$$\max_{d \in \{0,1\}} \{W^{d=0}(B, G; B'), W^{d=1}(B, G)\}, \tag{6}$$

where $W^{d=0}(B, G; B')$ refers to the government's value function conditional on debt repayment. $W^{d=1}(B, G)$ is the government's value function of default.

If the government repays its debt, it chooses its optimal fiscal plan taking into account the political constraint and the private sector policy functions $c^{d=0}(b, y, B, G; B')$ and

$b'(b, y, B, G; B')$:

$$W^{d=0}(B, G; B') = \max_{B'} \int_{\mathbb{Y}\times\mathbb{B}} V^{d=0}(b, y, B, G; B') d\omega(b, y) \tag{7}$$

$$\begin{aligned}
&\text{s.t.} \\
&T = \tau Y + q(B', G)B' - B - G, \\
&B' \geq 0, \\
&P(B, G; B') \geq P^s \\
&c^{d=0}(b, y, B, G; B') \text{ and } b'(b, y, B, G; B').
\end{aligned}$$

Given the aggregate states and the distribution of wealth and income, the government takes into account that its fiscal plan needs to receive a majority of votes in the population. A sovereign default takes place when the government cannot propose any fiscal plan such that $P(B, G; B') \geq P^s$, where $P(B, G; B')$ satisfies Eq. (5).

In default, the government negotiates over debt reduction. Let $D(B)$ be the set of government spending realizations $G \in \mathbb{G}$ such that a default occurs:

$$D(B) = \{G \in \mathbb{G} : d(B, G) = 1\}. \tag{8}$$

In default, the renegotiation is described by a static Nash bargaining game between the government and the creditors over the joint surplus. The government's value function of agreeing on a debt recovery rate a with the creditors is given by:

$$W^{d=1}(B, G) = \int_{\mathbb{Y}\times\mathbb{B}} V^{d=1}(b, y, B, G) d\omega(b, y), \tag{9}$$

where $V^{d=1}(b, y, B, G)$ solves Eq. (3).

The government's outside option in the Nash bargaining game is assumed to be:

$$\begin{aligned}
W^{aut}(G) &= \int_{\mathbb{Y}\times\mathbb{B}} V^{aut}(y, G) d\omega(b, y) && (10) \\
\text{with } V^{aut}(y, G) &= u(c) + \beta\mathbb{E}[V^{aut}(y', G')|y, G] && (11) \\
c &= y(1-\tau) + T - \phi(G).
\end{aligned}$$

The government's surplus of a recovery rate a is given as:

$$\triangle^{gov}(a, B, G) = W^{d=1}(B, G) - W^{aut}(G).$$

We follow Chatterjee and Eyigungor (2015) and assume that every creditor, regardless of her bond holdings, seeks to maximize the aggregate value of bonds. The creditor's surplus is given by

$$\triangle^{cred}(a, B, G) = q(aB, G)aB.$$

Given debt B and government spending G, the equilibrium recovery rate $\alpha(B, G)$ solves the following Nash bargaining problem:

$$\alpha(B, G) = \arg\max_{a} \left[(\triangle^{gov}(a, B, G))^{\theta} \left(\triangle^{cred}(a, B, G)\right)^{1-\theta} \right], \tag{12}$$

where θ denotes the government's bargaining power.

2.2.4 Creditors

In addition to domestic creditors, there is a large number of identical risk-neutral foreign creditors who have full information on the state of the economy and act in perfect competition. They can borrow or lend at risk free rate r. The zero expected profit condition implies:

$$q(B', G) = \frac{1}{1+r}\mathbb{E}[1 - d(B', G')|G] + \frac{1}{1+r}\mathbb{E}[d(B', G')\alpha(B', G')q(\alpha(B', G')B', G')|G]. \tag{13}$$

The formal definition of the recursive equilibrium can be found in the Appendix A.

3 Solution Method and Calibration

3.1 Solution Method

Solving the model is challenging because the aggregate approval P depends on the distribution $\Lambda(b, y)$, which itself is affected by the fiscal plan chosen by the government. Inspired by the solution method proposed in Krusell and Smith (1998), we assume that the government uses a forecasting rule $F(\mathbf{x}\gamma)$ to predict the aggregate approval P. The forecasting rule is estimated from model-based simulation and depends on two variables $\mathbf{x} = (T, q)$ that are the main determinants of the individual approval: transfers T and the bond price q. On the one hand, individuals evaluate the size of the transfers in comparison with the size of transfers in case of a sovereign default. On the other hand, q captures the rate of return a household receives when saving in bonds. While poor households do not hold government bonds and only care about transfers, for wealthier households the bond price becomes an important determinant of their individual approval of a fiscal plan.

We use a fractional response model to specify the forecasting rule $F(\mathbf{x}\gamma)$ as an approximation of the aggregate approval rate $P \in (0, 1)$. Following Papke and Wooldridge (1996), the fractional response model with $j = 1, \ldots, n$ observations is given by:

$$P_j = F(x_j'\gamma) + \epsilon_j, \ j = 1, \ldots, n$$

where the dependent variable P_j is the aggregate approval rate. $0 \leq F(\cdot) \leq 1$ is a cumulative distribution function, x_j contains the independent variables T_j and q_j, γ is the vector of regression coefficients, and ϵ_j is the error term. Following Papke and Wooldridge (1996), we choose the logistic function $F(z) = \frac{\exp(z)}{1+\exp(z)}$ and determine γ by maximizing the log-likelihood function:

$$\mathbb{L}(\gamma) = \sum_{j=1}^{n} P_j \log(F(x_j'\gamma)) + (1 - P_j) \log(1 - F(x_j'\gamma)).$$

To solve the model we apply the following algorithm:

1. Start with an initial guess for the forecasting coefficients γ.

2. Given the forecasting rule $F(x_j'\gamma)$, apply standard value function iteration techniques to solve for the optimal policy functions of the public and private sector.

3. Given the policy functions, simulate the model economy to derive the income and wealth distribution, individual voting, and the aggregate approval.

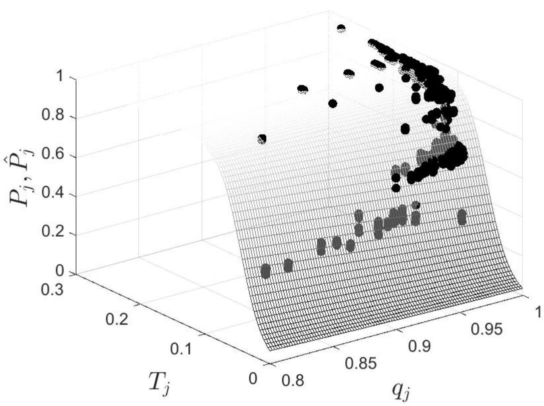
4. Use the simulated time series to estimate the coefficients γ of the fractional response model.

5. Update the coefficients γ and go back to step 1.

6. Iterate until the coefficients γ converge.

Figure 2 shows the aggregate approval $\hat{P}_j$ predicted by the estimated forecasting rule. The dots show the simulated observations (T_j,q_j,P_j) entering the estimation. A comparison of the estimated and the simulated aggregate approval suggests that the parsimonious specification of the forecast rule delivers a suitable approximation. The mean absolute deviation (MAD) defined as $\frac{1}{n}\sum_{j=1}^{n} |\hat{P}_j - P_j|$ yields 5.35%.

Figure 2. Predicted Aggregate Approval



Notes: The figure shows the aggregate approval $\hat{P}_j$ predicted by the estimated forecasting rule. The dots show the simulated observations (T_j,q_j,P_j) entering the estimation.

3.2 Calibration

In the quantitative analysis, we calibrate the model to the Italian economy. Italy is highly indebted and exhibits a substantial amount of domestic public debt (Figure 1). In the following, we specify the functional forms and calibrate the parameter values on an annual basis. A subset of parameters is calibrated externally whereas the remaining parameters are calibrated internally to match specific empirical targets. Table 1 summarizes the set of parameters and targets. Appendix C describes the data sources.

Table 1. Benchmark calibration

Parameter		Value	Target
External			
Risk-free rate	r	0.013	German bond yields
Risk aversion	σ	2	Standard value
Idiosyncratic income	ρ_y	0.7	Autocorrelation of income
	μ_y	1.0	Average income
	σ_v	0.319	Standard deviation of income
Government spending	ρ_G	0.86	Autocorrelation of government spending
	μ_G	0.1872	Average government spending
	σ_ϵ	0.023	Standard deviation of government spending
Voting threshold	P^s	0.5	Simple majority
Internal			
Political preference	$\bar{\omega}$	0.045	Average debt to GDP (maturity adjusted)
Time preference	β	0.77	Average domestic debt ratio
Income tax	τ	0.28	Tax revenues as share of GDP
Default cost	ϕ_1	0.68	Average bond spreads vs. Germany
Bargaining power	θ	0.96	Average recovery rate

The utility function is assumed to have a constant relative risk aversion (CRRA):

$$u(c) = \frac{c^{1-\sigma}}{1-\sigma}, \tag{14}$$

where $\sigma > 0$ denotes the parameter of relative risk aversion. We set $\sigma = 2$ which is a standard value in macroeconomics. We calibrate the time preference β to match the domestic debt ratio of 67.92%. The risk-free rate r is set to 1.3% based on the average real long-term bond yields of Germany.

In default, the recovery rate is negotiated between the government and the creditors. The government's bargaining power θ is set to match an average recovery rate of 23% based on Sunder-Plassmann (2018) and Yue (2010). The default cost takes the following form:

$$\phi(G) = \phi_1 \sqrt{(\bar{G} - G)},$$

where $\phi_1 > 0$ determines the level of the cost. $\bar{G}$ is the maximum value that G can take. Since $\phi'(G) < 0$, default becomes more costly for lower realizations of government spending. We set ϕ_1 to match the average spread of Italy vs. Germany of 1.21%.

Income and government spending shocks are assumed to follow AR(1) processes:

$$\log(y') = (1 - \rho_y) \log(\mu_y) + \rho_y \log(y) + \upsilon,$$
$$\log(G') = (1 - \rho_G) \log(\mu_G) + \rho_G \log(G) + \epsilon,$$

where υ and ϵ are i.i.d $N(0, \sigma_\upsilon^2)$ and $N(0, \sigma_\epsilon^2)$, respectively. We estimate the AR(1) process for G using data for government final consumption expenditures. We set the autocorrelation of the income shock $\rho_y = 0.7$ and calibrate $\sigma_\upsilon = 0.319$ to match the standard deviation of income. We normalize $\mu_y = 1$ such that aggregate income $Y = 1$ and all variables are measured as GDP ratios. We discretize both Markov processes using Tauchen's method (Tauchen and Hussey (1991)).

The proportional tax τ is set such that tax revenues τY match the average tax revenue collected from individual labor and consumption taxes as share of GDP (27.95%).

We assume that the government needs a simple majority to get approval of its fiscal plan, $P^s = 0.5$. The government's political preferences are given by:

$$\omega(b, y) = \sum_{y \in \mathbb{Y}} \pi^*(y_i)(1 - e^{-\frac{b}{\bar{\omega}}}).$$

This specification is taken from D'Erasmo and Mendoza (2021). $\pi^*(y)$ is the long-run distribution of income. The parameter $\bar{\omega} > 0$ determines the creditor bias: With increasing $\bar{\omega}$, the government gives more weight to the utility of households with larger bond savings. In the benchmark economy, we calibrate $\bar{\omega} = 0.045$ to match the average debt-to-GDP ratio of 17.92%.

4 Results

4.1 Understanding Political Defaults

In this section, we study the properties of the policy functions to understand the economic mechanisms behind the dynamic interaction between sovereign default risk, political constraints, and the distribution of income and wealth. We facilitate a comparison of the benchmark political economy with a counterfactual economy in which the government does not require approval of a fiscal plan. In this counterfactual economy, the government is politically unconstrained such that its debt policy is determined by its political preferences $\omega(b, y)$. The counterfactual economy is similar to the one proposed by D'Erasmo and Mendoza (2021) in which the government optimally decides whether to repay outstanding debt obligations or to default. However, we assume that in default, the recovery rate is an endogenous outcome of a bargaining process while in D'Erasmo and Mendoza (2021) it is exogenously set to zero.

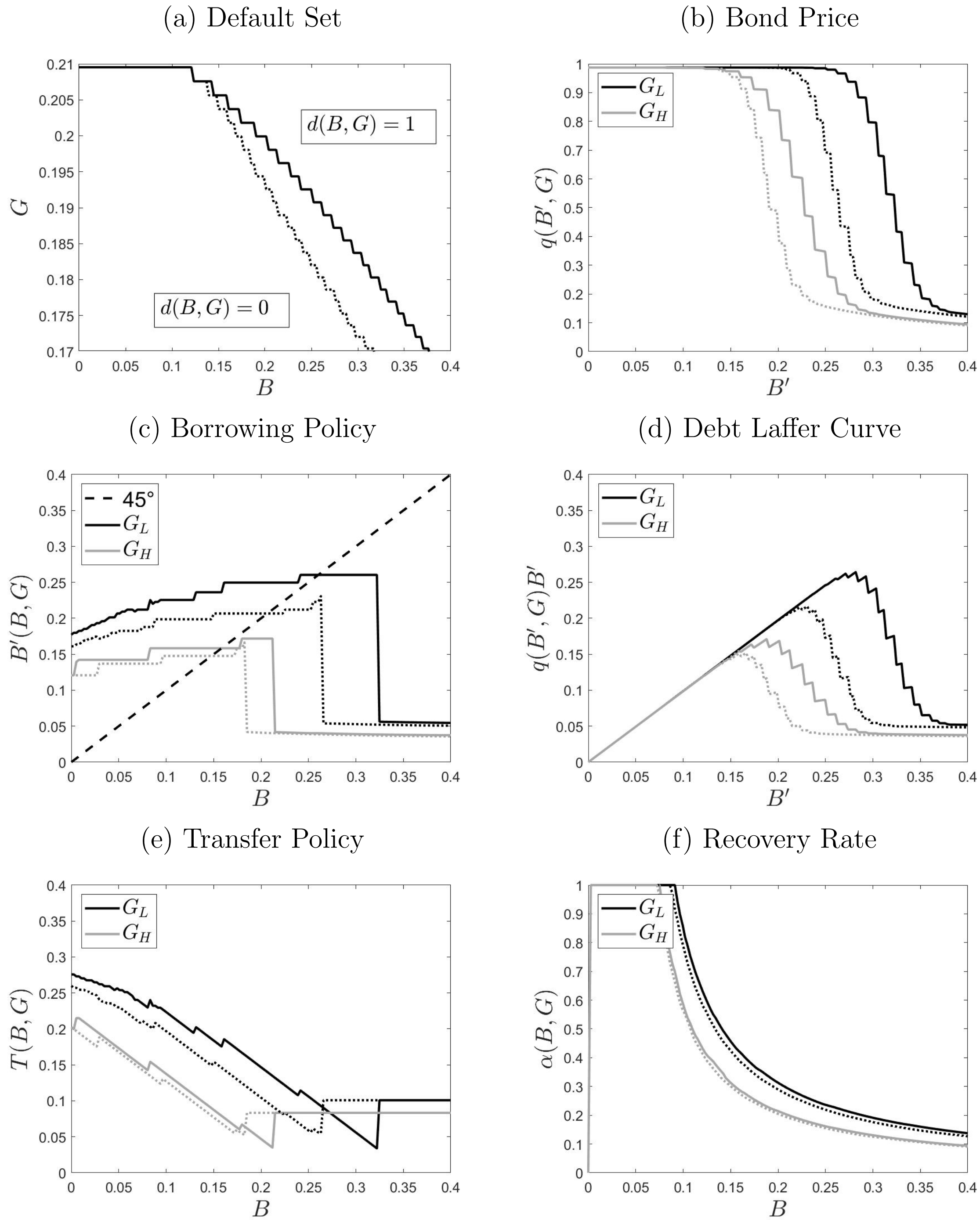
Figure 3 shows the government's policy functions for the counterfactual economy (solid line) and the benchmark political economy (dotted line). Specifically, the figure depicts the bond price $q(B', G)$ as a function of B', the borrowing policy $B'(B, G)$ as a function of B, and the debt Laffer curve $q(B', G)B'$ as a function of B' for different realizations of government spending G. Furthermore, it displays the sovereign default set $d(B, G)$, the recovery rate $\alpha(B, G)$, and the aggregate approval $P(B, G)$ together with the transfer policy $T(B, G)$.

We first turn to the counterfactual economy in which the government does not face any political constraints. The default set highlights that default incentives are larger for higher levels of sovereign debt and for greater realizations of government spending. These properties shape the pattern of the bond price function, which is decreasing in the issuance of debt and in government spending. For low debt, the government has no incentive to default and repayment is certain in the next period. Consequently, the bond price is equal to the inverse of the risk free rate. For larger values of debt, the bond price reflects the increasing probability of a sovereign default. When borrowing is so large that a sovereign default occurs for any realization of the aggregate spending shock, the bond price collapses to zero. The government's optimal borrowing policy function $B'(B, G)$ is increasing in the level of existing debt B and intersects with the 45-line. On the left of the 45-line, the government accumulates debt whereas on the right of the 45-line it reduces debt. Clearly, the bond price restricts the government in the issuance of new debt. For low realizations of government spending, the smooth pattern of the bond price allows the government to gradually increase borrowing up to the point where a default becomes optimal. For high spending realizations, the bond price is a steep function in B'. In this case, the government is severely borrowing constrained by the high interest rate on its debt. The debt Laffer curve $q(B', G)B'$ shows that the revenue from debt issuance follows a hump-shaped pattern. For low levels of B', borrowing is risk free and the revenue increases at a linear rate $\frac{1}{1+r}$. For increasing B', debt becomes risky such that the larger interest rate adversely affects the revenue from debt issuance. Since the rising interest rate reduces the government's fiscal space, the government is forced to reduce the transfers to the households such that less redistribution takes place. In default, the government re-schedules its debt, which relaxes its budget constraint and allows to increase its redistributive spending. The recovery rate is bargained between the government and the creditors and is decreasing in the degree of sovereign indebtedness.

To evaluate the impact of the political constraint on the government's decisions, we now compare the counterfactual economy with the benchmark political economy (dotted lines in Figure 3) in which a fiscal plan needs the support of the majority of the households. Figure 4 displays the aggregate approval $P(B, G)$ together with the transfer policy $T(B, G)$ and the bond price $q(B'(B, G), G)$ of the optimal borrowing choice $B'(B, G)$ as a function of debt B given different realizations of government spending G. To understand the driving forces of the aggregate approval rate, Figure 5 displays the individual approval $p(b, y, B, G)$ as a function of individual bond holdings b and idiosyncratic income y for different levels of sovereign debt B given mean government spending $G = \mu_G$. If debt is low, all individuals in the economy approve the government's fiscal plan (white area). As sovereign indebtedness increases, however, the rise in the interest rate generates two opposing forces. On the one hand, the smaller fiscal space forces the government to cut transfers and to reduce redistribution. On the other hand, households benefit from the higher interest rate on their savings. A sovereign default relaxes the government budget constraint and allows the government to raise transfers but households lose part of their savings. Consequently, households at the bottom of the wealth distribution reject the fiscal plan and favor a default (black area) while wealthier households support the fiscal plan. Figure 4 reveals that in the aggregate, the first effect dominates and the approval rate is decreasing in sovereign debt. At the individual level, Figure 5 also highlights that although households with low income benefit more from redistribution they may still support the fiscal plan because they are relatively more affected by the exogenous default cost $\phi(G)$.

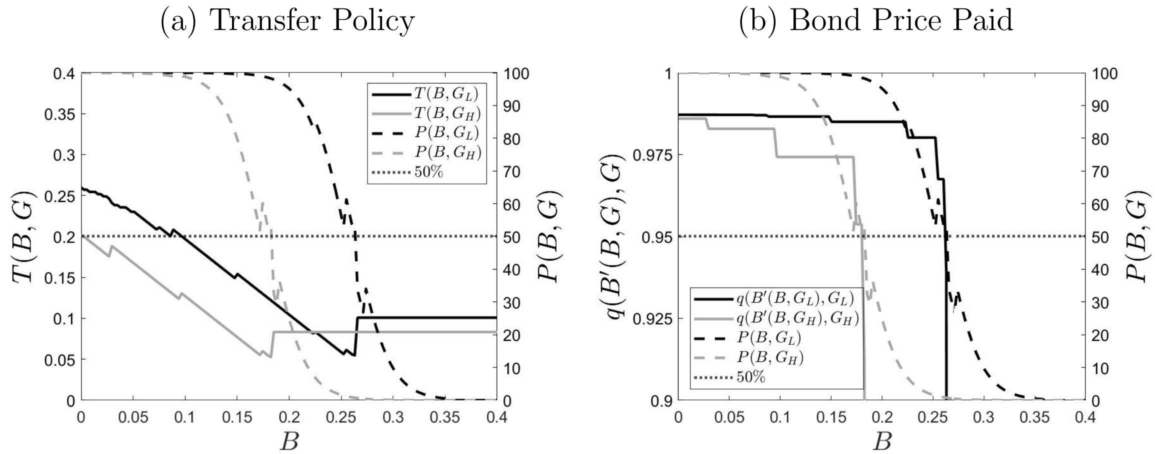
The pattern of the aggregate approval rate highlights that the political constraint makes fiscal plans infeasible already for intermediate levels of debt. Consequently, the political constraint enlarges the default set (Figure 3) and produces a *political default set* characterized by the difference between the defaults sets of the counterfactual economy (solid line) and the benchmark political economy (dotted line). The higher sovereign default risk is reflected in the pattern of the bond price, which becomes much steeper in the benchmark political economy. Consequently, the government is more credit-constrained and the revenue collected from borrowing decreases. Moreover, the debt Laffer curve peaks at a lower level of debt. Importantly, as the political constraint increases the costs of borrowing, the government can afford less redistribution and the transfers to households are smaller compared to the politically unconstrained economy.

Figure 3. Policy Functions, Debt Laffer Curve and Default Set



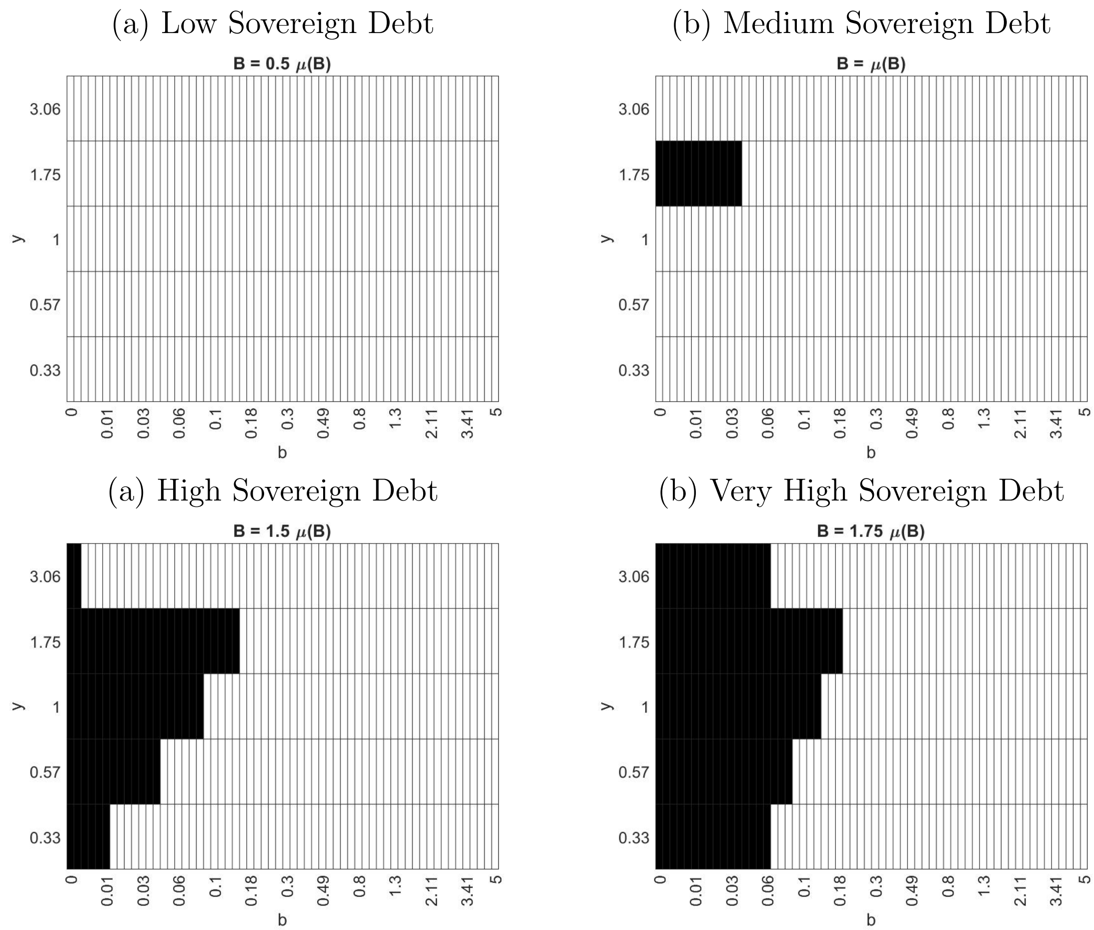
Notes: Panel (a) shows the default set for combinations of B and G. Panel (b) displays the bond price $q(B', G)$ as a function of B'. Panel (c) depicts the borrowing policy $B'(B, G)$ as a function of B. Panel (d) displays the debt Laffer curve $q(B', G)B'$ as a function of B'. Panel (e) shows the transfer policy and Panel (f) depicts the recovery rate $\alpha(B, G)$ as functions of B. The solid lines refer the counterfactual economy in which the government is politically unconstrained. The dotted lines refer to the benchmark political economy. G_H and G_L are government spending shock realizations one standard deviation above and below the mean μ_G, respectively.

Figure 4. Aggregate Approval of Fiscal Plans



Notes: Panel (a) displays the transfer policy $T(B, G)$ and the aggregate approval rate $P(B, G)$ for the benchmark political economy as a function of B whereas Panel (b) shows the bond price paid $q(B'(B, G), G)$ and the aggregate approval rate $P(B, G)$ for the benchmark political economy as a function of B. G_H and G_L are government spending shock realizations one standard deviation above and below the mean μ_G, respectively.

Figure 5. Individual Approval of Fiscal Plans



Notes: The figure shows the individual approval $p(b, y, B, G)$ for different combinations of individual bond holdings b and idiosyncratic income y for different level of sovereign debt B and mean government spending $G = \mu_G$. The white area denotes approval, $p(b, y, B, G) = 1$, and the black areas denote rejection of a fiscal plan, $p(b, y, B, G) = 0$. $\mu(b)$ denotes the mean value of b.

4.2 The Impact of Political Constraints on Sovereign Debt and Default in the Long Run

To study the impact of the political constraint on sovereign debt and default, we simulate the benchmark political economy and the counterfactual economy for 10.000 periods and exclude all default events when computing the long-run statistics. Table 2 summarizes the results. The benchmark political economy provides a reasonable match of the Italian data. In particular, it matches the empirical overall level of debt as share of GDP, the domestic debt ratio, the spread, and the average recovery rate.

It turns out that in the long run, the political constraint reduces sovereign debt and default risk. This finding is driven by a general equilibrium effect. The policy functions have shown that the government finds it difficult to design a fiscal plan that gains the support of the majority of households. Consequently, for a given level of debt, the political constraint raises sovereign default risk. Since higher interest rates make debt more expensive, the government is more restricted in its borrowing choice. In the long run, the government accumulates less debt compared to counterfactual economy, which, in turn, dampens sovereign default risk in general equilibrium.

Table 2. Long-Run Statistics

Description	Counterfactual	Benchmark	Data
Total debt B	20.86	17.77	17.92
Domestic debt $\check{B}$	12.29	12.20	12.17
External debt $\hat{B}$	8.57	5.57	5.75
Domestic debt ratio $\check{B}/B$	58.91	68.66	67.91
Government spending G	18.73	18.73	18.72
Interest spread	1.47	1.20	1.21
Recovery rate α	20.28	22.86	23.00

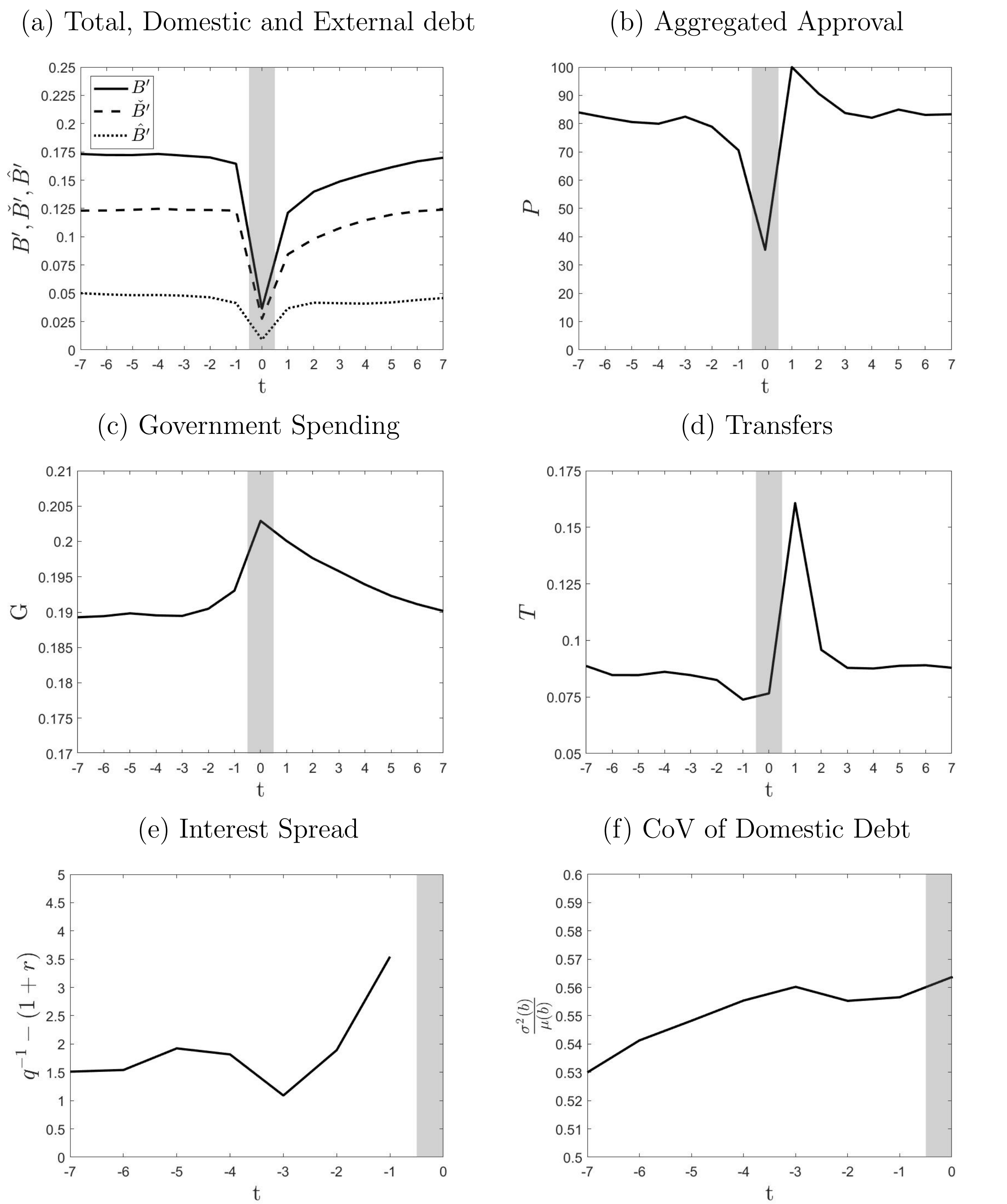
Notes: The statistics are based on average values of 10.000 simulated periods and excluding all default events. All variables are denoted in %. Debt (total, domestic, external) and government spending transfers are reported as GDP ratios. The recovery rate is based on all default events.

4.3 Political Conflict and Default Events

Figure 6 considers the benchmark political economy model and presents the macroeconomic dynamics around the default event at $t = 0$. It shows average sovereign debt, the composition of sovereign debt (domestic, external), aggregated approval, government spending, transfers, the interest spread, and the coefficient of variation (CoV) of domestic bond holdings as a measure of wealth inequality.

Prior to a typical default, the economy is characterized by a series of favorable government spending realizations allowing the government to borrow at a decent interest rate. The aggregate approval of the government's fiscal policy is stable at around 80%. The debt crisis is triggered by adverse shocks to government spending. The rising interest rate makes debt repayment costly and forces the government to reduce transfers to the households. Wealth inequality gradually increases and a political conflict occurs: While wealthy households benefit from the higher return on their savings and prefer the government to fulfill the debt contract, poorer households reject the fiscal plan and support a default. Consequently, the approval rate of the fiscal plan decreases substantially forcing the government to default. In $t = 1$, after the default, the government re-schedules its debt, regains access to financial markets, and starts borrowing again. Transfers increase sharply and the associated fiscal plan receives the full support of the population.

Figure 6. Default Event



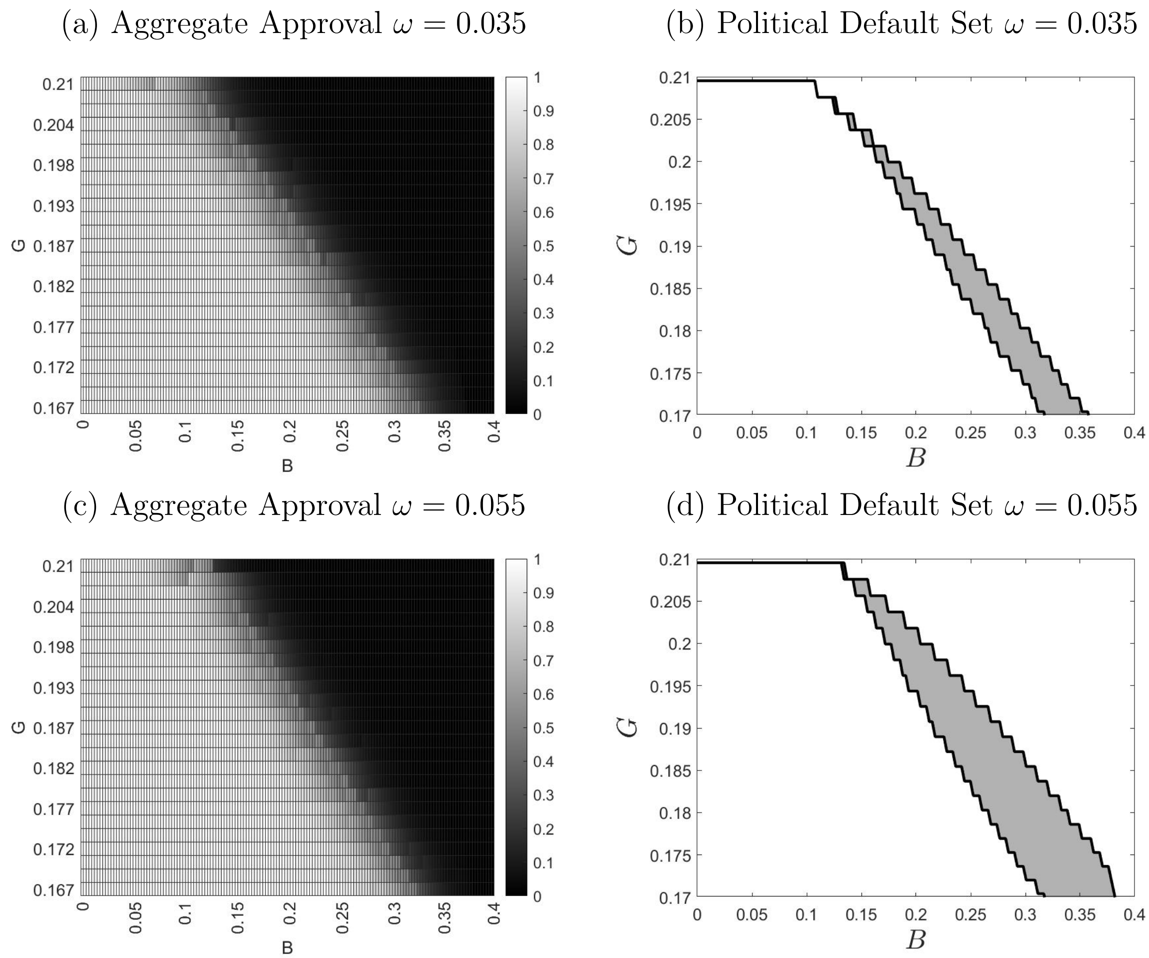
Notes: The figure shows the dynamics around an average default event taking place in period $t = 0$. We simulate the model for 10.000 periods, collect all default episodes and take the average over all default events. The panels show debt (total, domestic, external), government spending and transfers as shares of GDP. The interest spread and aggregated approval are depicted in percent. CoV stands for coefficient of variation.

4.4 The Impact of Political Preferences on Political Defaults

To explore the role of political preferences, in Figure 7, we compare aggregate approval rates and political default sets for two government types. In comparison to the benchmark calibration, the first government type (Panels (a) and (b)) has a lower bias towards households who hold government bonds whereas the second government type (Panels (c) and (d)) has a larger creditor bias.[2] The aggregate approval rates highlight that the government with the larger creditor bias is politically more constrained: The political constraint is binding (dark gray area where the approval rate equals 0.5) for lower levels of sovereign debt and smaller realizations of government spending. Consequently, the enlargement of the default set by the political constraint is more pronounced for the government with a larger creditor bias (gray area in panels (b) and (d)).

[2]Figure 11 in Appendix B shows how the government weighs bond holders in comparison with their representation in the economy for the benchmark calibration.

Figure 7. Aggregate Approval and Political Default Set



Notes: Panels (a) and (c) show the aggregate approval rate $P(B, G)$ as a heatmap depending on debt B and spending shocks G. Panels (b) and (d) display the political default sets for combinations of B and G.

Table 3. The Impact of Political Preferences: Long-Run Statistics

	Counterfactual		Political		Data
Creditor bias $\bar{\omega}$	0.035	0.055	0.035	0.055	-
Total debt B	19.37	22.27	17.56	17.99	17.92
Domestic debt $\check{B}$	12.23	12.31	12.18	12.19	12.17
External debt $\hat{B}$	7.14	9.96	5.38	5.80	5.75
Domestic debt ratio $\check{B}/B$	63.16	55.29	69.34	67.75	67.91
Government spending G	18.72	18.73	18.73	18.73	18.72
Interest spread	1.64	1.37	1.54	0.97	1.21
Recovery rate α	20.46	20.33	22.20	24.50	23.00

Notes: The statistics are based on average values of 10.000 simulated periods and excluding all default events. All variables are denoted in %. Debt (total, domestic, external) and government spending are reported as GDP ratios. The recovery rate is based on all default events.

Table 3 considers two different types of governments and summarizes the long-run statistics for the political economy model and the counterfactual economy in which the government is politically unconstrained. Figures 12 and 13 in Appendix B display the policy functions for the two government types. In the absence of political constraints, for a given B, the government with a higher creditor bias is less likely to default, renegotiates larger recovery rates, and faces a higher bond price. The government with a more pronounced creditor bias is less borrowing-constrained due to the lower interest rate such that it accumulates more debt in equilibrium (Table 3). In contrast, in the political economy, the political constraint is more binding if the government is characterized by a larger creditor bias. The larger likelihood of a political default implies that different government types have similar default sets and implement similar debt policies. Thus, the equilibrium allocation of the political economy *endogenously* reflects the preferences of the population across income and wealth.

4.5 The Welfare Costs of Political Constraints

To evaluate the welfare implications of political constraints, we compute the consumption equivalent variation of moving from the benchmark political economy to the counterfactual politically unconstrained economy. The individual consumption equivalent variation κ is defined as:

$$\mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t u((1+\kappa)c_t^{\circ}) = \mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t u(c_t^{\star}).$$

$'\circ'$ refers to the benchmark political economy and $'\star'$ denotes the counterfactual economy. With the CRRA-utility function (14), κ can be calculated as:

$$\kappa(b,y,B,G) = \left(\frac{V^{\star}(b,y,B,G)}{V^{\circ}(b,y,B,G)}\right)^{\frac{1}{1-\sigma}} - 1. \tag{15}$$

Positive values of κ indicate that political constraints generate welfare costs.

The aggregate welfare change κ^{Λ} is calculated by weighting κ with the average distribution $\bar{\Lambda}^{\circ}(b,y)$ derive from simulating the benchmark political economy model 10.000 periods excluding all default events:

$$\kappa^{\Lambda}(B,G) = \int_{\mathbb{Y}\times\mathbb{B}} \kappa(b,y,B,G) d\bar{\Lambda}^{\circ}(b,y). \tag{16}$$

The government's welfare gain κ^{ω} is derived by weighting κ with the government's preferences $\omega(b, y)$:

$$\kappa^{\omega}(B, G) = \int_{\mathbb{Y}\times\mathbb{B}} \kappa(b, y, B, G) d\omega(b, y). \tag{17}$$

Panels (a) and (b) of Figure 8 show the individual and aggregate consumption equivalent variations $\kappa(b, y, B, G)$ and $\kappa^{\Lambda}(B, G)$ as functions of sovereign debt B taken as given mean government spending $G = \mu_G$. Panel (a) considers individual welfare changes across different levels of individual wealth b. Panel (b) considers aggregate outcomes considering all households ($b \geq 0$) as opposed to only those households who do not hold any bonds ($b = 0$) and those with positive bond holdings ($b > 0$). The grey dashed (dotted) vertical line refers to the level of B for which a default occurs in the benchmark political economy (counterfactual economy). In the following, these threshold values are denoted as $\overline{B}^{\circ}$ and $\overline{B}^{\star}$ for the benchmark political economy and the counterfactual economy, respectively.

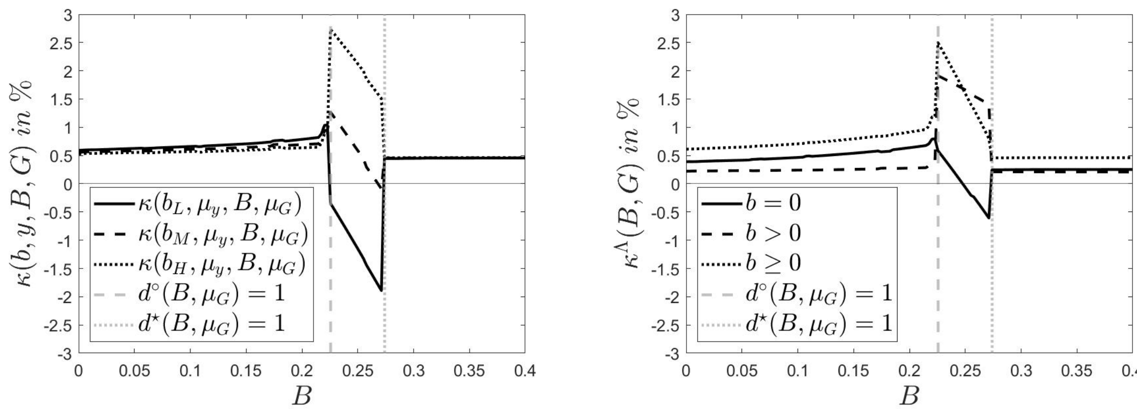
For levels of B larger than $\overline{B}^{\circ}$ but lower than $\overline{B}^{\star}$, the government's fiscal plan is not supported by the majority of households. Thus, in the political economy a political default occurs whereas in the counterfactual politically unconstrained economy the government finds it optimal to repay outstanding debt. As households at the bottom of the wealth distribution support a default and reject the fiscal plan, they benefit from being in the political economy rather than in the counterfactual economy. On the other hand, households at the top of the wealth distribution suffer from severe losses from the political default as they lose part of their savings.

For $B < \overline{B}^{\circ}$, a sovereign default does not occur in either of the two economies. Still, all households benefit from a removal of the political constraint. The underlying reason is that the political economy is more prone to default, which is reflected in a lower bond price. In turn, the higher interest rate reduces the government's fiscal space for redistribution. Consequently, the government implements lower transfers in the political economy than in the counterfactual economy (Figure 3). This finding highlights a pecuniary externality: Individuals do not internalize how their voting behavior and the resulting political defaults affect the bond price and transfers in equilibrium. As B increases, the bond price and transfers decrease and the welfare cost of the political constraint becomes larger. Moreover, households with no or low wealth face larger welfare losses as they do not benefit from the higher interest rate.

Figure 9 displays the aggregate consumption equivalent variations $\kappa^{\Lambda}(B, G)$ and $\kappa^{\omega}(B, G)$ for mean government spending $G = \mu_G$ as functions of sovereign debt B for different values of the government's creditor bias $\bar{\omega}$. The previous analysis has shown that a larger creditor bias implies that the political constraint becomes more binding. Consequently, the higher interest rate implies that the aggregate welfare cost is increasing in $\bar{\omega}$. Moreover, the government suffers a larger loss compared to the population in the aggregate because households with positive wealth are over-represented in their weighting (see Figure 11 in Appendix B)).

Figure 8. The Impact of Political Constraints on Individual and Aggregate Welfare

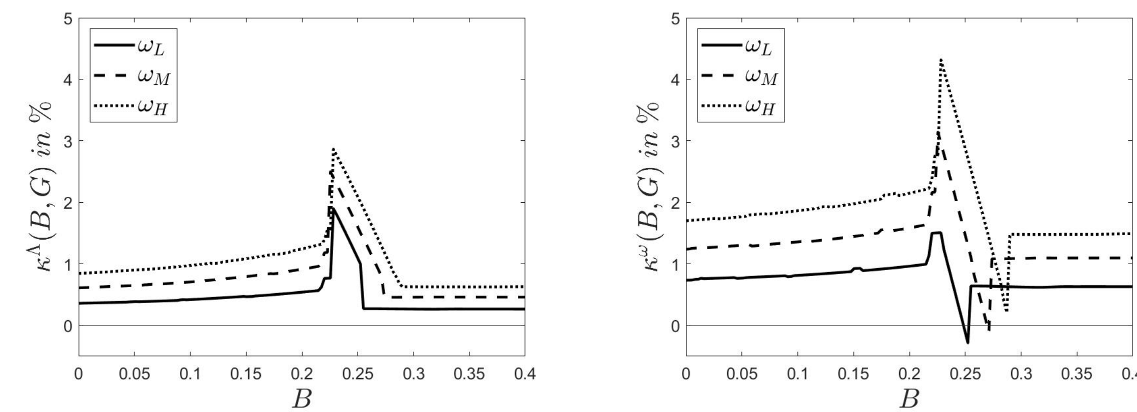
(a) Individual Welfare (b) Aggregate Welfare



Notes: Panel (a) shows the individual consumption equivalent variation $\kappa(b, y, B, G)$ given by Eq. (15) for mean income μ_y and mean government spending $G = \mu_G$ as a function of sovereign debt B considering three values of individual wealth, $b_L = 0$, $b_M = 0.5\ \mu(b)$, and $b_H = \mu(b)$, respectively. $\mu(b)$ denotes the mean value of b. Panel (b) shows the aggregate consumption equivalent variation $\kappa^\Lambda(B, G)$ given by Eq. (16) for mean government spending $G = \mu_G$ as a function of debt B considering all households $b \geq 0$ and only those households who do (not) hold government bonds $b > 0$ ($b = 0$).

Figure 9. Political Preferences and Welfare

(a) Aggregate Welfare (b) Government Welfare



Notes: The figure shows the aggregate consumption equivalent variations $\kappa^\Lambda(B, G)$ given by Eq. (16) and $\kappa^\omega(B, G)$ given by Eq. (17) for mean government spending $G = \mu_G$ as a function of debt B considering all households ($b \geq 0$) for three different values of the creditor bias ($\omega_L = 0.035, \omega_M = 0.045, \omega = 0.055$).

5 Empirical Evidence

The model predicts that for a given level of debt, the political economy is characterized by larger sovereign default risk reflected in a higher interest rate than the counterfactual economy. In equilibrium, however, the tighter borrowing constraint dampens public debt accumulation in the political economy, which, in turn reduces sovereign default risk and the interest rate in the long run. In this section, we provide cross-country empirical evidence in support of this theoretical prediction.

We build on Azzimonti and Mitra (forthcoming) who study a selection of Latin American countries and regress sovereign interest spreads on the tightness of political constraints. We extend their analysis in two directions: First, we consider a larger sample of countries and, second, we incorporate the political preferences of governments as an additional control variable.

Our sample ranges from 1995 to 2015 and includes Latin American countries and Eurozone countries to account for the sovereign debt crisis in the 1990s and 2000s as well as the recent European sovereign debt crisis. For the Eurozone countries, we calculate sovereign interest spreads as the long term government bond yield spreads of the respective country vs. Germany. For the Latin American countries, we use the EMBI+ spreads provided by JP Morgan.

We use the measures of political constraints provided in *The Political Constraint Index Dataset* by Henisz (2000, 2002). This dataset includes two variables *POLCONiii* and *POLCONv* that range from 0 to 1 with higher values being associated with tighter political constraints. More information on the data is provided in Appendix D.

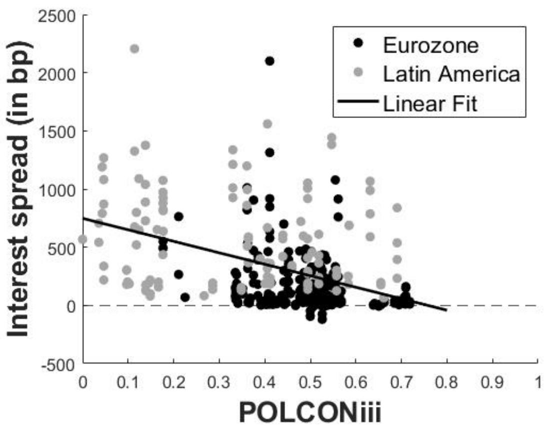
Figure 10 shows scatter plots considering country-year observations of sovereign interest spreads and the measures of political constraints. The depicted linear fit indicates a negative correlation between sovereign interest spreads and the tightness of political constraints, which supports the model's prediction.

We confirm this finding in a regression analysis in which we control for debt-to-GDP ratios and GDP growth. Moreover, we include as a control variable the political orientation of national governments taken from *The Database of Political Institutions 2020* (Cruz et al., 2021). We construct two dummy variables, namely *Right-Exe.* and *Right-Gov.*, which denote right-leaning executives and governments, respectively. Our approach is related to Cotoc et al. (2021) who account for the fraction of time that a country is governed by a left-leaning government to study the long-run correlation between a country's propensity to elect a left-leaning government and its sovereign spread. In our model, we interpret a government as being right-leaning if it is characterized by a larger creditor bias with greater welfare weights that are increasing in the household's bond position.

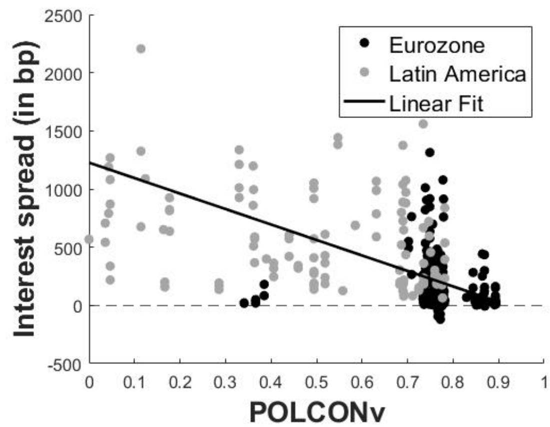
Table 4 shows the results of pooled OLS and panel fixed effect (FE) regressions with robust standard errors in parenthesis. The regression results support previous findings of e.g. Azzimonti and Mitra (forthcoming) and Cotoc et al. (2021) and are in line with the model's prediction. In particular, the coefficients of *POLCONiii* and *POLCONv* are significant and have a negative sign suggesting that tighter political constraints reduce sovereign spreads. Moreover, a right-leaning orientation of the government significantly decrease sovereign spreads.

Figure 10. Political Constraints and Interest Spreads

(a) POLCONiii



(b) POLCONv



Notes: The figure shows country-year observations of interest spreads and political constraints. Interest spreads in the Eurozone are calculated as the long term government bond yield spreads of the respective country vs. Germany from Eurostat. Interest spreads in Latin America are given by JP Morgan EMBI+ spreads from Worldbank. A measure for political constraints is provided by "The Political Constraint Index (POLCON) Dataset" by Henisz (2000, 2002). POLCONiii and POLCONv range from 0 to 1 with higher values being associated with tighter political constraints.

Table 4. Regression Results

	dependent variable: *Interest Spread* (in %)							
control variables	(1) pooled OLS	(2) pooled OLS	(3) panel FE	(4) panel FE	(5) pooled OLS	(6) pooled OLS	(7) panel FE	(8) panel FE
POLCONiii	-10.39***	-10.71***	-4.619*	-4.887*				
	(1.649)	(1.689)	(2.655)	(2.645)				
POLCONv					-14.32***	-14.44***	-4.146	-4.184
					(2.343)	(2.315)	(3.269)	(3.244)
Debt to GDP	0.0376**	0.0375**	0.170**	0.170**	0.0423***	0.0422***	0.168**	0.168**
	(0.0148)	(0.0151)	(0.0701)	(0.0704)	(0.0145)	(0.0148)	(0.0687)	(0.0691)
GDP growth (in %)	-0.180	-0.175	-0.129	-0.125	-0.227*	-0.225*	-0.143**	-0.140*
	(0.138)	(0.139)	(0.0780)	(0.0783)	(0.124)	(0.124)	(0.0685)	(0.0693)
Right-Exe.	-1.470***		-1.051**		-0.990*		-1.004**	
	(0.506)		(0.482)		(0.504)		(0.449)	
Right-Gov.		-1.365***		-1.092*		-0.888*		-0.980*
		(0.517)		(0.560)		(0.496)		(0.525)
Constant	6.320***	6.447***	-2.803	-2.722	11.28***	11.35***	-1.717	-1.711
	(0.913)	(0.928)	(3.688)	(3.669)	(1.281)	(1.272)	(2.679)	(2.695)
Observations	451	451	451	451	451	451	451	451
R^2	0.147	0.145	0.444	0.446	0.286	0.285	0.442	0.442
Number of Countries			25	25			25	25
Country FE			✓	✓			✓	✓
Year FE			✓	✓			✓	✓

Note: The table shows pooled OLS and panel FE regression results with robust standard errors in parenthesis. The sample period is between 1995 and 2015. ***,**,* represent significance level at 1%, 5% and 10%, respectively.

6 Conclusions

This paper has explored the political and distributional consequences of sovereign debt and default. Specifically, we have analyzed how optimal fiscal policy choices are affected by redistributive concerns, the composition of domestic and external debt, and political constraints. To this end, we have developed a quantitative macroeconomic model of sovereign debt and default in which heterogeneous households face idiosyncratic income risk and save in non-state-contingent government bonds. Debt contracts are not enforecable and the government is politically constrained in its policy choices: A fiscal plan is required to receive the support of the majority of households. If neither fiscal plan is approved, the government is forced to default and to renegotiate debt.

We highlight that debt crises are characterized by a political conflict. In the course of a crisis, rising interest spreads reduce the government's fiscal space and limit redistributive spending while facing higher debt service costs. While wealthy households prefer the government to fulfill the debt contract as they benefit from high interest rates, poorer households reject the fiscal plan and support a default. Consequently, the approval of the fiscal plan decreases and the likelihood of a political default rises.

We find that political constraints generate sizable welfare costs. Importantly, individuals do not internalize how their voting behavior and the resulting political defaults affect the bond price and redistributive transfers in equilibrium.

Sovereign debt models with heterogeneous agents accounting for an endogenous distribution of income and wealth are computationally challenging. For this reason, we have considered a stylized framework and incorporated only the most important ingredients from our point of view. The analysis has provided interesting insights but is limited by several simplifications. In an empirical paper, Erce et al. (2022) highlight the importance of selective defaults on domestic debt. It seems to be a particularly promising to allow the government to differentiate between domestic and foreign creditors and to explore the distributional and political consequences of selective defaults. Another interesting extension is to consider endogenous production and the tradeoff between equity and efficiency of progressive income taxation. All these aspects are left for future research.

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A Recursive Equilibrium

Definition: The recursive equilibrium is defined as

1. a set of household policy functions for consumption $c^{d\in\{0,1\}}(b, y, B, G)$, and savings $b'(b, y, B, G)$,
2. a set of public policy functions for borrowing $B'(B, G)$, default $d(B, G)$, and transfers $T^{d\in\{0,1\}}(B, G)$,
3. an individual approval $p(b, y, B, G)$ and an aggregate approval rate $P(B, G)$,
4. a recovery rate $\alpha(B, G)$,
5. a bond price function $q(B', G)$, and a default set $D(B)$,
6. a set of household value functions $V(b, y, B, G)$, $V^{d\in\{0,1\}}(b, y, B, G)$, and $V^{aut}(y, G)$,
7. a set of government value functions $W^{d\in\{0,1\}}(B, G)$, and $W^{aut}(G)$,
8. a distribution $\Lambda(b, y)$,

such that

1. **[Private sector:]** Taking as given $d(B, G)$, $q(B', G)$, $\alpha(B, G)$, $T^{d\in\{0,1\}}(B, G)$, and $B'(B, G)$,
   (i) $V^{d=0}(b, y, B, G)$, $c^{d=0}(b, y, B, G)$ and $b'(b, y, B, G)$ solve maximization problem (2),
   (ii) $V^{d=1}(b, y, B, G)$ and $c^{d=1}(b, y, B, G)$ solve problem (3),
   (iii) $V(b, y, B, G)$ satisfies Eq. (1).
2. **[Public sector:]** Taking as given $q(B', G)$, $\alpha(B, G)$, $c^{d\in\{0,1\}}(b, y, B, G)$, and $b'(b, y, B, G)$,
   (i) $W^{d=0}(B, G)$, $B'(B, G)$, and $T^{d=0}(B, G)$ solve maximization problem (7),
   (ii) $W^{d=1}(B, G)$ and $T^{d=1}(B, G)$ solve problem (9),
   (iii) $d(B, G)$ solves maximization problem (6),
3. **[Political outcomes:]** $p(b, y, B, G)$ and $P(B, G)$ satisfy Eq. (4) and Eq. (5), respectively.

4. **[Debt renegotiation:]** Taking as given $q(B', G)$, $W^{d=1}(B, G)$ and $W^{aut}(G)$, $\alpha(B, G)$ solves the maximization problem (12). $W^{aut}(G)$ and $V^{aut}(y, G)$ satisfy Eq. (10) and Eq. (11), respectively.

5. **[Bond price function:]** Taking as given $\alpha(B, G)$, $q(B', G)$ satisfies Eq. (13).

6. **[Market clearing:]** Defining domestic and external debt as $\hat{B}'$ and $\check{B}'$, respectively,

   (i) the bond market clears: $\hat{B}' + \check{B}' = B'$,

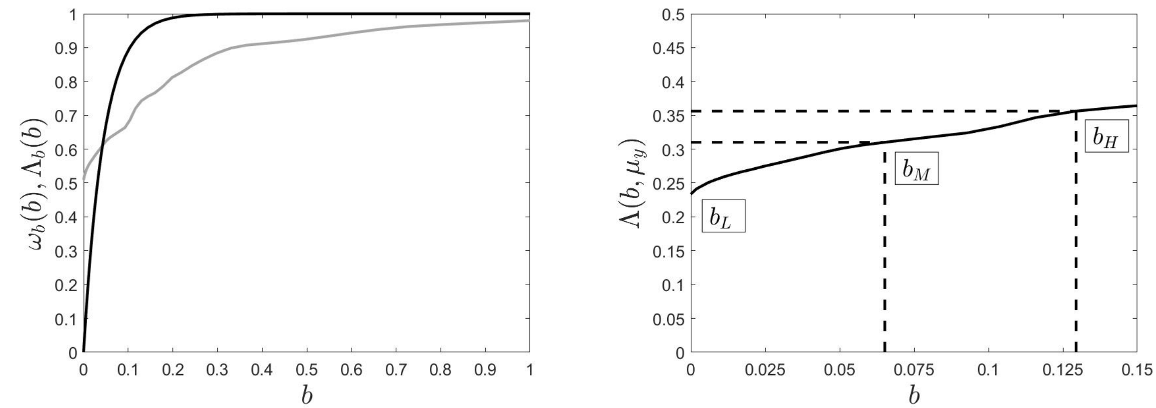
   (ii) the goods market clears: for repayment $C + G = Y + \hat{B} - q(B', G)\hat{B}'$, for default $C + G = Y - \phi(G)$.

7. **[Distribution:]** The distribution follows an evolution which is characterized by an one-period-ahead transition operator $\mathcal{H}^{d\in\{0,1\}}$ such that $\Lambda' = \mathcal{H}^{d\in\{0,1\}}(\Lambda)$.

B Wealth Distribution and Political Preferences

Figure 11. Wealth Distribution and Welfare Weights

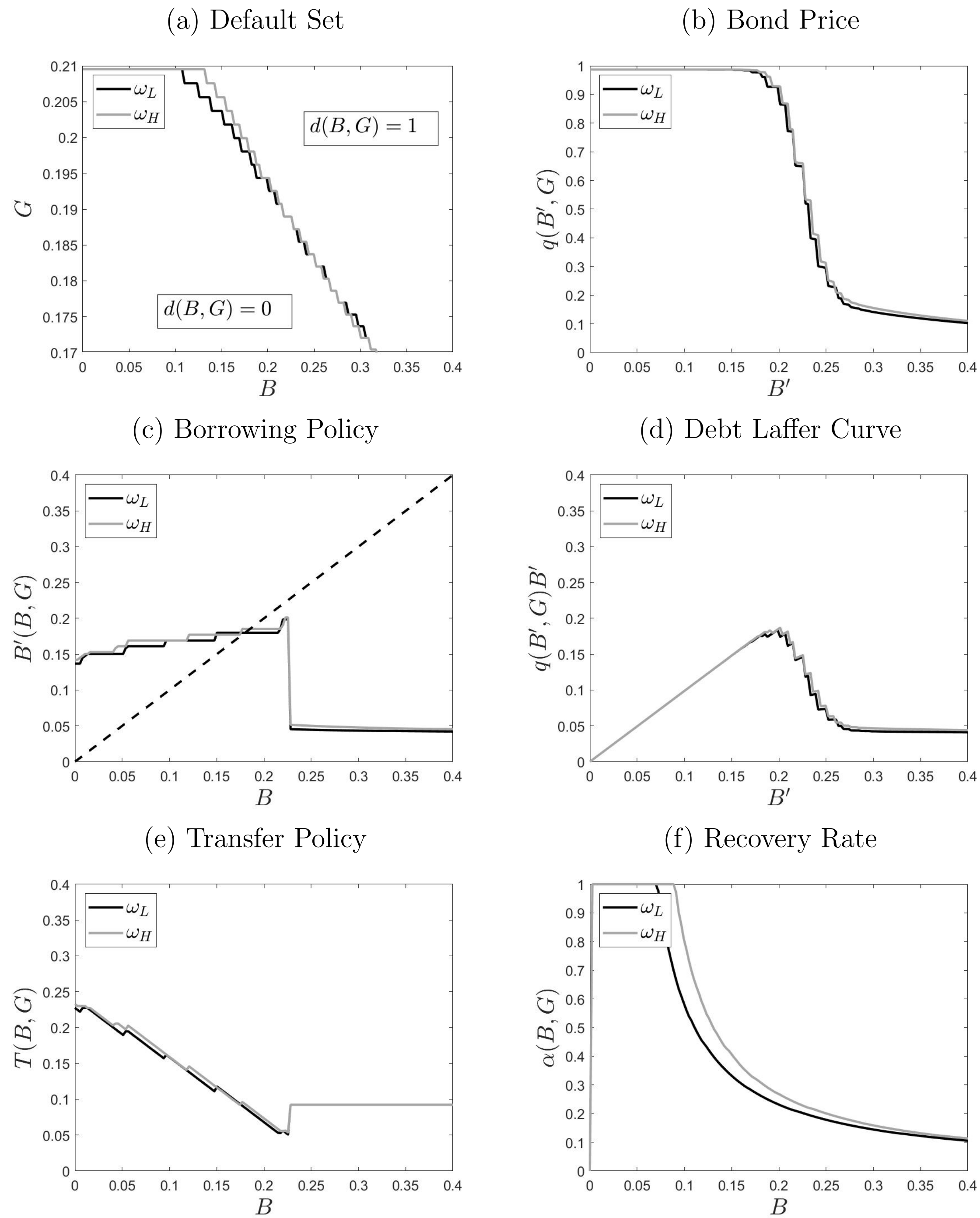
(a) Marginal Distribution / Weights (b) Conditional Distribution



Notes: Panel (a) shows the marginal cumulative wealth distribution $\Lambda_b(b)$ for the benchmark political economy (gray line) as a function of b. For comparison, the black line depicts the marginal cumulative welfare weights of the government $\omega_b(b)$. Panel (b) shows the conditional cumulative wealth distribution $\Lambda(b, \mu_y)$ for the benchmark political economy as a function of b given mean government spending $G = \mu_G$. b_L, b_M, b_H denote $b = 0, b = 0.5\mu(b), b = \mu(b)$, respectively. The distribution is computed as the average distribution from 10.000 simulation periods excluding all default events.

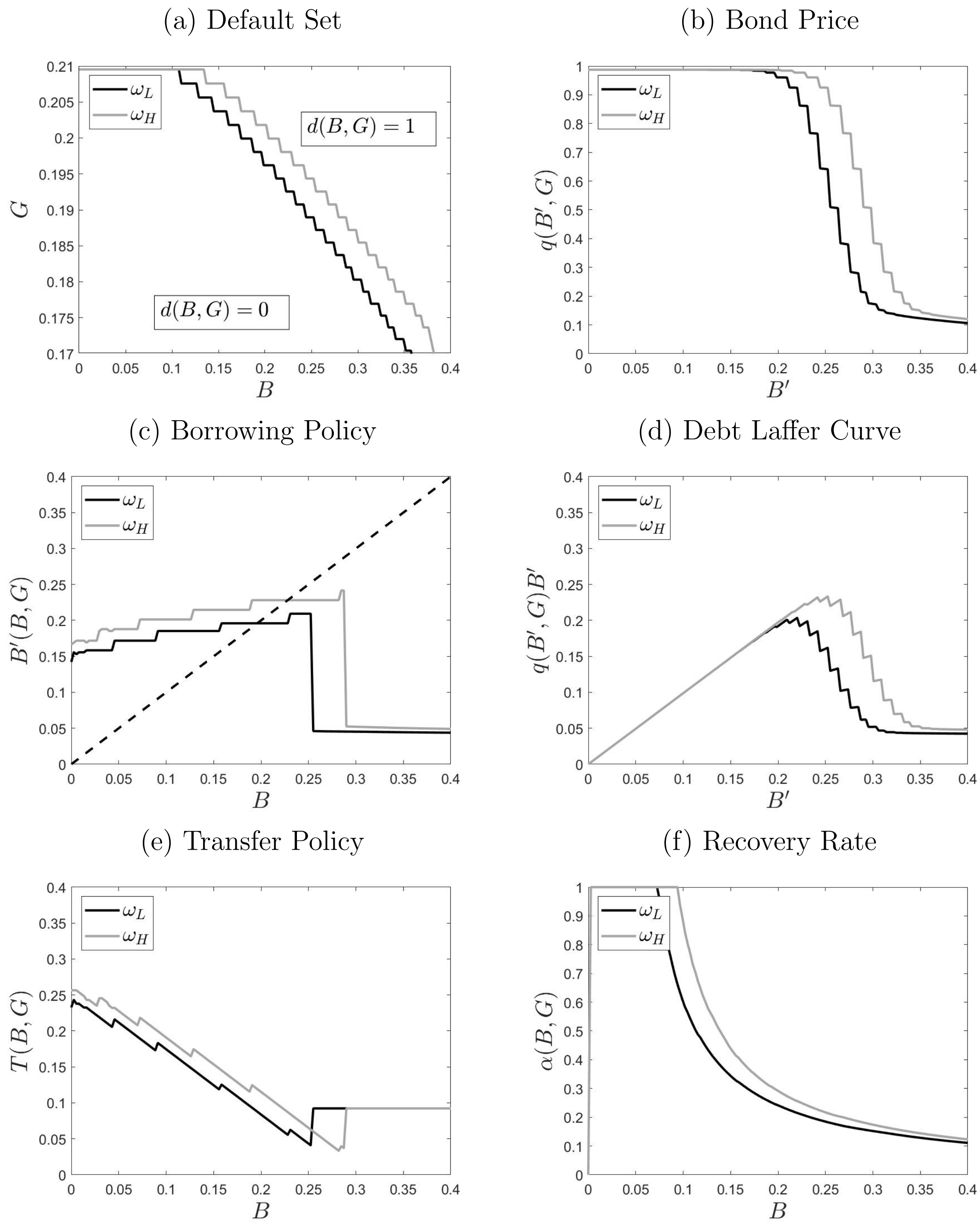
Let $\tilde{\Lambda}(b, y)$ denote the density of the distribution $\Lambda(b, y)$ such that the marginal density is given by $\tilde{\Lambda}_b(b) = \sum_{y \in \mathbb{Y}} \tilde{\Lambda}(b, y)$. The preferences of the government are given by cumulative welfare weights $\omega(b, y) = \sum_{y \in \mathbb{Y}} \pi^*(y)(1 - e^{-\frac{b}{\bar{\omega}}})$. The density of weights is $\tilde{\omega}(b, y) = \pi^*(y) \frac{1}{\bar{\omega}} e^{-\frac{b}{\bar{\omega}}}$ such that the marginal density of weights is given by $\tilde{\omega}_b(b) = \sum_{y \in \mathbb{Y}} \tilde{\omega}(b, y) = \frac{1}{\bar{\omega}} e^{-\frac{b}{\bar{\omega}}}$. Panel (a) of Figure 11 considers the benchmark political economy and shows how the government weighs bond holders in comparison with their representation in the economy. It displays $\Lambda_b(b)$ (gray line) as a function of b computed as the average distribution from 10.000 simulation periods excluding all default events. For comparison, the black line depicts the marginal cumulative welfare weights of the government $\omega_b(b) = 1 - e^{-\frac{b}{\bar{\omega}}}$. Households with $b = 0$ are not weighted by the government but represent a substantial fraction in the economies. The intersection of distribution and welfare weights is at $b = 0.05$ such that households with $b < 0.05$ are under-represented and for $b > 0.05$ over-represented in the weighting by the government.

Figure 12. The Impact of Political Preferences in the Political Economy



Notes: Panel (a) shows the default set for combinations of B and G. Panel (b) displays the bond price $q(B',G)$ as a function of B'. Panel (c) depicts the borrowing policy $B'(B,G)$ as a function of B. Panel (d) displays the debt Laffer curve $q(B',G)B'$ as a function of B'. Panel (e) shows the transfer policy and Panel (f) depicts the recovery rate $\alpha(B,G)$ as functions of B. The red lines refer to $\omega_L = 0.035$ and the blue lines refer to $\omega_H = 0.055$. Government spending equals its mean μ_G.

Figure 13. The Impact of Political Preferences in the Counterfactual Economy



Notes: Panel (a) shows the default set for combinations of B and G. Panel (b) displays the bond price $q(B', G)$ as a function of B'. Panel (c) depicts the borrowing policy $B'(B, G)$ as a function of B. Panel (d) displays the debt Laffer curve $q(B', G)B'$ as a function of B'. Panel (e) shows the transfer policy and Panel (f) depicts the recovery rate $\alpha(B, G)$ as functions of B. The red lines refer to $\omega_L = 0.035$ and the blue lines refer to $\omega_H = 0.055$. Government spending equals its mean μ_G.

C Calibration: Data

Table 5. Data Sources and Time Period

Description	Period	Source
Gov. debt (consolidated) (% of GDP)	1995 - 2015	ECB Government Finance Statistics
Gov. debt held by residents (% of GDP)	1995 - 2015	ECB Government Finance Statistics
Average residual maturity of gov. debt	1995 - 2015	Bank of Italy
Gov. final consumption expenditure (% of GDP)	1981 - 2015	World Development Indicators
Gov. tax revenue (% of GDP)	1995 - 2015	D'Erasmo and Mendoza (2021)
EMU convergence criterion bond yields	2002 - 2015	Eurostat

- **Average debt to GDP (maturity adjusted):** We use the average value of government debt (consolidated, in % of GDP) from the Government Finance Statistics of the ECB, which equals 115.5% for the time period 1995-2015. We use the average residual maturity of government debt from the Bank of Italy with an average value of 6.45 for the time period 1995-2015. The average maturity adjusted debt to GDP ratio is given as of 17.92%.

- **Average domestic debt ratio:** We use average government debt held by residents (in % of GDP) from the Government Finance Statistics of the ECB, which amounts to 67.92% for the time period 1995-2015.

- **Government spending process:** We use general government final consumption expenditure (in % of GDP) from the World Development Indicators. We estimate $\rho_G = 0.86$, $\sigma_\epsilon = 0.023$ and $\mu_G = 18.72$.

- **Income process:** We set $\rho_y = 0.7$ as a standard value and calibrate $Var(log(y)) = 0.2$ such that $\sigma_v = \sqrt{Var(log(y))(1-\rho_y^2)}$ to match the cross-sectional variance of residual log-earnings for Italy as reported by Jappelli and Pistaferri (2010).

- **Average bond spreads vs. Germany:** We use the EMU convergence criterion bond yields from Eurostat for the time period 2002-2015. The interest spread is computed as $r^{Italy} - r^{Germany}$. The average bond spread vs. Germany amounts to 1.21%.

D Regression Analysis: Data

Table 6. Data Sources and Time Period

Variable	Period	Source
Interest Spread (Eurozone)	1995 - 2015	Eurostat
Interest Spread (Latin America)	1995 - 2015	Worldbank
POLCONiii	1995 - 2015	Henisz (2000, 2002)
POLCONv	1995 - 2015	Henisz (2000, 2002)
Debt to GDP	1995 - 2015	IMF
GDP growth (in %)	1995 - 2015	IMF
execrlc	1995 - 2015	Cruz et al. (2021)
gov1rlc	1995 - 2015	Cruz et al. (2021)

- **Countries:** We consider the following Eurozone countries (EA-20): France, Greece, Ireland, Italy, Portugal, Spain, Austria, Belgium, Finland, Netherlands, Croatia, Cyprus, Malta, Latvia, Lithuania, Luxembourg, Slovakia, and Slovenia. Estonia is excluded because of lack of data on interest spreads. For Latin America, we include Brazil, Mexico, Argentina, Peru, Ecuador, Venezuela, and Chile.

- **Interest Spreads:** In the Eurozone, interest spreads are calculated as the long term government bond yield spreads of the respective country vs. Germany. For the Latin American countries, interest spreads are given by the JP Morgan EMBI+ spreads.

- **Political constraints:** We use the variables *POLCONiii* and *POLCONv* from the *The Political Constraint Index (POLCON) Dataset* by Henisz (2000, 2002) to measure the tightness of political constraints. *POLCONiii* and *POLCONv* are estimated from a spatial model capturing the policy preferences of the political entities with veto power, such as the executive, legislature, and judiciary. *POLCONiii* takes into account five veto points for each country. *POLCONv* includes two additional veto points. Both variables range from 0 to 1 with higher values being associated with tighter political constraints.

- **Political orientation:** The dataset *The Database of Political Institutions 2020* by Cruz et al. (2021) contains the variables *execrlc* and *gov1rlc*, which indicate the party orientation with respect to policy of the chief executive and the largest government party, respectively. Both variables can take the values “Right”, “Left”, “Center”, “No information” or “No executive/government”. We construct dummy variables called

Right-Exe. and *Right-Gov.* that take the value 1 if *execrlc* equals "Right" and *gov1rlc* equals "Right", respectively.